THE

PHOTOGRAPHIC NEWS:

A WEEKLY RECORD

OF THE

PROGRESS OF PHOTOGRAPHY.

VOLUME XXVI.

Nulla recordanti lux est ingrata.—MARTIAL.

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THE PHOTOGRAPHIC NEWS.

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THE NEW YEAR.

THE year which has just commenced should be one of noteworthy progress, if we read the signs of the times aright; as never since the Daguerrean era has the popular interest in photographic matters been so widespread and real. As an illustration of this may be mentioned the fact that popular lectures on photography have formed a prominent feature in the programmes of many institutions of a semi-scientific character, and we hear that arrangements are being made in several directions for providing elementary instruction in photography.

During the past year but few processes or methods of a decidedly novel character have been brought before the photographic world, but this circumstance has been more than compensated for by the thorough and earnest way in which details have been studied and processes improved.

The progress made in photo-mechanical printing methods last year is satisfactory, and one may fairly hope that during the coming year much may be done towards the extensive utilisation of some of these methods by publishers and others who may require large numbers of permanent photographic impressions. The issue of a practical treatise on Woodburytype printing by Leon Vidal cannot fail to cause many to attempt the practical working of this beautiful method of producing pictures which are so similar to ordinary silver prints as to be readily confounded with them by casual observers; and the circumstance that Mr. Woodbury's new method of working without the expensive and cumbersome hydraulic press is subject to no patent rights in this country will further facilitate the operations of experimenters in this direction. As regards collotypic work, which we are inclined to consider one of the most promising methods of the future, our description of certain practical details as carried out in the most important German establishments cannot fail to be of considerable value to those who are working in this country. We sincerely hope that during the year 1882 there may be a considerable advance made in the practical and commercial working of the collotypic methods; and it is to be hoped that the advantages to be gained by the use of the collotypic machine, rather than the hand-press, may be turned to account by those concerned. The fact of block or typographic printing not having made much progress during 1881 is noteworthy, but we hope that the method of casting from phototypic reliefs with the so-called Spence metal, originally proposed by us, may have an important bearing on block methods, especially as it is easy to obtain extremely sharp and perfect casts in plaster, or squeezes in wax, from the Spence metal; the former being suitable for use in the casting of type metal blocks, and the latter as moulds for receiving a deposit of electrolytic copper.

A good illustration of what can be done in the present day in the direction of plate printing is afforded by the portrait of Mungo Ponton issued with our YEAR-BOOK, this fine engraving having been produced in a very short space of time by Klic, of Vienna. During the past year we have seen a few specimens of work by Major Waterhouse's new method, the details being exquisitely fine, but the shadows somewhat wanting in vigour and pluck. The friend who showed us one of these informed us that it was deposited in about six hours by the current derived from a Gramme machine driven by a small gas engine. Here is a notable advance as regards electro-deposition, as the plate was over one-sixteenth of an inch thick, and the metal was extremely tough and good. To deposit such a plate with the old-fashioned appliances would have taken at least a week. The two examples of photo-engraving which we have presented to our readers during the past year speak for themselves.

With respect to gelatino-bromide work, we hope that during the year many modes of working which are at present but little employed may be so far improved as to come into general use. Among these may be mentioned the use of gelatino-bromide in the film form, or spread upon some such support as celluloid or fine paper; and the Warnerke process, in which a picture that has been developed with pyrogallic acid, but not fixed, is subjected to the action of warm water. Under these circumstances those parts of the film which contain unaltered bromide of silver wash away, while those containing reduced silver refuse to dissolve. As in carbon printing, the hot water should act on that side of the film which was farthest from the light when exposure took place: so a transfer of the film will be necessary in ordinary cases. The analogy between the gelatino-bromide film and sensitive bichromated gelatine goes even further, as the exposed and developed emulsion surface may be damped and inked so as to give a collotypic image. As a working process, however, this does not look practicable at present; but we hope to see useful results follow the experiments of Captain Pizzighelli, who, by treating a developed gelatino-bromide plate with bichromate, and exposing at the back, obtains a collotypic printing surface capable of yielding numerous good impressions. As details of this process have already appeared in the PHOTOGRAPHIC NEWS, it is unnecessary to now mention those precautions which must be taken in order to insure success. We hope that our readers will experiment with this process during the year; and we strongly recommend them to try the velvet roller in conjunction with Captain Pizzighelli's method.

It is much to be desired that during the year 1882 some convenient standard of light for photographic purposes should be arrived at, and that photographers may agree to the use of some screen for sensitometrical purposes which is constructed on scientific principles, and can be reproduced without any direct comparison with another standard. The principles on which such a standard screen can be made were clearly indicated in a leading article which appeared in the Photographic News during the first month of the present year; and we have every reason to think that the standard which we recommended, or something strictly analogous, will be ultimately adopted. As regards a standard light, more difficulty steps in; but we have found that when magnesium wire is burnt with suitable precautions, that much more uniform results are attainable than by the use of the ordinary standard candle; and, moreover, the bright light of burning magnesium is well adapted for use in conjunction with the standard light screen constructed on the principles which we enunciated in the article referred to.

Electric lighting for studio and for photo-mechanical work is likely to be largely adopted in the immediate future, and the secondary battery of Planté will probably be found of value as a means of storing up the current from a small battery which the photographer may keep in constant action. It is a pity that in the Electrical Exhibition at the Crystal Palace, exhibits bearing on photography are excluded, although the application of electricity to the various branches of photographic work formed a noteworthy and characteristic feature of the recent exhibition at Paris.

Considering everything, we enter on a new year with the brightest prospects, not only as regards scientific and technical progress, but also with respect to the commercial prosperity of those engaged in the numerous industries affiliated to the photographic art.

COLOUR BLINDNESS.

Intimately related as photography is with the colours of natural objects, it becomes a matter of some importance that photographers should be able to appreciate properly the colours of objects which are to be photographed. Yet it is probable that no two persons are exactly alike in their appreciation of colour, since that appreciation depends upon the physical constitution of the eye, an organ which is liable to all the imperfections of optical lenses, and which, even if naturally perfect, is under the control of that most uncontrollable portion of our bodies—the nervous system. Nervous derangement may produce temporary colour-blindness in every one. In many cases it has been proved that after prolonged nervous excitement the retinal apparatus for the reception of waves of light of medium wave-length is liable to become temporarily deranged, thus producing green colour-blindness. But whether we ascribe the defect to any structural imperfection in the eye itself, or whether it depends upon the temporary condition of the nerves, the fact remains the same, viz., that a comparatively large percentage of mankind are colour-blind to a certain degree, and that in very many cases the colour impression conveyed to the senses is altogether incorrect.

It is well known that a large number of candidates for employment on the railways are rejected on this account. Thus when, in 1876, Prof. Holmgren examined, on behalf of the Swedish Government, 266 engine drivers and other railway officials, he found eighteen of them totally unfit for railway service on this account alone.

The symptoms of colour blindness are so various that any classification of them seems almost hopeless; but a few of the more common mistakes often made by colour-blind people are as follows:—

Blue and yellow are nearly always perfectly distinguished, even in their lighter or darker tones, and are seldom confounded with each other.

Only these two colours are seen in the solar spectrum, the blue corresponding to the more, and the yellow to the less, refrangible rays. The red space is seen as yellow.

Red, although frequently identified in certain cases, is often confounded with black, white, or grey, with orange, with yellow, with green, with brown, with blue, and with violet.

Green is a colour most perplexing to the colour-blind, who generally cannot be said to manifest any definite sensation about it. It is confounded not only with red, but also with black, white, or grey, with orange, yellow, blue, violet, and brown.

Orange is confounded with yellow.

Violet is confounded with black, grey, or blue.

The cause of this variety of symptoms has been well explained. Sir J. Herschel has called the defect of colour-blindness dichromic vision, since the really colour-blind only have a sensation of two colours (yellow and blue), although they see white and black and pure grey precisely as others do.

Green, when unmixed with any other colour, would consequently be invisible to the colour-blind, and would have the appearance of grey; but the green of nature being generally mixed with yellow, they see the yellow only, darkened by the invisible-green element. In the same way, when the green is mixed with blue, they see the blue only. Violet being a compound of blue and red, would appear only as a blue darkened by the invisible red; and when the violet contains much red, this darkening may occur to such an extent as to cause a sensation of black or grey.

In the same way, all the above various symptoms may be explained by the composite character of most natural colours. We may take it as a fact that very many photographers have, in a greater or less degree, this defect of dichromic vision; and, without doubt, many mistakes are made in length of exposure by a want of proper appreciation of colour.

To see violet as grey, to confound green with yellow, and red with violet, would, in any case, tend to spoil a picture, the quality of which so much depends upon proper length of exposure. Fortunately, however, although a large number of persons have this defect in some form or another, comparatively few have it in the most severe form.

One practical truth is seen from a study of the colour-sensations experienced by the colour-blind—viz., the want of purity in natural colours; and it is the discrimination of such impurities, and the determination of actual shades of colour, in which there is such a wide-spread difference amongst different persons.

Unfortunately, many are not aware of the fact that they are colour-blind; nor is such a defect easily brought to notice without the aid of well-arranged experiments. But if photographers are liable to this defect, what must be the result if the artist also is colour-blind? Even the most scrupulous care will not improve the colour-discriminating power of the eye, if there is any physical defect in that organ with respect to any particular shades of colour. When we examine the statistics furnished by medical reports, and think of the wide-spread defectiveness in the colour sense amongst all classes of the community, we cannot but conclude that not a few, both of photographers and artists, are colour-blind. Sharp as the photographer is to detect the imperfections of his objective lenses, should he not also test the accuracy of the subjective lens—his eye?

PHOTOGRAPHING ON WOOD.

There are various known processes by means of which photographic impressions may be obtained upon wood blocks for the use of the engraver.

Wood blocks are sold of all sizes ready for use. They are quite flat and true on the surface to be engraved, and must so remain during all the operations to which they are subjected. In the event of a block getting warped it becomes useless for press-work. This is a point which photographers must bear in mind. In transferring to, or printing a photograph on the block, the wood should be uniformly wet all over, if water is used in the operation. It should also be set to dry on end, not on its back or face, otherwise it is almost certain to dry unequally and warp. The block as it comes from the maker has a very smooth surface, and, when used for drawing, must be dealt with by the draughtsman to render fit for work. It must be carefully prepared to receive the picture, in a manner which does not interfere with the engraver's work, while it facilitates the drawing.

This is done by making a paste of whiting and pumice powder. This paste is reduced to the consistency of cream, spread on the block, rubbed into the pores of the wood with the palm of the hand, and allowed to dry, so as to supply a white ground to sketch upon, and a tooth for the pencil.

As the pencil frequently requires to be used after a photograph has been printed on the block, the white gritty surface should not be dispensed with, as the conditions upon which success depends are the same whether the picture be a photograph or drawing. It is also necessary to note that there must be no film on the face of the block, either of collodion or gelatine—that is, no film that will flake off or interfere with the graver in cutting the finest lines.

The carbon process has been tried with only partial success, although we have seen some fine work cut through a carbon print. When carbon is employed, it must be in a very fine state of division, and the film charged with the smallest percentage of gelatine. Special tissue requires, indeed, to be prepared for the purpose.

The "dusting-on" or "powder" process has been used successfully; but it is difficult and uncertain in a climate so variable as ours. The best and simplest method, so far as we know, is transferring a collodion positive to wood. It has manifold advantages, and by one operation a positive of the exact dimensions required may be taken from the negative.

The collodion employed should form a tough film on the glass, and the glass plate, upon coating, should be either waxed or rubbed over with French-chalk, as recommended in the ordinary collodion-transfer process. After the transparency has been fixed and washed, it must be toned with a neutral solution of chloride of gold, strong enough to blacken the image through the glass. When the transparency is dry, it may be removed from its glass support, and transferred to the block. A weak solution of dextrine or (in preference) gelatine should be brushed over the block, and allowed to dry. The glass plate should be plunged into a trough of water rendered acid by sulphuric acid, and the film floated off the plate into the water. The film must now be turned over, the block placed in the water, and the film floated into position on the block.

The block is then withdrawn from the trough, and the superfluous water brushed away from beneath the film with a broad camel-hair brush; this secures perfect contact, and gets rid of air-bubbles. The water has swollen the gelatine up out of the pores of the wood, and brought it into contact with the film. It will be understood that, by reversing the film, the collodion side is presented outermost on the block. The block must now be dried without the application of heat by raising it up on blotting-paper edgeways. When dry, the impression should show up in black-and-white boldly on the block; but it will have a smooth, hard, glazed surface, which must be got rid of. This is done by dissolving off the collodion in a solution of ether two parts, alcohol one part.

In following out this process, no doubt technical difficulties will arise, and will have to be overcome by the operator; but the method is one with which we have ourselves succeeded in preparing blocks for the use of the engraver.

FREE SILVER NITRATE IN THE EMULSION.

BY DR. J. M. EDER.

In the number of the PHOTOGRAPHIC NEWS for the 23rd of December last (page 605), Mr. A. J. Brown describes his very interesting experiments on the behaviour of free silver nitrate in the gelatine emulsion, and he alludes to the investigations of this subject by Captain Toth and myself. Mr. Brown is correct in his supposition that the amount of free bromide present in the emulsion has an important influence on the result, my own researches under this head having a very interesting bearing on the question.

If the plate contains free bromide—that is, if the emulsion be insufficiently washed — steeping it in a weak solution of silver nitrate has very little effect, because the solution will be wholly or in part decomposed, so that no, or, at least, very little, free nitrate is present. Generally, it will be found useful to dip it in a mixture of 100 parts alcohol with ½ part of a solution of citrate of silver.* When the plates contain much gelatine, or when they are thickly coated, the silver baths must be dilute, or fog will be produced; on the other hand, thinly-coated plates, or those prepared with an emulsion containing less gelatine, must be treated with stronger baths. It is, therefore, necessary to test the degree of concentration of the silver baths before dipping the plates in them.

After the publication of my method, many complaints have been made to me from those who had tried it. Some were troubled with fog—these had used too highly concentrated baths; others found that no action at all was produced by the silver bath—in those cases the bath was too weak. A few trials will soon show when the proper degree of concentration has been reached. Favourable results are also obtained with thoroughly washed plates.

I feel convinced that free nitrate of silver acts as a sensitizer of the bromide—at least, to some extent—even though a part of the action may be due to the fact that the developer also intensifies the image.

PHOTOGRAPHY IN AND OUT OF THE STUDIO.

DISCUSSIONS AT PHOTOGRAPHIC SOCIETIES — CRIMINAL PHOTOGRAPHS—A NEW USE OF THE SOLAR SPECTRUM—FAMILY PHOTOGRAPHIC REGISTERS.

Discussions at Photographic Societies.—The papers read at the Photographic Society, and the discussions which follow, are of great value, but it may be questioned whether they would not be of more benefit if the papers were printed beforehand, and slips distributed to the members. In the case of an abstruse subject (such, for instance, as "Halation," introduced at the last meeting by Captain Abney) it is almost impossible to follow the speaker with any definite ideas when you are plunged without any warning into the middle of an elaborate subject; it is evident that the chances of being able to offer an opinion either one way or another are very small. Those who have had experience in societies will have noticed that in nine cases out of ten the discussion is more interesting than the paper, and it seems to us that facilities for discussion should be always kept in view by the introducers of subjects. To listen to a long, wordy paper is one of the most distressing things possible, especially when, as it often happens, the reader has not a good delivery. The result in most instances is a very incomplete presentment of the subject, and fogginess on the part of the audience. Much of this would be avoided if, as we have have suggested, the members were previously presented with slips. They would then come to the meeting with something like a clear notion of the subject, and would certainly enjoy the paper much more. This plan is adopted by the Institute of Chemistry, and with advantage, because in many cases it is not necessary to read the

* Citric acid	10 parts
Silver nitrate	10 ,,
Water	100 ,,

paper, and so much more time can be given to the discussion.

Criminals' Photographs.—It would be interesting to know what principle is adopted at Seotland Yard for the arrangement of the photographs of eriminals. In Paris the number of these photographs has grown to be so large that the authorities have found themselves overwhelmed with their own ereations. It is obvious that the whole utility of sueh photographs is bound up in the possibility of being able to identify a eertain prisoner with a photograph, and thus produee evidence of re-eonvietion. But what offieial, no matter how retentive his memory may be, ean retain 60,000 portraits in his mind, for during the six years sinee the rule has been in foree, the photographs have inereased to this number. The ordinary method of storing in albums certainly does not answer here, and the waste of time in searehing for likenesses or supposed likenesses is, we are assured, enormous. The *Annals de Demographie* has, however, come to the rescue of the police authorities, and suggests a classification of these portraits aeeording to those charaeteristies which may be said to remain constant. Thus, the first division would be the criminal's height, and all the portraits of men five feet being placed together, those of five feet two inehes in the same way, and so on up to six feet. Then might follow subdivisions, sueh as the colour of the eyes, the length of the foot, the shape of the head, and so forth, by which means some eertain clue would be afforded by each eriminal to be identified, which would reduee the present labour of search to a eomparatively trifling matter. In addition to this method, we would suggest whether it might not be possible to turn Mr. F. Galton's process of composite portraiture to practieal account? If it be true, as his experiments seem to show, that criminals are referrible to distinct types, the portraits of twenty or more criminals might be represented by one amalgamated portrait, whieh would possess suffieient resemblanee to any one of the twenty which has contributed to form the eomposite to make identifieation an easy task. These composite portraits are really more applieable to criminals than to any other class of society, and for this reason the faees are photographed under the same eonditions. We mean by this that in each case the ehin is elose shaved and the hair cropped, so that a eertain degree of uniformity is instituted before the work of combining the negatives is begun.

A New Use of the Solar Spectrum.—The solar speetrum has recently been made use of to show that the lower animals have the powers of vision. These experiments are very curious. Some almost mieroseopie erustaceans, common in fresh water (for instance, the daphnia or "braneh-horned water flea"), were plaeed in a well-darkened glass. A luminous speetrum was then introdueed, and as soon as the eolours appeared they beeame mueh agitated, and gathered together in the bright rays. By holding a sereen before the spectrum they were again dispersed. It seemed as if all the colours were attraetive, but they rushed the most quiekly to the yellow and green. If a rapid change were made to a violet they went away for an instant. Whilst the erowd was in the yellow a sufficiently large number appeared in the red, fewer in the blue, growing less and less in the violet. The most luminous portion of the spectrum was chosen by the daphnia, just as we ourselves should do, so that it may be fairly concluded that animals receive relatively the same impressions on the retina as more highly organised beings.

Family Photographic Registers.—If Mr. Francis Galton's suggestion, eontained in the *Fortnightly Review*, were earried out, a great impetus would be given to photographic portraiture, for whieh the profession generally would be very grateful. He remarks that the old-fashioned family Bible, which once served as a register of births, illnesses, marriages, and deaths, has disappeared, and nothing has taken its plaee. Photography, however, seems peculiarly adapted to supply what may be termed a "life history," and Mr. Galton aeeordingly advoeates the "establishment of a new form of family register, that shall contain all those notices that were formerly entered in the family Bible, and mueh more besides—namely, a series of photographie studies of the features from ehildhood onwards, together with faets that shall afford as complete a life history as is consistent with brevity. What is desired is something of this sort. In eaeh substantial family we should find a thin quarto volume solidly bound, having leaves of stout paper on whieh photographs may be mounted. Eaeh pair of opposite pages would be headed by the name of some member of the family. A double row of photographs would run down the side of eaeh page, eaeh about half as large again as a postage stamp, the one eontaining a medallion of the full faee, and the other one of the profile. Opposite to eaeh of these the events of the eorresponding period would be ehronieled. Every opening of the book would contain the photographs and events of about ten periods, five to each page, and would inelude from ten to twenty years of life history." To be of real use, however, it is obvious that the portraits should be permanent prints.

At Home.

HERR J. C. SCHAARWÄCHTER IN THE FRIEDRICHSSTRASSE, BERLIN.

A neat little office, with counter and show-cases around the room, forms the ante-ehamber of Herr Schaarwächter's studio. Herr Schaarwächter enjoys a high reputation as a portraitist—perhaps the highest in Berlin. His work, whether it is a soft vignette, or a deep and vigorously-printed study, betokens the care and assiduity of a man who loves his calling, and strives his every nerve for success. Like Luckardt, Herr Sehaarwächter poses every model himself, and employs plate after plate on a difficult subject until the sun deelines, and the model grows aweary. The photographer himself, however, seems never to tire; the interest he takes in his work keeps up his unflagging spirit. Herr Schwaarwächter's hour for ending his labours in the glass-room is two o'cloek; but it was five ere he regretfully gave baek his sitter—a tiny, blonde-haired English miss, of four or five—into the charge of her parents.

Before we leave the offiee, there is one praetical feature about it that may be reeorded, since it demonstrates what may be done in a small space towards the exhibition of pictures. There is against one of the walls a eabinet, on the inside of which are attaehed photographs of various kinds. The inside wall, you see, is not, however, the actual baek of the eabinet, for you may seize and open it—it is on hinges—and behind is displayed another show of pictures. This second back opens in like manner, and displays a third and fourth, so that the eabinet holds a large eollection whieh, while readily displayed, are within a very small compass. But the best of the arrangement is its exceeding simplicity. The false baeks, or walls, that open one after another, are all on the same hinge—or, rather,

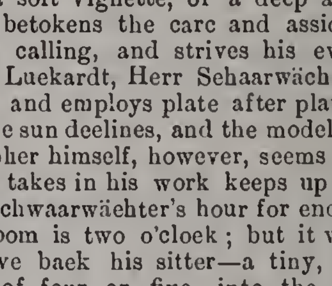


Fig. 1.

turn on the same pivot. As shown in our sketch, it is only necessary to lengthen the arm of every sueeessive hinge, in order to make one back fold over the other. Thus the outer back or flap of the cabinet, which folds over all the rest, is made fast to hinge *a*, while the next in order is fixed to *b*, until we come to the inside flap of all, which is carried by hinge *e*. With this economical means of exhibiting pictures, the customer need go no further than the little counting-house to select the kind of portrait he desires.

A handsome *salon*, the furniture covered with green velvet, serves as waiting-room, but there are few portraits to be seen here, as the visitor is supposed to have made his selection ere he penetrates thus far.

In the glass room there are several points to note. In the first place, Herr Schaarwächter has no lines or cords for the moving of his blinds or curtains. These, of blue linen, hang in very loose festoons from the roof. Brass wires run the whole length of the glass roof; they are parallel, and perhaps two feet apart. They are kept taut (this is very necessary) in the same way, pretty well, as our wire-fencing—that is, each end of wire passes over a roller, *a*, and then round a reel furnished with a cog'

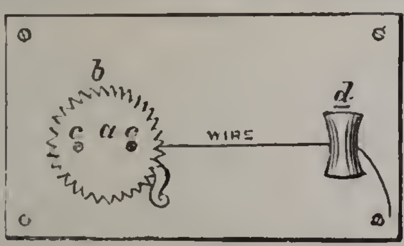


Fig. 2.

b. On the face of the cog-wheel are two holes, *c*, into which a key or winch fits, for the purpose of keeping the wire taut. The arrangement can easily be understood from our cut (fig. 2).

It is necessary that brass wire be employed, and not iron, for the latter rusts, and then loses its smoothness; and unless the wires are smooth, the curtain rings will not run upon them with ease and facility, for, as we have said, the curtains are quite loose and baggy. Here is a transverse section of the roof (fig. 3), showing how the wires

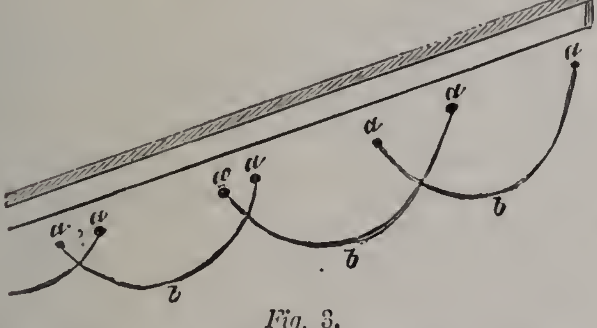


Fig. 3.

are fitted, and how the curtains are arranged. *a*, *a*, *a*, *a*, are sections of wires, and *b*, *b*, *b*, the curtains, which are so hung as to overlap one another. Herr Schaarwächter simply uses a light bamboo pole to manipulate his curtains. He pushes the curtain away at this part of the roof, or makes them cover that part. The rings on the stretched brass wire move with exceeding facility, and a more simple plan of manipulating curtains to effect light and shade cannot be conceived. "One of its advantages is that it never gets out of order," says Herr Schaarwächter, moving the blinds backwards and forwards with his pole, to show how easily they work.

The backgrounds, of which half-a-dozen hang one behind another, are drawn out for use with the same ease. The bottom of the background does not touch the floor, for the screen is suspended from above; the top is attached to two reels, which run upon a stout wire, and may thus be brought out at the back of the sitter, or pushed in again, with a motion of the hand (see fig. 4). A light and narrow skirting board is put down to cover the small pace between floor and background; or if it is an out-door scene, the join is covered by a fringe of grass, or something of the sort attached to a suitable foreground. The stretched backgrounds move out

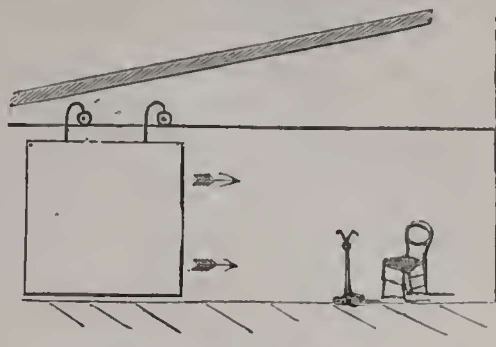


Fig. 4.

and in so easily that it is no trouble at all to change them. Most of the backgrounds are Seavey's, but one of home manufacture, representing a piece of faded tapestry, is marvellously good. Its subject was not only in keeping with many portraits we saw, but its faded neutral aspect afforded a striking contrast to the vigour and modelling of the sitter. The studio is protected from direct sunlight on the outside by an upright canvas screen about ten feet high; "but I always remove it in the winter time," says Herr Schaarwächter.

We walk into the laboratory. During the past winter Herr Schaarwächter employed nothing but gelatine plates with oxalate development; but for summer work he still prefers wet collodion, except for children. Here is an assistant washing plates and albumenising them; each sheet of glass is held under the tap, rapidly rubbed with a rag, rinsed again, and then albumenised, the solution being poured first upon one angle of the plate and drained, and then applied a second time from the opposite angle. Two whites of eggs beaten up and mixed with 8 lb. of water, to which a few drops of ammonia are added, serves for the preliminary coating of the plates.

"But I do not give up gelatine plates altogether in summer," says Herr Schaarwächter, leading us into his enlarging room. "All my diapositives are made with gelatino-bromide. A collodion positive is not only not so delicate, but it frequently exhibits a halo round the blacks, which gelatine never shows. Moreover, as enlargements all tend to hardness, while gelatine invariably tends to softness, the latter is a good counterpoise."

Herr Schaarwächter, however, although he produces small diapositives, does not make them in the ordinary way by placing negative and gelatine plate in contact in a printing-frame. He thinks you cannot control the exposure so well. He prefers making his transparency with the gelatine plate in a camera in the same way as the enlargement is afterwards made, giving a tolerably long exposure, and having recourse to leisurely development. A more satisfactory transparency is thus secured, he contends, for enlarging purposes, where it is very importpant that the utmost uniformity should exist. Herr Schaarwächter employs an enlarging apartment very similar to that we have described in our "At Home" at Messrs. Window and Grove, and elsewhere. He is wise enough to use also a horizontal bath, swinging on a pivot, for sensitizing plates, which permits of the draining of the plate so thoroughly; indeed, on the score of economy, little waste of solution, and cleanliness, this so-called Burton bath is exceedingly effective.

The printing room is an apartment fitted on one side with glass, towards which the printing-frames are turned. The frames are in tiers upon tall sloping stands, that much resemble flower-stands. The glass is not shaded, but in case the light is too strong, the stands are simply moved back—they are on a sort of tramway—two or three feet according to the judgment of the printer. The printing is said to proceed more rapidly than when a screen of tissue paper or dull glass is employed.

Herr Schaarwächter packs every negative in paper, putting half a hundred together in one pigeon-hole. Each negative is simply numbered consecutively, and a ledger describes them. If a negative is too large for the pigeon-hole, the searcher for it finds a piece of cardboard in place of the plate, and this cardboard tells the locality of the particular cliché. "I shall never throw away any of my negatives. I was thinking only the other day of clearing out the bottom row of old clichés, when I received an order for forty thalers (£6) from two or three of the portraits. As that sum represents a hundredweight or so of glass, I can look upon this old part of my stock as paid for."

Herr Schaarwächter had but just returned from a holiday on the shores of the North Sea, and he was good enough to show us a practical little outfit, made by a well-known hand —Stegemann, of Berlin—that had served him to bring back some reminiscences of his stay. To a spirit level upon his tourist camera, he attached considerable importance, for he found it one of the readiest means of levelling his camera, a point of some importance with tourists, whose small pictures have sometimes to be trimmed rather considerably to make them square. A changing box by Stegemann to hold a dozen plates, Herr Schaarwächter also pronounced to be very practical.

Just now Herr Schaarwächter is making a speciality of the Boudoir portrait; a single example of this is delivered to the customer for fifteen marks, or fifteen shillings. If he desires more afterwards, he may have a dozen for eighty marks. This plan of supplying single copies of the more expensive form of portrait might possibly be adopted in this country with advantage.

The "By-the-Bye" next week will be "On Finishing Carte Portraits." The following "At Home" will be "The Atelier Adèle in Vienna."

Notes.

We regret to hear that the conferring of the Legion of Honour upon Dr. Warren de la Rue finds that gentleman in a poor state of health. The distinction is given in connection with the recent Electrical Exhibition at Paris, but it recognises Dr. de la Rue's general claims to science, that of being an astronomical photographer being by no means the least among them.

It is likely that a professorship of photography will shortly be established in London, in connection with the City Guilds and South Kensington.

In view of the approaching marriage of the Duke of Albany, the Queen commanded Mr. Jabez Hughes to execute a series of portraits of His Royal Highness. The short, dull days of December are not conducive to good photography, but we hear that Mr. Hughes has, as usual, been eminently successful in carrying out the duty entrusted to him. Mr. Hughes evidently employed gelatine plates, for the local journal tells us the portraits were "taken by the most recent modern appliances, which permit photography to be exercised under conditions which till recently would be otherwise impossible." The sentence is little involved towards the end, but we think it must mean gelatine.

An old collodion worker writes as follows:—"In dealing with difficult subjects, I have entirely overcome halation by taking the negative on ruby glass, the flashed side next the film. Why should not gelatine workers do the same, as I am told that several satisfactory methods of stripping gelatine negatives are known?"

Accidents will happen in the best regulated journals. The illustrated newspapers have been frantic in their efforts to obtain sketches of the recent catastrophe in Vienna, and pictures of the Ring Theatre have been at a premium. One of the Paris papers succeeded in obtaining a photograph, and, setting to work, executed a wonderful woodcut showing the building, the excited crowd, the flames and all. Only, unfortunately, it was a photograph of the Stadt Theatre, and not of the Ring Theatre at all, and the Vienna public, who seem to be fastidious about such things, have been making quite a fuss over the little mishap.

But photographs of the burning Ring Theatre are also selling in Vienna, it appears, depicting the scene with great circumstance, and consequently finding a ready sale among those who have heard the wonders extolled of modern dry plates. It is needless to say they are not pure photographs; they are rather a *tour de force* of the retoucher than the photographer, being pictures of the building taken before the accident, and elaborated to meet a popular demand.

Photography has many valuable attributes, but it has also its drawbacks; and one of the latter is, that it is sadly unromantic at times. When it depicts a lovely lake scene, with some grand castle in the foreground, it will show us the chimney pots; or if a rustic maiden with her milk-pail is put before us, we notice at once that one of her boots is down at the heel.

That is the worst of photography—it won't make allowances. We have a friend who used to talk a good deal about his yacht, and beseech us to run down to Gravesend to have a cruise in it from Saturday to Monday. He doesn't beseech us any more, and for this reason. One day, in an unguarded moment, he showed a photograph of the craft; it was the picture of a mean-looking row-boat, with an extemporised mast and sail. He told us the photograph did not do justice to the little vessel, and we were quite ready to believe it, seeing the way in which the camera serves other romantic ideas; but, as we have said, he never afterwards asked us to go on a cruise.

The photographs of the Polar regions brought back by the *Alert* and *Discovery* are another instance of our art robbing a thing of its romance, for the dull stretches of half-thawed snow, and the bleak desolate foreshores that follow one another in the pictures, are simply typical of despair. One of the last examples is the series of bull-fighting scenes which instantaneous photography has recently given us. The pictures might have been better, but still the half-filled amphitheatre, the scanty performers in the area standing at a respectful distance from their foe, the clumsy-looking bull itself, though real enough in all conscience, convey no idea of the excitement and gorgeous pageantry usually connected with such displays.

In Germany they are paying attention to the chemical action of light upon liquors contained in glass bottles. It appears that whereas liquors contained in bottles of brown and green glass remain practically unchanged, even if exposed to direct sunlight, those kept in transparent bottles are materially affected by light, acquiring a disagreeable taste, and thus depreciating in quality, and therefore in value. Wine and liquor merchants are, on this account, advised to employ red, orange, yellow, green, or opaque glass bottles, and to discard colourless blue and violet ones, so as to avoid any photographic action.

"You know her?" a lady remarks in astonishment to an actress in *A Lesson*, for they are speaking of some very fashionable beauty, indeed! "Oh yes, very well," is the cool reply; "we often meet face to face, with perhaps a bishop or prime minister between us—in the photographer's window."

The camera is likely to be considered an indispensable article of outfit in the case of future exploring parties. An expedition just returned from the Spanish river in the province of Ontario reports the good news that it has discovered vast forests of pine, the trees being of wonderful growth; in some quarters the discovery appears to be treated with incredulity, but this would scarcely be the case if the exploring party had been able to confirm their story by a series of photographs.

Topics of the Day.

HOW TO MAKE A CAMERA STAND.

BY COSMO I. BURTON.

My old camera stand, which had served me faithfully for years, having finally broken down, I determined to obtain a new one. I say obtain, for on pricing them I found that I could not get such a one as I wanted under about twenty-five or thirty shillings. Not being willing to expend this sum without good reason, I resolved to make one, and I succeeded in doing this with a good deal of labour, but at a total cost of a little under half-a-crown. As I have used the stand for some time, and find it work exceedingly well, it may possibly be useful to some of the readers of the News to hear exactly how it was made.

To begin, then, at the beginning. The wood which is best for the purpose is English ash; it is not very heavy, is extremely tough, and, at the same time, tolerably easy to work, besides being pretty to look at. I do not know of any other wood which fulfils all these requirements so well as ash. Birch, for instance, is hard and tough, and when smoothly planed looks very well, but it is heavy, and also the worst wood to work that I ever came across, the grain usually running in about five different directions in any three feet of the wood; and here a word of caution: be sure that you get *English* ash—that is, not American—for though they differ very little in appearance, American ash is little better than fir wood in the all-important consideration of strength, and is much softer and easier to work than the English variety; for this reason it is very often used by carpenters instead, but it is a very poor substitute. Obtain, if possible, a piece of wood from near the root of the tree, as this is, at least, generally said to be the toughest part. The piece of wood I got was in the form of a plank about an inch and a quarter thick, and three feet long, and I ripped this up myself—a great deal of labour very much lost, for had I taken it to a sawmill they would have cut it to size in a few minutes for little or no charge, whereas cutting it with a hand-saw took several hours of very hard work. The stand I made was about four feet nine inches high; this is a little above the usual height of camera stands. Each leg was in three pieces, a lower thick one, whose dimensions were $\frac{7}{8}$-inch by $1\frac{1}{8}$-inch, and two upper thin pieces placed at each side of the lower one; their dimensions were $\frac{7}{8}$ by $\frac{1}{2}$-inch. Having sawn these nine pieces out of my plank, I planed them all carefully, then rounded the corners a little, and sand-papered them; this made them more comfortable to hold and carry in the hand, besides much improving their appearance. Then both ends of all the thin pieces and one end of each thick piece had to be rounded, and then came what I think was the most troublesome part of the whole process—that is, binding the ends of each piece with brass; it has to be done, or they would split away where the spikes of the triangle are inserted.

After a considerable number of unsuccessful attempts, I found that the following is the best way to do this:—Take a piece of thin spring brass sheet of the breadth of the end of the piece of wood to be bound—that is in this case half an inch for the small, and $1\frac{1}{8}$ inch for the large pieces, and about four inches long. Drill a hole near each end of the piece of brass, then open the jaws of a vice till they will just clear the wood without the brass; lay the brass across the opening of the jaws, and hammer the piece of wood down upon it until it closes upon the wood, then bore holes through those drilled in the brass, and screw it firmly on. If this operation is performed successfully, it should be quite tight, and the wood will never split from the end. When this is done, you have all the pieces ready to put together, which I did in the following manner, making each leg, as before described, of one thick and two thin pieces; bore a hole at one end of each piece, and another about eight inches from the same end, then take some hard brass wire one eighth of an inch diameter, or rather more, and make of it three small bolts. This can be easily done as follows: to make the head, take a small square piece of brass (a blank washer filed square does very well), drill in that a hole in which a piece of the thick wire will just fit tight; then solder it in with a spirit lamp or Bunsen burner (if the solder is good the head will never come off); then screw about half-an-inch of the bolt at the other end, and make a nut in the same way as you made the head, but screwing it, of course, instead of soldering it on. Then, to build up the legs, take the two thin pieces and one thick one, place them so that the holes at the ends of the thin pieces are opposite the hole in the thick piece, put the bolt through, and screw it up; then you have the leg in a state in which it will fold upon the slightest provocation; to prevent which another pin is put through the other set of holes, which are at the end of the thick piece, and eight inches from the ends of the thin pieces; this one may be a simple pin of thick wire; a bolt would be unnecessary.

When the three legs are built up in this way, all that is needed to complete the stand is the triangle at the top. This is best made of brass, but that is both troublesome and rather expensive, as it is necessary first to make a pattern of wood, which is a difficult bit of joiner's work, and then send it to a brass founder, and have it cast in brass. Accordingly, I made the triangle for my stand of wood, and it does very well. The wood I used was birch one inch thick, and the method of making it was thus. First make an equilateral triangle of about nine inches in the side, then cut off about two inches of each angle, and cut out the sides of the triangle in the form of the arc of a circle. The effect of this is to have what we might call three ends, to which it is easy to fix the camera legs. Bore a hole through each of these in such a way that when the triangle is laid flat the holes may be horizontal; through each hole drive a thick wire, leaving about half-an-inch projecting at each end. In order to fix the legs to this triangle, bore holes in the free ends of the two thin pieces, and fit them on to the projecting bits of wire above mentioned; then the two pieces of the leg must be pulled together a little below the triangle, and fixed there. The simplest way to do this is by means of a small hook and eye, or, instead of the hook, a screw nail, with the head projecting a little, does quite well.

Now we have the stand complete, except for the points of the legs, which must be made by a blacksmith, in the form of cones of sheet-iron to be screwed on to the legs. I have myself made such a cone of sheet-brass; but it was difficult, and not so good as a smith will make of iron for a very small charge. In speaking of the binding of the ends of the legs with brass, I recommended the use of spring brass, because for the same thickness it is much harder and stronger than common brass. The wire that is used should be of the same material. If a stand is made carefully, and following the above instructions, it should last quite as well as the best professional-made stands, and should bear a weight of more than 100 pounds. I can sit on the one I made myself, without its yielding perceptibly.

THE CHEMICAL ACTION OF LIGHT.

BY DR. J. M. EDER.*

Light promotes the oxidation of many of the resins. Guiacum resin darkens in colour under the influence of light. Powdered guiacum, or a piece of white paper stained yellow with an alcoholic solution of the resin, if exposed to the more refrangible rays of the spectrum, oxidises and becomes of a fine blue or greenish blue colour. In the red rays it is reduced, and the pale yellow colour is restored (Wollaston and Herschel). According to Becquerel, this change of yellow to blue takes place in that part of the spectrum lying between the lines H and P, the maximum of action being at M. Mastic, sandarac, and animé turn pale in the light, while gum ammoniac, gamboge, and other resins acquire a darker tint. Thin scales of asphalt are, by the action of light, rendered insoluble in a mixture of naphtha and oil of lavender, or in one of naphtha and benzine, or in oil of turpentine, or in benzole, or in petroleum ether. That part of the asphalt which originally was soluble in ether is, after the light has acted on it, rendered insoluble in the same menstruum.

This insolubility is caused by oxidation, since it does not occur either in a vacuum (Chevreul) in an atmosphere of hydrogen, or in nitrogen (Niépce), or under a closely-adhering film of collodion (Schrank). Kayser maintains that the change is unaccompanied by any increase in weight, and also that asphalt, rendered insoluble by the action of light, becomes again soluble by melting: for these reasons he concludes that the alteration is to be explained by polymerism. According to the same author, the constituent part of asphalt, which is insoluble in ether, but soluble in chloroform, is that which is most sensitive to light. Draper has shown that the whole of the visible solar spectrum acts upon asphalt. If a thin film of that portion of coal-tar which is soluble in benzine is exposed to the sun's rays, it becomes insoluble in that substance, as well as in a mixture of benzine and oil of turpentine.

According to Swan, caoutchouc is rendered insoluble in benzole and oil of turpentine by the action of light, but becomes soluble in alcohol. Caoutchouc also, dissolved in benzine, and exposed for a considerable time to the action of light and of the atmosphere, is oxidised, and the larger part of it becomes insoluble in alcohol or alcoholic ether; Eder and Toth found that this reaction took place much more slowly in the dark. The vulcanisation of rubber is effected by light in the same way as it is by heat.

To this class of reactions belongs the bleaching of many of the organic dye-stuffs, and on them depend the bleaching processes like those of wax and linen. Chevreul investigated the behaviour of various dyed fabrics under the influence of light, of the air, and of damp. He found that some of the dye-stuffs, such as indigo, archil, and safflower, in the absence of oxygen, withstand the action of light; while indigo, sulphindylic acid, turmeric, and annatto fade in the light quicker in a moist than in a dry atmosphere. The quality of the fabric—wool, cotton, or silk—is also a factor in the question of the permanence of the colour with which it is dyed. Turmeric, according to Chastaing, takes up oxygen, and bleaches under the violet or green rays, but not under the red; and A. Vogel finds that after a short exposure to light, turmeric paper is not visibly altered, but that lime water does not then produce the brown discolouration. Litmus bleaches most in the violet rays, less in the red, and scarcely at all in the dark. A change of colour is produced by light in the colouring matter of Campeachy and Brazil woods, weld (Gay-Lussac and Thénard), and barberry root; the latter substance discolours in oxygen much more rapidly than in nitrogen (Swindern). Berberin, and fabrics dyed with it, very soon bleach in the light, even when mordanted with tin; if tannin be used as the mordant, greater permanence is secured. A. Vogel found that alcoholic tinctures of violets, red carnations, poppies, and saffron, lose their colour sooner by being kept in blue glasses than in red. According to Herschel, nearly all the rays of the spectrum act upon vegetable colours, either destroying them altogether, or leaving a fainter tint produced by a second more permanent colouring material. Papers stained with colours obtained from different flowers fade soonest in the rays of the spectrum which are complementary in colour to that of the particular flower; thus yellow dyes of this kind are especially liable to fade in the blue rays, violet dyes in the green rays, and blue dyes in the orange rays. Sir J. Herschel, Mrs. Sommerville, and Mr. R. Hunt have investigated the action of the different rays of the spectrum on the dyestuffs from flowers, and Schübler and Frank their sensitiveness to white light. Dry substances dyed with vegetable colours are bleached by the action of dry chlorine gas much more rapidly in the light than in the dark (Wilson). Field and Bow have made some very complete experiments on the behaviour of the lakes and other painters' colours under the influence of light; yellow lakes, like that of Persian berries, are soon faded by the action of the atmosphere and of light—quercitron being, perhaps, the most permanent—and carmine is quickly destroyed by the light.

Chlorophyll, the green colouring matter of leaves, and its solutions, are bleached in the light, the solution in alcohol and benzol very quickly, that in ether more slowly, and that in olive oil most slowly; the rays of the spectrum absorbed by the solution act most energetically. The yellow and red colouring principles of leaves also fade in the light, and phyloxanthin especially in the blue rays.

Coal-tar colours are highly sensitive, and fade very rapidly in the light. Anilin red and chrysoidin are, as Eder and Toth have shown, especially affected by the blue and violet rays, hardly at all by the red. Abney's experiments prove that cyanin is particularly sensitive to the yellow rays, and that these rays are also the most powerfully absorbed by that substance. Hoffman's blue on starch paper fades very rapidly, but not so quickly on gelatine or albumen paper; fuchsin, anilin-green, and picric acid behave in the same way, and Bismarck brown is very sensitive. Solutions of fuchsin and alkanet red, and an alkaline solution of carmine, fade more slowly than the fabrics dyed with the same colours. H. W. Vogel has shown that a weak alkaline solution of purpurin is very sensitive to light. Anthracene blue is bleached by the sunlight three times as quickly as indigo.

According to Caprounier, the colours of a butterfly's wing fade soonest in white or violet light.

* Continued from page 609, vol. xxv.

ELECTRIC LIGHT IN PHOTOGRAPHY.

BY J. W. SWAN.

Last year I spoke of the probability of electric light coming into general use in homes and shops, and suggested that then photographers might, with very small cost, make use of it in their studios.

I have no doubt the anticipated change will come, and soon; but in the meantime it may not be without use to point out to those of your readers not to wait; that much of the trouble of producing electric light by means of the usual Bunsen cells may be avoided by using a secondary battery of forty elements, which can be coupled as one element in charging, and used in series in discharging. In this way the forty cells may be charged by two of Bunsen's cells.

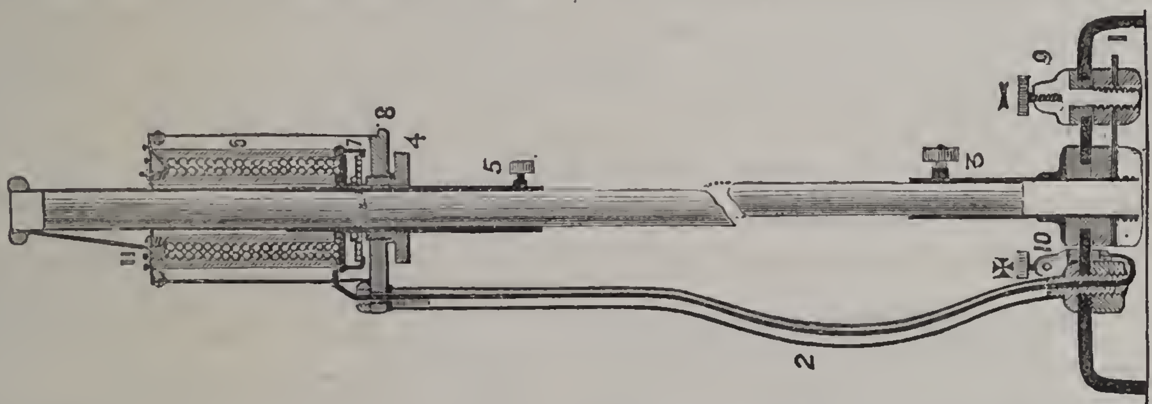
Should this plan be adopted, an electric lamp of some kind will be required, as the time during which the light acts is very short. The lamp may be of the simplest description. Two sockets to hold the two carbons, one fixed and the other to slide or screw in a tube, so that by hand the two carbons may be brought together or separate, is all that is absolutely necessary for photographic work.

For portraiture, where everything ought to go as quickly and smoothly as possible, it is an advantage to have a lamp with a simple automatic action for instantly distancing the carbons when the current is turned on by the switch.

The upper carbon should be large, and the lower one smaller and pointed. The two should not be in the same axial line; the point of lower carbon should abut against the front edge of the upper carbon, so as to produce the excavation on its point edge indicated in the sketch. The object of this arrangement is to have the whole light of the incandescent crater which forms in the positive carbon, and which is the chief source of the light thrown forward. The upper carbon is, of course, supposed to be the positive carbon.

With a lamp of this kind, the light need not be turned on until it is wanted. The turning on of the light should be effected by a strong and massive switch. In the distancing mechanism I have adopted the click action of the Brush lamp.

The following is a description of the lamp and its action.



1. Cast-iron stand.
2. Pillar supporting upper carbon mechanism, made of brass tube bent, as shown, to avoid heat of arc; the lower end is secured on to the base by means of brass bolt, screwed inside tube, and nut on the other side of base. The upper end holds the platform 4, and is fastened to it in the same manner as the base connection. A hole, large enough to admit the insulated wire, passes through the bolts at top and bottom of standard.
3. Lower carbon holder, made of brass tube, the exact size of carbon, with screw to secure it. A brass angle piece is soldered on to the lower part of holder, and insulating material—ebonite, vulcanite, or asbestos card of the shape shown—is introduced between holder and stand. The two binding screws, 9 and 10, are also insulated from the base in like manner, and connection is made between 9 and 3 by a copper plate screwed under both.
4. Brass platform, supporting electro-magnet and upper carbon holder. The brass case, covering electro-magnet, is soldered on to the platform on all sides, except where pillar is fastened. The lid of case is fastened to case with three screws, and the electro-magnet is screwed on to the lid.
5. The upper carbon holder, with set screw and ebonite top, slides freely through the regulating screw and the top of case, and is guided thereby.
6. The electro-magnet, of the type known as a cylinder magnet. The outer pole is screwed on to the inner one at the top, and two layers of insulated copper wire are wound inside.
7. The magnet-keeper is a washer of soft iron, guided by a tube soldered to it, and working upon the carbon holder. There are two brass fingers screwed on to the keeper opposite to each other, a layer of paper separating magnet and keeper.
8. Clutch is a washer with raised edge inside, split through the centre and hinged on each side of carbon holder; it is just large enough to allow the carbon holder to slide easily through it when the halves are in one plane, but the moment it is raised by the fingers on each side it grips the carbon holder. The regulating screw alters the lift given to the upper carbon; it forms a table for the clutch to rest on.
9. Binding screw, insulated from the stand, and connected with lower carbon holder by copper strap underneath stand.
10. Binding screw, insulated from stand, and connected with upper carbon holder by copper wire, with one end screwed underneath nut of binding screw; the other end of wire passing up the column to electro-magnet.
11. The flexible cord. The top end of the electro-magnet is pierced to allow of the insulated wire passing through, and one end of a piece of flexible cord, composed of a great number of small copper wires, is soldered to the wire from the electro-magnet, which projects above the cover; the other end of the flexible cord is soldered to the top of the carbon holder.

The action of the lamp is as follows:—

The current, passing up the column and through the electro-magnet to carbon holders, at once causes the electro-magnet to attract the keeper, which in its turn lifts the clutch at each side, and causes it to raise the carbon holder and carbon, the arc is established, and the current passes through the lower carbon-holder to the negative binding screw and through the battery.

The moment the arc becomes too long the electro-magnet is weakened, and the keeper, clutch, and carbon, drop, to be at once snatched up again by the re-invigorated magnet, and the arc is again formed.

When the current ceases, the keeper, clutch, and carbon drop; the keeper rests on the small shelf which is highest on the clutch, the clutch rests on the regulating screw, and the upper carbon on the lower one. It will be noticed that the lower carbon is slightly in advance of the upper one, in order that the glowing crater formed by the arc may be in front.

Both carbon-holders are open at top and bottom to allow of any length of carbon being used. The lamp is strong, and, having little mechanism, is not liable to get out of order, and it can be easily taken to pieces.

The binding screws are shown in the engraving, for the sake of clearness in explanation, out of their proper places; they should be opposite one another at right angles to a line drawn between the column and lower carbon-holder.

There is no regular feed in this lamp, as the regulations of the arc will be few, and it is not likely that one would occur during the time the lamp was used for the photograph, and even if a regulation did occur, it would be so quick as to be almost inappreciable.

CASH PAYMENTS, HOW I GET THEM.

On this subject, a lady sends us the following little drama:

SCENE—*The Reception Room of a Photographic Gallery. Assistant discovered putting pictures, &c., in order; after which she seats herself at desk.*

Assistant.—Now I wonder how this new scheme of ours of getting payment in advance will act! Pretty well, so far, certainly. In the week since the change was made only three people have objected; but that is almost too good to last, especially as we have for so many years worked on the old credit system. And a nice lot of debts we have to show for it! A customer—one of the oldest on our books, too *He* will object to paying before sitting, I'm sure. Now for the tug of war (*rises and goes forward to meet customer as he enters*). Good morning, Sir.

Customer.—Good morning. Fine day for a portrait—eh? and as several of my friends want my photograph, I thought I had better drop in on my way to the City.

Assistant.—Will you sit to-day, or have some copies from the last negative?

Customer.—That was taken six years ago.

Assistant.—Rather more than that, Sir; you've had a great many duplicates from time to time.

Customer.—Well, I think it is time I sat again. Unfair to cheat my friends by giving them a picture taken six or seven years ago—don't you think so?

Assistant.—Many of our customers are of a different opinion.

Customer.—Oh, let 'em, if they can believe anyone is deceived.

Assistant.—What style of picture did you think of having, Sir?

Customer.—Cabinet; can hardly do better, I think—eh?

Assistant.—Well, no; perhaps not, sir. You have seen the new styles, which are very popular—the Promenade and the Malvern?

Customer.—They are the long upright pictures for standing figures, aren't they?

Assistant.—They are best adapted to the full length, certainly.

Customer.—Now, if they'd introduced them ten years ago, I should have been glad; but it scarcely suits my figure *now*. I'll send my girls, though; just the thing to suit them.

Assistant.—Thank you, Sir. Then you will have cabinets —a dozen, I suppose?

Customer.—I shall probably want more, but I will see about that when I see proofs.

Assistant.—Certainly. Shall I give you a receipt, Sir?

Customer.—Receipt—for what?

Assistant (*aside*).—Now for the explosion; sit still, my heart! (*aloud*) We have made an alteration in our mode of business, Sir. You may have observed the notice.

Customer.—No, I didn't. Oh! I see (*reads*): "*We beg respectfully to intimate to our customers that we cannot in future keep open accounts. All pictures must therefore be paid for at the time of sitting.*" But what is the reason for this change?

Assistant.—Several, Sir. The principal is that we ourselves have to pay cash for chemicals and labour. Then the work of keeping accounts is very large in proportion to the sums booked. There are heavy working and post expenses incurred in sending, as we often have to do, several invoices for a trifling account. Then, again, we generally have to wait a long time for payment, and sometimes we lose altogether—perhaps not large amounts taken separately, but in total, since we have been in business, a handsome fortune.

Customer.—That must be your own fault. I am a business man, and never heard of such a thing in the City.

Assistant.—Your City businesses are different, Sir, and your customers are also different, to ours; yours keep books, ours do not; yours file accounts received, ours put them in the fire very often; yours forward the amount of account, or at least have a certain day set aside when the collector may call and get the amount.

Customer.—That may explain some, but hardly the large sum you speak of.

Assistant.—We lately kept a collector, but he found it almost impossible to collect as much money as would pay his expenses. When he went to a house, the lady or gentleman would be in the Park or visiting, or on the Continent. If at home, most probably "engaged." It is not that our customers generally had any wish to withhold the money, but, from the peculiarity of their position, it is difficult to think of it at the right moment, or for us to catch them when disengaged.

Customer.—Yes, granted all that: but why should I pay before I get the article I purchase?

Assistant.—There must be a certain amount of trust on one side or the other, Sir. We have tried giving it, and the experiment was a costly one. Now we are old and well-established photographers, and in this place all the year round we are to be found. We guarantee satisfaction with our pictures—that is, if you do not like one proof, we will give another sitting, and so on until you are satisfied: where then, the objection to pay at the time of sitting?

Customer.—But let us take my own case. I am an old customer, well known in the City, and with a tolerably big dwelling house in South Kensington. What objection can there be to trusting me? Is it worth your while to risk losing the orders of a large family by insisting on my paying money down?

Assistant.—Apart from the money loss, we should grieve to lose an old customer.

Customer.—Very well, then. Is your new rule likely to prove advantageous to you?

Assistant.—I have stated several reasons for its *necessity*, Sir. I think I might also give you another reason which may convince *you*.

Customer.—I should be glad to hear it.

Assistant.—Last year our collector called six times at your house for an account of £4 14s. 6d.

Customer.—But I was in America on business.

Assistant.—Certainly, but we did not get the money; no one had authority to pay it.

Customer (*aside*).—Had me there! (*aloud*). Well, I think I had better go and sit down. Give me a pen, and I will write you a cheque for that amount and for two dozen cabinets.

Assistant.—Thank you, Sir.

Customer.—But I don't acknowledge your argument sound, mind!

SOME EMULSION NOTES.

BY ARCHER CLARKE.

FIRST, when *liquid ammonia* is added to nitrate silver previous to mixing the same with gelatine and bromide, there does not appear the necessity to use the same degree of care as in the ordinary English plan, in order to obtain the nitrate silver in that fine state of subdivision that a spray-producer or a funnel drawn to a point gives. It is sufficient if one solution be poured into the other, and in this case equally good results follow, whether the bromide be poured into the silver, or the reverse, so long as the solutions are well stirred as the bromide of silver is formed.

Second, the supposed necessity to settle emulsion in a flat open dish is now, to a great measure, exploded. If left to set in any cylindrical vessel, either opaque or otherwise, as a salt-jar or glass beaker (even one up to five or six inches in diameter), both answer remarkably well; when thoroughly set, if some cold water be run on the top of the emulsion, and with the forefinger just loosen the edge all round, it will turn out in one piece, just like a *blanc mange*, and is then ready for breaking up and washing. To do this, the adaptation of the brawn presser, as shown by the writer at last technical meeting of the South London Photographic Society, is one of the readiest means, and a description of the same may be interesting to those who were unable to attend that meeting.

To an ordinary presser solder a fine *copper* wire gauze (sixteen to the linear inch inside the presser at the bottom), then solder a tin ring about three-quarters to an inch wide over the wire mesh, so that in looking through the presser a similar appearance is presented as in the diagram; then

to the outside fasten two metal handles, to support it over the wooden box the emulsion is washed in. If desired, a piece of fine canvas can be placed on the box before inserting the presser, and the emulsion squeezed into that; then, if a hole has been previously bored near the bottom of the box, the same will form a washing trough as well.

Third, I am inclined to modify my opinion that prolonged or excessive washing causes a thin but more sensitive plate, and put down the increased sensitiveness to the extra time the emulsion has to be left, in order to give the longer washing.

NOTES ON DEVELOPING-ROOMS, ETC.

BY SAMUEL FRY.

The persistence of error was never more abundantly exemplified than in the difficulty found in inducing photographers to work in a light room instead of a dark one. In the large majority, so dim is the illumination, that on entering from a studio or the open air, some time is required to sufficiently accustom the eyes to the gloom to discover any of its surroundings. Now the reverse should be the case. The most rapid plates made for use may safely be developed or changed in a room of which all details can be seen readily on entering, and in which the columns of a newspaper could be easily read. The counsel given to photographers, even down to the present time, by writers is seldom good. I will briefly describe what may be looked upon as a suitable developing-room for rapid dry plates. One must, of course, be guided by the construction of the room, but do not fear the window being too large. Mine is 4 ft. 6 in. high and 9 feet long, and none of it shut off. Avoid ruby glass. If it is reliable, it is so dark that, unless a very large amount is used, a dull day stops your work.

I recommend two systems, both carefully tested and known to be good—one with thin yellow tissue paper fastened up just clear of the glass, and an inner cover of Turkey-red twill. The latter can have a portion made to raise on a roller if needed. During the brightest weather in June I used the saloon of a screw steamer to change and develop in, and not in a single instance was there wanting the clear glass round the edges and in the shadows which always indicates that the light is safe. I really was very anxious till I ascertained by development that all was well, for the room was brilliantly illuminated. During a voyage on the Thames, when large numbers of most rapid plates were exposed, no sign of fog was ever found. Some people—many, in fact—paint their developing rooms black, which indicates their ignorance of one of the first principles, viz., that the reflection from a white surface, coming in through a properly-coloured window, cannot possibly acquire actinic power. The black walls make it like an undertaker's place. This yellow tissue and Turkey-red twill are capital for covering over lanterns for artificial light. All should have the means of turning on, at any moment, such a light; in dull weather, and towards evening, it is always better.

The second plan is by the means I have before described in these columns, viz., the well-known orange paper, stained by an alcoholic solution of magenta, and rendered translucent by boiled oil. This takes a capital colour, does not fade, and two thicknesses are sufficient; but the first plan is so simple, nothing more is required.

Now, with regard to developing dishes. Buy a few sheets of stout tin-plate at the ironmonger's, and have them made into dishes three-quarters of an inch deep. For 2s. 6d. I got a 12 by 10, two half-plates, and two quarter ones made. The solutions do not affect them. All the papier-maché dishes, ebonite, or gutta-percha, have a short life.

Now, with regard to developing, it is clearly shown by the closest observation that double or treble the usual quantity of bromide is a great advantage, and does not, as supposed, require longer exposure; one has also the benefit of much clearer shadows and half-tones. The longer glycerine developer is used, the more it will be liked. The action of the glycerine is to prevent deposit on shadows, and it effects a very important economy of pyrogallic acid; the additional quantity of bromide also does this. I am inclined to think that by the use of 150 grains of bromide of potassium in 6 ounces of water, with 1 ounce of ammonia, ·880 instead of 60, advantage all round is got, and great economy.

Correspondence.

HALATION.

Sir,—I beg to offer the following suggestion to prevent or diminish halation in dry or wet plates.

Place some broken pieces of common glue in a saucer or suitable vessel with sufficient water to cover it; let it remain in a warm room, protected from dust, until the glue has absorbed as much water as it will; then add to it as much glycerine (common) as water used; next heat until all is dissolved and mixed. Waxed or oiled paper may be used for a mould, turning up the edges of the paper half an inch or so all round; the mould being warmed, and the mixture poured into it while hot, it must be allowed to set and cool on a level surface. It may be coloured by the addition of dyes, &c., at the time of heating; this to be cut to the size, and used as the backing for plates during exposure. It is clean, and the same piece will serve for many plates. Being very cool, it may serve for preventing wet plates from drying too rapidly in the camera.

This preparation, *minus* the colouring matter, serves for taking numerous copies, using Judson's violet dye to write with, as in the multiplex.

Will some dry plate workers kindly try this simple backing, and state their experience? J. J. Morgan.

Proceedings of Societies.

Thursday Evenings for Photographers.

At the meeting held on Thursday, the 29th ult., Mr. Warnerke occupied the chair.

On the subject of stripping gelatine negatives from the glass without distortion or tearing, and by preference, a process that did not require plates expressly prepared, Mr. Henderson said he found a solution of alum and hydrochloric acid, if used persistently, would loosen the film sufficiently to allow of its being stripped off, but that it caused the film to be somewhat enlarged. He found that if a loosened film was immersed in a solution of bichloride of mercury and alum, it would shrink considerably.

The Chairman had found that unless the plates were prepared expressly, there was no certainty of success; he prepared the plates by rubbing them with talc or purified ox-gall, the latter by preference, and said it was not necessary to rub it on the glass, but that it might be added to the emulsion. The ox-gall he used was a purified form supplied by chemists, and not that obtainable at artist's colourmen.

Mr. HENDERSON had mixed ox-gall and alcohol, the result being a clear solution with a flocculent deposit.

With regard to the best means of cleaning off old gelatine negatives, so as to render the glass fit for re-coating,

Mr. COWAN said he used boiling water and soda.

Mr. HADDON suggested coating the faces of two plates with strong sulphuric acid, and then placing them together until all the gelatine was loosened.

Mr. HENDERSON produced a sheet of glass covered with Balmain's paint, which he proposed to use as a reflector in the dark-room, the light from a ruby lamp being allowed to fall upon the phosphorescent surface, and this reflected light to be used to work by, the lamp itself being screened.

Mr. W. E. DEBENHAM found that in a red light, paper which was of a deep red colour, such as is used for covering pill boxes, appeared to reflect nearly as much light as white, and he therefore suggested it would be safer to use, working by reflected light, a material of this colour as the reflecting surface.

The CHAIRMAN used reflected light from a red surface, and found it so safe that with half-an-hour's exposure to it he obtained no image. He used a lantern with cylindrical sides and a conical top suspended from the ceiling; the inside was painted red and the bottom glazed with ruby glass; a paraffin lamp was placed in the upper part of the lantern, and a ruby saucer was attached just under the flame to prevent any direct rays from it passing through the bottom of the lantern.

Mr. AYRES disputed the assertion made at a previous meeting that when several exposures were to be given upon a collodion plate it was necessary to expose each successive image for a considerably longer time than those preceding it.

The CHAIRMAN said that in the studio of Mr. Levitzky, in St. Petersburg, where the electric light and collodion were employed, it was found that if the light was turned on for one second, and then intermitted and another three seconds given, although only four seconds' exposure was given, the subject was as well exposed as if twelve seconds' continuous exposure had been given.

Mr. HENDERSON exhibited a camera for use when making several images on one plate; the dark slide was made to run from side to side completely through the camera, and was kept always in true register by rubber-covered wheels working behind them.

Talk in the Studio.

PHOTOGRAPHIC SOCIETY OF GREAT BRITAIN.—The next meeting of this Society will take place on Tuesday next, January 10th, at the Gallery, 5A, Pall Mall East, when matters of interest will be brought forward.

PHOTOGRAPHIC MAP-PRODUCTIONS ON NOTE PAPER.—Several communications on this subject will be sufficiently answered by the following remarks. An area of the map representing about a circular mile should be reduced to a diameter of about an inch and a-half, and the negative should be intensified by the lead process of Eder and Toth. The next step is to prepare a photo-lithographic transfer and put it down on a stone; but the general photographer will find it advisable to get the operation performed by a regular photo-lithographer, several of whom may be found in London. When an order for the map-paper is received from any customer residing within the circle, the stone should be sent to a lithographic printer, who will transfer an impression from it to a fresh stone, and mark thereon the position of the customer's house; any verbal address which may be required being then inscribed.

THE PREPARATION OF OXYGEN FOR LANTERN USES.—Several complaints have been made of an impure chlorate of potassium now in the market, and the use of which is likely to lead to serious accidents, as when it is heated to the decomposing point the oxygen is liberated with almost explosive violence. This impure article not only contains notable traces of chloride of calcium, but a considerable percentage of potassium chloride and some nitre, this latter being doubtless an intentional adulteration. The oxygen obtained by heating this impure chlorate is always so far contaminated by nitrogen and oxides of nitrogen as to be ill-fitted for the production of a lime light, as under ordinary circumstances a loss of over one-fourth of the light is the result. The price at which the impure article is sold is about half what one would pay for a good commercial article. When chlorate of potassium is crystallised in well-defined and perfectly dry prismatic tables, it may generally be relied on. All chlorate in powder, or any sample which becomes damp on exposure to the air, should be rejected. Chemically pure chlorate, such as is used in fabricating certain explosive mixtures, is not necessary for the preparation of oxygen, as this costs about twice as much as a good commercial article. The following may be taken as approximate prices:—

Bad and very impure samples	...	6d. per lb.
Good commercial chlorate ...	...	1s. ,,
Chemically pure ,, ...	...	2s. ,,

To Correspondents.

OTTO PFENNINGER.—The circumstance of the spots having made their appearance even when you used other samples of gelatine leads us to suspect that the muslin used for filtering is the source of the mischief. It is an excellent plan to boil the muslin with weak carbonate of soda solution before using, taking care to thoroughly wash it afterwards in clean water.

W. J. B.—1. Very well suited for the work, provided that a moderately small stop be used, and that you do not try to cover so large an area as to show the falling off of the light at the edges of the field. 2 and 3. No.

A. HONEY.—Any general advertising agent—as, for example, Messrs. Willing and Co.—will arrange the matter for you. 2. Probably about the same as in an English newspaper.

GEORGE B. SYMONDS.—It is principally a question of manipulative skill, and short instructions would be of no value. We will devote a leader to the subject at an early date.

L. B. BUSS.—1. Write to the Secretary of the Society, at John Street, Adelphi, W.C. 2. Next week.

SAMUEL ——.—1. It is a matter of taste, and hardly admits of such a view as you seem to take. 2. Very thin and soft iron wire. 3. Not unless the most extreme care be taken. 4. We have forwarded your letter.

INTERESTED.—1. At a temperature of about 1000° centigrade. 2. You had better perform the calculation for yourself. Multiply by 9, divide by 5, and add 32.

GALVANIC.—1. One cell of Leclanche's battery will suffice, if your receiving apparatus is well constructed and carefully adjusted. 2. We think it was in the year 1856.

THOMAS PATTERSON.—In such a case it is important that all traces of lead should be absent, but the presence of a small proportion of a zinc salt would do no mischief.

B. LAMB.—A 10 per cent. solution of a hard gelatine, such as that of Coignet.

MONTANS SOILLEUX.—We would recommend you to apply to the following houses: J. Atkinson, 33, Manchester Street, Liverpool; Marion, 22, Soho Square; and Oborne, Red Lion Square.

YOUNG FERRO.—1. Two ounces of the bleached shellac is the quantity of spirit you mention. 2. Gum dammar, 50 grains; benzole, 1 ounce.

JOHN NEWBURN.—There must be some mistake. The stamps have been returned.

A. LLOYD.—A portrait lens is not very well suited for the work, as the edges of the field receive much less light than the central portions. Under any circumstances you should use a small stop. Your lens may not be a genuine "Sheppard."

LIGHT.—No light is perfectly actinic, as you seem to imagine; and all visible rays, even those of the extreme red end of the spectrum, exert a certain action on such plates as you have been working with.

C. T. GALL.—The only way to succeed is to take extreme care as regards the purity of the bath solution, to avoid dirty or dusty supports, and to drain your plates thoroughly.

M. C. R.—A microscopical investigation of the question might throw considerable light on the matter.

CORNISH LAD.—It is probable that it is the result of an insufficient washing of the prints; or possibly you may be in the habit of working the fixing bath too hard.

ELECTRIC.—The conducting power of the solution may be considerably increased by saturating it with sulphate of soda; and we have fancied that deposits of copper obtained from such a solution are tougher and better than when the sulphate of soda has not been used.

PHOTO-LITHO.—It is very little use attempting to obtain a transfer from such a negative as you send us. Not only are the lines unsharp and badly defined, but the density is so unequal that some parts of the ground are less veiled than those lines which are on the denser portions.

ONE IN A DIFFICULTY.—1. We have examined the sample of blotting-paper, and found it to contain a considerable quantity of sodium hyposulphite. 2. Boiling water partially decomposes it. 3. Write directly to the gentleman you mention.

ERRATA.—In the report of the Thursday Evenings last week, page 624, line 20 of report, for "positive," read "protective;" and in line 21, for "spirit," read "ether."

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CONTENTS.

TESTING THE RAPIDITY OF PLATES.

An interesting discussion arose at the Photographic Club a short time ago, as to the effect of various conditions on the sensitiveness of gelatine plates.

The principal questions were whether any actual difference of sensitiveness arises from the use of hard or soft gelatines, and also whether any considerable slowing effect is produced by leaving an appreciable amount of free soluble bromide in the film of a gelatine plate.

The most remarkable divergence of opinion was found to exist on each of these points, and evidently in the minds of a few there was some confusion between increase in the time taken to develop, and reduction of sensitiveness.

It is one of the most curious facts in connection with emulsion work, that different experimenters working under apparently precisely similar conditions produce entirely different results. It would almost appear as if the same physical causes could produce different effects. Certain it is, at any rate, that because one person has got a particular result, it does not follow that the same result will be got by a different person following the instructions of the first as closely as he can, and probably this is the true reason for a great part of the divergence of opinion; but we believe that there is a different reason, and a more easily explained one, than this: it is the different methods used to test the sensitiveness of plates of different kinds.

The most usual method is by the use of a sensitometer of one form or another. The one which has gained most popularity is that invented by Mr. L. Warnerke, and in which a tablet divided into squares of graduated density is interposed between a standard light and the sensitive plate for a certain length of time, and the result observed after development, but before fixing. The graduated tablet may be produced in various ways. We ourselves suggested not long ago the use of sulphur in various thicknesses.

At a recent meeting of the Photographic Society of Great Britain a new sensitometer was described, wherein light, either direct or reflected, is allowed to act upon the sensitive film after passing through a series of graduated holes, no medium being interposed between the light and the sensitive film. In this actinometer one of the factors of error is possibly done away with; but it was pointed out at the meeting above referred to, that it leaves the most serious ones—namely, the difficulty of obtaining a standard light, or a standard surface of reflection—still unsolved.

It has been pointed out at various times that the indications of sensitiveness given by the sensitometer seemed to be at variance with those given by actually taking negatives, and upon the reason of this variance, which certainly does exist, we should wish to say a few words.

We shall suppose that anyone of the forms of sensitometer above mentioned be used, and that all the defects of a standard light, &c., have been overcome, we have still the fact to take into consideration that this standard light is not at all likely to be of exactly the same colour as daylight, but that it will probably contain a greater or less proportion of that colour of light, which has the maximum effect upon the films tested, than daylight has. This will be most noted if films containing iodide and those that do not be compared first by gas or candle light, and then by the luminous tablet or by daylight. It will be found that if all three have the same sensitiveness by candle light, the bromo-iodide plate will have the advantage by daylight, and still more by the luminous tablet.

It is not, however, to this that we wish to draw attention, as the subject has been often discussed before; but it is to a far greater source of error.

In reading a plate which has been exposed under the sensitometer, the only thing which is taken into account is the last figure which is visible; that is to say, the only thing which is indicated by the test is *what is the minimum amount of light which has an appreciable effect upon the plate which has been tested.* This is no doubt one of the factors which decides the sensitiveness of a plate, but it is by no means the only one. When we hold up a negative to the light to judge whether it has been sufficiently exposed, it is not merely the last limit of detail, the most poorly-lighted object which has been able to impress itself on the plate, that we judge by; it is by the whole gradation of the picture from the high lights to the deep shadows.

Let us take an example to prove what we mean. Let us take two plates, one prepared by the slow digestion method, the other by the ammonia nitrate, and test them under the sensitometer. We shall suppose that the same figure appears in each case, and that a high one, and that the development is continued until the density of the first square which represents the high light of a negative is the same.

Now, according to the usual practice, these two plates would be put down as of the same sensitiveness; but let us look a little further into the matter. Let us fix the two plates. Probably in the case of the ammonia nitrate plate it will be found that after fixing, the same figures are to be seen as before, or possibly one or two figures will be lost. With the other, however, it will probably be found that three or four figures are due.

It may be said that if this is all, it is only necessary to read the plate after, instead of before, fixing; but there is more than this. On examining the plates closely, it will be seen that in the ammonia nitrate plate the shades of density run up with comparative quickness; that in the case of the last few squares which have made their appearance, each one is considerably more dense than the one immediately following it; whilst with the other it will be found that the rise is very slow, and that several of the squares are almost imperceptible. Now it will be quite evident that these two plates, which would probably pass as being of the same sensitiveness when tested with the sensitometer, will produce widely different negatives with the same exposure. The ammonia nitrate negative would appear more exposed than the other one. Probably something nearer fair judgment of the relative sensitiveness would be got by taking a silver print from each of the plates which had been exposed under the sensitometer, and judging from the general effect produced.

Very possibly what we have just considered accounts for the fact that so many consider that they have failed to gain sensitiveness by the ammonia-nitrate method, whilst others claim to have got greater sensitiveness by it than by any other. It also possibly accounts for the divergence of opinion which, as we mentioned, exists with regard to the effect of hard and soft gelatines, and of free bromide in the film.

It may be asked, what we propose to substitute for the sensitometer? We have no substitute to offer. We would only say, use the sensitometer with discretion; remember that it is not infallible; and check your results by camera exposures. The sensitometer is invaluable and correct enough for all practical purposes for comparing plates prepared by the same formula.

Dr. Eder exposes plates for various lengths of time in the camera (the subject being a draped bust), varying the time of exposure till results as nearly as possible the same are got on plates of different makes; and undoubtedly this is an excellent plan, although it has the objection that it wastes a great number of plates; and, further, that it must give a considerable margin in the results, as, when plates of the same sensitiveness are used, exposures varying a good deal may be given, without producing negatives which are appreciably different to the eye.

PRINTING-IN SKIES AND BACKGROUNDS.

Under any circumstances double printing is an operation requiring not only artistic taste and discrimination, but also no small amount of manipulatory skill and dexterity. To follow the outline of a sky or a figure in a portrait is by no means an easy task, and even if done successfully with the cutter or the brush, the result is generally a hard-outlined production, which a casual observer cannot look on without at once perceiving that something is wrong.

Some of the best combination pictures which we have seen were made by using one silver print as a ground, and attaching portions of the other prints which may be required to build up the picture; after any required retouching has been performed, the whole is photographed in the ordinary way. An expert manipulator and skilful copyist may produce admirable results by this process; but in the hands of the average photographer it might be expected to yield unsatisfactory results.

In many instances a necessity arises for printing-in a new background to a negative, or a fresh sky to a landscape, when the above-mentioned complex method would involve too great an expenditure of time and labour, even if one were sure that the quality of the picture would not notably suffer. In such a case the vignetting method of M. Lambert may be followed with advantage, as it is rapid, and well suited for work either in carbon or silver. It involves no process involving any probability of deteriorating the general character of the pictures.

The printing frame which is to be used is placed on a retouching desk, and the lower right-hand corner is marked, after which the negative is placed in the frame in an inverted position, and pushed well home into the marked corner. Over the negative is placed a sheet of plain glass, and on this the background is carefully stopped out by means of any opaque varnish. The glass is then removed and another substituted, and on this the figure is stopped out instead of the background. Two screens are thus obtained, and if both are superimposed and pushed up into the register corner of the printing frame, no light will pass. One of the screens, let us say, that which stops out the background, is now put into the frame, and over it the negative, care being taken that both are well seated in the marked corner; after this the sensitive surface, whether dry plate, silver paper, or carbon tissue; this being also well up in the corner. The required exposure having been given, the second or figure screen is placed in position, and over it the cloud or background negative, and next the sensitive surface; all (except, perhaps, the cloud or background negative) being well up in the register corner. The second exposure is now given, and if the operation has been successful, a delicately-vignetted edge, having an extremely near resemblance to a natural outline, will be the result, as in each case a thickness of glass intervenes between the cut-off of the light and the sensitive surface.

According to the skill of the manipulator more or less parallel light may be used for printing, the frame being placed fairly out of doors, or a little inside a window.

Surpassingly perfect results have been obtained by this simple and rapid method, and we have seen a fresh sky printed into a seascape so perfectly that even a close inspection of the rigging of the vessels would hardly betray the secret, even to an expert.

HINTS ON BUSINESS—EMPLOYMENT OF TIME.

At the present time, when the art of photography may be considered as settled into the quietude of middle age, as opposed to the mad rush and unrest of its youth, following its most brilliant and promising infancy, it must often be an anxious thought to the head of a business to know in what manner he may best employ his time for the furtherance of his business—a business which depends more than most others on the judgment, taste, and ability of its promoter.

It must obviously be impossible to lay down any rule for the guidance of any one on this point, as so much must depend on the idiosyncracy of the individual himself.

Many persons have splendid ability in the management of customers, or the power of pushing business into fresh channels; some are competent book-keepers, others, again, have the artistic feeling strong within them, or the scientific knowledge of chemistry invaluable in the mechanical work of photography. So many more examples of special ability for certain work must arise to each reader's mind, that it is unnecessary to indicate any more examples here, and each one must decide for himself to what department of his business he is most adapted, and to which he should devote his talent and energy.

All of us must have felt, and most regretted, how little can be accomplished by any one person in the hours that comprise our working day; and it is therefore a necessity, if we would accomplish anything satisfactory to ourselves or progressive in our business, that we should devote our time and ability to some practical purpose, in whatever department of our business we may have decided on as most fitting. What man can hope to excel in everything in business? And to acquire complete mastery over one branch is better than frittering away time in a vain endeavour to do everything, or see everything that is done.

Frequently persons the most anxious to use their time advantageously accomplish the least, as they go from one thing to another, leaving each incomplete in their well-intentioned but abortive efforts to do everything, and their determination not to let the most trivial matter pass without their personal supervision. Those who fall into this error *may* make good servants, but never successful men of business on their own account, for not only do they accomplish little themselves, but they obstruct others in the performance of their duty, and really retard work instead of assisting and forwarding it.

What Dr. Watts has said of ideas may not be out of place here in regard to business:—"There are some persons who never arrive at any deep, solid, or valuable knowledge in any science, or any business of life, because they are perpetually fluttering over the surface of things in a curious and wandering search of infinite variety; ever hearing, reading, or asking after something new, but impatient of any labour to lay up and preserve the ideas they have gained. Their souls may be compared to a looking-glass, that wheresoever you turn it, it receives the images of all objects, but retains none."

The head of a business should be content to be the lever moving the business machine, and not strive to be every crank, and pulley of it at the same time.

Not less to be avoided is the indifference and carelessness that others display in their business relations—the men who leave everything to others, not discriminating between the painstaking and careless workers, prefering ease at the present moment to prospective benefit, and when their business is going on well relax in their personal application to it—which may have been originally the mainspring of their success—and think they have fairly earned a right to live in ease, and trouble themselves no more. The machine may be working well, but the motive power must not be withdrawn, or a collapse must sooner or later follow.

Some examples of this nature must recur to the minds of most photographers of long standing—of clever men brought to ruin commercially by this laxity in personal application to business.

The indifference of the master is frequently followed by inattention in the subordinates, although there are many whose probity and industry are not to be affected, and whose sense of duty is strong enough to keep them through all temptations. Still it is not well to trust entirely to the chance of this fortunate combination of good qualities. Successful men of business are frequently—generally, even—not so much remarkable for great ability as for knowing exactly in what that ability consists, using it to its fullest extent, and being able to discern and make use of the capabilities of others.

To the photographer especially it is desirable, having determined which department of his business is most to his taste and ability, that while keeping supervision over every part, he should in practice confine himself to that selected.

PHOTOGRAPHERS' ASSISTANTS IN FRANCE.

As our readers are aware,* the *Chambre Syndicale de la Photographie* has recently instituted in Paris an official examination for photographers' assistants, and as the regulations for the conduct of this examination cannot fail to be of interest, we take this opportunity of making them known in England.

Every candidate for the diploma of "Photographic Operator" must apply to the President of the Society for admission to the examination, stating his Christian and surname, his birthplace either in France or abroad, the establishments where he has learned and practised photography, and his titles or degrees (if any). He must also submit at least two copies of each of the works he may have published, accompanied by a certificate of character and conduct, and he must indicate the special branches of his profession in which he desires to obtain a diploma. In reply he will be informed of the days and hours when the examinations, both theoretical and practical, will be held. The examination fee, which will be returned to those who fail to get a diploma, will be 25 francs (£1).

The theoretical examinations will be held publicly in the building of the Society, and only those candidates who obtain a certain number of marks will be admitted to the practical examinations.

* See Photographic News for 30th December, 1881, p. 614.

The maximum number of marks for each subject will be 20, divided according to the following scale:—

0—Nil.
1, 2—Very bad.
3, 4, 5—Bad.
6, 7, 8—Indifferent.
9, 10, 11—Tolerable.
12, 13, 14—Fair.
15, 16, 17—Good.
18, 19—Very good.
20—Perfect.

The subjects of the exercises for the theoretical examination will be fixed by the examining board in private before the examination commences, and will be placed in sealed envelopes. Before commencing, the candidates will draw by lot the order in which they are to be examined, and then they will ballot for the exercises. When a candidate has been examined in a subject, each of the examiners will fill up a report of the manner in which the candidate has acquitted himself, and will enter on it the number and description of the exercise, together with the marks he awards on the scale indicated above. The report, having been signed by the examiner, will be placed in a sealed envelope bearing on the outside also the number and description of the exercise. At the close of the examination the reports will be opened by the examining board.

In order that a candidate can be admitted to the practical examination, he must have obtained at least 200 marks in the theoretical examination. The number of marks obtained for the exercises in chemistry and physics will be multiplied by a factor 4, and that for the exercise in the application of photography by a higher facter (say 8), and these products added together will give the whole number of marks to the credit of the candidate. No candidate will be admitted to the practical examination unless he has obtained at least six marks in each of the exercises in chemistry and physics, and at least twelve marks in that of photographing proper.

The programme of the examinations will be as follows:—

I.—For the Certificate of Ability in the General Knowledge of Photography.

1. *Theoretical Examination.*—General principles of photography. Elements of chemistry and physics as applied to this special branch of science. Different negative and positive processes.

The examining board for this examination will consist of three members, of whom one will examine the candidate in photographic chemistry, another in photographic physics, and the third in the application of these sciences to the various negative and positive processes.

2. *Practical Examination.*—The exercises for this examination will be worked by the candidates who have been permitted to compete, in the presence of the same examining board, with the addition of members specially qualified to judge of practical work in photographic printing processes, such as phototypie, Woodburytype, photographic typography both in relief and in engraving, photographic enamelling, and other special processes.

Reports will be made on the various exercises with separate marks for each, viz.—A. Negative processes on collodion, both wet and dry, and gelatine, and all the details of the different operations. (Value: 10).—B. Positive printing process in silver chloride, and all its details. (Value: 10).—C. Manufacturing processes. (Value: 6).—Each member of the board will adjudge marks separately in the exercises A, B, and C, and a total of 300 marks in this examination will gain the certificate.

Each member of the board will make a separate report on each exercise of a candidate whom he has examined, and will hand it to the chairman marked with the different letters A, B, C, and the number of marks he has awarded.

II.—For the Certificate of Ability in a Special Application of Photography.

1. *Theoretical Examination.*—The programme will be the same as that of the theoretical examination in 1, the only difference being that a minimum of 150 marks will be necessary to admit the candidate to the further examination. The number of marks to gain the certificate in any separate speciality must be at least 15 (that is to say, "Good").

2. *Practical Examination.*—The exercises in this examination will bear on the special applications selected by the candidate. In this case the diploma will indicate the speciality in which the candidate has passed.

Diplomas.

The diplomas or certificates of ability will be of different kinds; there will be certificates of ability in the general knowledge of practical and theoretical photography, as well as of particular processes. These diplomas will be signed by the members of the examining board, and countersigned by the president and secretary of the *Chambre Syndicale.* They will contain the name and birthplace of the candidate, the nature of the examination he has passed, and, if there is room, the names of the instructors of the institutions where he has learned his profession.

A total of from—

300 to 350 marks will carry the qualification	—	*Fairly Good.*
350 to 450	,,	*Good.*
450 to 500 and above	,,	*Very Good.*

This qualification will be stated on the candidate's admission letter. A list of the diplomas granted will be published and issued to all the photographic societies at home and and abroad for insertion in the technical journals.

The Society will fix the time of the examinations, and will nominate the examining boards for each examination. These boards may be composed either entirely of Fellows of the Society, or of other persons selected by the Society for their special knowledge and qualifications, or of foreigners of distinction well known in the photographic world passing through Paris; the latter will only assist the examiners in the character of experts. The president of each board will be elected by the members of that board, but he must in every case be a fellow of the *Chambre Syndicale.* It will be his duty to regulate the proceedings at the examination, and to transmit the results to the president of the Society.

The questions of the general programme of the theoretical examination will be divided among the three examiners as follows:—

Chemistry	Nos. 1 to 10
Physics	Nos. 11 to 20
Photographic applications	Nos. 20 to 30

A syllabus of the subjects on which these questions will bear will be shortly published.

The practical examinations may include any or all the different processes at the pleasure of the examiners, but the exercises will be directed to one entire process—positive and negative. In any special process, such as Phototypie, Woodburytype, or Photo-engraving, the examiner may set any exercises he pleases, and there will be no syllabus of the questions that may be asked. Candidates may work with their own chemicals and apparatus.

Any special artistic qualification in the candidate, such as a certain knowledge of drawing and painting, will enable him to obtain 50 marks extra.

The *Chambre Syndicale* reserves the right of making any alterations in the above regulations which the progress of photographic and applied science may render necessary.

Applications of candidates for the diplomas may at once be addressed to M. Lévy, president of the *Chambre Syndicale*, 113, *Boulevard de Sebastopol, Paris.*

THE GREAT ELECTRICAL EXHIBITION AT THE CRYSTAL PALACE.

FROM OUR SPECIAL CORRESPONDENT.

When acting as a Special Correspondent for the Photographic News at the Paris Electrical Exhibition, I was informed that the directors of the Crystal Palace contemplated opening an extensive exhibition of electrical appliances towards the end of the year. At the time this information gave me pleasure, although it certainly appeared difficult to imagine how the big bazaar at Sydenham could be sufficiently cleared of the nick-knack stalls, peep-shows, and other fantasies which are so familiar to us, as to make room for the heavy plant, the motive machinery for producing the thousands of horse-power force which are absolutely essential, the ranges of shafting, and the various bulky articles which must be got together in order to in the least measure represent the present advance in electric science as applied to modern industry.

Assuming that the Palace Company could not move the stalls and other trivialities aside, so as to make room for the proposed exhibition, one might think that the only possible course would be to erect a suitable temporary building in the grounds, and leave the Palace proper in the hands of its old tenants.

Although the exhibition was to have been opened in December, I heard strangely little about it; but an article which appeared in the *Daily Chronicle* on Wednesday week announced the exhibition to be actually open; and on inspecting the advertisements of the Palace Company a day or so after, I found there could be no doubt of the fact, as a notice headed "International Electric Exhibition" finished with the note—"No extra charge to the Exhibition."

Accordingly, on Tuesday last I went to see it, but after a preliminary walk round the Palace had revealed no evidence even of any preparation for the Exhibition, I began to enquire, Where is it? A policeman, who looked more intelligent than the average, was first appealed to, and he pointed to a few electric lamps at the northern extremity of the central avenue, and laconically observed, "They will be lighted up between five and seven this evening." But where is the Electrical Exhibition? "There," he curtly said, as he again pointed to the lamps, and turned aside to admit some people into a passage which may have led to a concert hall or a peep-show. "Is that, then, the only set of lights which will be in action to-night?" I again enquired. "Rather," he answered; "but those will burn for two hours, as I told you before."

The next thing was to find the general manager's office, and to make enquiries. "Mr. Grist can tell you all about it," they said; "he is in there." Mr. Grist was, however, not in there, but someone who did occupy the office told me that Mr. Grist was busy with the catalogue, and that the Electrical Exhibition occupied the great central avenue and the galleries. A careful inspection followed. Where are the motors, where are the dynamo machines, the shafting, and the belts? As the policeman had pointed to the north end of the avenue, the first microscopic examination was directed in this quarter, and then, amidst the fancy stalls, the thin end of the great Electrical Exhibition was found. A real galvanizing machine, nearly as good as any which one can see in the New Cut on Saturday night, and having a large signboard over it announcing that "Electricity is Life," was only rivalled in magnificence by a few of Messrs. Willing's well-known electric signs, in which the words are studded over with small mirrors, these being kept in motion by a contact breaker arrangement, similar to that of the ordinary electric bell. One of these was actually in action, blinking out the word exhibition. Further search revealed a stall with a variety of telegraphic instruments lent by the South Eastern Railway Company, this being of some little interest, as including objects of historical note. Magnetic clothing and pads to be worn against various parts of the body next came under my notice; these appliances, like the *Pilules Electriques* which are sold in Paris, being calculated to cure most diseases. There is, however, one noteworthy distinction: the *Pilules Electriques* were *not admitted* to the Paris exhibition, but the magnetic appliances *are admitted* to the Crystal Palace show.

Long walks among pictures, pigeons, handkerchiefs, gloves, and fancy articles lead one at last to islands where electricity has at least some indirect bearing, there being no less than three exhibits of lightning rod tops, these being moulded and bent to every imaginable form, it being evidently thought that the more fantastic the design of the top, so much greater the efficiency of the conductor.

At this stage of the proceedings an official "Day Programme" of the Crystal Palace Company is obtained, and, as it gives a list of the exhibitors to the number of fifty-seven, it becomes possible to view the articles systematically. The Rustless Iron Company show iron pipes and other fittings, which are certainly of indirect interest to telegraphic and electrical engineers; while another firm shows a case of small hand-tools, including about a dozen pairs of pincers of ordinary design, all very useful to the practical electrician, no doubt. The United Asbestos Co., the Phosphor Bronze Co., and about half-a-dozen other firms show exhibits having a somewhat remote bearing on electric science.

One of the most extraordinary features of the exhibition is the absence, as far as my own observations go, of any form of dynamo machine; this apparatus being, as is well known, the keystone of modern electric progress. There must, however, be one somewhere for working the few lights which are placed, but perhaps it is put out of sight. The dynamo machines shown in the Paris Exhibition numbered over three thousand, and almost every stage in the experimental development of this remarkable engine of progress was well illustrated. Perhaps the reason may not be difficult to find, for if your readers will refer to page 599 of your issue of December 16th last, a letter will be found which leads one to suppose that the management regard a dynamo machine as some kind of photographic apparatus; and photographic apparatus is not admitted. Even the balloon photographic arraugement exhibited in connection with the name of Mr. Woodbury appears to be a mere dummy; the balloon being hung by a string, and the portion representing a camera being apparently far too heavy for the balloon, even if this had been inflated with gas. On the table underneath were other articles, possibly the real camera; but a stout cover, securely nailed all over the top of the table, rendered it impossible for me to ascertain.

One matter of interest—a magic lantern with about twenty slides arranged on a kind of wheel so that they can be exhibited in rapid succession—is shown by Messrs. Webster and Williams, of St. John's Wood.

Although the exhibition is open, it must be understood that it is not yet as complete as the management intends to make it.

By-the-Bye.

ON FINISHING CARTE PORTRAITS.

It is not only on the subject of finishing carte portraits that we are going to speak, although we have just said as much; but on the finishing of all kinds of portraits of small size, whether they are called cartes, cabinets, promenades, Malverns, boudoirs, makarts, &c., &c. The fact that we have now so many different sizes shows plainly enough the effort made on all sides to import novelty, chic, fashion, or other attractive quality to their wares, and if only this indispensable item to a prosperous portrait business were more thoroughly understood or recognized, it would be well indeed for photographers in general. By all means let our young photographers—and old ones, too, for that matter—study and practise the principles of art, for only under these circumstances can they win a name for themselves, and secure for photography a place among the fine arts. But there is a difference, we contend, between the small portrait that is issued by dozens, and the study or genre photograph of larger dimensions. The small portrait should possess art qualities, but in the nature of things it should possess something else too; and it is this something which, on the one hand, many photographers hold to be beneath their notice, and others do not sufficiently understand.

In the carte—by which we mean all other small portraits as well, that are issued by the dozen or half-dozen—it is not sufficient to have a graceful pose, a well-lit face, vigorous contrast, and soft harmonious colouring. All these proclaim the artist, and these, if present in perfection, may sell the picture, of course, no matter how slovenly it is mounted, how devoid of neatness and elegance may be the surroundings. Unfortunately, ninety-nine photographers out of a hundred do not produce—they cannot give the time, even if they have the qualifications—carte portraits which are to be valued on the score of art alone; and there is the consideration, moreover, that their customers in the main require something beyond. Hence it is that the finishing of small portraits is a matter of so much importance.

The finished carte is, as we have before maintained in these columns, something of an object of *vertu* or *article de Paris*. We would give an English name, if we could find any so expressive. The purchaser, nine times out of ten, is not the same, as he asks for a carbon enlargement on opal, or a large study finished in chalk or pigments. In the latter case it is art alone that carries the day; in the former the customer wants some bright presentable little objects for giving away. Many people have their portraits taken once or twice a year; while they are staying at a fashionable watering-place, or are up in town for the season, they call at a studio, in which they have seen some novel and attractive little portraits, and put down their guinea or half-guinea for a dozen. If they are not regular customers of the photographer, they may argue, "Well, I meant to have my portrait taken this year, and I shall get some done like those new ones in Oxford Street:" or, again, "My last portraits are so antiquated, I really shall be taken like Matilda, upon nice black cards with gold borders," &c. In a word, the "finish" of a picture secures new customers, and this is why it is so important.

We need not insist upon such a quality as neatness in the finishing of a picture; nor need we point to the importance of making the best of a photograph, although the latter never seems to receive the attention it deserves; a defective portrait, as everybody knows can be made presentable, and a good one considerably improved, by tact and judgment in printing and mounting; yet at some studios the same hard-and-fast rule prevails as to vignetting and trimming, whatever the negative may be like. The white card mount, thank goodness! is now very seldom seen—at any rate, without a tinted or Indian border—and hence the high lights of a photograph are not made to suffer as was formerly the case. The cream-coloured mount that now almost invariably takes the place of white gives a chance to photographs with degraded lights, while the reason of black mounts being so popular is very evident: they permit the use of deep rich shadows without these appearing unusually heavy.

Much favour has been bestowed upon the large three-quarter portraits on shining ebony cards and gilt bevelled edges. Novelty has much to do with this predilection; the thick card, the handsome gold bevel, and the exquisite finish are all attractive. The portrait itself presents nothing new, and is such as any good photographer might produce; yet there cannot be a doubt that a considerable impetus has been given in portrait photography by this new style of mounting—an impetus that has nothing to do with the art of photography itself.

While, then, art must be the basis of all good photography, art alone will not make the ordinary photographer busy. He must believe also in fashion, style, elegance, chic, or by whatever term he choses to call that quality which attracts the public. The other day we called attention to some Christmas cards by Mr. W. England; the ensemble was delightful, and yet it would be difficult to say that they contained anything absolutely novel. We are all conversant with photographs upon an ivory-like basis, such as Mr. England employs, and yet the semi-transparent opaline material in his cards appeared new. There was a comparatively large surface of it, and the tasteful gilt edging contrasted possibly with its translucent character. Then, again, the pigments of the little coloured photographs seemed to acquire transparency too, although the result was obtained by simply attaching a paper print to the gelatine surface. The finished picture, besides its pretensions towards art, was chaste, elegant, and attractive; and we feel certain that if Mr. England can only supply his charming little miniatures fast enough, there will be a considerable sale of them.

Reutlinger, of Paris, was one of the first to thoroughly understand the importance of studying fashion in the matter of small portraits. He it was who was so successful in the preparation of glazed and medallion pictures, and in the printing of fancy borders around the portrait, so that the high lights did not suffer by juxtaposition with the mount. Reutlinger was in the zenith of his fame just before the Franco-German war, and this, unfortunately, brought to a precipitate standstill, a most brilliant business. Reutlinger understood posing and retouching to the letter, but he understood how to finish a portrait still better, and this enabled him to distance his Paris colleagues.

Other continental photographers have been hardly less successful than Reutlinger in introducing changes of style and finish, and one of the last modifications—for it involves no actual photographic change—is that recently described by Fritz Luckardt in the YEAR-BOOK, which is so simple that it wants but a word or two to describe it. And here we may point out a singular circumstance. While to foreign photographers we owe most of the changes in respect to "finish" of carte pictures, it is to photographers in this country that changes in their size and form—no less an element of fashion, elegance, and chic—are due. The cabinet portrait, the promenade or panel, and the Malvern all date from this country, and although there are formats with other names, none are so popular as these.

In conclusion, then, we would say that photographers would do well to look upon carte portraits not only from an art point of view, but also in the light of *articles de vertu*, or bright little knicknacks upon which taste and fashion exercise an influence. It is, we assure our readers, because the photographers of foreign capitals pay more attention to this point, and not because they produce better photographs, that they secure the favour of so many of our travelling countrymen.

The "At Home" next week will be "The Atelier Adèle in Vienna"; the following "By-the-Bye" will be, "The Photographer's Elixir Vitæ."

Notes.

The Photographic Society of Great Britain has awarded the silver progress medal for 1882 to M. Leon Warnerke.

A grand art exhibition, in which photography has a share, was opened this week in Lisbon. The King and Queen of Spain were present with the Court of Portugal at its inauguration.

Some discussion took place on Tuesday evening at the meeting of the Photographic Society, on the subject of drying gelatine plates, when M. Warnerke gave it as his opinion that films dried in an hour were less sensitive than those dried in four hours. The last-named period he preferred to any other.

Still, it is well to bear in mind that, however skilfully a gelatine film is dried, its sensitive properties may be afterwards impaired by faulty storage or packing. Gelatine is one of the most hygroscopic of substances, and speedily absorbs moisture again from the atmosphere if it gets the chance.

Last year we chronicled a remark of Mr. Robert Faulkner's, to the effect that he thought artificial light might well be employed in the studio during dull murky days, for the purpose of strengthening the high lights. This is precisely what M. Levitsky does in his electric studio at St. Petersburg. He takes portraits by means of the electric light during the daytime. The high lights are those illuminated by electricity, while the shadows are portions of the model lit by daylight alone.

The Royal Polytechnic closes finally on the 21st inst. We paid it a visit on Saturday, and were well rewarded for our pains. It is a pity that just as photographic transparencies are taking the place of the old coarsely-painted slides, the best place in London for exhibiting them should be closed to the public. A tour through the Isle of Wight is illustrated by lantern photographs at the Polytechnic, and the vivid truth of the scenes called up before the spectator—Sandown Bay, Ventnor, the Needles, &c.—invoked the enthusiasm of the audience again and again.

But it is the photographer himself who appreciates a lantern picture best. He really does not know what he has in his negative until it is thus amplified and illuminated. The wonders of photography then stand out indeed, provided the transparency has been skilfully produced. In another lecture on ballooning by Mr. Hepworth, a cheap and effective mode of producing diagrams was shown to be that of photographing wood-cuts, and projecting these on the screen with a lantern. Photographs of maps are especially successful; it is surprising how clear and bright the stupendous continents appear which originally came from some school atlas. This application of the camera opens up a wide field for the instruction of youth.

A friend of ours returned in great glee last week from a visit to one of the principal workers of gelatine plates in London. "I went right through every room, where they mix the emulsion, coat the glass, dry the plates, and pack them. He showed me everything, sir, everything!" Here was a lucky man, and we at once proceeded to congratulate him; he would now be able to set about plate-making on his own account. "Oh, you can't see anything, don't you know, because it is so dark; but he described everything to me as I went along!"

When Madame Albani quitted Berlin on Monday, the Emperor of Germany gave her a photograph of himself, and the Empress an autograph letter. The Empress of Germany, we hear, is the only crowned head who refuses to give away a portrait, and, so rumour affirms, she has only once been photographed.

The Newcastle-on-Tyne and Northern Counties Photographic Association celebrated its first anniversary on Tuesday. The success of this, the newest of our societies, seems never to have been in jeopardy for a moment, and the Honorary Secretary—for upon him it usually depends whether the society shall be an active or passive one—may be pardoned when he proudly boasts that the twenty-five promises of membership, twelve months ago, have developed into sixty-seven members and two non-members at the present moment.

At the same time it cannot be denied that Newcastle enjoys unusual advantages to foster a photographic association. The distinguished president is Mr. J. W. Swan, F.C.S., and among the Council is the honoured name of Professor Herschel, M.A. Mr. J. B. Payne, F.R.M.S., is the hon. secretary, Mr. P. M. Laws the treasurer; while among its active supporters are Professor Marreco, M.A., Dr. Berwick, Messrs. Mendelssohn, J. Downey, and E. Sawyer—all men of known ability.

There was a time when shellac was considered a necessary constituent of sealing-wax; but its assistance is dispensed with now-a-days, it seems, in the manufacture of the ordinary article. Here is one receipt: Common resin, 12 parts; yellow beeswax, 1 part; lampblack, 2 parts. You melt the resin and beeswax, and then stir in the black. If red wax is wanted, Venetian red is substituted for lampblack.

The Admiralty has been trying experiments with a view to get at the best way of reflecting the electric light without loss, a problem that is likely to concern the photographer very closely ere long. Most of our battle-ships carry the electric light for the purpose of sweeping the seas in search of torpedo-boats contemplating a night attack. It would be the aim, of course, of the torpedo launch to destroy the light apparatus as soon as it could, and for this and other motives the swift little craft is armed with small but powerful guns. The battle-ship, on the other hand, is seeking to protect its source of light behind armour, and then to bend the rays in the proper direction by some suitable apparatus.

Both lenses and reflectors have been tried on board the *Sultan* at Portsmouth, and her captain has come to the conclusion that a dioptric lens is by far the best apparatus to employ. A reflector made of Chance's glass, and carefully silvered, proved tolerably serviceable, but the bright light travelled a much greater distance when aided by the lens. The smoke and steam of a torpedo launch can be plainly seen a mile off, for the rays strike against the vapour as it would against a solid screen.

One hundred and eighty pounds is usually quoted as the highest price paid for any negative—the sum given by Messrs. Marion and Co. to Mr. Watkins for a photograph of the Prince of Wales in Masonic dress. But negatives ten times as valuable have been in existence, which have been simply too costly to sell. A recent example of a valuable cliché is that of "You Dirty Boy." This well-known statuette is by Giovanni Forcadi, the same sculptor who produced "I'm First, Sir," two ragged newspaper boys touting for customers. The right to photograph this last was sold for ten pounds, and the sculptor would willingly have parted with the right of "You Dirty Boy" for twice that sum, before the work was exhibited at the Paris Exhibition.

But after its exhibition matters were different; the statuette began to attract, and when the sculptor was asked a second time to sell the right of photographing it, he demanded one hundred pounds. Nevertheless, the would-be purchaser had foresight enough to pay the money, and the sum he realised by selling photographs of "You Dirty Boy" passes the wildest imagination. Some say that the profits were no less than ten thousand pounds; but be this as it may, the lucky speculator gained sufficient on this single work to ensure him comfortable retirement. Subsequently £1,600 were paid for the exclusive right of employing "You Dirty Boy" as a trade mark, of which the possessors are the well-known soap makers, Messrs. Pears and Co.

Topics of the Day.

NOTES ON DARK-ROOMS.

BY COSMO I. BURTON.

Within the last few years—in fact, since the introduction of gelatine emulsion—the construction of either permanent or temporary dark rooms has become a very different problem from what it used to be. I was going to have said in the days of collodion; but, to be cautious, I will say before the days of gelatine.

I think we may classify dark rooms under five heads, according to what we might call their degrees of darkness.

1. Under this head come rooms for working processes less sensitive than the ordinary silver printing process, such as the copying of tracings and the like. About this quality of dark room there is not much to be said, because generally one thickness of ordinary yellow blind cotton is a sufficient protection against any but summer sunlight, for which two thicknesses are advisable or even necessary.

2. To pass on, then, to the second head, which includes all the ordinary printing processes, ranging in sensitiveness from the common silver printing up to the slowest dry collodion. These, again, require very little remark, except that, I think, for amateurs, unless they work very large sizes, a special room for printing is quite unnecessary. I have always found it most convenient to use a pantry with water laid on, and to tone at night by lamplight. Here a word of warning to the inexperienced: it is necessary always to use the same kind of light for toning by, or you will be sure to have your prints irregular in colour. I have always used a paraffin lamp, because I had no gas, and having got accustomed to it find it does very well; but I believe a whiter light would have been better, as, for instance, a colza lamp; but, as I have begun with the paraffin, it is best to keep to it.

3. The third class of dark rooms includes those intended for the collodion process in any of its multitudinous forms. Perhaps it would have been more correct to have divided dark rooms into only three heads, because it is here that it begins to be really necessary to exclude light, except that of the proper colour, which ought to be yellow. Red light is very dangerous when working with iodide of silver in in any form; and a red light which appears to the eye not to be so strong as a yellow light will yet produce more fog on a wet collodion plate, as I know from bitter experience; yet, notwithstanding this fact, it is strange what an amount of white light one may have in a collodion room, supposing that you have an opaque bath, and the light all comes from one direction, so that you may turn your back to it in developing. For the window of such a room, I decidedly prefer yellow glass or oiled yellow paper to blind cotton, as the former lets through more light, and that of a purer yellow colour than the latter; however, this is a matter of taste, and of no real importance. I therefore hurry on to class—

4. Dark rooms for working ordinary gelatine emulsion in. Here the real difficulty of dark rooms may be said to begin. The first object is to exclude all light whatever. When I first made a dark room for working gelatine emulsion in, I chose a large press, about ten feet by six: went inside, and shut the door; then began to congratulate myself on having got a room perfectly light tight, except under the door; this was easily corrected by means of a piece of old carpet laid on the floor so as to cover the crack. Then I was about to proceed with my self-congratulation, when I saw light coming from a crack at one corner, then from along the angle of the roof and one of the walls, then from another corner, and so on; in fact, when I had been in that place for a quarter of an hour, I could see light streaming in at every corner, the very walls seeming transparent; so there was half a day's work pasting up brown paper before that room, which I at first supposed perfect, before it could be considered safe to work a sensitive plate in. And here I would remark how extraordinarily difficult, it sometimes is to see where light is coming from; you may see a spot of light on the wall of a room, but to see where it has come in is sometimes by no means simple, especially if the light has been once reflected off a mirror or a piece of glass. I remember once noticing a bright spot of light on the roof of an ordinary room; it was obviously produced by the reflection of the sun from somewhere, but where the reflecting surface might be I could not for the life of me make out. However, my curiosity being excited by the matter, I at last climbed up, and got between the window and the spot of light on the roof, and then observed that it was reflected off the edge of a crack in one of the panes of glass in the window. I give this merely as an instance of how difficult it may be to find out at once where light is coming from.

The press which I utilized as a dark room had no window, otherwise the difficulty of making it dark would have been somewhat increased, though not very much, I think, because it is comparatively easy to shut out light like that from a window where there is no doubt about it. What is really difficult is to make all the cracks and crevices of a room light-tight; but though it is easy to permanently darken a window, it is by no means easy to do so temporaily, if the room, for instance, be required for other purposes than photography. I have seen this very neatly done, in the case of a skylight, by placing a piece of carpet over the window, which could be pulled up and down by means of two strings. The arrangement, when I saw it, did not work well, but I think that the construction was to blame, and that the theory was good; but this arrangement was not sufficient to make the room completely dark; it was necessary to have a shutter besides, which, in the case I am describing, was made of a very light wooden frame covered with paper, and painted black. This was supported in the window by means of two light springs of ash wood, which were fixed on to the frame, so that they could be turned round and made to grip on the sides of the window. I recommend this method to all who have such a window to darken; of course, the shutter would work equally well in almost any window.

And now I pass from methods of keeping out light to methods of admitting it—that is, to the much-discussed problem of a light for the dark room. The most conflicting opinions are constantly expressed on this subject by different writers; one saying that you must work with no more light than one candle behind two thicknesses of the deepest ruby glass; another affirming, with equal confidence, that it is quite safe to work with daylight and one thickness of yellow or orange glass. I do not admit the truth of either of these statements, and in my own case try to hit the happy medium, always keeping on the safe side, and having too little rather than too much light; and as convenient a way of working as any, I think, is to put the plate in the slide in darkness, and do not have any light at all till after the plate is in the developer, when a little white light will do no harm, and it is much easier to see how the development is going by white than by red light. At different times I have used many different kinds of light; the one I have used oftenest is simply a candle inside a ruby funnel; but this light is very feeble, and white light escapes by the top of the funnel, unless it is covered in some way; also the funnels are expensive, and break very easily. The reason for this I believe to be that they are not properly annealed after being flashed or covered with a thin coating of red glass to give them their colour. In constructing a permanent dark room in a friend's house, I made a very convenient and safe light by taking a brick out of the partition between his laboratory and workshop, covering the space with one or two thicknesses of ruby paper, and placing a gaslight at the other side. This arrangement did exceedingly well, and it is easier to take a brick out of an ordinary partition than most people suppose.

5. The fifth and darkest class of dark rooms are those used for preparing and working emulsions for special purposes, such as the photographing of the spectrum, as in the case of Abney's researches into the photography of the red and ultra-red portion of the spectrum. The light he used was a candle placed behind ruby glass at a distance of twenty feet from his working table, and even that light was not safe for some of the processes in the preparation of the emulsion. But as I have never worked in a dark room of this kind, I have no more to say on the subject.

ON PHOTOGRAPHIC ADVERTISEMENTS.

BY CLIFTON CLIFF.

There are a good many people about who hold with the doctrine that a business of any kind cannot be made to pay without liberal advertisements. It is reported, and I believe truly, that one patent medicine vendor spends no less a sum than £50,000 per year in advertisements, and it is argued therefrom that the more we advertise, the more business we get. This is to a certain extent true, the main point being, however, not in the quantity of advertisements, but in their quality and genuineness. The gentlemen in question has, without doubt, realised an immense fortune; but the question that arises in thinking minds is, whether it was the advertisements, or the quality of the goods advertised, that helped him to do so. In my opinion, neither the one nor the other, taken separately, would have had the desired effect; it has been the combination of the two that has led to the happy result. Had the medicine been advertised as better than everybody else's, and able to cure every disease, and upon trial have turned out useless, I do not think all the advertising in the world would have made the sale for it that it now has. This is a point we should seriously consider before we spend our capital on advertising.

I recently had a photographer's circular put into my hand, in which the firm sending it out, stated that their studio was the finest in London—that their portraits were the best in England—that they were more highly finished than elsewhere, and wound up by stating that their price was 3s. 6d. per dozen.

Now, I would ask, is this kind of advertisement likely to make the fortune of its originator? Most people now-a-days are endowed with at least a modicum of common sense, and such being the case, they cannot fail to see that the advertisement is, on the face of it, mere bombast. They would naturally ask themselves, "How is it that if this man takes the best photographs in England for 3s. 6d. per dozen, there are people who go to other studios and pay double, treble—aye, and quadruple—for portraits which are inferior?" An advertisement of this kind is likely to bring an influx of business at the moment of issue; but are the people likely to come again or to recommend their friends? The margin left after deducting cost of materials and rent would necessarily be very small indeed, and the operator who could turn out the "best photographs in England" would not be very likely to accept the salary that the advertiser would be able to afford to give. Then, again, come the gentlemen who advertise that they are using a process that nobody else is allowed to use, and turn out, in consequence, superior photographs to all others. This is just as bad as the other sample. A few people may be cajolled into sitting, but they do not find such a very vast difference in the resulting proofs, and they don't try a second time.

One advertisement recently shown me in a provincial paper was unique; it specially requested mothers not to bring their leather-lunged and squalling brats to a certain studio, as they would not be taken, and also requested gentlemen from the country not to bring so many samples of different earths and clay on their boots and leave them on the reception room carpet. It wound up by requesting visitors not to be misled by another photographer who had hired "a second-hand stable" as a studio. This I conceive to be a sample of the very worst system of advertising. It is true it would makethe originator known, but, I cannot help thinking, would serve rather as a warning to avoid that studio, and accept even the alternative of the "second-hand stable." Another original gentleman, through the medium of an advertisement, asked his lady sitters not to come to him with their "hair done in the hideous skull-cap fashion now so prevalent." This, I opine, was not at all likely to make the ladies flock to that photographer.

Not very long since, an enterprising gentleman in the suburbs of London tried a novel method of advertising. He had some thousands of little circulars printed, and worded something to this effect: "Coupon.—Messrs. Camera and Lens hereby agree to take twelve carte-de-visite portraits of bearer for the sum of two shillings and sixpence. This coupon is only available for one month from date." These coupons were distributed far and wide all over London. The bait took, and people rushed to the studio. The operator was working from early in the morning till dark, exposing instantaneous plates, and developed them after. The pictures were, I believe, fair ones, and though the same rush of sitters did not continue after the month, still I believe the advertisement considerably increased the business. Personally, I should not care to follow suit; I merely give the instance as one more sample of how photographers do advertise. Messrs. Camera and Lens did not say that the pictures would be superior to anybody else's, and the public did not expect them to be, so there was no deception. Had they have stated anything of the kind, though the first rush would possibly have been as great, I rather question if any permanent increase would have resulted.

One of the best methods of advertising is publication of good portraits of celebrities. Do you live in London, there are plenty of well-known people who will sit to you for the asking; it is a cheap method of getting your name known to the public, and a good one at the same time. If you live in a provincial town, there are the local clergy and the doctors; secure good pictures of these, and you secure their congregations or their patients, as the case may be.

One of the best newspaper advertisements I ever saw was something like this—

YELLOW & OKER,
Photographers and Miniature Painters,
1927, Broadway,
Old York.

At first sight it looked like a business card lying diagonally across the columns; everyone who saw the paper, necessarily saw the card. There was no puffing of patents or anything vulgar about it, but I do not doubt it had more effect than nine-tenths of the preceding kinds.

A very good dodge is to take gratis portraits of editors of local papers, who in return give a paragraph notice of your studio, which brings in far more than the portraits cost you.

If there is a "Literary Institution" in your town, join it; it all brings grist to the mill. But whatever you do, there is one thing I would warn all against: if you are religiously inclined, and a Dissenter, don't let it be known that you are opposed to the Church; or if you are a Churchman, be as friendly as possible with the Dissenters. Don't go and address meetings convened by the Church Association, or any other such warlike body; and, above all, don't dabble in politics; whether you be liberal, conservative, radical, or ultra-radical, let it not be known; we vote by ballot, so no one need know your opinions unless you openly proclaim them.

Possibly the best advertisement of all is to turn out uniformly good work; in a dozen pictures, don't let one bad one go, "just to make up the number, you know," for ten to one that single bad proof will do you more harm than the eleven others will do you good. Overhaul your specimen cases as often as possible, let no mediocre work be exhibited, and see that no fading pictures are left in the case a day longer than necessary.

Correspondence.

PACKING GELATINE PLATES.

Dear Sir,—Referring to a letter in the Photographic News of the 23rd ult., from a New Zealand correspondent, respecting fog in gelatine plates, supposed to be caused by the paper used in packing, I beg to say that I have met with the same difficulty, perhaps in a slightly exaggerated form, and have lost a large quantity of plates from that cause alone. For some time I was quite at a loss to understand the phenomenon, and attributed it to a defect in the dark slide.

One day, on developing a plate, I was astonished to find not only the usual fog, but part of the instructions for developing, plainly marked on the plate.

I may add that the plates used were all from one well-known maker. I have found three such negatives, and have forwarded them to you per rail for your inspection.—Yours truly, Chas. W. Horsley.

CARELESS TREATMENT OF EXHIBITS, ETC.

Dear Sir,—As yet another testimony to the fact that I am far from being alone in my complaint as to the above and other matters, I send you the following extract from the *Artist* for January:—"Great grumbling is going on from correspondents in the photographic periodicals about careless packing returns from the London Society's Exhibition. It is to be hoped it will have some effect. This deponent will testify that years ago he had an expensive set of frames much damaged from the same cause, and he ceased both membership and exhibiting for that reason. There are other details attention to which some correspondents think the 'parent Society' might be the better for."—Yours truly, H. A. H. Daniel.

EXHIBITION OF PHOTOGRAPHIC APPLIANCES.

Dear Sir,—Will you allow me to call attention once more, through the medium of your pages, to our Exhibition of photographic appliances? The day by which all those who wish to exhibit were requested to send in applications has just elapsed, and, I am glad to say, the number of applications is such as to render it certain that we shall have a very interesting and instructive exhibition. There must, however, be many more, both amateur and professional photographers, who have special pieces of apparatus, or illustrations of special processes, which it would be desirable that others interested in the science should have an opportunity of seeing. A good many such have already promised their assistance. Will you help me in making it known, to those who have not already done so, that the Society will be glad to receive further contributions, and that I myself am prepared to furnish any further information in my power to anyone who thinks it worth while to write to me on the subject? Most of the principal makers of photographic apparatus have liberally responded to my application, and I hope those who have not promised to assist will do so before the time comes for the Exhibition, which it is proposed to open on the occasion of the first lecture of Captain Abney's course here, namely, the 30th of January.—Yours faithfully, H. T. Wood, Secretary.

THE ELECTRIC LIGHT.

Dear Sir,—I was much interested, as no doubt were many more of the fraternity, with Mr. Swan's letter in your last issue, as a communication from a gentleman of his standing comes to us with authority.

It has long been my desire to obtain photographs by the electric light, and I, in conjunction with a friend, have tried many experiments to that end, but without much good effect. Now it appears to me that we have been kindly put in the right path.

Would Mr. Swan increase the obligation by clearing up a few difficulties which beset the experimenter in the first outset?

What size Bunsen elements, for instance, would be necessary to charge a secondary battery of forty cells? And of what size should the latter be? How are we to know when the secondary battery *is* charged? Again, when experimenting with Planté's accumulator, we have always found the charge either too weak or too small to be of much effect for photography. And in trying to construct a Faure battery, we were brought to a standstill by not knowing how to keep the red oxide of lead (which is a powder) upon the lead plates.

If Mr. Swan would clear up these few difficulties, he would be conferring a favour on many, and on none more than your Constant Reader.

ERASING HALATION FROM A NEGATIVE.

Dear Sir,—I have seen a good deal in the News of late about halation, and it referring chiefly to interior pictures, and my fancy being landscape, I have not followed the whole of the correspondence; but having a night with nothing particular to do, I just looked over my negatives of our first Society's trip of 1881 to Wingfield Manor, and found a negative which well illustrated the subject of halation. It was a negative of the crypt, which had been taken on a commercial plate, and was exposed for fifteen minutes during a bright period of the day.

No. 1 print is from the negative as developed, which you will observe has halation or blur round the doorway to such an extent as to totally obliterate all idea of a door. No. 2 print is from the same negative after I had played with it half-a-hour. My experiment was simply this: I got a bit of clean chamois leather, and soaked it in a solution of glycerine and water, about six drops of glycerine and two drachms of water. I then commenced careful rubbing on the negative with the piece of damp leather round the end of my finger. The gelatine soon became soft, when great care is required not to break it, but with a light touch, I believe all the detail can be brought out of the densest blur. Those who try this will find, after rubbing a short time, the leather will become very dirty, and a clean place on it must be taken, and so on, until the detail desired is brought out.

I hope this will be of as much service to the readers, as many hints I have got from the News have been to me.—Yours respectfully, W. B. Hadfield.

[The specimens sent well exemplify the value of this simple means of improving a negative which is marred by halation.—Ed. P. N.]

Proceedings of Societies.

Photographic Society of Great Britain.

The usual monthly meeting of this Society was held on Tuesday, at 5, Pall Mall East, the President, J. Glaisher, Esq., in the chair.

The following gentlemen were elected members of the Society:—Messrs. J. Jackson, C. R. Wilkinson, John Clarke, Q.C., and W. Brewis.

A paper "On Drying Cupboards," by Captain Abney, was read by Lieutenant Darwin. Captain Abney stated that after Mr. England described his drying-box some months ago, he found it answered perfectly, save in hot weather, when he found there was a difficulty in getting the plates to set quickly. He found also that the iron rods on which the plates rested left markings on the plates, and that the soot deposited on the chimney by the gas jet sometimes fell and caused spots on the plates.

Mr. England said he had never been troubled with the difficulties referred to by Captain Abney. He used a straight jet somewhat similar to the jets used in cigar shops for lighting cigars. If a flat flame which touched the sides of the chimney were employed, he could well understand how soot could be deposited. He had had his boxes in use for two years.

Mr. W. Bedford said he had used Mr. England's box, but instead of wires he had iron castings planed on the upper surface. He found, however, a difficulty from the iron being colder than the surrounding air, and he overcame this drawback by winding string evenly over the iron, and resting the plates on the string. Mr. England's plan of keeping up the circulation of the air answered very well in cold weather, but in hot he found an advantage in adopting Mr. Kennett's method, by which the products of combustion were not carried into the chamber.

Mr. Maxwell Lyte thought from his experience that drying by means of a gas jet produced insensitiveness. He used therefore to dry by means of air made warm by a hot water pipe and by sulphuric acid and quicklime.

Mr. England had tried boxes for drying sensitized paper warmed in hot water, but had not found them answer. He might observe, with regard to the markings mentioned by Capt. Abney, that he now used the wires curved, so that the plates only touched the wires at the edges.

Col. Wortley had found a box heated by means of a hot water coil to answer perfectly. He believed in a thorough desiccation of gelatine plates, as he had found greater sensitiveness therefrom. For this reason means should always be adopted to carry away damp air from the box. Some time ago he had a packet of plates sent to him which were quite damp in parts, so that they stuck together; but after they had been thoroughly dried they gave very good results, save in those portions affected by the damp. He also thought that the plates should be dried quickly, and immediately after they had set. After many experiments he had come quite to this conclusion.

Mr. Woods observed, with reference to Mr. England's remark as to flat flames, that Capt. Abney used a straight jet. No smoke could be seen, but it gathered after a time on the chimney.

The President then announced that the Progress Medal had been awarded to Mr. Leon Warnerke, and in so doing welcomed that gentleman back from Russia, and asked him to favour the meeting with any observations he might be able to make in reference to his Russian experiences.

Mr. Warnerke observed that he had really very little to say, since Russian photographers derived most of their ideas from England. In the course of his remarks, however, Mr. Warnerke referred to the fact that in Russia the gelatine process was scarcely used, and was in reality a novelty. In respect to drying-boxes, the difficulty he had found in Russia was not so much how to dry the plates, as to keep them from drying too quickly. This arose from the dry atmosphere, and the construction of the houses. He did not think that plates dried too quickly were so good as a more gradual desiccation. A plate dried in from two to three hours was, for instance, better than one dried in an hour. In regard to wet collodion, it was sometimes supposed that the light in Russia was of greater actinic power than in England. This, as tested by the actinometer, was found not to be the case, yet the exposures were shorter than in England, because of the absence of fog. In respect to the electric light, Mr. Warnerke mentioned that M. Levitsky employed it almost entirely, even in daytime, frequently making use of daylight to light the shadow side of the face only. Mr. Warnerke also referred to a plan he had adopted for determining when the ground glass in photographing architectural subjects was vertical, and referred to a method of hot-pressing adopted in Russia, by which results equal to enamelling could be obtained.

Col. Wortley said, in respect to drying gelatine plates quickly, he did not mean that they were to be dried as quickly as possible. The plan he adopted was to place the plate in the drying cupboard about seven o'clock in the evening. The flame heating the hot water apparatus was then turned off, and the pipes remained at a constant temperature of 80° to 88° two to three hours, and then gradually cooled, so that by morning the plates were quite dry.

The President announced that nominations for the Council must be sent in by Jan. 23rd, and Messrs. Acland and Heaviside having been appointed auditors, the meeting adjourned.

South London Photographic Society.

On Thursday, January 5th, this Society held the annual popular lantern meeting, at the house of the Society of Arts, Adelphi, Rev. F. F. Statham (President) in the chair.

The meeting was certainly as successful as any ever held in every way. The large room was packed, about 400 members and friends being present. We understand that as many as 850 slides were passed through the lantern. The addition of a little music was a great point. The lantern was most admirably managed by Mr. W. Brooks, and the music and reading were also ably done by Mr. F. A. Bridge. Altogether, the whole meeting was a complete success, and reflected great credit upon the management.

The Chairman made a few remarks relative to the purpose of the meeting; and the first slides shown were some excellent views in Switzerland, Isle of Wight, and the Paris Exhibition, by Mr. W. England.

Mr. Nesbitt then showed very good slides of sea views and shipping, and some excellent groups of gipsies on Mitcham Common.

Messrs. Harding then favoured with a song, "Darby and Joan."

Mr. W. Brooks then passed through the lantern some of his own slides, the most noticeable of which were an exceedingly fine portrait of the President, some views in Cornwall, and one of the best slides of the evening, "A Breaking Wave."

Mr. W. B. Bolton was the next exhibitor, his contributions consisting of some Welsh scenery; also a group of gentlemen whose names are household words in the photographic world. We presume this group was taken on one of the Saturday outings of the Photographic Club. In connection with this slide, Mr. F. A. Bridge said the *poet* of the Society had composed a few lines, which he sang as follows:—

"'Twas on a summer's afternoon,
A lovely day in the month of June,
These brave Camaronians went to test
Which made emulsion plates the best;
And when their stock of plates was done,
Their stock of chaff was soon begun
By Williams, and Wilmer, and W. Brooks;
But Cutchey grew touchey, you see by his looks.
Then on Chislehurst Common a wager was laid,
Was lost and won, and duly paid,
That W. B. and W. C.,
In a race upon donkeys, as here you see;
But when the donkeys felt the weight
Upon their backs of each, six stone eight,
They vented their mirth in a comical way,
Then kicked up their heels and galloped away.

Some interesting slides by Dr. Maddox followed.

Mr. H. Garrett Cocking then sang, "What will you do, Love?"

A series of slides by Mr. Payne Jennings were then shown; amongst others, four of them depicting the meeting of the waters.

Mr. F. A. Bridge then sang Moore's "Meeting of the Waters," as the slides were passed on the screen.

Some exceedingly good pictures of ancient buildings in London, by Mr. H. Dixon, and some of the well-known animal photographs of Mr. T. J. Dixon, were shown.

Mr. Harding then sang, the "Well of St. Keyne."

Mr. F. Howard's slides of views at Dorking, &c., and the interior of several cathedrals, were very good.

Some good photographs by Dr. Plaistow were then shown; also pictures of considerable interest by Messrs. Wood and Foxlee.

Mr. W. England then exhibited some excellent slides of statuary, the effects with different colours thrown on the screen, one after another, being remarkably fine.

Mr. H. Garrett Cocking then sang, "Love was once a Little Boy."

Mr. F. A. Bridge then proceeded to read the story of "Little Nell," illustrated by slides by Mr. York. These slides are a novelty, inasmuch as they are photographed from life, with pictorially painted backgrounds. The effect was good, both in this and the subsequent story of "Meg and her brother Ben."

Other slides followed by Messrs. Ayres, Pearson, and England, and some further music closed one of the best meetings it has been our good fortune to attend.

Thursday Evenings for Photographers.

At the meeting held on January 5th, 1882, Mr. Coles occupying the chair,

The question as to the best method of cleaning glass beakers, test-tubes, &c., was discussed, Mr. Cutchey recommending the use of "Smith's Cleansing Powder" for the purpose.

Mr. Henderson exhibited a mixture of ox-gall and gelatine prepared in March, 1880. The gelatine and ox-gall were thoroughly incorporated, and the only odour to be detected was a slight smell of methylated spirit. He also showed an improved form of cutter, for trimming paper prints, made on the principle of the wheel glass-cutters.

Mr. Cowan exhibited a sensitometer he had constructed after the plan of that shown and described by Messrs. Macklow and Spurge at the last meeting of the Photographic Society of Great Britain. The apertures, in this case, were so arranged that each admitted double the amount of light admitted by the one preceding it. The phosphorescent tablet was prepared by melting paraffin wax, and shaking sulphide of calcium into it.

The Chairman passed round specifications of "Schönheyder Patent Sanitary Stove," which he thought photographers would find of great service in drying plates.

Sheffield Photographic Society.

The usual monthly meeting of this Society was held at the Freemason's Hall, on Tuesday evening, January 2nd, Mr. T. H. Morton, M.D., presiding.

The minutes of the last meeting having been read and confirmed, the arrangements for the forthcoming exhibition were again brought forward, when it was resolved that coloured photographs be deemed admissible. It was also agreed to hold the lantern entertainment in a room adjoining. From the Committee's report, the exhibition promises to prove a satisfactory addition to the annual gathering.

Mr. Hadfield described an effective method of dealing with excessive halation in gelatine negatives (see page 22).

Mr. Stringfellow related a peculiar circumstance connected with a gelatine plate. His assistant had taken several whole plates in ordinary double slides for outdoor work. On handing over the plates to develop, one of them showed no image when immersed in the alkaline pyrogallic solution, proving that a mistake had been made in exposing. The plate was washed, drained, and placed, while still wet, in the camera, and exposed the usual time on an object in the studio. It was then immersed in the same developing solution previously used, and came out a first-class negative.

Mr. RAWSON exhibited a number of stereo. and other pictures.

Mr. DAKIN contributed a few platinotype prints for the album.

Mr. PATTERSON, of Ramsay, Isle of Man, exhibited views of some of the fine scenery of that island.

Messrs. D. H. CUSSONS, of Southport, sent copies of their pocket almanac for distribution.

The meeting shortly afterwards adjourned.

NEWCASTLE-ON-TYNE AND NORTHERN COUNTIES PHOTOGRAPHIC ASSOCIATION.

THE annual meeting was held on Tuesday evening, January 10, at the Crown Hotel, Clayton Street, Newcastle-on-Tyne. Before commencing the business proceedings a large number of members and friends, including many ladies, partook of an excellent tea.

The chair was then taken by Mr. JAMES DOWNEY, who called upon Mr. J. B. PAYNE (Hon. Sec.) to read the annual report, as follows :—

"Your Council, in offering to you their First Annual Report, have much pleasure in pointing out the marked and gratifying success attained. At the preliminary meeting held just twelve months ago, there were 25 promises of membership received. At the present moment there are 67 members and two hon. members. The attendance at the ordinary monthly meetings has been very satisfactory, averaging fully two-thirds of the number of members enrolled. The attendance at the out-door meetings was not so good, and in consequence of this, the Association has suffered a small loss, as will be seen from the Treasurer's report. The best thanks of the members are due to the Council of the College of Physical Science, the Council of the Literary and Philosophical Society, for the liberal manner in which they have assisted the Association by placing their rooms at our service; also to Dr. Berwick, and Prof. Freire Marreco, and Mr. Gibson, for the contribution of papers; and to Dr. Berwick, Messrs. Laws, Gibson, Muras, Mendelssohn, &c., for the contribution of photographs. Three Lantern Exhibitions have been held, and proved fairly successful. Your Council hope that the members will take this branch up a little more vigorously, especially in the production of transparencies. Much may be done in this way in assisting each other by exchanging slides. The Association is indebted to Messrs. Mawson and Swan, for the loan of lanterns and screen, Messrs. F. York and G. Smith, of London, Messrs. Coote, Chadwick, Leigh, and Woodward of Manchester, for the loan of slides. The following members have also lent transparencies for lantern exhibition, viz.:—Messrs. Armstrong, Berwick, Gibson, Grimshaw, I'Anson, Laws, Marreco, Payne, J. H. Robinson, Sawyer, &c. As the success of the Association depends mainly upon the individual interest taken in it by the members, your Council hope that a liberal supply of papers, or subjects for discussion, will be brought forward at the ensuing meetings, and rely upon your generous support."

The Treasurer's balance-sheet showed that the Society was in a satisfactory financial condition.

The reports having been unanimously adopted, Messrs. Gray, Freeman, and Burrows were elected members, and the following gentlemen as officers:—

President—Mr. J. W. Swan, F.C.S.

Vice-Presidents—Professor A. Freire Marreco, M.A., and Dr. G. Berwick.

Treasurer—Mr. P. M. Laws.

Council—Professor Herschel, M.A., Messrs. H. S. Mendelssohn, J. Downey, E. Sawyer, L. Davidson, A. L. Stevenson, and W. Armstrong.

Hon. Secretary—J. B. Payne, F.R.M.S.

The business having been disposed of, the meeting took the form of a social gathering, songs, readings, &c., being contributed by the ladies and gentlemen. Too much praise cannot be accorded to Messrs. Sawyer and Son, for the very handsome manner in which they devoted themselves to the entertainment.

Talk in the Studio.

CANTOR LECTURES.—The next course of Cantor Lectures at the Society of Arts will be on "Recent Advances in Photography," by Captain W. de W. Abney, R.E., F.R.S. The first lecture will be given on January 30. It will be introductory, and will treat of the action of light, development, the Daguerrotype process, &c. The different molecular forms of the silver haloids, and the sensitiveness of the different salts of silver, will form the chief subject of the second lecture. Dry plate processes, instantaneous pictures, enlargements, the applications of photography to science, will be treated in the third lecture; while the fourth will be devoted to printing processes and mechanical printing processes, including photo-engraving. In connection with the lectures, an exhibition will be held of photographic apparatus, illustrations of new processes, &c.

To Correspondents.

CHURCH STREET.—We have reason to think that your assistant is quite right in his conjecture; but before making any claim for compensation, you must be in a position to establish this view. Possibly a satisfactory way would be to cut a print in halves and to mount one piece on the questionable card and the other on a sample of card which has proved safe; both prints being then kept in a moderately damp place for a fortnight. Let us have further particulars.

CRUCIBLE.—Rather over 6,000 grains if the sulphide were pure.

F. STANLEY.—We should be inclined to suspect the mounts. Before sending out any more pictures on the cards in question, it would be well for you to try the experiment suggested in answer to CHURCH STREET. We will test the cards for the presence of hyposulphite.

LITTLE PHOTO.—The negative is a very good one indeed; but it would print better if you were to print in a slow light, or to shade the printing frame with a few thicknesses of tissue paper. A weak sensitising bath for the paper will be found most suitable for such a negative. You must remember, however, that the variations now proposed will render the operation of printing much slower.

HANTS.—The formula you enquire for is as follows:—Citric acid, $\frac{3}{4}$ ounce; white sugar, $\frac{1}{2}$ ounce; ninety-grain solution of silver nitrate, 1 ounce. After these have been ground in a mortar, 16 ounces of the same silver solution are added. Blistering seldom occurs when a strong bath has been used.

THETA.—1. You will have no difficulty, provided that the original from which you enlarge is small enough to be well within the ordinary covering power of the lens. The lens you mention will enlarge from carte-de-visite size to any magnitude. 2. There is no such manual at present.

EDWARD FREWING.—No particulars are given, but we are tolerably sure that the following would answer well:—One ounce of white of egg, one ounce of water, and thirty grains of bichromate of ammonium. Let us know how you get on, or any difficulty you may meet with.

MANCHESTER MAN.—The rough milboard boxes are made to order by any paper-box maker, and the grooved wooden boxes are kept in stock by all dealers in photographic apparatus.

A POOR PHOTO.—1. Cut up the cardboard, and make a strong infusion in distilled water. Next filter this and test with a dilute solution of iodide of starch. A discharge of the blue colour indicates the presence of hyposulphite. 2. So great is the liability to fog, under the circumstances, that few use the addition you name; you can try adding a smaller proportion. 3. It depends on the condition of the bath; but five grains to a pint should do in ordinary cases.

A. LLOYD.—Will communicate with you by post.

MANFRED.—1. The sample marked "No. 3" is the most suitable, this being a genuine cardboard, and tolerably free from the various mineral substances often added to give weight or to form an artificial surface. 2. As regards the bronze lettering, it may be observed that mischief appears to have followed the use of such cards in some instances. There is no reason why real gold powder should not be made use of, as the quantity used is very small; one ounce, costing about £6, being sufficient for dusting no less than 20,000 devices such as you send on sample "No 5." 3. There can be no doubt whatever that if the firm you mention undertake to do the printing in gold, and inferior metal is used, they will not only be answerable for any damage done, but also liable to a prosecution for fraud.

LEICESTERSHIRE JOHN.—1. The mount for the panel portrait is 13 by $7\frac{1}{2}$, the size of the actual print ranging from $11\frac{3}{4}$ by 7 to 12 by $7\frac{1}{8}$; but to our taste this last is rather too large for the mount. 2. We will try and obtain the required information; and, if successful, will communicate with you by post.

J. LASHMER.—All these defects are certainly calculated to try one's temper, especially under the circumstances. Still, you should blame yourself for not having taken the simple precaution of trying one or two plates from each packet.

FERROTYPE.—The cut edges should be varnished. Dilute the bitumen varnish sold as "liquid jet" with twice its bulk of benzole, and pour out a layer a twentieth of an inch deep in a flat dish. All you have to do now is to dip each edge successively.

THE PHOTOGRAPHIC NEWS.

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CONTENTS.

GELATINE FROM A CHEMICAL AND PHYSICAL POINT OF VIEW.

Gelatine as a basis for the negative photographic image now holds a place comparable to that which pyroxyline held a few years ago; and in consideration of this fact it becomes necessary for the photographic world, and especially those who are engaged in the manufacture of plates, to take careful note of the general chemical character of gelatine, the manner in which it becomes altered or broken up by various reagents, and other circumstances which attend its reactions.

If a bone is soaked for some days in dilute hydrochloric acid, the whole, or greater part, of the mineral matter becomes dissolved out, and a soft cartilage-like mass, which retains the original shape of the bone, remains behind, this residue constituting the organic or essentially animal parts of the bone. The organic body thus obtained is known as ossein, and although ossein is in itself insoluble in hot or in cold water, it soon becomes changed into gelatine when it is boiled with water. This conversion of ossein into gelatine appears to be unaccompanied by any definite chemical change, the composition of the insoluble ossein and the soluble gelatine being apparently the same, and the following figures represent the composition of ossein or gelatine according to analyses which appear to be reliable.

Carbon	49·2
Hydrogen	7·8
Nitrogen	17·9
Sulphur	0·7
Oxygen	24·4
	100·0

Very many parts of the animal organism are of the same nature as ossein, if not actually identical with it; and among these may be mentioned the so-called connective tissue, the epidermis, tendons, and horn. All these substances are used in the industrial manufacture of gelatine, and the care or skill exercised in the manufacture determines whether the product shall be a fine white and clear gelatine, or the highly impure and partly decomposed product which is sold as a cheap glue.

The following may be taken as a general outline of the principal operations. As it is generally impracticable to use up the raw material as soon as it arrives at the factory, means are ordinarily taken to dry and preserve them, and this is effected by repeated immersions in a thick milk of lime, and drying in sheds specially constructed for the purpose. In this state the materials will keep well, and can be transported from place to place without difficulty or fear of nuisance. The next step is to re-dip into milk of lime, and when the dried animal matter has become softened, the lime which adheres to the surface is rinsed away, and the materials are exposed for some days to the air, in order that any lime which may have penetrated into the interior may become converted into carbonate by the absorbtion of carbonic acid from the air. In some cases a weak bath of chloride of lime is used at this stage, in order to partly bleach the animal matters. The still damp and soft materials are next boiled in water until those parts capable of transformation into gelatine have dissolved. In order to facilitate the removal of insoluble residues, which always remain behind, the skins and so forth are contained in a kind of metal colander which fits into the boiler, and can be lifted out at pleasure.

Two methods of clarification of the hot liquor are in use, alum being generally used when there is sufficient lime in the gelatinous solution to render it decidedly alkaline; and albumen is ordinarily employed when the solution is neutral or slightly acid. When alum is used, about one ounce is added to each hundredweight of hot solution. The reaction of the lime and the alum causes the deposition of a precipitate of mixed sulphate of lime and alumina, which precipitate carries down various impurities with it, five or six hours being ordinarily allowed for the hot solution to settle. When albumen is used, it is stirred into the hot solution, and, in coagulating, it carries the impurities to the surface.

The gelatinous solution is, in this country, usually allowed to set in flat receptacles, tables covered with plate glass being used for the finer kinds; while in France it is usually allowed to set in large rectangular moulds, the blocks thus obtained being afterwards cut into leaves or flakes. In any case, the flakes are spread on nets to dry—the operation of drying being one requiring the exercise of the greatest care and judgment.

The following method of purifying a commercial gelatine is so effectual that a highly satisfactory article can be obtained from the crude and impure gelatine sold as a low-priced glue.

The solution is allowed to gelatinize, and the jelly is cut up into fragments, and tied up in a coarse cloth. This is next placed in frequent changes of water which is slightly warm, but not hot enough to dissolve the bulk of the jelly. After the greater part of the colouring matter has been dissolved out in this way, the residual jelly is dissolved and strained; its own bulk of alcohol being then added. A clot of very pure gelatine is now thrown down.

Moist gelatine rapidly decomposes and putrefies in the air, but the addition of carbolic acid, alcohol, or ammonia, tends to prevent this. When subjected to dry distillation gelatine yields carbonate of ammonia and various basic oils. When boiled with water it is gradually changed into a body having nearly the same composition as gelatine, but soluble in cold water, this being usually called meta-gelatine. Cold sulphuric acid converts gelatine into leucine, glycocine, and other products, while hot nitric acid oxidises it, oxalic and saccharic acids being formed as principal products.

A substance very similar to gelatine, and known as chondrine, is obtained by boiling cartilage or imperfectly formed bone with water, and it differs from true gelatine by the fact that it is precipitated by alum, acetate of lead, and the sulphate of iron or copper. It is well suited for making carbon tissue, and it forms the base of the so-called grenetine, this being a high-class product manufactured by M. Grenet, of Rouen, from cartilage and the skins of young animals.

We shall pursue this subject in a subsequent article.

PHOTOGRAPHY IN AND OUT OF THE STUDIO.

Photo-Engraving in Russia—Photographs of Celebrities—Dangers from Electric Lighting—Mounting Photographs.

Photo-Engraving in Russia.—Backward as the Russians are in some of the civilized arts, they occupy the first rank as regards map-making, it being said that there are "one million and thirty thousand maps in store at St. Petersburg, Warsaw, Wilna, and Kieff, ready for any sudden outbreak of European hostilities." Before such gigantic productions as this, the stores at our Ordnance Departments pale into insignificance. Of course, it must be remembered that in Russia there are few private map makers, the Government undertaking the whole of the supply; but even then we doubt whether any other country with its private topographers turns out so large a quantity. At the recent geographical display at Venice, Russian maps attracted a considerable degree of attention from the beauty of the workmanship displayed—workmanship in which photography played an important part. The improvement in Russian maps dates from 1866, when the "Corps of Military Topographers," founded in 1796 by the Emperor Paul, underwent a re-organization. Since 1866 every improvement has been taken advantage of, especially improvements in photo-engraving, until it must now be said that Russia possesses the most complete map manufactory in the world. During the last two years special attention has been paid to photo-engraving, and the process in use, the invention of a Pole, is said to possess immense superiority over the zincographic process adopted by our Intelligence Department. The method employed is kept a profound secret, and therefore has never been patented; but those who are curious on the subject may see specimens in the way of reproduced engravings in Percy Thornton's "Foreign Secretaries of the Nineteenth Century," and reproduced maps in Hensman's "Afghan War." One especial feature would appear to be the possibility of making alterations during manipulation, so that foreign names can be exchanged for English equivalents, and *vice versa*. As to the superior accuracy of the Russian maps over the English ones, it may be noted that Colonel Valentine Baker, in his "Clouds in the East," says that when he visited the Perso-Turcoman border in 1873, the secret and confidential maps he took with him from the War Office were found to be so worthless that he threw them away, and made use of the beautiful Russian maps of the country. It may be said that the authority for the above remarks is the *Globe* newspaper, which has a tendency to exaggerate the importance of anything done in Russia supposed to have the remotest connection with any possible injury to "British interests," and therefore the statements may be taken with the usual grain of salt. Mr. Warnerke, in his recent interesting communication to the Photographic Society having reference to the progress of Russian photography, said that the Russians derived all their ideas from us. Can he tell us anything about this mysterious photo-engraving process which the Russian Government has obtained, not from England, but from Poland?

Photographs of Celebrities.—A dealer in photographs is now-a-days as good an authority as can be found on the degree of popularity which public favourites enjoy. A London newspaper has been collecting statistics—with no very great success, be it observed—as to the portraits which are most frequently asked for, and mentions the Princess of Wales, Mr. Spurgeon, and Sarah Bernhardt as occupying the first places. Poets are said to be only moderately popular, and of them Longfellow bears away the palm. So far as the photographs exhibited in the windows are concerned, we can scarcely agree with this dictum, save in regard to the Princess. Mr. Spurgeon is rarely seen in the windows, though, no doubt, his portraits command a ready sale; and Mr. Longfellow is more conspicuous by his absence than by his presence. On enquiry of a peripatetic dealer in photographs, an extensive trade which has grown up of late in the streets, we found, odd as it may appear, that Mr. Irving and Miss Ellen Terry were the favourites, the demand for members of the Royal Family being very limited—a proof, we suppose, of the lamentable tendency of the lower orders towards Republicanism. Without photography the illustrated papers would be in sad straits. When the marriage of Prince Leopold was announced there was a frantic rush for the photograph of the Princess Waldeck. Not one was to be had in the London shops, as might have been expected, and the possessor of even a shadowy resemblance of the lady would have commanded a fancy price for it.

Dangers from Electric Lighting.—Insurance offices have been so long accustomed to demand increased premiums from photographers on account of "extra risks," that they are not likely to lower their charges because explosive collodion is abandoned, and non-combustible dry plates only used. If the electric light comes into use for photography—and this is by no means a distant prospect—it is quite possible the offices will consider it their duty to further increase the payments, if certain statements which have reached us from America are to be relied upon. We are told that not long ago the woodwork over the entrance of one of the New York theatres was set on fire by a break in the insulation which brought the naked wire in contact with the wood. The current fired the wood and melted the lead with which the wood was overlaid. Again, three distinct cases of fire were traced in New York to the heating of the metal staples by which the wires were fastened. The Randolph Mills, in Pennsylvania, were burned down by particles of white-hot carbon falling on warps of yarn—a danger to the possibilities of which it may be remarked the authorities at the British Museum are quite alive, as transparent saucers are now placed under the light, so as to catch any incandescent carbon which may fall. In connection with this subject it may be mentioned that the Franklin Institute has recently reported on the dangers of electric lighting, and the committee recommend a number of precautions to be taken which they specify. If the asbestos paint, experiments in the fire-resisting qualities of which were made a few days ago at the Crystal Palace, be really an effectual safeguard, it should prove especially useful to prevent fire arising from imperfect insularity of the wires.

Mounting Photographs.—Apropos of mounting photographs, on which something was said a few weeks ago in the Photographic News, those who would prefer to use glue will find an advantage in trying the powdered glue of Messrs. Cannon, of Lincoln. Glue in this form is especially suitable for small consumers, as it can be made simply by pouring boiling water over the powder, and only the exact quantity needed can be melted. For economy, cleanliness, and ease of manufacture it is certainly superior to the cake glue.

At Home.

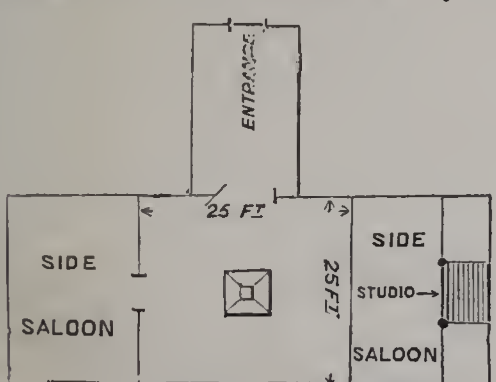
THE ATELIER ADÈLE IN VIENNA.

As in London, so in Vienna, it is difficult to say which studio is the very first. Nevertheless, we may say this of the Atelier Adèle, it is second to none in the Kaiserstadt; while we may also remark that in some respects it is the finest studio we have ever visited. In the first place, its glass-rooms—there are two of them—are not photographic studios at all in the ordinary sense, but brightly fitted *salons*. They are light, lofty apartments with elegant panels of white and dark wood, fitted with ornamental mirrors here and there, with a flooring of polished pine, and ornamental windows. The roof is of fluted glass, what glass there is, while the side light comes through matt glass windows, which have fancy panels figured over them. Everything appears as clean, bright, and new, as a modern dining-room or library, except that the woodwork is rather light, and there is an abundance of illumination.

There is little of photography in these elegant glass-rooms. A single camera is seen, and not even one example of a fancy background. Two or three plain backgrounds are all that meet the eye, with here and there a banner screen, made use of occasionally instead of the blue blinds, with which the glass may at any time be covered. One screen is exceedingly elegant. It is simply a light wooden frame, about five feet high, over which is negligently thrown two pieces of gossamer satin, one blue, the other white. Either one reflecting surface or the other is employed near the sitter as may be necessary, the delicate sheen of the glossy surface, either white or pale blue, yielding a very soft reflection; while to the eye, the pretty screen, with its shining fabric unstretched, is particularly pleasing.

Photographers who have not got on very well with gelatine plates, and still practise the wet process, may take consolation in the fact that the gelatino-bromide method is as yet unknown in the Atelier Adèle. "I have tried dry plates in my branch establishment on the Prater," says Herr Perlmutter, to whom, by the way, this beautiful studio belongs, "but only for equestrian portraits. But as I find I can get a very good wet collodion picture in the open air with a second's exposure, I do not find any necessity for adopting gelatine even there. I will not throw over collodion," continues Herr Perlmutter emphatically, "until I see that vastly superior results can be obtained with something else; and, in my opinion, gelatine negatives are not superior." It is only fair to say that the Vienna light is a very good light; the exposure for a cabinet picture is never more than seventeen or eighteen seconds, and frequently requires only twelve, while carte negatives are taken practically instantaneously.

The entrance to the Adèle studio is very imposing.



Viennese photographers have a way of locating themselves on the top floor of an hotel—Luckardt, it may be remembered, is to be found at the top of the Hotel National—and a stranger feels rather diffident at first about penetrating the depths, or rather heights, of a hostelry in order to pay a visit to the studio above. When, however, the summit of the Hotel Müller is reached, you are adequately repaid your trouble. Like the fine reception room of MM. Benque et Cie, in Paris, the Atelier Adèle is very dark. There are no windows in the broad corridor by which you enter, and you begin to think that they must have closed the shutters by mistake. The corridor leads into a central *salon*, still rather gloomy, for the two windows are draped with heavy curtains, and the furniture and floor are sombre to a degree. Everything is dark. The paper in one room is dark crimson, and in the other dark blue; here, in this apartment, the furniture is ebony and gold, in that, dark oak and gold; either drab velvet or dark satin covers the chairs; the floor is of dark polished wood, covered with dusky Turkey rugs; the portraits that are on the walls are deep and vigorous, and mounted in shining black frames, while even the books of specimens have dark binding.

In the centre of the main *salon* is a handsome vase with green foliage and fresh grasses, forming the middle of a luxurious settee. Altogether, the apartments are most richly furnished, and when once accustomed to the subdued light, you feel a repose and quiet in these cool drawing-rooms that is very enjoyable after the hot sunshine and dusty streets of Vienna. While waiting, the visitor may read some couplets over the doors, the gist of which is to warn him not to expect too much flattery from the camera. Here is one of them:—

Ein Schmeichler ist der Spiegel nicht
Er gibt dir immer dein wahr Gesicht.

The charge for cabinet portraits is fifteen florins per dozen, a florin being said to be equal to two shillings English, although it is not so much just now by threepence or fourpence. For boudoir portraits, a style as long as the well-known promenade or panel, but twice as broad, the cost is thirty-six florins a dozen.

Herr Perlmutter is occupying himself a good deal with equestrian portraits, as we have hinted; he finds that if it is difficult to secure a pleasing picture of man and horse, still, in the event of success, it is a success, indeed—both from an artistic and pecuniary point of view. In fact, Herr Perlmutter is thinking seriously of invading England, and coming to London to try his hand on this especial branch of photography, with which, our readers will remember, M. Disderi occupied himself at Brompton, many years ago. If there is work among cavaliers at Vienna, there must be ten times as much in our West End. It is a difficult task making good equestrian portraits, Herr Perlmutter admits; but he does not think photographers have ever fairly tried to do the work. If they did, they could not fail to get plenty to do, for those who own valuable horses are generally more anxious to get pictures of their property than of themselves. The number of people who own valuable horses is very large, and they represent a large *clientelle* to be had for the asking. In any case, Herr Perlmutter's heart is in his work, and he frankly says that if he succeeds in producing a good equestrian picture, it gives him ten times more delight than any photograph secured in the studio.

For all that, Herr Perlmutter makes some charming studies in his atelier. Large direct portraits as big as those submitted in the Crawshay Competition are to be seen in the waiting rooms, for he prefers securing pictures direct, rather than enlarging, if money is no object. He works mostly with Voigtländer lenses. "Have you no Ross or Dallmeyer on the premises?" we ask. Herr Perlmutter shrugs his shoulders. "I should very much like to have an instrument of Mr. Dallmeyer, but I cannot purchase one. There are none to be had ready made. I must order one to be constructed, and if I did that, it might not be what I wanted when I got it."

Silver printing, and no other, is employed in the Atelier Adèle, and black mounts edged with gold are evidently much in favour. The albumenized paper, here, as in most German studios, has a faint roseate hue, which, while pleasing in portraits of small size, is also chosen because of the idea that it may counteract any yellowness that may subsequently appear in the pictures. This, as it may be, rosy-tinted paper is a little out of place in a vigorous masculine portrait.

"Do you retouch much?" Again Herr Perlmutter shrugs his shoulders. "So far as ladies are concerned, we must retouch a great deal; otherwise our lady customers won't have the pictures—that's all." The matter is no longer in the hands of the photographer; retouching is absolute with the Viennese dames, and they require a great deal of it. "We generally use Faber's 2H," adds Herr Perlmutter.

We pass from the glass-room into the laboratory, where plates are being fixed and washed, the day's work collected on draining racks ready to be varnished. As a rule they are treble-plates, but in summer time the thin end is sometimes not exposed, as the third image in those circumstances leaves much to be desired. They are all wet plates, as we have said, and their manipulation presents no feature of novelty.

"The next "By-the-Bye" will be, "The Photographer's Elixir Vitæ"; the following "At Home" will be, "Herr Hofphotograph Koller in Pesth."

INSTANTANEOUS PHOTOGRAPHY.

From the "Magazine of Art," by permission of Messrs. Cassel, Petter, and Galpin.

ALTHOUGH it is the practice to speak of instantaneous photography now-a-days with a good deal of assurance, to any one who gives himself the trouble to think, the term is a very indefinite one. To take a photograph in the tenth part of a second would by many people be deemed instantaneous, and yet if it were so described, what should we call the exposures made by the French astronomer, M. Janssen, who take pictures of the sun by submitting a sensitive plate to the solar rays for the brief space of $\frac{1}{20000}$ of a second? The phrase "instantaneous photography," then, is simply a term of convenience, and to speak of rapid photography, as distinguished from ordinary operations, would be at once more correct and more intelligible.

Although feats of rapid photography were familiar enough in the Daguerreotype and collodion days, it is only since the introduction of gelatine plates that such work has grown into importance. Within the space of this brief article we cannot explain wherefore the sensitive salts of silver, when enclosed in a film of gelatine, should be more readily acted upon by light than when contained in collodion; we must refer the reader to the pages of the more

technical journals in which the chemical and physical aspects of photography receive the attention they deserve. Our endeavour here will be simply to show in what way instantaneous photography may be made use of by painters and draughtsmen, and also to point out that, with an artist behind the camera, it is possible to secure a photograph which has some claim to be considered an art-production.

Our illustrations will explain in a measure, how helpful the camera may be to the artist. Take Mr. Mayland's "Shipping and Smoke" as an example. An artist sent from abroad to obtain sketches of the busy Thames, with a view to producing a work on London, or a painter desirous of depicting upon canvas the crowded highway so indicative of our commercial prosperity, would value a photographic sketch of this nature very highly. Half a dozen such pictures, supplemented by a few rough drawings in his note-book, would amply suffice for his purpose. The massive screw-steamer gliding swiftly down the river, the dark-sailed barges, the black smoke from funnel and factory, indicate an amount of "life" which, if he had been able to grasp it at the moment, could not have been set down in black and white without much labour. But, in all probability, it would have been impossible to seize the effect with a pencil; the heaving water as the huge screw swings quickly round, the dense curl of black smoke blotting out portions of the sky, the barge tacking to avoid the steamer, the belching chimneys in the background—not one, but all of these effects go to make up the picture.

Another example of rapid work by which the artist may benefit is the "Swans" of Messrs. Marsh Brothers. It would need a quick eye to seize either the vivid movement of the fast-turning birds, or the iridescent effect upon the water, which has almost the viscid appearance of molten metal. Mr. Mayland's flock of sheep, full of life and animation, cropping the grass among gorse and heather as they advance, is another study that animal-painters would make good use of; while "Henley Regatta" and the "Cricket Match" are of a class which special correspondents and artists for the weekly illustrated newspapers will best appreciate.

The rapid gelatine plates permit much that was impossible before, and for this reason it is that painter and draughtsman will be able to derive greater assistance from the camera. Street scenes are not only capable of depiction, but by the aid of a clever apparatus recently constructed by Mr. Bolas, and which has received the name of "Detective Camera," they can be secured without the presence of the photographer being dreamt of. The camera, which was recently described in the photographic journals, is to all outward appearance a small portmanteau, a hand-bag, or even a boot-black's block, as the case may be, and this is set down for an instant on the pavement, the parapet of a bridge, or any eligible site. The photographer rapidly takes account of his lighting, his distance, and foreground, makes his exposure, and is away with the instrument before even his sojourn has been remarked. The results we have seen are quite Hogarthian in their character. An apple-stall at the foot of London Bridge, with a boy bargaining with the woman for her wares; two men seated on the paddle-box of a penny-steamer, the one relating an incident, and the other rubbing his forehead in doubt—such things are but sketches, it is true, but they would be invaluable to any painter of the life and manners of our metropolis. The rapidity of gelatine plates, therefore, permits of taking something more than set scenes and arranged tableaux, with which photographers formerly treated us; photographs full of life and being are now attainable, and this quality must ever be valuable to the artist.

To come to the second point of our paper. Now and again, as everybody knows, a most excellent result is achieved by the ordinary photographer; but if he is to produce you a photo-picture every time he sets up his camera, he must understand something more than the technicalities of his calling. We will go to Mr. Mayland's picture of the Thames once more. A similar scene may be frequently witnessed on our river, yet such pictures as his are scarce. To secure the result, the photographer had not only to wait until a disposition of the shipping proper to the exigencies of art was before him, but he had also to judge of the lighting, so that the massive shadows of vessel and smoke came between him and the sun, to produce due contrast, while at the same time the technical excellence of his photographic plate should not be marred. Nay, more; it was necessary for him not only to have some art-knowledge in order to choose and seize a picture, but to possess sufficient skill and wisdom to produce his shadows, high-lights, and half tones in harmony with the subject. In a word, he must so understand the *development* of the plate that he can give due effect to lights, shadows, and distance.

This endeavour to get something of fine art into camera pictures is successfully achieved in many of the photographs of to-day. At the last Paris Exhibition, indeed, one of our English photographers, Mr. H. P. Robinson, of

Tunbridge Wells, was granted the gold medal for the art qualities of the fine photographs he exhibited. It is perhaps only fair to say that Mr. Robinson, as an exhibitor at the Royal Academy, has claims to be considered a painter as well; but still it is on the ground of art-photography that he has gained distinction, and we will here try to show how it is that an artist who is also a practised photographer secures very different results to one who understands but the technicalities of the matter.

Given a landscape, and given a photographer who is so far a photographer only that he can perform all the technical operations satisfactorily. There is a patch of black firs in the foreground, there is a grey castle high upon the eminence, there is a slope of brown woods in the distance. It has been argued many a time that the camera is but a mechanical instrument that cannot go wrong, but must perforce reproduce any scene that happens to be in front of it. Very good. The exposure is made, the plate is developed, and we look at the result. The negative is clear and bright, and lacks nothing as a chemical result; but the brambles in the foreground look like dried faggots, the castle on the hill is only half the height it is in nature, the pines are represented by pitchy darkness on one edge of the picture, and the woods in the distance are lost in the bright sky-line. The technical photographer has a reason for all this; he will say that the brambles were so close that they were out of focus, the lowness of the hill is simply due to the lens, for all objectives have a tendency to depress the horizon, the pines are black in nature, and if the plate had been sufficiently exposed to photograph them properly, the sky-line would have fogged. In all these explanations he is right, but for all that a photographer with some pretensions to art-knowledge would have made a very different thing of it. Mr. Robinson, Mr. Mayland, Mr. England, Mr. Bedford, Mr. Payne Jennings, Mr. Harvey Barton—to take half a dozen names at random of our best landscape photographers—would have made a picture. The brambles, boldly limned in the foreground, would have contrasted with the soft brown woodland on the horizon, the castle walls of silver-grey would rise sharply against the sky-line, while the pines, with their clear dark shadows in middle distance, would complete the picture. If he were an artist as well as a photographer, he would first know what is required to make a picture, and then be able to make it. As a painter has to begin by choosing his pigments and mixing them, so in a measure he must bend his apparatus to his requirements. At the outset of his work he knows that if one lens will not fulfil his requirements, another will; he is aware that if he raises it a little out of the centre, he will correct that tendency to depression we were speaking about; but what lens he uses, and how he manipulates it, is all a matter of judgment. Next, to light the scene with effect, so as to secure massive yet transparent shadows, to decide which shall be the high-lights of his picture, to produce an effective rendering of this object, while another shall not unduly suffer, are all points to be considered. We need not dwell upon choice of foreground, or upon the composition of the picture, for it is only too evident that the photographer must study these, if he is to produce anything of an artistic nature; but in the *development* of the plate, the knowing exactly what he wants and what he is working for, there is again considerable scope for taste and judgment. He will strive to produce a negative which, while vigorous in part, shall yet show the gentle haze in the distance, and furnish a print so soft and harmonious in colour, that it looks like a sepia or charcoal drawing. He must, we repeat, know what is wanted in a picture, and be able to produce it.

Notes.

The Sheffield Photographic Society open their exhibition on Monday next.

To-night Dr. Huggins lectures at the Royal Institution on comets, and proposes to show some of his interesting astronomical photographs.

Mr. J. W. Swan on Saturday last lectured again at Newcastle on Electrical Storage of Energy; there was a large attendance, over which Sir W. Armstrong, C.B., presided. Verily! here is a prophet in his own country.

Monday next is the last day on which nominations for the Council of the Photographic Society are received.

Major Waterhouse, B.S.C., has returned to Calcutta to take up his duty of Assistant Surveyor-General of India. He carries back several improvements for the collotype process, and a set of velvet rollers for photolithographic work.

The *Photographische Mittheilungen*, the well-known Berlin journal conducted by Dr. Hermann Vogel, changes from a monthly into a fortnightly journal in the present year.

We ought, by-the-bye, to have announced that this year another annual has appeared in the German language, the *Deutscher Photographen Kalender*, of which Herr K. Schwier, of Weimar, is the editor. The other annual in German, the *Jahrbuch*, still flourishes under the able direction of Dr. Hornig, of Vienna, to whose courtesy we are indebted for a copy.

Never has the barometer been so high for forty years past as on Wednesday, when it registered 31·02, more than an inch higher than the average at this time of the year. The Kew barograms—as the photographic records made by the barometer are called—will be invaluable years hence, for, since this application of photography, implicit reliance can be placed upon the records. The dense gloom and cloud that photographers have been troubled with of late are doubtless connected with this high pressure upon the barometer.

Photographic societies abroad are raising subscriptions for a monument to Daguerre; at the last meeting of the Berlin Society for the Advancement of Photography one hundred marks were collected.

Tobacco smoke as a developer. Mr. Woodbury, who has just returned from Brussels, tells us of some "magic" photographs on cigar tubes, the pictures being developed on smoking.

Whether complaints against the insensitiveness of "commercial dry plates" are well or ill founded, it is certain that the glass itself, especially in the case of smaller sizes, frequently leaves much to be desired. Messrs. Valentine, of Dundee, for this reason adopt the expedient of furnishing the dry plate manufacturer with their own glass, a plan that may be recommended to all large or moderate consumers of commercial dry plates.

Mr. W. D. Valentine, one of the members of the firm, when in town the other day, gave an amusing account of that wet field day last year when the Volunteers of Scotland were reviewed by Her Majesty. From morn to eve it rained might and main, and the dripping defenders of their country had to go through their evolutions wet through. Quoth one gallant Volunteer, with damp skin and shivering gait, as he passed Mr. Valentine and his camera, "For goodness sake, if you are going to photograph us, do it with a *dry* plate."

It is gratifying to find, after a fortnight's experience of lighting the stage of the Savoy Theatre with the Swan electric lamp, that those whose business keeps them on the boards are still as enthusiastic as ever about the new mode of illumination. Mr. George Grossmith, whose clever impersonations in the Gilbert-Sullivan operas have had no slight influence upon their success, tells us the change is delightful, especially in the case of the footlights. The glare, hot vapour, and unsteady haze inherent to gas, and so productive of headache, at once fall away when the electric float is used, while the atmosphere behind the scenes is vastly improved, as much from decrease of heat as freedom from noisome odours.

The little electric room, at one of the wings, full of coils, switches, wires, &c., in which the electric engineer sits and directs the heightening and lowering of the lights, will become historical, since it is the first structure of its kind. To lower the light, the engine power is not slackened, but simply a portion of electric energy is permitted to run to waste. Each dressing-room is furnished with a Swan lamp, and here again Mr. Grossmith extolled the advantages of electricity, for flaring gas jets render these rooms sometimes quite uninhabitable, so deficient are the latter of ventilation. By the way, busy man as Mr. Grossmith is, he finds time to foster his old love for the camera, and he is still the ardent amateur of years ago. His success in opera-bouffe does not prevent him taking a deep interest in the construction of lenses.

The Bench is growing quite scientific. Mr. Justice Grove, whose battery is still a household word among chemists and electricians, has now been joined by Sir John Holker, the late Attorney-General, who, it seems, says of himself that "he understands a little of chemistry and nothing of law."

The Photometric Committee, consisting of Mr. Livesey and Professors Williamson and Odling, have made their report to the Board of Trade. As photographers are much interested in the establishment of a standard light, they will be glad to hear the result at which the committee has arrived. The standard sperm candle, by reason of the possible variations in its mode of manufacture, as also in its mode of burning, the Committee recommend should be discarded in future as a unit of light, although the quantity of light furnished by a particular source shall, as hitherto, be expressed in standard candles.

In place of the sperm standard candle, the committee propose that Mr. Vernon Harcourt's "air-gas flame" be used as a standard, since it is exceedingly exact and trustworthy. Briefly described, the "air gas flame" is a flame 2½ inches high, proceeding from a brass burner with a quarter-inch orifice. The gas is burnt at a definite rate, and consists of a definite mixture of air and the vapour of light petroleum. As Vernon Harcourt's "new unit of light" will in consequence of this report become of interest, we shall publish detailed particulars of it.

GELATINE EMULSION.

Mr. Andrew Pringle, in a communication to the Edinburgh Photographic Society, says:—

Before giving you a few details (and disasters) connected with the chemical parts of my march after rapidity, I may as well give you an idea of my premises and apparatus wherein and wherewith I work in my experiments. My dark room is most convenient in the matter of water, gas, shelves, presses, &c., but being at the top of the house is a sort of stove in summer, and an ice-house in winter. The latter defect is easy enough to remedy; the former would seem to militate against successful work with gelatine, but I am thankful to say the evils usually attendent on great heat never seriously incommoded me. I have an accumulated stock of gas stoves, furnaces, Bunsen's burners, kettles, &c., and as I make my own gas I have nothing to fear in the way of varying pressure or sudden extinction, except when, as happened lately, the holder is blown clean out of the tank.

I emulsify usually at about 100° Fahr., either by violent shaking in a hock bottle, adding the silver about a drachm at a time to the bromided gelatine, or by vigorous whisking in a round porcelain bowl. I may at once say that I question the perfection of both these methods, and am on the look-out for something better. Will any of you help me? I used to boil the emulsion direct in a stonewere vessel covered with a lid, but I now boil in the hock bottle loosely corked in a tin can half full of water. This can I set upon a ring burner on Bunsen's principle, and as the hock bottle is a deep red colour, I fear not the light. Having boiled the required time I add my larger quantity of gelatine—of which more hereafter—then pour the whole into a porcelain jar of cylindrical form and smallish diameter, and allow it to set slowly. I like the emulsion to set slowly, because thereby greater rapidity is obtained without risk of decomposition; in fact, the cooking goes on to a certain extent. I sometimes wrap this jar in flannel to make it set slowly. When set I cut it out with a silver spoon, place it in a bag of "Leviathan" canvas, and gnashing my teeth vigorously—for I hate the clammy operation—I squeeze the emulsion in long threads into a teapot of cold water. This squeezing is quite wrong; the heat of the hand melts some gelatine, a quantity of gelatine sticking to the canvas is lost; but I have now got an apparatus, made by Mr. Maynard, which looks like business. The emulsion being in the teapot I cover the lid-hole with muslin, and an Indian-rubber band to hold it; I stick the rubber pipe in the "stroup," connect the tube with the tap, and run in water for an hour. I have never seen a sign of undissolved nitrate in any emulsion I have ever washed by this method.

Having washed as stated, I run all the water off so far as I can, and then lay the emulsion in its jellified state on a frame covered with muslin, and there I leave it to drip or dry for an hour or so; if I admit this I find the emulsion too thin, and require to add more gelatine, which *de se* upsets all previous calculations. The jelly being dried, or rather dripped, in this manner, I melt it in a pyro-bottle and measure it; what is wanting, if any, I make up with absolute alcohol; any overplus I must perforce remedy with gelatine, but now the latter mishap rarely occurs.

I have been much bothered in the operation of coating my plates. I lost large quantities of emulsion when I tried to coat as with collodion; I spoilt plates when I tried to coat upon the cold level slab; and now I have got over the difficulty by laying the plate on a slab of wood lying on the marble slab, pouring a pool of warm emulsion in the centre, and guiding it smartly over with a glass rod, then immediately sliding the plate on to the level slab. My levelling-table is the top of a disused wash-hand stand (at least, it has been disused since I annexed its top); this is laid on a strong framework furnished with four iron screws, so that I can level it in a few seconds if it ever go wrong.

My drying-box has been my greatest misery. First I made one myself; but I could not keep down the heat, and the emulsion melted. Then I got a copy made of Mr. England's; but, not having a convenient exit for the draught, it would not dry a plate at any price. *N.B.*—This box is a capitally made one, and for any one who could arrange so as to have the exit flue led out of his room it would answer well. I am open to offers. Having failed so far, I set myself to a bit of joiner work; *i.e.*, I watched a fellow setting himself to it, and between us we turned a big press in my dark-room into a series of bars stretching from side to side, leaving the bottom shelf as it was so as to cut off ascending light. After many trials and many disappointments I at last arrived at the point where I and my press now are. We are now a press about seven feet high and thirty inches wide, with several rows of drying racks stretching from side to side; this is far superior to the plates lying on their backs, catching dust, and not drying evenly. At our top are let in two-elbowed three-inch zinc pipes, and between them a number 0 Archimedean chimney can, which I expected to rotate with the draught, but which shows an irritating composure of mind and body. Our bottom shelf does not reach either to the back or to the door; but light is excluded by two boards nailed at an angle to back and door so as to overlap the space left open by our bottom shelf. Below this shelf stands a paraffin-stove, single-wicked, and covered, where possible, with orange-paper. Two square holes are cut, one on each side of the stove, and a long hole in the front of the press close to the floor, and this hole communicates freely and directly with the bottom holes inside. A dish of calcium chloride is placed just inside the floor hole, and another on the inner shelf. My room at present is as damp as a room can well be, but in twenty-four hours my plates are perfectly desiccated. A red baize cloth covers the whole press.

But I have wasted a sad time on my apparatus, and I fear yon will never get through with my real subject.

I began with emulsion of pure silver bromide, something like this:—

Gelatine Nelson No. 1... ...	grs.	30	+ 170 added later.
Amm. brom.	,,	120	
Water	oz.	3	
Silver nitrate	grs.	200	
Water	oz.	3	

Boiled thirty minutes, washed forty-five minutes. Result—fair rapidity, but thin and bad colour of negative.

I soon after tried the same formula boiling forty-five minutes, but the result was still too slow. This seemed to me curious, as I knew others getting great rapidity by what appeared to me the very same process. This sort of thing went on for several times, when I bethought me that my tap-water, though splendid for drinking, might not be good chemically. I then made for myself a still, and renewed my experiments with distilled water, when I at once got a decided increase of rapidity, but no improvement in quality.

I next tried the following—

Gelatine N. No. 1	20 grs. + 200
Amm. brom.	120 ,,
Potass. iodide	11 ,,
Water dist.	3 oz.
Silver nit.	200 grs.
Water	3 oz.

Boiled one hour, adding a drop of hydrochloric acid. Washed as usual, coated, &c., as usual. Results—still slowish, but a very beautiful quality and colour of negative. I must remark that all this time I never could get my coated plates properly desiccated, and I have no doubt that fact would partly account for the slowness. I next tried Mr. Burton's formula, as published in the *Journal*, more with a view to try the precipitation process than expecting to find any novelty, and against my next three batches I find in my note-book, "Utter grief; would not precipitate." This seemed a bad look-out; but persevering, I at last got my emulsion to precipitate quite well, but when all was done I preferred my old love, and went back to my leviathan canvas and my tea-pot.

I may here say, that during the process of cooking it is very interesting as well as instructive to examine from time to time with a good microscope the granularity and other characteristics of the emulsion as the process of boiling goes on. The colour of the emulsion as it goes from stage to stage is as interesting as the fineness of the bromide of silver deposit. I almost always watch my operations with an inch objective; that is quite high enough power. The colour finally reaches a beautiful ruby violet, and at this point the emulsion ought to be very sensitive.

I found then that the iodide gave a marked improvement in the quality of my negatives; I showed some transparencies made with my iodised emulsion to a well-posted photographic friend, and he was quite struck with their beauty. But I further found that if the iodide did not slow the emulsion, it at least inculcated a considerably longer cooking; and I was advised by a friend to try the effect of a little chloride, and from that time my troubles ceased. It never rains but it pours; and not only did my emulsion turn out fine in quality, but with thirty minutes' boiling and other operations precisely as before, I have now got an emulsion as rapid, so far as I can judge, as any I have seen, but possessing all the good qualities that I had been searching after, —density, clear shadows, and a good printing colour.

ON LIGHT.

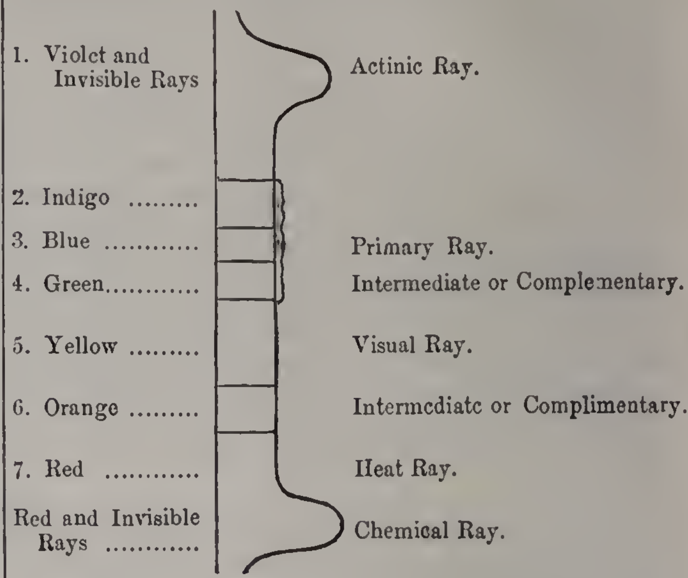
BY W. HARDING WARNER.*

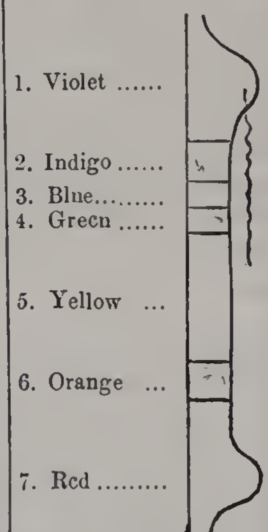
STRANGE as it may appear, few know, or care to know, the origin of light; yet to photographers, and to amateurs specially, it ought to be a matter of interest and importance; for without that knowledge we can never hope to make photographs in the colours of nature. We may be excellent chemists and scientists, and yet we shall fail. At the present time light is to the photographer what steam is to the engineer; it enables us to annihilate time and space, to work even quicker than its sister, steam, and, though so widely different in its appearance apparently, I hope to show you the analogy existing between them.

Some, doubtless, when in London in the days of the old Polytechnic Institution, will have seen there the great steam electrical machine. It consisted of a boiler constructed in a similar manner to that of a locomotive, and so arranged on its upper and outer surfaces that a number of jets of steam generated at high pressure should play upon a long brass rod called a "conductor," and be from thence led by a chain into a large Leyden jar or box, there to be stored up for future use. I am surprised that this simple mode of generating electricity for lighting purposes has never been thought of and taken up by some talented civil engineer. I feel sure that the present expensive system might be modified, for a box or jar so charged would give off a stream of electric fluid to last for an indefinite period without risk or loss of power; and it might be so readily kept up and renewed—a bucket of hot water in a tremendous perspiration to light the world! And yet so it really is.

Some years ago the late Sir Charles Wheatstone invented a machine which, shortly described, consisted of a horse-shoe magnet supported on an iron bar, round which was coiled soft iron wire, one end of which projected in such a way that, on the revolving of the magnet, each pole alternately touched the wire helix, and thus, in a short time, a current of electricity was generated which, collected together, formed light. The whole was set in motion by a large flywheel moved by hand, so that, by friction of the particles of metal, light was produced. Thus by the human arm light came into being.

Turn we now to the solar spectrum.





This, explained photographically for wet collodion for landscapes, may be expressed thus:—Spring, autumn, also in early morn in summer, always presenting a greater or lesser degree; but there must also be a proportion of No. 7 to soften, round, and temper it.

This and Nos. 5, 6, and 7, when in excess, compel the use of a strong bath, and plenty of bromide in the collodion. They are found often in summer, also in the winter at times, in various forms in the atmosphere; and Nos. 5 and 6 always at decline of day and the opening dawn of summer.

No. 7, when in excess in summer, gives great trouble, as it swamps the actinic ray, requiring long exposures and weak developers to get good results.

Violet, *Indigo*, *Blue* } are like the treble notes in music. To produce them in nature they take 600 millions of millions of vibrations to produce one ray of white light.

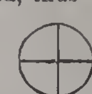
They photograph—Black printing white descending the scale.

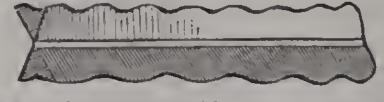
Green, *Yellow*, *Orange* } Dirty white to grey. Grey to black. Brown to black.

Red—Black to intensity excepting pink, which, partaking of the violet ray, is very actinic. } 400 millions of millions of vibrations produce one ray of red light.

They are longer than the violet rays by ten feet, and answer to the bass notes in music, which take long strings, giving deeper sounds from the length of vibrations.

The shape of a ray of light is four-sided, thus—





Long and wavy, and every ray of heat contains a ray of light ten feet shorter than the heat ray. When the clouds are low the wind blows, and the undulations of the rays are longer, confused and mixed up together, and thus there is what is termed a "bad light."

* Abstract of a communication to the Manchester Photographic Society.

For Gelatine.

Violet } Equal white, which, when subdued like unto ground
Indigo } glass or the light of a foggy morning, produces har-
Blue } mony and clearness, while by itself as pure white it must be used sparingly.

Green } May be largely used in their many shades, and pro-
Yellow } duce most exquisite pictures.
Orange }

Small church windows, when white or of rolled cathedral glass without colour, may be shaded with yellow paper, and give most harmonious and pleasing results.

Red equals black, and must be used with care when in conjunction with the other colours ; otherwise with some makes of plates, you get, if you expose for the shadows, a soot-and-whitewash appearance. Like collodion, you should over-expose for the shadows and let the high lights take care of themselves, managing all in a careful development of the subject.

Gelatine specially deals with what collodion fails in altogether, or requires a very long exposure to compass. If, in taking a landscape subject, a study be not made of the colours, a true estimation of exposure can only be guessed at. The deepest shadows should be looked at first. If of green, according to depth, long or short ; if of grey, the same in proportion ; of red, the same as green (except pink, which, partaking of violet, may be short) ; of orange, same as red ; and of yellow, like dirty white.

White of intense purity should be avoided, as liable to produce halation ; or, if not that, hardness, softness and roundness of image being made up of shaded whites obtainable with a slow plate, a comparative exposure, and a moderately-large stop. With all this governing exposure and a perfect study and knowledge of the powers of the chemicals used for development, any exposure may be given, combated, and overcome without fear of failure or of over-exposure ; but you must work slowly. Your plate may be rapid ; but just as much as it is so beyond a certain ratio, so do your difficulties increase. If you desire perfection in landscape, all should be in harmony.

Correspondence.

DARK ROOM ILLUMINATION.

Sir,—In the Photographic News of the 6th inst. is an article by Mr. Samuel Fry, on the subject of "Dark Room Illumination." Mr. Fry does not content himself with expressing his present opinion, contrary as it is to that of most dry plate workers; but, in his own peculiarly pleasant way, assumes the infallibility of his notions, and says, "The persistence of error was never more abundantly specified than in the difficulty found in inducing photographers to work in a light room instead of a dark one." Mr. Fry advocates the use of a large quantity of light in the developing room. Of course, if there were any light which produces no effect upon a really sensitive plate, we might treat ourselves to plenty of it. No such light, however, has yet been found, and therefore the consensus of opinion is in favour of using as little light as is consistent with seeing the progress of the development.

Mr. Fry mentions two methods of illumination, both of which he asserts to be safe, even with a large surface of window. One of the methods—namely, the use of two thicknesses of orange paper stained with aniline magenta, and oiled—I have had in use, except that I used crimson, but with the addition of a ruby glass, without which a transparency could be printed upon a really rapid plate. The other plan, and that which Mr. Fry appears to prefer, consists in the employment of an outer screen of yellow tissue paper, and an inner one of red twill. This does not commend itself, as in all such textile fabrics a certain amount of light (in this case merely tinted yellow by the tissue paper) passes unaltered through the interstices of the material.

It should be remembered that assumption is not as good as argument, and accusations of "persistence in error" against those who hold views different from Mr. Fry's are quite out of place. The expression of Mr. Fry's opinion is not quite such conclusive evidence upon any point as his authoritative dictum might lead the uninitiated to suppose. Mr. Fry has reason to retract sometimes. Probably he is not himself so "persistent in error" as to now maintain the direction he gave at one time to photographers to mix their alum and hyposulphite solutions for the purpose of fixing gelatine negatives.—I am, yours obediently,

W. E. Debenham.

Dear Sir,—Having read Mr. Fry's letter in the News of January 6th on light in the dark room, I must say I am of his opinion that it is not necessary to work nearly in the dark. You may have plenty of light if it is of the right colour, but not ruby glass, as it makes the place so very dark and unpleasant to work by. I did work with it, but discarded it. I now use the following, which answers well for the most sensitive plates :—I put thin orange paper over clear glass—that is, stick it on with starch. I then take crimson lake, raw sienna, and burnt sienna mixed in proportions to bring about the colour required, and paint on the paper. If one coat is not deep enough, I give it another of course, with sufficient medium. If two coats of paint are put on, that will be all that is required ; but if only one, it will be better to oil or varnish the paper, to make it more transparent. Two other colours are very good, each in themselves—madder brown or burnt sienna, with medium as may be required.

I may say I have used some of the quickest plates with perfect safety, and I shall be glad to hear the opinion of any one who may try it.—Yours, Thos. Heaviside.

HOME-MADE TRIPODS.

Dear Sir,—Will you allow me to supplement Mr. Burton's "Topic" by giving a cheap method of shoeing the points of tripod legs with tin-plate.

After the legs have been glass-papered up, taper each to a point of about an inch or more in length, proportional to the stoutness, then take a piece of note-paper and wrap round this conical end, and mark it to allow one of its edges to overlap about an eighth-of-an-inch, as also round the leg at the height the shoe is required, and trim. Tin-plate shaped by this pattern can be made up by any tinman into what appear to be small extinguishers for about three-halfpence or two-pence each. The little caps thus formed, when driven upon the legs, will be found to accommodate themselves to any variation in section, and may be readily secured with headless shoe-nails drawn through holes pierced with a bradawl near the edges of the open end. Should the amateur be desirous of giving a finish, the rough edges may be all smoothed down with a file in a few minutes, and will look as neat and workmanlike as those turned out of first-rate shops.

In respect of serviceableness I can speak from experience, having two or three sets of legs thus shod, which have been in hard wear for several years, without showing signs of giving way.—Yours faithfully, John Harmer.

BROMIDE EQUIVALENTS.

Dear Sir,—For the last two months a week has not passed without an animated discussion on the equivalents of ammonium bromide. Mr. George Dawson takes in that discussion the part of defender of science, and by misrepresenting my statement, made some six years ago, accuses me of the crime of "propagation of scientific fallacies."

At the beginning of this discussion I chose to be silent, not expecting any good for the photographic public from personal wars. Observing, however, that considerable interest is shown in this controversy, and that very useful information based on my observation is ridiculed, I have decided to write this letter, in order to deny most emphatically that I ever proposed to alter any of the theoretical chemical equivalents.

On February 8th, 1876, I read a paper at the Photographic Society, entitled, "Investigations Relative to Emulsion Collodion." In this paper (*vide Photographic Journal*, February 16, 1876, p. 146), I said, "I shall scarcely surprise auybody wheu I say that most carefully ealeulated combiuing proportions of silver and different halogens, based on theoretical eqnivalents, will give most iuaeeurate results." I did not attribute ou that occasion the inaeeuraey to the error of equivalents, and did not propose to alter them, but after ehoosing my salts from one of the best houses in London (Hopkin and Williams), I ascertained its eombiuing proportions, aud having found that they did not vary appreciably iu the samples from other good houses, I published my data, being eouvineed that it would be useful to other photographie investigators. I think that logically, the imputed heresy cannot be based on the quoted statement. But I leave the personal side of the question in order to make a few remarks of a more utilitarian nature.

Since 1876, I have had occasion many times to test the bromides for the combining proportions with silver, and I found that the salts I got in London almost iu every case gave me the same data. (I generally got my chemicals only from first-elass houses, and I believe every reasonable photographer does the same.)

Consideriug that combiniug proportions of chemicals thus obtained vary eonsiderably from the theoretical, aud that lesser variatious exist between the samples from different dealers (best), I believe that a table of these practical combining proportions will be of great importance for experimental photographers, even of more practieal value than theoretical equivaleuts; for this reason I give here a eopy of this table. It would be an anomaly in the standard book of chemistry, but a photographic periodical is a proper place for it.

	Quantities necessary for conversion of 1 gr. of Silver Nitrate.	Silver necessary for conversion of 1 gr. of Bromide.
Potassium bromide ..	0·741 ...	1·35
Sodium ,, ...	0 599 ...	1·67
Ammouium ,, ...	0·555 ...	1·80
Cadmium* ,, ...	0·995 ...	1·005
Iron ,, ...	0·80 ...	1·25
Ziuc ,, ...	0 699 ...	1·43
Urauium ,, ...	1·149 ...	0·87
Solution of† ,, ...	0·95 min.	1·052
Aqua regia‡ ,, ...	1·15 miu.	0 87
Caleium ,, ...	0 80 ...	1·25
Barium ,, ...	0·95 ...	1·052
Strontium ,, ...	0·985 ...	1·014
Lithium ,, ...	0·659 ...	1·517
Copper ,, ...	0 665 ...	1·503
Magnesium ,, ...	0·865 ...	1·155
Manganese ,, ...	0·746 ...	1·340
Quiniue ,, ...	2·5 ...	0·400
Cinchonine ,, ...	2·222 ...	0·45
Aniline ,, ...	1·00 ...	1·00
Aluminum ,, ...	3·24 min.	—

Theoretieal equivalents are absolutely correct for absolutely pure chemicals, and we hope they will stand test of time; but the table annexed, and applicable to the chemicals photographers are most likely to work, is more eorrect, praetieally, at present, and it will stand the test until some improvement in the manufacture of these chemieals alters them; in that case, nothing will stand in the way to prevent the altering of the table to suit fresh requirements. L. Warnerke.

THE SOUTH LONDON SOCIETY.

Dear Sir,—Will you correct in this week's News an error in the report of the South Loudon meeting? It was Miss Harding, and uot Messrs. Harding, who sang; and Mrs. H. G. Coeking, and not your humble servant,

H. Garrett Cocking.

* Ordinary (not anhydrous).

† Bromine, 1 fluid drachm, dissolved in 1 fluid ounce of alcohol.

‡ Aqua regia formed from hydrochloric acid (sp. gr. 1·18), 2 parts; nitric acid (sp. gr. 1·420), 1 part.

THE ELECTRICAL EXHIBITION.

Dear Sir,—One of the earliest maxims instilled in my youth was that "womeu," children, and fools should never see things half finished; and the Crystal Palace Company have, in advertising their exhibition at least a month before the time, laid themselves open to several untimely verdicts on the above principle.

There is one thing, however, to be said in their favour, that they eould not well elose the Palace during preparation, espeeially at Pautomine time, so as to get everything in readiness, as was done in the Paris "Exposition," so that a complete exhibition could, on the openiug day, at onee dazzle the eyes of the public with its splendour.

If your correspondent on this matter had seen, as I did to-day (the 16th of January), huge boilers being carted into the Palace, he would not have wondered at the paucity of lights or other electrical appliances requiring machinery. A large number of engines and dyuamic machines are only just being placed in the basement, aud should he visit the Palace a month or two heuce, he will perhaps form a different opinion. My iusignificant exhibit to which he calls attention, and in which the priucipal features are like mauy others at present, eovered up, consists of a table on which is mounted as a cover an Ordnauee Surrey map of the district around the Palace. Over this is suspended a model balloon, with a model camera attached, to illustrate the system of suspension.

As the Company would not allow (for obvious reasons) the same to be filled with gas, it is suspended by cords from the girders, the cord representing that attaching it to the earth, leading to a small model of a transport car, sueh as would be necessary to eonvey the whole apparatus from place to plaee, having a drum to wind the cable ou, and a space for the empty balloon, &c. This car, to have been in proportion to the ehart, would have had to have beeu eonstructed about the 100th part of an ineh in size; as it is, the wheels cover the whole of the Paris grounds, as represented on the ehart. The principal object of my exhibit will be found the camera with its arrangement for exposing and ehanging the plates, the other portions whieh I have explained being added simply to illustrate more fully the purposes in view.

Walter B. Woodbury.

Proceedings of Societies.

Edinburgh Photographic Society.

The third ordinary meeting was held in 5, St. Andrew Square, on the evening of Tuesday, 10th inst., Mr. James Henderson, vice-president, in the chair.

The minutes having been read, approved, and signed, the following gentlemen were duly elected ordinary members:—Messrs. Andrew Watson, Charles G. H. Kinnear, Robert Hogue, and John W. D. Pottage.

A lengthy discussion took place concerning the sum of money to be expended on prizes for presentation prints. Two members wished the amount to be limited to £35. It was ultimately agreed to leave the matter in the hands of the Council, with power to expend whatever sum in their judgment was deemed necessary. The general opinion was in favour of offering gold, silver, and bronze medals, struck from the same dies, and of the same iutrinsic value as those of the celebrated exhibition of the Society held in the Royal Academy in 1876-7.

The Corresponding Secretary read a paper by Mr. Andrew Pringle, entitled "Gelatine Emulsion" (see page 31).

Mr. J. G. Tunny, in proposing a vote of thanks to Mr. Pringle, bore testimony to the value of several of the hints contained in the paper. He had had similar experiences in regard to the presence of chloride in the emulsion. He found that a chloride had a eompensating power, giving back to the emulsion those qualties of which it had been deprived by the iodide, without in any way introduciug any injurious quality. He had found such au emulsion possessed peculiarly favourable attributes for the production of transpareucies.

Mr. J. M. Turnbull considered that Mr. Pringle was in the forefront as an emnlsion maker. He himself did not think that extreme rapidity was the most valuable quality in dry plates, as they were not so universally useful; but working as Mr. Pringle did, their advantages outweighed their disadvantages, as he provided himself with the very best appliances, and apparatus specially constructed for the trying requirements of extremely sensitive plates.

Mr. J. Jameson exhibited an adjustable plate-box, made of corrugated zinc, with one side so arranged that plates of considerable variation in width could be securely held; also an ingenious automatic washing trough, in which the plates were placed face down upon perforated trays, the corners of the plates being firmly held by movable supports, that by an exceedingly simple arrangement could be adjusted to any size of plate. He also showed his simple apparatus for corrugating zinc, consisting of two pieces of grooved beechwood hinged together at one end, the grooves of one piece fitting the projections of the other. The simplicity, power, and results caused considerable surprise, especially as it had been in use for twenty years, and was still as good as when first made.

Mr. J. G. Tunny said he had been fortunate enough to secure a sample of the gelatine sent by a German firm for examination by members of the Society. He did not know the maker, but certainly it was the finest gelatine that had ever passed through his hands. It formed a hard, firm emulsion, setting quickly, and combined well with other makes of gelatine. It did not possess the few unsatisfactory qualities of the make of gelatine that he had hitherto considered the best.

Mr. James Balmain exhibited Boga's chronometric instantaneous shutter.

A copy of the *Montreal Herald* newspaper of Dec. 20th was laid on the table. Occupying a large part of the first page was a very fine collotype print.

The Secretary intimated that a copy of the Annuals for 1882 had been received from the Publishers of the Photographic News and the *British Journal;* also a quantity of Messrs. D. H. Cusson and Co.'s handy almanac.

Several interesting matters had to be postponed owing to the lateness of the hour.

A vote of thanks to the Chairman terminated the proceedings.

The first "Popular" meeting of the current session was held in Queen Street Hall, on the evening of Wednesday, 11th inst., when a splendid series of transparencies produced by Mr. W. J. Chadwick, of Manchester, illustrating a tour in the Isle of Man, were exhibited. The majority of the pictures were coloured in a most delicate and careful manner. A vote of thanks was awarded to Mr. Chadwick, and to Mr. Davies for his descriptive lecture. There were about 800 present at the meeting.

Photographers' Benevolent Association.

At the Board of Management meeting, held on 4th inst., it was decided to hold the annual general meeting at 8 p.m. on Wednesday, 25th inst., Mr. W. S. Bird in the chair. Every member who can possibly attend is earnestly requested to do so, and also to use his influence with those members of the profession who do not at present belong to the Association to at once join its ranks. Non-members are invited to the meeting.

Glasgow Photographic Association.

A meeting of this Association was held in the Religious Institution Rooms on the 12th inst., Mr. John Parker, President, in the chair.

The minutes of last meeting were read and approved of, Mr. A. H. Lewis was elected a member, and Messrs. T. Storey Davis and Donald Maciver were elected subscribers.

In reply to a question from the question box, as to why there were so few meetings,

The President said that the meetings at present were according to the constitution and rules of the Association, viz., once a month. Several members expressed a desire that the meetings should be more frequent, when it was agreed that for the remainder of the session meetings would be held fortnightly. As an extra attraction, Messrs. McGhie and Thompson offered to contribute some photographs to be balloted for amongst the members present.

The Secretary (Mr. John T. McLellan) gave a demonstration of portraiture by means of "a new photo-chemical light," and succeeded in taking two fairly good negatives. He prefaced his experiments by saying that in conformity with a promise made at last meeting he had selected the light that gave the greatest amount of chemical energy, and had succeeded in taking portraits by its means with an exposure of about one second, and proposed to repeat the experiments. The light employed was the result of burning one and a-half foot of magnesium ribbon in a globe of oxygen gas in the first experiment, and of burning a similar length of ribbon in a mixture of oxygen and air in equal proportion in the second; the first be recommended as giving the best result. A tissue screen was interposed between the sitter and the light; the focus of the lens was 6 inches, and the stop used was $1\frac{1}{4}$ inches; both plates were developed and shown to the members.

The remainder of the evening was spent in examining some fine transparencies thrown on the screen by means of the lantern, and the meeting closed with a vote of thanks to the Chairman.

Photographic Society of Ireland.

The usual monthly meeting was held in the Royal College of Science on Friday, 13th inst., Mr. Thomas Mayne in the chair. The minutes of the previous meeting having been read and confirmed, Messrs. Thomas Sherlock, Thomas James Robinson, Thomas McGovern, E. J. Hudson, Thomas Cranfield, Samuel Baker, and Henry Redding were elected members of the Society.

Amongst the many objects of interest submitted for inspection was a "gun camera," constructed and exhibited by Mr. John Russell. This instrument is admirably adapted for instantaneous outdoor work, and has the advantage of extreme portability. The inventor has adopted a contrivance of great novelty, enabling the operator to secure the subject in exact position on the plate, thus effectually preventing disappointment on finding that the object is so near the edge of the plate as to be of little or no use, or perhaps not on the plate at all.

There were also shown some very fine instantaneous views, taken last summer with the above, and which were as sharp and full of of detail as if the camera had been mounted "on solid rock."

A discussion arose as to the advantages of gelatine films, the difficulties of development, and the supporting them in the dark slides, as well as their keeping qualities, evoking a great amount of comment.

Mr. Thomas Mayne exhibited some gelatine transparencies made by Mr. Samuel Baker with the aid of a lantern, illustrating the advantage of using a good camera lens in conjunction with the ordinary condenser, instead of the usual lenses supplied, for procuring a greater amount of light, as well as greater definition of image in the pictures; and as a natural result the lenses were proved preferable for producing enlargements.

A new $7\frac{1}{2}$ by 5 camera, by Hare, was also on the table, and much admiration was expressed for several recent improvements, amongst them being the manner in which the double swings were effected.

Mr. J. V. Robinson, who has been working for some considerable time at the production of a solution for mounting photographs on thin paper which would prevent all "cockling," has succeeded in doing so, and an album of views taken at the late excursion of the Architectural Society of Great Britain was examined, the absence of "cockling" being very conspicuous, the prints not having been pressed in any way. These views do Mr. Robinson the highest credit, considering the difficulties under which they were taken. There were also some very excellent "moonlight" photographs on view.

The next meeting of the Society is intended to be held on Friday, the 10th February, 1882.

Thursday Evenings for Photographers.

A meeting was held on the 12th inst., Mr. C. G. Cutchey in the chair.

Mr. A. Cowan showed a further improvement upon Messrs. Mucklow and Spurge's sensitometers; the improvement consisted of a piece of perforated zinc over the apertures; the holes in this being all of one size allowed the amount of light admitted by each aperture to be much better regulated. Mr. Cowan used 2, 3, 4, 6, and 8 holes, &c. The light was admitted through a piece of opal glass, and with one minute's exposure to a fish-tail burner, three feet distant, Mr. Cowan said he could bring up six tints.

Mr. Brown exhibited two gelatine plates dried at varying temperatures, in each of which were three distinct bands of sensitiveness, that part dried at the highest temperature being the least sensitive.

Mr. Cowan showed a plate developed with Mr. H. Berkeley's sulphite of soda formula; he also showed the solution used to develop it, which was quite bright and clear. He said he had exposed two plates (giving the same exposure in each case), and developed one with fresh pyrogallic, and the other with Mr Berkeley's formula, allowing them to remain in the solution for the same length of time, the result being that there was no perceptible difference in the tone of either picture; that while the fresh pyrogallic solution was turbid, the other was perfectly clear.

Mr. Henderson exhibited a lamp for keeping emulsion warm whilst coating. It consisted of a food-warmer having a floating night-light swung on gimballs in the centre, and a piece of coloured medium placed over the side opening. Thus, not only did it keep the emulsion warm, but acted as a lamp for coating.

Mr. Brown used a heated fire-brick for keeping the emulsion warm, and found it answer the purpose well.

Mr. W. Ackland had experimented largely with vegetable gelatines, and said a very good gelatine, with strong salting power, was obtained from quince pips.

Mr. Henderson had experimented with the addition of gums to the emulsion, and found a decided advantage in the use of dextrine; he recommended six grains to an ounce of finished emulsion.

In answer to a question from the box, as to what value should be put upon the negatives in selling a business, Mr. Ackland said that the value of a photographic business should be from one and a-half to two years nett profits, the negatives to be included in the goodwill, stock and fixtures to be taken at separate valuation.

Dundee and East of Scotland Photographic Association.

The fourth general meeting of the above Society was held in Lamb's Hotel, on Thursday evening, 12th inst., James C. Cox, Esq., President, in the chair. In opening the proceedings, the President took advantage of the first meeting in the new year to convey the compliments of the season to each member individually, and to express the hope that the prosperity of the Society would continue.

After the minutes of last meeting had been read and approved, the President proposed that a vote of thanks should be given to the local press and the photographic journals, English, Continental, and Transatlantic, for their excellent reports of this Association; and that the receipt of annuals, &c., be acknowledged with thanks.

The next exhibition of lantern slides, comprising views in Sweden and Norway, &c., was arranged to take place on the 26th inst., and Messrs. C. Johnson (hon. secretary), Valentine, Macdougald, and Roger were appointed a committee to carry out details.

Mr. G. D. Macdougald, analyst, read a paper entitled "A Few Words on Gelatine Emulsions" (in our next), in which he demonstrated, with the aid of the blackboard and diagrams, the theory of bromide emulsion. He gave figures to prove the equivalent, and recommended the use of the microscope in watching the process through its various stages.

Questions and a discussion followed, in which the President, Messrs. Robertson, Donald, Roger, Anckorn, Ferrier, and others took part.

A vote of thanks was awarded to Mr. Macdougald for his paper.

It was resolved that a question-box be provided for the use of members in which to deposit queries to be answered from meeting to meeting.

A member exhibited an improved blow-through gas burner for laboratory or ordinary use, which met with much approval.

A vote of thanks to the Chairman closed the proceedings.

Talk in the Studio.

King's College Science Society.—A meeting of the above Society will be held on Wednesday, January 25th, at 8 p.m., when Mr. J. M. Thomson, F.R.S.E., F.C.S., will read a paper on "The Action of Light on Certain Substances, and its Application to Photography."

The Technical Exhibition.—The following are among the contributors to the Society of Arts Photographic Exhibition:—J. Spiller, W. Bedford J. Werge, P. Meagher, G. Hare, Lancaster and Son, Fallowfield and Co., Watson and Son, L. Warnerke, Marion and Co., the Autotype Company, the Platinotype Company, the Woodburytype Company, W. Brooks' Prof. Stebbing, W. Huggins, M. Jannsen, Prof. Roscoe, W. K. Burton, Captain Abney, E. W. Foxlee, D. Dallas, Horne and Thornthwaite, Prof. Piazzi Smyth, W. Rouch and Co., Francis Galton, Prof. Eder, W. Woodbury, F. York, the Kew Committee, the School of Military Engineering, Morgan and Kidd, A. L. Henderson, and the Photographic Supply Association. In all, the number of contributors is a little over eighty. Messrs Crossley have lent the Society one of their six-horse gas engines, which will be at work driving dynamo machines for the production of the electric light, when required, during the exhibition. Exhibits are to be sent in on Monday next, and the exhibition will open on the following Monday. It is announced that persons wishing to inspect the exhibition will be supplied with tickets on application to the Secretary of the Society.

To Correspondents.

W. Weston.—Thank you for the details of your experiments, which we will bring under discussion when we have gathered further information regarding some points bearing on the matter.

B. B. H.—In your own case we should be inclined to give a slight slope to the side looking towards the wall. If you can arrange for the whole or the greater part of the wall in question to be whitened or covered with white glazed tiles, the gain in light will be very considerable.

F. C.—1. The colour is doubtless a roseaniline salt. 2. If you brush a weak solution of sandarac in alcohol over the back of the paper, it will prevent the curling, and prove a partial remedy as regards the other difficulty you mention. Of course the solution must not be so strong as to render the paper partially transparent —perhaps 20 grains to 1 ounce; but much depends on the quality of the paper. 3. We cannot tell you what paper is used in the instance you refer to, but should recommend you to try to obtain a fine enamelled paper. You might also render the coating on ordinary albumenised paper insoluble by immersion in methylated spirit, and then wash to remove the chlorides; when dry, coat the face, and finally treat the back with the sandarac solution.

W. T. Martin.—If you make use of a small proportion of gelatine, in relation to the silver bromide, you will attain the desired end.

Academy.—1. He certainly can say so, but sensible people are not likely to believe him. 2. No diploma is usually required to enable one to tell lies regarding his own qualifications; but if your neighbour does better work than you do, make haste and surpass him in excellence.

A Subscriber.—1. See our "At Homes" in back Nos. of the News. 2. Yes. 3. Yes, quite as rapid if intelligent care be exercised.

W. B.—1. Not at all advisable. 2. An excellent practice, but only after thorough washing. 3. Methylated spirit.

W. Bradshaw.—Either slate or wood. An old petroleum cask answers well.

W. Griffith Medley.—They have probably but little commercial value, and your best way will be to sell the prints. You might write to some photographic publisher in London.

F. Stanley.—We certainly did find a trace of hyposulphite. You must remember that damp is necessary to enable the destructive salt to pass from a mount to the outer face of the albumenized paper.

T. W. W.—Far too complex and delicate an instrument for use under such circumstances.

Charles Linton.—1. We have already expressed our opinion, and, at present, see no reason to modify it. 2. An india-rubber tube can be made to serve very well if tape is wrapped spirally round the outside, so as to give it increased strength.

Ifford.—Nickel-plating answers well in such cases, but there is no reason why you should not make the article of the so-called German silver.

S. T. Simpson.—If your camera is provided with a front which can be raised sufficiently, you will very seldom require the swing-back, it being understood that you are working with the lens you name.

C. Cox.—The rotating cutter is the best tool for the purpose; a zinc templet being used as a guide.

J. Jensen.—It certainly looks rather suspicious, but you had better withhold your opinion until you have made further enquiries.

L. T. J.—The painted canvas sold as "target cloth" will be very suitable for the kind of background you require, as it is very strong, and will withstand the rough usage which you anticipate.

J. Wilkins (Sunderland).—The matter is still before the committee, but it seems doubtful if any satisfactory conclusion will be arrived at.

Indignant.—It is certainly a most impudent and fraudulent proceeding, but you probably will have to commence an expensive lawsuit in order to obtain redress.

THE PHOTOGRAPHIC NEWS.

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CONTENTS.

THE CAUSE OF VARYING SENSITIVENESS IN GELATINE EMULSIONS.

At a recent meeting of the Photographic Club, with Captain Abney in the chair, the question as to what is the cause of the greater or less sensitiveness of gelatine emulsions was discussed at some length. The chairman exhibited some emulsion plates which, although distinctly red by transmitted light, were, he said, extremely sensitive.

The general result of the discussion seemed to be to prove that it would be most interesting to all to know what really *is* the cause of the varying degrees of sensitiveness, but that at present no one is in a position to impart the desirable information.

The chairman said that it would be interesting to know whether or not the bromide of silver had ever been isolated in a pure and highly sensitive form, so that it could be combined again with gelatine to form a rapid emulsion, without any cooking process being gone through. If such had been done it would go far to prove that sensitiveness is due entirely to a molecular condition of the bromide of silver itself, and not to a chemical combination between the bromide and the gelatine.

Mr. H. Trueman Wood stated that, in making an emulsion by the boiling method with a small quantity of gelatine, he had boiled till the viscosity of the gelatine was totally destroyed, and until the bromide of silver had subsided to the bottom of the vessel; that he had poured off the supernatant fluid, had washed the bromide of silver, and on mixing it with the proper amount of gelatine and water, had got a highly sensitive and excellent emulsion. This, though it goes far to show that the change is in the bromide of silver itself, uncombined with gelatine, can scarcely be taken as a proof, unless the precipitated haloid had been carefully analysed to discover the existence or non-existence of combined gelatine. If the sensitizing action of boiling consists in a process which involves a chemical combination between the silver haloid and the gelatine, it is probable that such gelatine as had combined with the bromide would not be washed out.

Dr. Eder recognises two distinct molecular forms of bromide of silver having relation to the sensitiveness. There is, first, the "powdery" bromide, which gives a very slow plate, which is red by transmitted light; and second, the "granular" bromide, which gives a rapid plate, which is, *as a rule*, blue by transmitted light.

At the above-mentioned meeting the opinion was stated that there is no relation between the colour of an emulsion and its sensitiveness. To a certain extent this is true. It is impossible to state accurately from the colour of a plate whether or not it is highly sensitive. A plate which has a distinctly red tinge by transmitted light may be more sensitive than one which has a blue tinge; but, on the other hand, we may say that, working by any of the ordinary methods, there is a tendency for the colour to change from red to blue as the process advances, and that as long as this change of colour goes on, the emulsion will continue to become more and more sensitive. It must be remembered that there are various ways of examining the colour of a plate.

We took occasion a short time ago to point out that, if an emulsion be made containing but a small amount of iodide, the resulting plates, if thickly coated, will transmit, either before or after cooking, nothing but orange or yellow light; but that if, on the other hand, the emulsion be spread very thinly, so that on looking through it the form of a gas flame may be distinctly seen, this flame will appear ruby-red on looking through a plate coated before cooking, but blue after boiling, for the time required to gain the highest sensitiveness. This, to a certain extent, accords with the remark made at the Club, that when a very small quantity of a red emulsion is mixed with a considerable quantity of a blue emulsion, the whole appears far more red or orange than would be expected.

It is only by spreading a little emulsion very thinly on glass, and looking through this at a light, that we can give any information as to the degree of conversion from powdery to granular bromide which has taken place; but even then it is difficult—nay, impossible—to tell when the conversion is complete, because it is not possible to judge with sufficient accuracy of delicate shades of colour. We would point out a way in which far more accuracy may be attained; but it is only applicable to methods in which cooking is performed with a small quantity of gelatine—say, not more than six or seven grains to the ounce.

Place a drop of the emulsion to be examined on a glass plate; spread it very thinly, and dry it by gently heating the plate. Now, if this drop of emulsion be examined by transmitted light, it will be found to have divided itself into distinct rings or patches of red and blue emulsion. Examine this before boiling, it will be found that there is little or no blue; but as the boiling goes on, it will be found that the blue increases in proportion to the red till, when conversion is complete, there will be blue only. At any time the blue will be found to separate itself distinctly from the red; that is, as we have said, if only a small quantity of gelatine be in the emulsion.

It will be seen that although we cannot take the colour of a plate as definitely indicating its sensitiveness, yet we consider an observation of the change of colour to be a most useful guide to assist in telling when to stop operations in the case of ordinary methods.

It will be seen further that we recognise as the chief cause of increased sensitiveness the change from one molecular form of bromide of silver to another—from the powdery to the granular. That there must be something more than this, either some further molecular change or some chemical combination, appears evident from the following considerations:—

If different methods be used, and if in each the process be pushed until the conversion is just complete, the resulting emulsions may yet be of widely different degrees of sensitiveness.

An emulsion in which the conversion is not complete may be more sensitive than one in which the conversion is complete.

Under certain circumstances, sensitiveness may go on increasing long after conversion is complete.

It will be understood that we have, for the most part, been considering emulsions containing silver bromide alone. When other haloids are introduced, the question becomes still more complicated. In any case, it is one of the deepest interest, and one which deserves more attention than it has had. Until we know more than we at present do as to what changes take place in emulsions in relation to increase of sensitiveness, we are only working by rule-of-thumb. The question is one which we should like to see discussed in these pages by those of our correspondents who have given attention to the matter.

GELATINE FROM A CHEMICAL AND PHYSICAL POINT OF VIEW.

SECOND ARTICLE.

THE gum-like product obtained by the prolonged heating of an aqueous solution of gelatine, and alluded to in our article of last week as meta-gelatine, is largely present in some of the commoner kinds of commercial gelatine, such as a cheap glue; while such products as Coignet's gold label gelatine are almost free from it. The presence of even a large proportion of meta-gelatine is often advantageous, as for example in the preparation of carbon tissue; but in other cases it is an undesirable impurity.

The property which gelatine and its primary source—ossein—possess of forming insoluble compounds with the various forms of tannic acid, is of fundamental importance with respect to the art of manufacturing leather; and a solution of tannin has been found of considerable use for hardening negatives and collotypic films.

When gelatine is impregnated with about one-sixth of its weight of a soluble bichromate, as that of potassium or ammonium, it becomes so sensitive to light that a sheet or film of the material may be impressed with a tolerably vigorous brown image when exposed under a negative for rather less time than would be required to produce a print on albumenised paper. Such an exposed film of bichromated gelatine possesses properties which form the basis of the greater part of the photo-mechanical processes now in use. If it be soaked in water, those parts which were protected from the action of light, rapidly swell to more than four times their original thickness, while the exposed portions refuse to absorb water or to swell. A plaster cast may now be taken from the film, and on casting type metal in the plaster mould, we obtain either a relief suited for decorative purposes, or a type block adapted for ordinary relief printing, the latter being produced when the original negative consisted only of extremes of light and shade, as in the case of one taken from letter-press or a pen-and-ink drawing.

If the soaked gelatine film be rolled with an ordinary printer's roller charged with printing ink, it will be found that the fatty ink will refuse to adhere to the swelled and wet portions of the film, but it will readily attach itself to those parts which have been acted on by light. The inked film, if now pressed against a sheet of paper, yields up some of its colour, and thus prints a photograph in fatty ink. Fresh copies can be obtained by re-inking the gelatine film. Here, then, we have the basis of the collotypic process and of the ordinary method of obtaining a photo-lithographic transfer.

Let us suppose, now, that the exposed gelatine film is treated with warm water instead of being soaked in cold water. In this case the protected portions will dissolve to a depth proportionate to the opacity of the corresponding parts of the negative; and if the action of the hot water be stopped at the right time a relief will be obtained in which the thickness of each part will correspond to the extent to which light has acted. To thus obtain a solid gelatinous reproduction of the negative is the primary operation in the Woodbury photo-mechanical process, and similar reliefs charged with a suitable pigment form the so-called carbon prints.

Of the use of gelatine as a vehicle for the sensitive bromide of silver of the negative plate we need say nothing here, as this is a matter of every-day discussion at the present time.

A few words on the principal gelatines of commerce will be followed by some notes on a method of testing the setting quality or tenacity of samples.

Isinglass consists of the sounds or air-vessels of various species of sturgeon, and the principal supply comes from Russia. It generally contains a notable proportion of saline matter, which can be readily removed by a moderately long soaking in cold water. A solution of isinglass, when carefully filtered, gives a remarkably hard and structureless film, well suited for collotypic or gelatino-bromide work. Isinglass should be purchased in an uncut state, as the fine shreds are often adulterated with cheaper qualities of gelatine.

Grenetine is a clear and transparent product, consisting principally of the substance already referred to as chondrin, and it is especially suitable for making Woodburytype reliefs, the Pretsch process, carbon printing, and also for collotype work when only a small number of copies are required. A product having most of the useful properties of grenetine is sold in England as "Nelson's Transparent Sheet," and a somewhat harder gelatine which is adapted for similar uses is known as "Nelson's Amber Gelatine," this latter being very well adapted for preparing gelatino-bromide plates in cold weather.

Coignet's Gold Label Gelatine, which is sold in packets of one kilogramme, is a product of great value to the photographer and the photo-mechanical printer, as its solution possesses great setting or gelatinising power, and it yields an unusually tough and tenacious film. For preparing collotypic plates when long numbers must be printed, for coating transfer papers, and for gelatino-bromide work in hot weather, the gelatine in question is invaluable. It has, however, the disadvantage of being liable to yield films which are either pitted, or covered with ridges which arrange themselves in map-like forms; but the addition of ammonia, and vigorous churning of the solution, tend to overcome these difficulties. It is often possible to purchase an excellent imitation of Coignet's gelatine at about half the price of the genuine article; but careful judgment must be exercised in selecting the sample.

"French Medal Glue." This is usually sold in clear yellow tablets about nine inches square and nearly half an inch thick, and the quality is generally excellent. It may be used in making carbon tissue or Woodburytype reliefs, and it forms a very good mounting material, but its solution should always be tested with litmus paper, and if any acid reaction is observable the sample ought to be rejected. Scotch glue is similar in character to the medal glue, but is generally somewhat darker in colour.

Russian glue is usually a very high-class article, being excellent as a mountant; but as it often contains a considerable proportion of phosphate of lime, is not well adapted for general photographic uses.

The lowest quality of commercial gelatine is a cheap glue, sold in the oil shops at about fourpence per pound. It is generally soft and in a state of incipient decomposition; in fact, it will almost dissolve in cold water. It is, however, very well adapted for sizing canvas or other material which is to be used for backgrounds, as it does not become extremely hard and brittle on drying.

The quality of a gelatine can be measured approximately by estimating the gelatinising power of a solution of definite strength, and various samples can be easily compared together by the method of Lipowitz. For this purpose each sample is dissolved in nine parts of water, so that the solutions shall contain exactly ten per cent. of solid matter. The testing apparatus consists of a small beaker, to which is fitted a tin cover, and through this cover a stiff wire slides, the lower extremity being provided with a spherical terminal half an inch in diameter, and the upper end is fitted with a small tin box. Each sample of gelatinous solution is poured into one of the testing beakers so as to half fill it, and after a rest of twelve hours, a cover is fitted to each beaker, and the ball is allowed to rest on the surface of the jelly, sufficient shot being next poured into the tin box to force the ball fairly into the mass of jelly. The weight of shot required serves to indicate the relative strength of the several samples.

Although the above method may be objected to as subject to some deficiences from a scientific point of view, it is found that in actual practice the results are satisfactory.

It sometimes happens that a fictitious hardness is communicated to gelatine by ordinary alum or chrome-alum, the hardening power of the latter being very considerable; a large proportion serving to induce complete insolubility.

SHEFFIELD PHOTOGRAPHIC EXHIBITION.

The Exhibition of Photographic Art now open at the Cutlers' Hall, Sheffield, deserves some notice at our hands. Although comparatively small, it is by no means an insignificant display of talent, as the pictures are sufficiently meritorious to afford pleasure and profit by inspection. If exhibitions are to become the fashion, and every society is to have one—and we see no reason why they should not—the present example may teach, like its predecessors elsewhere, what are the elements of success, or the reverse. The Sheffield Society wisely decided at the last moment to dispense with a catalogue, and passed a resolution that pictures, &c., being the work of an exhibitor should bear the title of subject, and also the artist's name, but in examples not the exhibitor's work, the title only be placed on the frame. By adopting this arrangement the task of identification is rendered easy, and perhaps preferable to consulting a catalogue, which is sometimes rather suggestive of Bradshaw. The room selected was on the whole well fitted for a temporary art gallery—a spacious lofty apartment, forty feet long and about twenty wide, with five large windows having north aspect. The pictures were well arranged on wall and screens, attention being paid to position, a few large ones only exceeding an altitude of seven feet. Tables for apparatus were conveniently placed.

The pictures numbered between three and four hundred, and contributors about forty. Home-made work was in excess of that from a distance, although there were imports which had travelled and done good service before. Woodbury, Autotype, and other enlargements were abundant, but it was remarked that distant friends had not responded very freely to Sheffield's invitation. Are exhibitions held too close together? Do pictures suffer by careless packing? Or does the absence of medals from a programme make contributors shy? Our readers may draw their own conclusions; but, whatever view is arrived at, there can be little doubt that the individuality of a district should be well represented in all local exhibitions, competitive or not. Of members' work, the first series of pictures attracting notice on entrance are a set of well-mounted studies by Mr. Crosby, and enlargements. The portraits—large size—show artistic skill; one, entitled "The Reader" (a recumbent figure intent upon a book), and portraits of Nelly and Fanny Crosby, are commendable. The landscape is well chosen, but the shadows are too strongly pronounced.

Mr. G. V. Yates is a large contributor. The varied subjects in frames bearing his name are of a uniformly high-class order; his Derbyshire scenes and a case of portraits showing, by much careful finish, an experienced hand. Mr. Stringfellow's productions, some on wall and others on screen, are very good samples of gelatine and collodion. Of the former a pair of small pictures, the Rivelin Valley, early morning, please by a refreshing crispness and soft detail, as also Isle of Man views. His Scarborough 15 × 12 collodion, compares favourably with the now universal gelatino-bromide process. Some excellent Autotype enlargements show what can be done with a first-class negative. Mr. W. B. Hadfield has three frames of small pictures, just the little bits a tourist ought to pick up in Derbyshire and Isle of Man, and portraits of one little Wide-awake are remarkably pretty.

The pictures by the Hon. Sec. (Mr. J. Taylor) are of local and general interest, and prove that he can turn to account both collodion emulsion and gelatine. The most notable of his specimens are views in Douglas, and landscapes in Yorkshire and Derbyshire.

Mr. J. D. Leader, F.S.A., has on the screen a choice collection of prints, delightful in the antiquarian mind. The president of the Society (T. H. Morton, M.D.) sends a large number of pictures, including frames which he exhibited in London and elsewhere. He has fortunately secured natural clouds in many views, which always enhance the value when acquired without under-exposure.

Mr. Fred. J. Hall has mementoes of towns in Norway, and also some excellent local views, as Roche Abbey and the Lake at the Farm. Mr. Hicks is represented by a case of capital portraits and a fine Autotype group of Canon Blakeney and family, perhaps the best thing of this class in the room.

Mr. Daken lends an enlargement from one of his portrait negatives; Mr. H. P. Collinson, views in Miller's Dale; Mr. Rawson, numerous stereos, artistically selected—evidently his *forte*; Mr. T. Firth, a charming view near Roche Abbey; Mr. T. Bromley, stereoscopic views in his usual fascinating style—Haddon Hall Terrace and Lath Hill Dale are particularly nice.

Contributors from a distance, as before observed, were few and far between.

We noticed a splendid winter scene, by Geo. Renwick, Burton—Frost Study—an ice-bound lake, surrounded by trees loaded with snow and hoar frost, skaters on the ice animating the view.

Mr. James Stoyle sends strikingly-effective interiors and *souvenirs* of Ilfracombe on the tables.

Messrs. Cubley and Preston send a goodly array of stereoscopes, a lantern, and changing tent; Messrs. Hunter and Sands, their well-known cameras and rapid shutters, and views taken by them; Moorse and Co., studio and other cameras; Shew and Co., changing box and apparatus.

On the tables, in addition, were lantern slides by the President, and stereos by Mr. Rawson, who also had a large transparency in a graphoscope.

Mr. Taylor forwarded his new 12 by 10 camera and hinged tripod, and there were also burnishers by the Sheffield makers—Mr. H. Rock and Mr. Woodson.

FRENCH CORRESPONDENCE.

Œleoccoca-Oil Sensitive to Light—Vegetable Mucilage—Oscillating Bath—Gobert's Engraving Process.

Œleoccoca Oil Sensitive to Light.—At the last meeting of the Photographic Society of France, M. Fleury-Normagis exhibited specimens of œleoccoca oil, which, as he maintains, is sensitive to the action of light. This substance, which has not yet been used in photography, possesses the property of hardening when acted on by the luminous rays, becoming opaque and of a waxy consistency. Every substance which is sensitive to light is worthy the attention of photographers, and for this reason M. Fleury's statement possesses great interest. The oil should now be investigated from a photographic point of view, and to isolate the sensitive element, so as to discover what use it can be turned to. M. Fleury distributed to several of his colleagues specimens of the oil, to enable them to analyse it, and to find out to what photographic purposes it can be applied.

Vegetable Mucilage.—M. Fisch presented some bottles of a vegetable mucilage, the origin of which he did not make known. He merely said that it is a very inexpensive substance, and is made from a very common plant. It is a sort of vegetable albumen, which can be used in some photographic processes in place of animal albumen and gelatine. This substance does not set quickly, but it can be bichromatized and flowed over paper or plates, where it will dry. It can also be tinted with colouring material as is done in the carbon process. According to M. Fisch, it is well adapted for the preparation of photolithographic paper. I am just now engaged in making experiments with it as a substitute for albumen in coating plates to be engraved, and as a substitute for gelatine in carbon printing. As this mucilage does not solidify like gelatine, it cannot be used for the preparation of emulsions. It is vexing not to be able to tell what this substance really is; but, if it is useful and valuable, I hope that it will soon become known.

Oscillating Bath.—In the course of remarks by M. Sans he stated that during development the bath must be kept oscillating, and this he effects by means of a turning jack. In the discussion which ensued, M. Chardon remarked that the jack will not run for more than half-an-hour without being fresh wound, and he had adopted a plan of moving his oscillating bath by means of a small electric motor set in action by a couple of Daniell's cells. This motor is a modification of one exhibited by M. Trouvé at the late electrical exhibition. This arrangement is a very simple one; it can be set up in any suitable part of the laboratory, when, directly contact is made, permanent oscillation is obtained. The expense for generating the electricity is extremely small, and may, in fact, be neglected. In consequence of a failure on the part of the mechanic whom he employs, M. Chardon was not able to show his ingenious apparatus, but we may hope to see it at the next meeting. I have already had occasion to insist on the advantage of providing every well-arranged laboratory with electric power, which can be used for a great number of purposes. We can employ it not only in making the baths oscillate, but also in turning the tables for engraving plates; also for acting on the shutters and on the bell of the oxalate of iron photometer; for sifting fine sand, and for the incandescent lamps. In short, the time will come when this electrical arrangement will be absolutely indispensable in every properly-arranged laboratory. I might have added that the motor could also be used for turning the table on which the frames are exposed to the light; a table supporting several frames could by this means be made to turn so as to expose each side in succession to the light.

Gobert's Engraving Process.—The process of engraving introduced by M. Gobert is so very simple and practical that I am induced to say something more on the subject; I am anxious that it should be tried, for I feel sure that its value will be appreciated. To begin at the beginning: an etcher, we all know, works with a needle on a plate of copper which has been coated with a special kind of varnish. Drawing with his needle the lines which he desires to have etched, he lays bare the metal. Now, to obtain good results in this way, it is necessary to have some amount of skill, and the operator is often exposed to accidents, due either to improper varnish or to his own want of skill, and these accidents frequently are the cause of the work having to be done all over again. But by employing a photographic process these difficulties are obviated; besides which, the original drawing is preserved, and from it as many copies as may be desired can be reproduced. On the other hand, any one having in his possession a line drawing can take from it an etching superior to the copy produced by the manual labour of the most skilful artist. These considerations make it one's duty to insist very strongly on the Gobert process, as being one which can be worked with the greatest facility. An engraving, either in line or mezzotint, can itself be used as the negative, provided that it has been executed on somewhat transparent paper. The copper plate is coated with bichromatised gelatine, quickly dried, and then exposed to the light beneath the engraving. Owing to the bichromatised albumen being very sensitive to light, the exposure need not have a long duration; but in any case it is much shorter than would be required for a film of bitumen. The development with cold water is readily managed, and on account of its colour it is easy to watch how the image comes out. To etch the plate, we use a solution which does not attack the photographic film; but, on the contrary, hardens it still further, so that we may be certain that the copper will only be etched in those places where it has been laid bare. We may also rest assured that the action of the mordant, even if it were prolonged still further, would not have the effect of causing the film to scale off, and thus spoil the result. This mordant, as I have already explained, consists of a concentrated solution of perchloride of iron in rectified spirit. In the whole process there is nothing absolutely new, excepting that for a layer of bitumen is substituted a much more sensitive substance, and that in place of diluted acid is used a solution of much greater reliability.

Leon Vidal.

A SIMPLE APPARATUS FOR WASHING GELATINO-BROMIDE EMULSION.

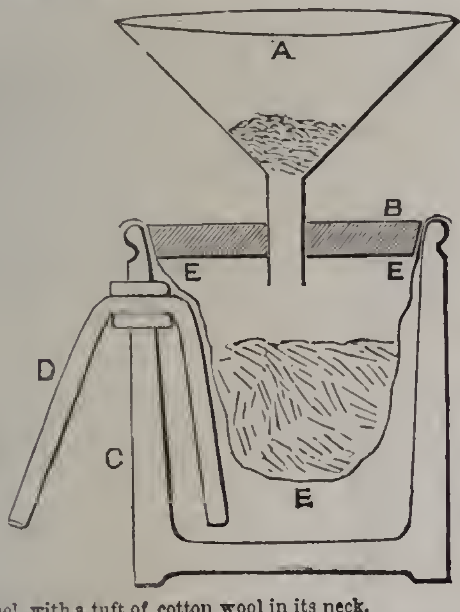
BY WILLIAM BIRRELL.

I obtain a common white two-pound jelly-pot, for which I pay twopence, and I then take a diamond-pointed steel drill (such as used by blacksmiths and others), and make it as hard as possible by heating it to redness, and quenching in cold water. Then put it into a joiner's brace, and bore a one-inch hole in the side of the pot, about two inches from its upper edge (the drill has to be ground several times during the operation, as it soon loses its edge). I then fit a cork tightly in the hole, after which a half-inch hole is made in the centre of the cork, and a piece of india-rubber tubing, long enough to reach to the bottom of the pot inside, is fitted in this hole; the other end passes below the bottom outside. This acts as a syphon.

I then obtain a cork or bung large enough to fill the mouth of the pot, and make a hole in its centre, into which is inserted the tube end of a gutta-percha funnel, the tube being allowed to project fully through the under side of the cork. A piece of muslin is next fastened over the mouth of the pot in such a way that it falls down bag-fashion to within one-third of the bottom of the pot. I found that the syphon would work well as now arranged, and to use the apparatus the emulsion is put into the muslin bag, and the cork or bung is put in its place, a plug of cotton-wool inserted into the neck of the funnel, and the whole apparatus is placed under the tap. The water goes down through the gelatine, then rises up to the syphon, and when this acts it immediately drains all the water off, and as this sudden drawing off is repeated every time the jar fills up to the bend of the syphon, the soluble salts are very soon washed away.

I think this is a far better plan than either soaking, or pouring water over the emulsion, as the apparatus now described both soaks and drains. With this thorough washing, the emulsion does not require to be cut up into such small pieces as would otherwise be necessary, a point of some importance. Captain Abney advises us to squeeze the emulsion twice through coarse canvas, but I have found when that was done it was impossible to get all the superfluous water out of it by any reasonable amount of draining over hair sieves or otherwise, and the plates coated with such an emulsion are poor and thin—or, in other words, totally useless. No doubt alcohol is to be recommended to abstract the water, but this is an expensive complication; at any rate, I have found I can get as good a result by using the apparatus as I can with the alcohol, and as thick a film; so the alcohol and extra labour are saved. I am indebted to Mr. William England's article in the News for the idea of filtering the water, and I think a great number of spots on the plates arise from impurities in the washing water.

My apparatus could be made of gutta-percha or ebonite; perhaps properly japanned iron or tin plate would do. The following diagram will be readily understood on reading the reference notes.



A. Funnel, with a tuft of cotton wool in its neck.
B. Cork or bung.
C. The jam-pot, provided with a hole to carry cork, which holds—
D. India-rubber tube;
E. Muslin bag, held in position by the bung, and containing the fragments of emulsion.

A CURE FOR YELLOW GELATINE NEGATIVES.

BY H. B. BERKELEY.*

Judging by the greater part of the pyrogallol-developed negatives which we see, there is great room for improvement in the method by which they are produced. I refer to the all-pervading, dingy-yellow colour of the image, even the shadows of which partake of the same sickly tint.

Some of the members are aware that I make use of a nostrum of my own, a "sure and certain remedy" against "yellow-sickness," and perhaps some have disrespectfully spoken of it as my "fad." It is my intention to-night, therefore, to show you this "fad" applied to actual practice.

Before adopting my method in its present form, I added sulphite of soda to the water used for making this alkaline developer; the pyrogallol was dissolved in a small quantity of alcohol, in order to preserve it, and a few minims of this were added, together with soluble bromide and ammonia, to the required quantity of solution.

The bottle of alkaline developer I now hold in my hand was made last May in this way, and in it was developed a negative during half-an-hour. One minim of ammonia was added to each ounce of solution, and three minims of pyrogallol. This may serve, perhaps, as a striking instance of the efficacy of my "fad" in preventing the oxidation of the pyrogallol.*

The method I now employ is somewhat different in detail, though the same in principle. Forty parts of crystallized sulphite of soda are placed in a graduated measure and made up to nearly a hundred parts with water. When the crystals are dissolved, the solution is nearly neutralized by citric acid (the neutral sulphite will be found to be alkaline; indeed, itself is an alkaline salt); ten parts of pyrogallol are then added, and the whole is made up to one hundred parts with water. Every ten minims of this solution contain one grain of pyrogallic and four grains of crystallized sulphite of soda.

I have here a bottle of solution so made on 13th of October last. I do not perceive any change in it since that time. The bottle has been simply corked.

In this bottle I have a solution of pyrogallol made one year and five months ago; it is still practically colourless. The pyro used had been previously kept in alcohol, and the solution was much discoloured. The quantity of pyro in this solution amounts to three grains per ounce. The solution should contain hydrosulphite of soda, which has a greater avidity for oxygen than has the neutral sulphite. A small piece of metallic zinc has been kept in the bottle, with a view to preserving the de-oxidised condition.

The first negative I now pass round—"On the Banks of the Wye, near Rhayader"—was thought to be rather under-exposed, and development began thus: Moistened with water; then pyrogallic $\frac{3}{4}$ grain, and ammonia $1\frac{1}{2}$ minim. The image came up too quickly: $1\frac{1}{2}$ grain ammoniac bromide added; in one minute, $\frac{3}{4}$ grain more pyrogallic; in five more minutes, 1 grain bromide. Development lasted sixteen minutes. The second negative—"In the Bed of the Wye"—was developed thus: Moistened with water, pyrogallic $1\frac{1}{2}$ grain, ammonia 2 minims, and bromide $\frac{1}{2}$ grain. Sky and water appeared in one minute; nearly full detail in seven minutes. The development lasted $8\frac{3}{4}$ minutes.

I may add that I keep, as nearly as possible, exact account of exposure and development of negatives, not the least important item being a record of the length of development.

The plates were prepared from precipitated and boiled bromo-iodide emulsified in Coignet's gelatine.

To the above remarks Mr. Berkeley has since added the following:—Some misconception seems to exist as to the object of adding, and functions of, the citric acid. The intention is to neutralize the alkalinity of the sulphite, which, besides being itself an alkaline salt, commonly contains carbonate as an impurity, the crystallization being very imperfectly carried out. The alkalinity might tend to the oxidation of the pyrogallic, and cause the solution to have less perfect keeping properties. Probably from this point of view it is a refinement of no great value; but we prefer to consider our pyro. to be neutral. One slight objection to citric acid alone as a preservative of pyro was the necessity for allowing for the amount of citric acid present in each developer, and this, of course, varied with the quantity of pyro. solution used. If, on the other hand, a slightly alkaline solution of pyro. were used, the amount of alkalinity could scarcely be estimated by taking account of the ammonia added to the developer. In practice, however, where no exact experiments are to be instituted, the pyro. stock solution may doubtless be simplified by leaving out the citric acid altogether.

Now, with regard to the colour of the negatives produced in this way, it has been suggested to me that the colder tone may be due to "sulphur toning"—that sulphide of silver is produced in the image. This appears to me not to be possible. I have no well-founded statement to make on this point, but may say that we all know that a large portion of the ordinary alkaline-developed image is not metallic silver. My impression is, that when sulphide is used, this deposit of organic matter in the image is prevented; and, time being given, a strong image of pure, or nearly pure, metallic silver is the result.

* Read before the Technical Meeting of the Photographic Society.

* A body of the liquid, about two inches thick, transmits light of a straw-colour.

Notes.

Honours to the Vienna Photographic Society! His Majesty the Emperor of Austria has nominated the honorary president, Herr A. Martin, a Councillor of State.

Mr. Woodbury is expected in Vienna to give a demonstration of his improved process before the Society of the Kaiserstadt.

Mr. J. W. Swan's lecture at the Royal Institution, on "Electric Lighting by Incandescence," is fixed for March 10. Captain Abney will lecture on the friday following, on "Spectroscopic Work with the Infra-red Rays of the Spectrum."

A photographic portrait seems to have become a necessary adjunct to a warrant of arrest. Mr. Nicol Fleming, one of the Glasgow Bank directors, who was arrested on Monday in London, was identified by the police officer by means of a photograph.

The most interesting exhibit at the approaching Society of Arts gathering will, in all probability, be the gelatino-chloride transparencies of Dr. Eder and Captain Pizzighelli, the preparation of which is described at some length in our Year-Book.

A rectification of peculiar importance to photographic chemists is contained in a paper by Professor Cook, of Harvard College, which has just been presented to the French Academy of Sciences. The atomic weights of bromine and silver are both altered in this memoir, the equivalent of the first being fixed at 80, and that of the second at 108.

There was not a single hour's sunshine in London last week—or, rather, in Greenwich. To put it accurately, the amount of bright sunshine amounted to 0·8 of an hour. As the sun was above the horizon for a period of 58·7 hours, it is obvious that we only got 1·4 per cent. of the maximum amount of sunshine. No wonder photographers cry out for a quicker process of printing!

The record would have been different, no doubt, if, instead of being taken at the Royal Observatory in murky Greenwich, in the midst of the smoke and thick vapour that comes over from the Isle of Dogs, the observation had been made in a clear atmosphere and at some elevation. Thus, the new Etna Observatory, which has just been completed by the Italians, is likely to give us far more valuable records in respect to meteorology and solar physics than any we have yet obtained. It is built on a small mount near the crater, and is so placed that a current of lava descending the volcanic mountain would probably divide and avoid the building. The Etna Observatory stands more than 9,500 feet above the sea, and is more than twice as high, therefore, as Ben Nevis, where Scotch meteorologists have recently established a temporary observatory.

We are glad to state that Mr. W. J. A. Grant is safe home again after his fourth voyage to the Polar Seas. The voyage this time has proved more difficult and perilous than usual; but we believe Mr. Grant has brought home with him, in the stout little whaler the *Willem Barents*, an important addition to the series of Polar photographs which form so trustworthy a record of frozen wilderness that lies around the North Pole.

The Salzburg School of Photography—the only establishment in Europe in which photography in all its branches and applications is made the sole study—mustered 39 students last year. Of these, eight were youths from 14 to 18 years, who had no knowledge of photography; and the remainder, assistants and principals from various studios in Germany who attended the classes, laboratory, and work-rooms to seek chemical and technical instruction.

The telelogue is a system of optical telegraphy proposed by Captain Gaumet. There is apparently very little of novelty in the suggestion. An oblong board several feet in height is marked with a huge letter, painted in silver on a dead black ground, and this is exhibited at one station and read at another some four or five miles off by the aid of a spy-glass. In a word, you spell at a great distance. If such a method of signalling were of value—which we very much doubt—there would be no reason why the signals should not be recorded by photography. The sender and receiver might be governed by a clockwork instrument working at the same speed, and every ten seconds or so an exposure might be made—the sensitive plate being shifted a little after each—so that the signals are written down. By placing the developed plate in a suitable magnifier the message might afterwards be read.

The circumstance calls to mind the little use that is made now-a-days of a telescopic tube in front of the camera. In the case of tiny objects seen at a distance, a tube in front of the camera adds to the vigour of the image by cutting off extraneous light. For this reason we have always advocated the use of a tube in front of a balloon camera, for a photographer in the clouds is flooded with hurtful light on all sides, and the earth, far away, which he wants to depict, is the darkest of all. Some years ago our duty led us to depict the embrasures of a fortress at a distance of upwards of a mile, to see if a photograph of any value could be obtained of out-works in war time; the picture had, of course, afterwards to be enlarged, and we found that its sharpness and clearness were decidedly improved by the employment of a long tube.

Let any one try the experiment upon a church tower a couple of miles off—we have photographed Barking Church, across the Essex Flats—taking pictures with a tube and without it; he will be surprised at the difference of results. Only, in exposing, he must remember that in long-distance photography the proper lighting of the object is all-important, and in developing, that the result at best can only be a faintly-detailed one. Naturally, a clear day and a long focus lens are very desirable.

In Germany, a complaint has arisen among photographers about the extortion of certain agents connected with actors and actresses, who seek to levy black mail. An *artiste* is photographed, and subsequently the agent appears, and demands his *douceur*. In one case, in Berlin, 300 marks (£15) were demanded; but, in the end, 100 marks were taken. The German photographers are asked to band themselves together, in order to withstand such demands in future.

An opinion by one qualified to give it is always worth noting, and for this reason we call particular attention to Mr. Ackland's recent remarks upon the subject of buying and selling a photographic business. Mr. Ackland, as some of our readers may know, is the guiding spirit of Messrs. Horne and Thornthwaite, and may be credited, therefore, with some experience on the subject of which he speaks. According to his views, then, the value of a well-established photographic business, including all negatives, is equal to the nett profits of the business for a year and a-half or two years, the fixtures being taken at a separate valuation.

The *Wochenblatt* is exercised in mind about some lamentably erroneous statements that have recently appeared concerning a certain Persian potentate who is in Berlin just now for the purpose of studying photography and retouching, and having his right eye cured of cataract. In the first place, he is not the "uncle of the Shah" at all, as some people want to make out; his name, our Berlin contemporary rather indignantly tells us, is Prince Sultan Oveis Mirza, Ihtisham el daulet being not an uncle, but a cousin of a son, Firuz Mirza, of the uncle of the Shah. This, obviously, makes all the difference. Again, as to the doubts which have been thrown upon the advisability of a man suffering from ophthalmia taking lessons in the art of retouching, the *Wochenblatt* points out that the left eye of the prince is still in the best state of preservation, and consequently quite competent for the work. Altogether, we think our contemporary comes out of the matter very triumphantly.

ODD JOBS.

BY THE AUTHOR OF "LOOKING BACK."

No. 7.—St. Mary's Island.

In local parlance this little romantic place is termed the "Bates"—"Bate" being the popular term for bread, cheese, and beer, on the Northumberland and Durham coasts. I may state that St. Mary's lies about nine miles north of Tynemouth, and eighteen south of the Coquet. It is a wonderful little island, or, to be more particular, peninsula: for you can during the ebb of the tide walk dry-shod from the mainland, a distance of about half a mile. To give a graphic description of St. Mary's, I may term it a little bit of rock with a low sprawling house upon it, the latter bearing an old-fashioned sign-board, intimating to all whom it may concern that the proprietor is "Liscenced to sell," &c. The whole place is surrounded by huge masses of rock covered with seaweed, that float with the rising tide, and wave their long arms about on the waves as if they were things of life. There is a natural harbour towards the open sea where picnic parties, steam tugs, and pilot boats run in to rest or refresh. Entering the house, you pass through a sanded tap-room, redolent with the fumes of stale beer and tobacco smoke. Beyond this, and almost dug out of the hill, towards the sea, is a snug little parlour, where the worthy landlord will proudly show you a couple of skulls that were found when digging the foundation; and likewise display a letter from the Bishop of Durham expressing his belief that St. Mary's at one time was the site of a monastery, and that no doubt the skulls in question were those of some famous abbots who had been buried within its walls. And now the Hartley pitmen drink beer and play quoits on the site where once bell, book, and candle reigned supreme.

Not only is St. Mary's remarkable for its bygone sanctity, but there are legends of smugglers having haunted the place, and if you wish to see the landlord mad, just mildly suggest that the two skulls might be the remains of some of their brutally-murdered victims.

I was there, autumn was a year, during a short holiday, and, with my usual luck, had the pleasure of being locked up in the house for the space of three nights and days during the raging of a most tremendous storm: the doors were never opened during the time, and the windows barricaded with storm-shutters. Had it not been for a French hurdy-gurdy the landlord had won at some lottery, and a dirty pack of cards, I do not know how we could have passed the time while the wind was howling as only an east wind can howl, and the spray and foam flying over the roof in clouds. On the second day, while we were peering through the pigeon-hole of the storm-shutter, a Dutch lugger, without a shred of canvas, and her foremast gone, came sweeping between us and the mainland. In vain the drenched and bare-headed man at the tiller strove to keep her in mid-channel. A great roaring wave or two, a furious gust of wind, and she struck on the rocks opposite. In a moment or so we saw the man wade ashore through the surf, and, seeking shelter in a hollow in the bank, coolly light a pipe that by some means he had kept safe from the wet, and, puffing away, philosophically sat watching the breaking up of his bark.

At last the leaden clouds broke up, the wind gradually lulled, the roar of the waters around us softened, and at length the door was gradually opened. Never in all my life did I see such a conglomeration of foam! The house—the island—was literally smothered in it. After creeping through this mass of soft bubbles, and literally digging out the boat, we launched it; and, amidst a splashing, short surf—through which I hugged the camera and dark slides in the most careful manner—we pulled over to the mainland, and landed under the lee of the lugger, that still seemed to hang bravely together, despite the awful buffeting she had received.

After sundry futile attempts to get on the beach dry-footed, and, bearing the satire of our sea-dog of a landlord about town-bred people being so tender that they were afraid to even wet their little toes, I got indignant, and, with the air of an amphibious animal, stepped from the boat, and walked slowly up the beach, receiving on the way two drenching showers, that ran down the back of my neck, and nearly took me off my feet.

However, my camera and slides were safe from the briny, and not heeding the grins on the boatmen's faces, I fixed up the apparatus, and exposed two whole plates—one second, and two seconds, making one of the wildest pictures one ever saw—the raging sea still covered with "white cats"; the foam-girt island; the wrecked lugger, and boat in the foreground.

It was a week before I could get them developed, and the one-second exposure came first. When looking at the surface of the plate I was chagrined to see that it was spotted all over with small round yellow ticks. However, upon developing, I found that they were not the worst fault the plate had, it being greatly under-exposed. After, for curiosity, fixing this negative, albeit the spots still remained when looking down upon it, they were not to be observed when looking through it. I dare say they were produced by the action of the saline. The second plate was a wonderful success—having altered the developer by adding more bromide—the only fault in it being an undefinedness as to where the ocean stops and the sky begins; but that is a fault easily rectified by blocking out the latter with opaque, and printing in heavy clouds to suit the wild picture. The foam round the island likewise wants a little dodging in the printing, inasmuch as if printing along with the rest, it looks as if it were some flaw or blur on the negative; to obviate this, I have to give the foam double printing. The white tips of the waves I worked upon with indigo blue—on the wrong side of the negative, of course—which improved the picture immensely.

Altogether, I do not regret my three days' seclusion, nor my ducking when coming away from St. Mary's Island.

ABOUT DRYING CUPBOARDS.

BY CAPTAIN ABNEY R.E., F.R.S.*

Last session Mr. William England brought before the notice of the Society a drying-cupboard, which I at once adopted, and have had in use till the present time. Except in very warm weather, I have found that it worked perfectly, when I found that sometimes markings due to the iron rods showed upon the plates dried in it. I have annexed the cut of the original drying-

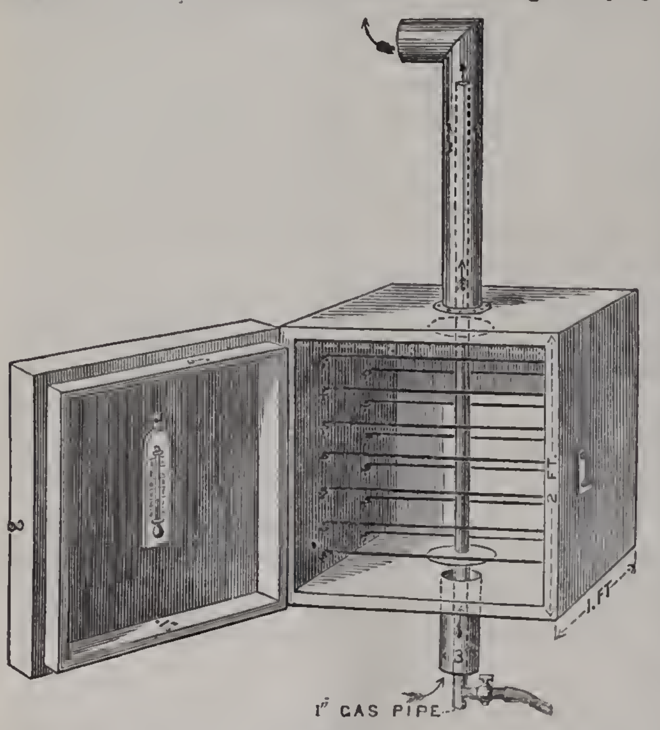


Fig. 1.

box as it appeared, which will render my explanation more easily understood.

It will be seen that the gas piping terminates a little below the tin tube. This I have found to be conducive sometimes to black specks depositing on the plates, owing to the carbon from the gas depositing on the sides of the tube. This is carried up by the up-draught, and then falls down the tin tube. The remedy for this is, of course, very easy; it only needs a wire brush passed down the gas tubing occasionally, to free it from accumulations.

During the hot weather of last summer, I was much annoyed at the length of time plates took to set on the glass revolving shelf, and also on their melting when placed in the cupboard, more particularly when ice had been used for hastening the setting operations. This, and the fact that the wire sometimes caused marking, induced me to alter my cupboard, placing glass shelves instead of the wires. The idea was given me by a gentleman whom I met abroad, but whose name escapes me. The shelves are three inches broad, and the length of the cupboard will thus carry a whole plate. One end of such a slip is supported in a stirrup shown in fig. 2, in the top of which is a slot, through which a screw is passed into the cupboard.

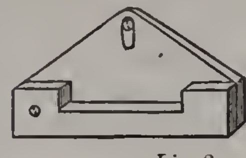


Fig. 2.

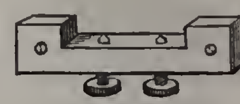


Fig. 3.

Opposite to this is another stirrup, fig. 3, into which are inserted two thumbscrews, as shown; this is placed exactly opposite the first stirrup in the cupboard. The strip is placed between these two stirrups, and is first levelled crossways by means of the thumbscrews. When level in this direction, the length of the strip is levelled by raising or lowering the first stirrup; and when in position, the screw in the slot is screwed home. When once levelled, the strip will always fall into position. In my cupboard I have seven such strips placed across the cupboard, every alternate strip occupying the position of a back wire. When plates are coated, the back strips are filled first, and then the front strips, and the plates set, and are dried on these strips without being shifted. When I referred this matter to Mr. England, he said that in some experiments of his, he found that the strips were apt to cause markings, owing to the fact that the gelatine set just where the back of the plate was in contact with the glass. To avoid all danger, I have adopted two different methods:—First. I placed strips of cardboard along the shelves, through which the points of drawing-pins protruded, so that each plate might rest on three points. Drawing-pins have the same length of pin, as a rule; but, if not, a file speedily reduces the longer ones to the proper height. Second. The shelves were coated with thin gelatine, and buckshot sprinkled over them. These were equally effective. The idea of allowing the plates to set in the same place as where they are to dry is by no means a novelty; but I have thought that it might interest the members to show how an England cupboard can be adapted for this purpose. There are other details which might be altered for hot weather. For instance, an up-draught might be created by giving the tin tube another bend upwards, and placing a gas jet in it; the air for the supply of the gas jet would have to come through the cupboard. If the tube fixed on the up bend be made long enough, no more gas need be used than by the present arrangement. The jet can be lighted from a hole in the side of the tube, which can afterwards be plugged with a cork. Mr. Cowan's method of heating the inlet pipe itself might take the place of the inner gas pipe, when the cupboard is used in cold weather. The hot air can be distributed by perforated zinc or wire guaze, such as is used in chemical operations.

I give this method of heating, as I have found a tendency sometimes for the gelatine nearest the gas pipe to run, owing to its heat. If the gas pipe be polished outside, or be covered with some bad-radiating surface, this is not much to be apprehended. Brass tubing should answer bet er than ordinary gas tubing on this account.

Mr. England uses his cupboard, he tells me, for drying sensitized paper, and, from my experience of it, it is certainly most efficient for such a purpose.

* Read before the Photographic Society of Great Britain.

AN OUTBURST OF SUNSPOTS.

On the 25th July last, certain astronomers announced that they had seen a sudden outburst of spots on the face of the sun. Mr. Hennessey and Mr. Clarke, who have an observatory at Dehra Doon, in the North-West Provinces of India, were the first to announce the fact, stating that they had secured a photograph of the phenomenon. As, however, a critic has recently remarked, "I fancy your sudden group of spots is, after all, a curious system of blemishes in the negative," Mr. Clarke thus writes in *Nature*:—

"On July 25th, 1881, the sun was quite invisible, owing to clouds, until towards 4 p.m., when a temporary break occurred, and I took negative No. 1175 at 3h. 58m. p.m. After this the sun again became invisible, while the rising clouds were so dense as to present little hope of getting another negative; so, as evening was approaching, I was thinking of closing work for the day, when, while I was still watching at the camera, an unexpected opening occurred in the rising clouds below the sun, and, soon after, the sun's image appeared on the ground glass used for focussing. To my surprise I now saw, at about 4h. 35m. p.m., a large group of spots about the sun's centre, which were quite absent in the previous negative, No. 1175; little expecting anything of the kind, or indeed to see the sun at all that evening I was not ready to expose a plate, but now seeing what had happened, I determined to persevere, though the clouds were very unpromising of another break. So I at once took points on my blue setting glass, as is usual to set the instrument by (so as to avoid needless hiding of spots behind the wires), and having done this, I prepared a plate as quickly as possible, and set the exposing slide all ready, though the sun now was invisible; fortunately, another opening occurred at 4h. 47m. p.m., when I took negative No. 1176, in which appears the group of new spots about the sun's centre, which new group I saw without doubt at about 4h. 35m. on the ground glass for focussing. I then continued to watch for another negative until 5h. 30m. p.m., when, the sky having become quite dark, I gave up work for the day."

PHOTO-CHEMISTRY OF SILVER CHLORIDE.

A recent paper presented to the Vienna Academy by Dr. J. M. Eder and Captain Pizzighelli on this subject is thus summed up in the Journal of the Chemical Society. The three following questions are investigated:—

1. How should silver chloride be prepared so as to be sensitive to light, and fit for chemical developers?

2. What are the general properties of the silver chloride undeveloped picture?

3. What are the best re-agents for the development of this picture?

The authors point out that homogeneous silver chloride films can only be obtained by using an emulsion made from silver chloride and collodion or gelatine, &c. Silver chloride precipitated in presence of excess of a chloride is better than that precipitated in presence of excess of silver nitrate, on account of the tendency to irregular decomposition in the latter case. The sensitiveness of a pure silver chloride collodion emulsion is greatly increased by the addition of such bodies as tannin, gallic acid, and morphine acetate, both as regards light and developers; the improvement is specially marked in the latter case. Silver chloride gelatine emulsions are much more sensitive than collodion emulsions. Digesting the emulsion only slightly increases the sensitiveness. The production of a latent picture is checked by the presence of alkaline chloride, and in a still higher degree by acids, such as hydrochloric and nitric. Ammonia greatly promotes the decomposition in light; ammoniacal silver nitrate can therefore be used to advantage for precipitating the chloride.

With regard to the second question, they show that the film changes as soon as it is exposed to light; it is blackened by a short exposure, owing to the formation of a sub-chloride insoluble in nitric acid; this is reduced to metallic silver by developers; by prolonged exposure, the plate becomes solarised. By treating a prepared plate with potassium bromide after exposure, the chlorine is replaced by bromine, and the plate becomes a silver bromide plate.

Several developers are mentioned; ammonio-ferrous-citrate in presence of free citric acid is recommended as the best, and is prepared as follow:—600 grams of citric acid are dissolved in 2 litres of water, and neutralised with ammonia; 400 grams of citric acid are now added, and the solution is diluted to 4 litres. 90 c.c. of this solution are mixed with 30 c.c. of a cold saturated solution of ferrous sulphate, and 6 c.c. of a sodium chloride solution (1 : 30). In all developers the addition of 0·1—0·3 per cent. of sodium chloride is very advantageous. Silver chloride plates require longer exposure than the bromide or iodide plates. The time depends on the developer, being less when the developer is concentrated, or when its action is very energetic. The reduced silver formed on treating an exposed plate with developers, when seen by transmitted light in thin films, appears of different colours, according to the method employed, *e.g.*, that from ordinary silver chloride is yellow-red to red-brown, whilst that from silver chloride which has been digested for some time, or that prepared from ammoniacal silver nitrate, is dark-brown, black-violet to black. When developed with ammonio-ferrous-citrate, the silver from the former is red-brown, from the latter black-brown. With other developers yellow-brown or red, or red-brown silvers are obtained. Silver chloride gelatine is sufficiently sensitive to produce by direct gaslight in twenty to thirty minutes a completely finished positive from a photographic negative,

Silver chloride is preferable to the more sensitive bromide for the production of more modified pictures, because the development can be better controlled.

The best re-agent for fixing silver chloride plates is sodium thio-sulphate.

SPECTRUM IMPRESSED ON SILVER CHLORIDE, AND ITS BEARING ON SILVER PRINTING IN PHOTOGRAPHY.

Captain Abney, in a contribution to the *Chemical News*, says:— The place of maximum intensity at the least refrangible part of the spectrum impressed on silver chloride was observed to be at H, and when silver albuminate was used, the maximum effect was produced at D. In ordinary albumenized paper, both silver chloride and albuminate are present; in dull weather, the light is deficient in the ultra-violet rays; hence the larger proportion of work falls on the albuminate, and a lack of brilliancy in tone is the result. Care must therefore be taken in maintaining the right proportion of haloid to organic salts. The author suggests that the above facts may be made the basis of a scientific measurement of the radiation of total daylight.

Correspondence.

ON LIGHT.

Dear Sir,—" A little knowledge is a dangerous thing.' The truth of this saying I have seldom seen more fully exemplified than in the paper printed in your last issue (January 20, page 32) on "Light," which contains a larger amount of mischievous nonsense than I have ever seen concentrated in so small a space before. To justify such strictures, I will, with your permission, point out a few of the grossest blunders.

Mr. Warner begins by drawing a supposed analogy (where nothing of the kind exists) between steam and light, basing it on an old experiment of Sir W. Armstrong's, and investigated by Faraday, in which electricity of high tension is produced by the friction of water-particles carried forcibly through jets by steam from a boiler. But the electricity of high tension thus obtained, which can charge a Leyden jar and be discharged by a single spark, and electricity of quantity, obtained from a battery or dynamo machine, which can be stored in an accumulator and takes hours to discharge on connecting the terminals—these are all one to Mr. Warner.

From his next paragraph I can only gather that he has been looking at some old magneto-electric machine in which the wire round the armature has got loose, and knocks against the poles of the magnet, and *thus* (shade of Faraday, what an explanation!) produces an electric current. Mr. Warner doubtless supposes that in the machine supplying the lamps along the Thames Embankment (for example), the electricity comes from the tag end of a loose wire rattling against a magnet.

Passing over the enigmatical sentences about the seasons, there is a reference to the abstruse subject of the rates of vibration and the wave-lengths of those vibrations which cause the sensation of different colours in the eye as follows:—

"*Violet* / *Indigo* / *Blue*" } are like the treble notes in music. To produce them in nature, they take 600 millions of millions of vibrations to produce one ray of white light.

Passing over the grammatical absurdities in this sentence, we gather that a ray is produced by six hundred millions of millions of vibrations. Now a ray is defined in the text-books as "the direction in which the light under consideration travels;" in other words, a ray is simply a straight line. To say that there are six hundred millions of millions of vibrations in a ray, is as sensible as to say that there are six hundred million million grains in a mile, or seconds in a cubic foot. The statement should be somewhat as follows:—The sensation of green light is produced by a rate of vibration in the ether (or hypothetical medium in which light is propagated) amounting to six hundred million million vibrations per second. I say green light, because the rate corresponding to indigo is not six hundred, but six hundred and eighty-six million million, and for red the number is five hundred, not four hundred million million vibrations per second.

But what is one to say of the astounding statements lower down about the length and shape of rays of light? Are they like sticks of sealing-wax, or fiddle-strings, or (see diagram) like hot cross buns, or bits of corrugated zinc, long and wavy, and all ten feet shorter than the heat rays inside which they are snugly esconced? And if you get within ten feet of a gas burner, does the light go out while the flame still stays hot? (It certainly ought to, according to Mr. Warner.) And when the clouds are low and the wind blows, what becomes of the extra ten feet of heat rays at the end of all the rays of light, flapping about in the darkness? What a tangle there must be!

Sir, the smatterings picked up by this gentleman on the difficult subjects of the polarization of light and the nature of colour may be entertaining to himself; but on behalf of your readers, some of whom may not have studied the subject of light even in one of the little science primers which can be got for ninepence at any bookseller's, and may have expected to learn something about it from Mr. Warner's paper, I do protest against the insertion of such misleading rubbish in a paper so admirable as yours is when it deals with the details of its own subject.—I am, dear sir, yours, &c., W. F. DONKIN.

St. George's Hospital, January 21, 1882.

LIGHTING OF DARK ROOMS.

SIR,—Having read the correspondence of late as regards the lighting of so-called "dark rooms," I am of opinion also that it is not necessary, as consistent with development, to work nearly in the dark. I use the following with perfect safety, with which I consider the most rapid commercial plates may be worked, and have never had an instance of fog, but clear glass at edges and clean shadows, which proves the lighting safe. And it makes your development much safer to have plenty of light to see every bit of detail than to judge partly by time and partly by the appearance of the image at the back of plates. I have a glass window 10 by 8, and another piece of glass working on a hinge, the system of a door, covered with one thickness of ruby paper; also a piece of ruby glass in a groove, so that if the light is strong, you may modify or strengthen at pleasure, as you do not require the same amount of ruby glass in a weak light (the fall of afternoon) as in strong.—I remain yours, obediently,

OLIVER GODFREY.

SIR,—Having had recently occasion to rebuild my dark rooms, I made my windows as follows.

I have three frames, 30 by 24, one glazed with plain glass, which is hinged to the casement at the side and opens outwards; the second, which is a sliding frame, is glazed with ruby *pot metal*; the third is plain glass covered with orange paper, as recommended by Mr. Fry, and slides in front of the other two frames. Now I find that for the latter frame I have no use, as I have never found a plate fog (even the most sensitive) with the light that comes through the one thickness of ruby pot-metal; and as I have two windows of the above size in a room 14 feet by 7 feet, it will be apparent that it is by no means dark, but comfortably light; also there is nothing outside to obstruct the sky view, so unobstructed daylight falls full on the window. I develop close to the window with confidence, and have no recourse to quick manipulation or dodging to screen the plate. Such experience as mine confirms the prevalent notion that it is not at all necessary to work in a dark room. By this term, I do not mean you can develop in open daylight, but that your dark room need not be so dark that you cannot see anything therein, or work with comfort, as I, along with others, no doubt, used to do, and as all the plate-makers insisted on. W. BARRY.

Proceedings of Societies.

MANCHESTER PHOTOGRAPHIC SOCIETY.

THE usual monthly meeting of this Society was held at the Mechanics' Institution, on Thursday, the 12th inst., Mr. E. LEADER WILLIAMS, M.I.C.E. (President), in the chair.

The minutes of the previous meeting were read and confirmed; after which the following gentlemen were duly elected members of the Society:—Messrs. John Dale, Edwin Eccles, Fredk. Livesey, J. Ford, W. Copeland, W. Gilbert, and J. Scotson.

Mr. ALFRED PUMPHREY, of Birmingham, was then introduced to the meeting, and, after some very happy introductory remarks, in which he thanked the Society for their kind invitation to the meeting, he read a paper, and gave a very interesting demonstration, on "Gelatino-Bromide Films, and Cameras for the Same." Referring to what had been done by the Rev. H. J. Palmer, of Liverpool, in the matter of films, he gave his own experience of the value of films, having used them for photo-mechanical printing for more than five years, stating that he considered the first and primary advantage was that they were capable of yielding more prints than glass negatives, and that the chances of long life to a film were greater than to the same picture on glass. From experience he had found that the lifetime of a good wet collodion negative, ever so well varnished, used in *daily* printing, rarely exceeded eighteen months, whereas such collodion films being transferred to gelatine he had used them more than twice that time, and were still in good condition. In the matter of portability, he clearly showed that, substituting films for plates with the ordinary camera (carrying a dozen glass plates and dark slides), the weight was reduced at least one-third, and with the new camera which he exhibited, carrying 100 films, the weight could be reduced seven-eighths as compared with the old methods.—Then followed the explanation of the 100-fold filmograph. The one shown was a half-plate size, and which, fully charged, weighed five pounds. The method of working in the camera was illustrated by a skeleton model (made purposely), so that all could see and understand the simplicity of the arrangements. A picture was taken in the camera by lamp-light, and developed before the members. During the development he (Mr. Pumphrey) showed what he believed to be the best method of manipulation, and proved beyond doubt that the process was quite as simple as upon glass; and, in reply to various enquiries as to the tenderness of the films, he astonished many of the members by rubbing the film with his finger during the process of development. He said that when all the principles of working were fully understood, the whole process, inclusive of washing, should not occupy more than half-an-hour, and, to further expedite matters, several might be going on at the same time. He strongly recommended following the hyposulphite solution with a saturated solution of alum to eliminate the former. The methods of drying were then shown and explained by various interesting samples. Following the demonstration of the working of the process, he (Mr. Pumphrey) exhibited a series of seventy gelatine film negatives, with prints and lantern transparencies from the same. They were taken by a gentleman in Switzerland in June last year, and although these films were prepared before he (Mr. Pumphrey) was ready with them commercially, the results compared very favourably with a series of negatives taken on Swan's plate by the same gentleman in the previous year. He (Mr. Pumphrey) replied to a great many questions put by the members, and altogether the demonstration was very highly appreciated.

The CHAIRMAN expressed himself much pleased and interested in the proceedings, and proposed a vote of thanks to Mr. Pumphrey, which was carried with acclamation.

Mr. W. Blakeley exhibited some large and very interesting photographs of the interior of the large room in which was held the late exhibition of photographs. They were taken by ordinary gaslight; the exposure was two hours, with a Ross' medium-angle doublet lens.

Several other members had sent negatives, prints, and opals, besides sundry apparatus, &c., all of which, owing to the lateness of the hour, were postponed to the next meeting.

Amateur Photographic Association.

A Council Meeting of this Society was held on Thursday, the 19th inst., Captain Lewis, M.A., in the chair.

The minutes of the previous meeting having been read and confirmed, the following members were elected :—Messrs George William Palmer, J. Hedley Robinson, R. De Salis, Stewart R. Majendie.

The prizes awarded at the annual meeting were then laid before the Council, and approved. They were as follows :—For Messrs. Schwabe, a silver-mounted claret jug; W. D. Howard, a silver goblet; W. S. Hobson, a ditto; R. Murray, a water-colour drawing by Earp; W. Adcock, an album elegantly bound in morocco; J. C. Hannyngton, a ditto; R. O. Milne, a ditto; T. R. Shervinton, an oil-painting in frame by W. McEvoy; S. Norman, a ditto; Arthur Hill, a ditto; and J. L. Rinking, an album elegantly bound in morocco. The prizes will be on view until the end of next week.

Sheffield Photographic Society.

An exhibition of photographic pictures and apparatus, under the auspices of this Society, held in the hall belonging to the Cutlers' Company, was thrown open to public view on Monday, January 23rd. The preparation as arranging and hanging pictures, &c., had, by a united effort of the members, been brought satisfactorily to a close on Saturday evening preceding, and only needed an appreciative public to render their exertions a success. The wishes of the promoters of this new departure were to some extent gratified, as troops of friends responded to the call, visiting the building during the day, and again in the evening to witness a lantern and musical entertainment.

The President of the Society, Mr. P. H. Morton, M.D., took the chair, and in opening the proceedings said :—

It was extremely gratifying to the members of the Society to see so many friends present, because it was an evidence that photography was understood and appreciated. This was, he believed, the first public exhibition of photographic pictures and apparatus held in Sheffield, and although they could not expect to excel the exhibitions held in London, Manchester, and other large centres, still they would find on those walls some excellent work, quite sufficient to show what could be done by photography. At least they could say it was very creditable for a first attempt. That was not the time or place to enter into long descriptions; but he wished to say that photography had progressed much during the last few years, and this progress was due partly to the introduction and general adoption of gelatine as a medium for the sensitive salts employed. By this means films or plates were prepared of almost any degree of rapidity, so that pictures could be taken of objects in motion, and under circumstances quite impossible in the early days of the collodion process. Photography was also more largely employed in other ways. It was used frequently in astronomical, microscopical, and other scientific investigations; and also in our arts and manufactures. They would, no doubt, have observed of late years the great improvement in the pictorial illustrations that embellished our books and periodicals; and although he readily admitted that the skill of the draughtsman and engraver was never better than at the present time, yet he was convinced that they were indebted in many instances for the accurate portraits of eminent persons, and views in distant countries, to the indefatigable exertions of the man with the camera. Photography had made some extraordinary attempts to obtain views, even of the bottom of the sea. Photography had been up in a balloon, but owing to the peculiar gyrations and movements incident to that mode of progression the pictures had not, as yet, been satisfactory. But they could easily understand that a captive balloon, carrying the plates and necessary apparatus, worked by an electric current from below, could secure pictures at a high elevation, pictures which would be very important in military operations as showing the position of the enemy. He dared say the military authorities would investigate this matter, especially as the Royal Engineers had an excellent school of photography, and turned out very good work. But it was not from a scientific or utilitarian point of view that most of the amateur members had turned their attention to this art. It had been more from an æsthetic desire. Now he did not wish this word "æsthetic" to be misunderstood. There were some individuals who professed to have a claim to be æsthetic because they had a sunflower in their garden, a dado on their walls—people who surrounded themselves with the monstrosities of the last century, and had ample leisure to look disconsolately at pieces of indifferent blue china. In cases like this he should be inclined to recommend one of the ordinary anæsthetics, such as chloroform or chloral, until that morbid sensation had passed away. The æsthetic principle of photography was sustained by the power they possessed of bringing home some of the lovely scenes to be found in this and other lands, with all the variety of light and shade, cloud, and breaking wave, and rippling stream. They had also the power of making fac-similes of those extraordinary architectural remains that showed the wondrous skill of a past age. The contemplation of such objects as these he need hardly say elevated the soul, enlightened the understanding, quickened their sympathies, and kept their memories green.

Thursday Evenings for Photographers.

At the meeting held on the 19th inst., Mr. A. Haddon occupying the chair,

Mr. McKillich exhibited some excellent negatives of microscopic subjects, taken on Wratten and Wainwright's rapid plates, with a one-inch objective (uncorrected), and a condenser of about two inches focus, the illuminator being a small paraffin lamp about eight or nine inches from the object; and he enquired if anyone could suggest how best to bring out all the detail of an object, some parts of which were much more bright than others.

Mr. Henderson suggested using slower plates, and giving longer exposures.

Mr. Cowan exhibited a bottle containing an ounce of pyrogallic developing solution (Mr. Berkeley's formula), with which eight plates had been developed; he also showed the eight plates, which had all received the same exposure, the first six having been left in the solution for one minute, and showing a very slight gradual decrease in detail. No. 7 was left for four minutes, and No. 8 for ten minutes in the developer. The solution was of a bright sherry colour, and, judging from the results, its developing action was far from being exhausted.

Mr. Brown suggested that if fresh ammonia were added to the solution, the pyrogallic would be found to have lost none of its energy.

In the course of a short discussion on various liquid non-actinic mediums, Mr. Pearsall suggested that the liquor obtained from red cabbage by boiling it with sulphuric acid would be found to answer the purpose. This liquid, he said, was much used by chemists for lecturing and similar purposes.

Bolton Photographic Society.

The monthly meeting was held at the Baths, on the 12th inst., Mr. Parkinson in the chair.

The general business having been despatched,

Mr. Hampson, who officiated in the absence of the Secretary, read a further communication from Captain Turton.

After a long and desultory discussion it was resolved that the letter be laid on the table.

Votes of thanks were passed to the editors of the photographic journals for copies of their almanacs, and also to Messrs. Cussons, Southport, for a number of copies of their handy little memoranda and almanacs.

Talk in the Studio.

Photographic Society of Great Britain.—The next Technical Meeting of this Society will take place on Tuesday next, January 31st, at the Gallery, 5a, Pall Mall East. The chair will be taken at 8 p.m.

South London Photographic Society.—The next meeting of this Society will take place on Thursday next, February 2nd, at eight p.m., in the Rooms of the Society of Arts, John Street, Adelphi, when Mr. Cobb will read a paper on "Co-operation in Matters concerning Photography."

The Technical Exhibition.—Any reader wishing to visit the display of photographic appliances which will be inaugurated at the Society of Arts on Monday next can have an admission-ticket by applying at our publishing office.

Photographers' Benevolent Association.—The dense fog which prevailed on the 25th instant prevented a sufficient number of members attending the meeting convened for that date to constitute an annual general meeting. It was therefore postponed until February 1st, at 8 p.m., and it is sincerely hoped that every member will make a point of attending on that occasion.

The Clonmel Riots.—Mr. Henry Holborn forwards us a picture of the charge of the 20th Hussars during the Clonmel riots. It is a "freehand" sketch with a photographic background, apparently, and as "many hundreds of it have been sold," we congratulate Mr. Holborn on its production.

A Quick Shutter, by Mr. R. G. M. Conybeare.—The above-named gentleman has forwarded us an extremely convenient and compact form of the blind shutter, the blind taking the form of an endless band working over two small rollers, its length being thus considerably reduced. One of the openings is framed with thin tin plate, and to this frame an elastic band is attached which gives the required impulse. As Mr. Conybeare has promised us a detailed description, we need not say more in this place.

Substratum for Gelatine Plates.—Mr. Warnerke has described a substratum for gelatine plates, to prevent the defect well known in gelatine plates under the name of frilling. This substratum is a cure for that defect. The formula is as follows:—Water, 2,000 c.c.; soda silicate, 10 grammes; white of one egg; ammonia, a few drops. After this mixture is made, about 30 c.c. of alcohol is added, and the whole carefully filtered. This solution is used in a porcelain dish, the glass plate being placed in the dish, resting on one end, and then gently let down on its face, until it touches the surface of the mixture. It is then removed, drained, and dried. On the glass so prepared, gelatine emulsion flows the same as collodion.

Mrs. Brassey's Dark Room on Board the "Sunbeam."—A bath-room, lined with orange-coloured American cloth, and provided with an extra yellow glass to fit over the ordinary scuttle, makes an excellent dark-room for developing photographs. A tank for distilled water and a small sink with india-rubber tubing are easily managed, so that no mess need be made even when the yacht is rolling slightly. In the odd corners shelves with holes are fitted for the bottles of chemicals, while in yet another corner is the medicine-chest, the contents of which can be seen at a glance.—*Magazine of Art.*

The late Dr. J. W. Draper.—In alluding to the work of the late Dr. J. W. Draper, who died this month at New York, and who must not be confounded with his son Prof. Henry Draper, whose labours in spectrum-photography are so well-known, *Nature* says:—In 1837 began the notable series of researches upon the nature of rays of light in the spectrum with which the name of Draper will always be associated. His paper that year bore the title "Experiments on Solar Light," but it failed to attract much attention in Europe. He was now devoting himself to photography and photo-chemistry with great zeal. His paper "On the Discovery of Latent Light," in 1842, dealt with the images produced by rays of light which are only subsequently developed by some chemical reaction—a process with which the art of photography has made us familiar, but which was then a curious and novel phenomenon. It was Draper who first discovered that in the ultra-violet part of the spectrum there are absorption bands like the Fraunhofer lines in the visible part of the spectrum. To enumerate the works which proceeded from Draper's pen upon the chemical and physical properties of the ultra-violet, or, as he styled them, tithonic rays, would be inadmissible here. Suffice it to say that the greater part of the fifty memoirs mentioned in the Royal Society's Catalogue related to this subject, and the most important of them are to be found reprinted in his "Scientific Memoirs," published in 1878. In this volume may be found the pregnant suggestion for a standard of white light for photometry of a piece of platinum foil of given size and thickness, raised to a white heat by an electric current of specified strength. To guard against fusion he suggested that an automatic short-circuiting apparatus should be constructed by some "skilled artificer." He thus exactly anticipated Edison's first incandescent lamps; though the satisfactory standard of white light appears to be as far off as ever. The latest papers Draper published were entitled "Researches in Actino-Chemistry," and treated of the distribution of heat and of chemical force in the spectrum.

To Correspondents.

*** "By-the-Bye" and "Topic" are compelled to stand over for want of space.

P. T. sends us two photographs of yachts taken from the deck of a third craft. In both pictures the yachts appear to be going almost at racing speed, their spreading canvas bending to the wind, and white patches of broken water falling from the cut water. They are, in a word, most successful productions. P. T. tells us they were taken by a Steinheil eleven-inch focus aplanatic lens, and a drop shutter with aperture about half the diameter of the lens.

H. Bryant.—Use Nelson's No. 1 Photographic Gelatine.

N. E. D. Jones.—The simplest way will be to write to him and ask if he is willing to make an arrangement, as you have certainly no right to reproduce the picture without permission.

Lantern and Lerebour.—1. It is probably as suitable as any of its kind. 2. The carte-de-visite lens you mention would undoubtedly be much superior. 3. Probably not, but slightly better results are *sometimes* obtained by reversing. 4. Yes, in most cases, but focus with the full aperture. If you find that an image of the flame shows on the screen, and it cannot be got rid of by shifting the light, you had better place a piece of very fine ground glass on the lamp side of the condenser. This proceeding involves loss of light, and is essentially a makeshift method; but it often enables one to obtain a better result than would otherwise be practicable with a paraffin lamp as a source of light.

O. S.—If you wish to work on 10 by 8 gelatino-bromide plates, we would recommend you to go to one of the best makers and obtain a rapid rectilinear or symmetrical lens of about thirteen inches focus. With the full aperture this will give admirable portraits or instantaneous pictures in a good light, and if stopped down will give almost microscopic detail over the whole of the plate. If only a narrow angle of view is required, and a lens of long focus is consequently necessary, either the front or the back combination may be removed, the stops remaining in position; but the marginal lines will not be quite straight in this case. When, on the other hand, it is necessary to include a very wide angle, a lens of short focus must be employed—a portable symmetrical or wide-angle rectilinear having a focus of six, seven, or eight inches. In this case the smallest stop must be employed.

Tripod.—You had better let it be six inches higher.

D. A.—Commercial barium peroxide is dissolved to saturation in dilute hydrochloric acid, and enough baryta water is added to commence the re-precipitation of the peroxide. The solution being now filtered, excess of baryta water is added, when the whole of the barium peroxide is thrown down in a state of almost complete purity; and if this be kept in the moist state, it is merely necessary to add it to dilute sulphuric acid (one part to six of water) until this is saturated, in order to obtain the required product; this being poured off from the precipitate.

An Operator.—This correspondent wishes to meet with someone who can give him information as to the best locality for a photographic business in Australia, what it would be advisable to take out, and if there would be a good chance of obtaining an appointment as an assistant. Can anyone of our readers give the required information?

S. P.—As full details are given in the Year-Book, we cannot occupy valuable space in reproducing them in this column.

V. M.—So much depends on circumstances that it is difficult to advise without knowing more. A comprehensive article on the subject will appear shortly.

C. E. W. (Bradford)—If you purchase either of the old-fashioned instruments, we would recommend you to purchase the first on your list, provided that it is in good order. It will give equal illumination, and very nearly straight marginal lines. No. 3 would be a somewhat more useful lens, but is not worth the considerable difference in price. You would, however, find it better to obtain a modern lens of class referred to in the postscript of your letter.

Yorkshire.—An article on the subject shortly.

Limestone.—Use an old collodion and somewhat acid bath, giving good exposure, and using a weak iron developer. Fix and wash well, finally rinse with distilled water; next place in following bath:—

Red prussiate of potash	6 parts
Nitrate of lead	5 ,,
Distilled water	100 ,,

After about fifteen minutes, remove and wash well, next immersing in a mixture of one part of sulphide of ammonium and four parts of water; and finally rinse, dry, and varnish.

J. S. S.—1. The C.D.V. lens you refer to. 2. You can manage it without first making a transparency; but your quickest and best way will be to make a carbon or gelatino-bromide transparency first, and then to make a wet plate negative from this.

Several Answers are unavoidably postponed until next week.

THE PHOTOGRAPHIC NEWS.

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CONTENTS.

RECENT PHYSICAL RESEARCHES ON THE IODIDE OF SILVER.

It was in 1839, as our readers know very well, that M. Daguerre announced that he had succeeded in obtaining images by the action of light upon carefully-prepared silver plates which had been exposed to the vapours of iodine. A perfect surface of silver having been obtained, it was placed for about twenty minutes in a box containing iodine, at the end of which time it was found to have acquired a "fine golden tint." A more lengthened exposure produced a purple tint, and the plate was then useless. The golden-tinted plate was introduced into the camera, care being taken that no trace of light should fall upon it. After exposure in the camera, the plate was submitted to the action of the vapour of mercury, and then only did the image make its appearance. It was afterwards fixed by a solution of salt and hyposulphite of sodium. But the process was tedious—an exposure of twenty minutes in the camera was often necessary, and it was only when bromide of silver was used in conjunction with iodide that a workable system of Daguerreotype was possible.

During the last few years the physical properties of the iodide of silver have been studied by Mr. G. F. Rodwell, and the results communicated to the Royal Society.

In the first research on the subject (*Proceedings Royal Society*, 1875), the author commences with a description of some experiments on the effect of light upon the iodide. On this subject great diversity of expression exists in the text-books; thus Gmelin says, "It turns brown on exposure to light, but less quickly than the chloride." Fizeau describes it as "*noircissant lentement à la lumiére*." Miller says, "It is but slowly acted upon by light." While Vogel (*Jahresbericht*, 1863) affirms that if it be precipitated with an excess of iodide of potassium it is scarcely affected by light, whereas if precipitated with an excess of nitate of silver it changes colour, but undergoes no chemical change. The general idea that the iodide of silver is nearly as sensitive to light as the chloride is altogether erroneous. We must remember that the change produced by light is not apparent until the developing solution containing certain reducing agents has been employed; and the exact nature of the change is very obscure. The author of the article on photography in Watt's Dictionary of Chemistry speaks of it in the following terms: "The atoms have apparently acquired a certain degree of mobility, in consequence of which, when submitted to the action of reducing agents, such as ferrous sulphate or pyrogallic acid, they suffer decomposition, the silver being reduced to the metallic state, and forming a metallic film on the parts of the surface which have been exposed to light."

In order to ascertain the sensitiveness of iodide of silver to light, Mr. Rodwell made the following experiments:—

1. "By means of a large lens the rays of the electric lamp were brought to a focus within a glass cell containing a solution of iodide of potassium; a solution of nitrate of silver was then introduced by a pipette at the apex of the cone of rays. The precipitated iodide of silver possessed its usual pale colour.

2. "Freshly-precipitated iodide in suspension, with a slight excess of iodide of potassium, remained in the bright glare of a July sun without undergoing any perceptible change; neither did it subsequently darken.

3. "Freshly-precipitated iodide in suspension, with a slight excess of nitrate of silver, underwent no immediate change on exposure to a July sun. At the end of an hour it had become slightly grey, and subsequently darkened.

4. "Organic matter in the shape of starch paste did not induce any change when mixed with freshly-precipitated iodide in suspension with a slight excess of iodide of potassium. Albumenized paper with iodide precipitated upon it did not undergo any immediate change.

5. "Some dried and powdered iodide was found to have acquired a slight greyish metallic tinge after an hour's exposure to the sun. A freshly-broken surface of fused iodide became very slightly darker after exposure to the sun. A very pale microscopic crystal of iodide, removed from the interior of a crystalline mass, became slightly brown after several hours' exposure to diffused light.

6. "Crystals of iodide of silver produced by direct solution of silver in hydriodic acid were not affected by light; neither were crystals of hydro-argentic iodide (AgIHI), nor crystals of argento-potassic iodide (AgIK3).

7. "A sheet of silver leaf was exposed to the vapour of iodine (produced by spontaneous evaporation) for five minutes; it possessed a faintly yellow tinge, which on exposure to the sun instantly became pale green, but, on further exposure, returned to its original pale yellow. A second sheet was exposed for ten minutes to the vapour of iodine; it acquired a golden-yellow surface, which, on exposure to diffused light, acquired a purplish-red colour, and on exposure to the sun became greenish-purple. On continued exposure this colour disappeared, and the plate returned to almost the original yellow colour.

8. "A sheet of silver leaf was exposed to the vapour of iodine for half-an-hour, at the end of which time it possessed a decided golden yellow colour. On exposure to the sun, it instantly acquired a dark purple colour, edged with green, at those parts least exposed to the direct vapour of the iodine. On continued exposure the purple became paler, but the sheet did not return to its original yellow colour.

9. "A developing solution composed of ferrous sulphate, alcohol, acetic acid, and water, when applied to the exposed sheets of paragraphs 7 and 8, which had been purple, but on continued exposure nearly regained their original colours, produced a reddish-brown colour,

10. "A sheet of silver leaf was exposed to the vapour of iodine for many hours. It was found to be converted into a slightly adherent film of lemon-yellow iodide. Light had no effect upon it, even after a long exposure to a July sun; neither was any colour produced on the addition of a developing solution.

"The pure iodide of silver would thus appear to be scarcely affected by light, except when silver is present, either in the form of nitrate, or, as in the case of the silver films, as metallic silver."

In connection with this question, we may point out that a very important paper, "On the Photo-Chemistry of Silver Chloride," has lately been published by Messrs. Eder and Pizzighelli, in the *Wiener Academie Bericht*, 82, pages 144-160, to which we have already referred in these columns.

The properties of the silver iodide in relation to heat are even more remarkable than its relations to light. As far as we know, it is the only solid body which contracts on heating. The conditions of this contraction and its extent have been examined by Mr. Rodwell during the last five years, and the results may be found in the Proceedings of the Royal Society. He has also examined the co-efficients of expansion of the chloride and bromide of silver, and of various alloys of the iodide with the iodides of lead and copper, and with the chloride and bromide of silver. The latter were found to possess higher coefficients than those of the more expansible metals, such as zinc, and silver; while the iodide of silver is altogether anomalous. It contracts slightly during heating between 0° and 142° C.; between 142° and 145°.5 C., it undergoes considerable contraction, and from this point to the melting point (527° C.) it expands. Moreover, the iodide passes from the crystalline into the amorphous condition between 142° and 145° C., and possesses a point of maximum density at 142° C. Below 142° C. it is a pale green, highly crystalline body, while above that temperature it is a transparent, red, highly plastic, and amorphous body.

Some of the alloys of iodide of silver with the chloride and bromide possess the curious property of turning bright green on exposure to light; and when—if ever—the long-desired colour photography becomes an accomplished fact, no doubt these double iodide compounds will come largely into play. It seems to us that the right direction to work in, as regards the direct photographing in colours, is to seek, by the combination of iodide of silver and other silver salts with various bodies, to produce substances which are specially sensitive to certain rays of the spectrum, and which have certain colours excited upon them by the action of such rays. Purples and greens are already within our reach, and there can be no reason why, by diligent search, other colours serviceable for purposes of direct photography should not be found.

PHOTOGRAPHY AT THE SOCIETY OF ARTS.

Captain Abney's Lectures, and the Technical Exhibition.

It has been our lot to attend several courses of Cantor Lectures at the Society of Arts, and we have, on these occasions, been not only initiated into the mysteries of sugar refining, wool dyeing, bread making, and the coal-gas manufacture, but have also heard the late Rev. Arthur Rigg explain, with all the ardour of an enthusiast, the principles upon which mechanical tools are constructed; and have listened to Professor Colvin when he told how Greek and Roman art are sealed to him who is not properly versed in classic lore.

We have, however, not yet seen such a large or interestedly expectant assembly waiting for the advent of the Cantor lecturer, as was the case on the occasion of Captain Abney's first lecture, which was delivered on Monday evening last. Not only were all seats filled, but the approach to the lecture-room was densely packed with both men and women, who evidently regarded a remote chance of seeing and hearing as a sufficient recompense for considerable personal inconvenience; while many a one who had either been unsuccessful in obtaining the necessary ticket of admission, or had been dismayed by the remote chances of being able to find even standing room, took refuge in the library of the institution, where the collection illustrative of photographic technology was arranged; and we are told that it is intended that this technical exhibition shall be for a few weeks accessible to those interested in photography.

A demonstration of one of the earliest, and perhaps the most beautiful, of all photographic processes, was the first feature of the lecture, Mr. William England showing how the Daguerreotype plate is prepared, exposed, and developed, while the lecturer, in his well-known forcibly vivid style, elucidated the theory, and called attention to the practice.

Some transparencies which Mr. England made from old Daguerreotypes were next projected on the screen, and one picture of New York Harbour taken by Mead Brothers about twenty-five years ago, was regarded by those present as being quite comparable to the gelatino-bromide work of the present day.

Some electrotypic productions of Daguerreotype plates were next handed round, after which the Talbotype was discussed, and the various manipulations were demonstrated; the development being performed by supporting the exposed paper on an easel, and applying the developing solution by means of a broad camel's hair brush, so that the gradual appearance of the image should be visible to all present. At this stage the lecturer referred to the facilities which a paper process offers for artistic efforts on the part of the photographer; it being easily practicable to retard or accelerate the development of any part of the picture with the view of modifying the general balance of light and shade.

The deposition of metallic silver on the exposed haloid salt was compared to the growth of a crystal around matter of its own kind; the metallic or semi-metallic matter of the partially reduced salt attracting to itself the silver which continually tends to separate from a so-called physical developer. Physical development is then analogous to crystallization, and to illustrate this a wet collodion plate was prepared, and developed in a vertical glass trough containing the usual iron developer: an image of the plate being meanwhile projected on the screen by the electric light, a yellow glass serving to cut off the more actinic rays. Captain Abney then explained that he preferred to use the term chemical development in a sense differing from that usually accepted; and he would consider it as referring to a definite chemical reaction between a developing fluid and a body chemically altered by exposure to light. As an illustration of this view, some paper which had been charged with uranic nitrate and exposed, was treated with a soluble silver salt as a developer, metallic silver being deposited on the exposed parts by the reducing action of the uranous salt formed by the action of light. According to Captain Abney's use of the term, the production of an image on the usual gelatino-bromide plate would not be regarded as chemical development, the elective force which causes certain parts of the bromide to fall under the power of the alkaline reducing agent being physical rather than chemical. This view was elucidated by the experiment of exposing a bromo-iodide film, and then coating one half of the plate with a fresh layer of haloid silver salt. When this composite plate was developed the picture was not confined to the lower or exposed film, but extended also to the unexposed stratum which had been superimposed.

A consideration of the use of iodide of silver and chloride of silver with alkaline development, and of the various developers in use, next followed; after which, the bromo-iodide paper, which the lecturer recently brought before the notice of the Photographic Society, was referred to;

and a demonstration was given to illustrate its practical value. The development of a picture on this paper formed one of the most effective demonstrations of the evening, the picture rapidly unfolding itself in all its details. Captain Abney's lectures will probably prove to be the most successful course which has yet been given in connection with the valuable foundation of Dr. Cantor.

The Technical Exhibition, which has been organized by Mr. Trueman Wood, in connection with Captain Abney's course of lectures, was opened a couple of hours before the time of the lecture, and we must heartily congratulate the indefatigable Secretary of the Society of Arts on the success of his efforts to get together a collection which should be fairly representative of the present condition and bygone phases of this branch of applied science. On entering the Library, where the principal exhibits were arranged, the absence of large, shop-window-like stacks of highly-polished mahogany and brilliantly-lacquered brass was striking. In fact, the first object that met our view as we entered was a dingy apparatus nearly resembling a small and deformed cucumber-frame, which one out of a group of three persons who were examining it informed us was the first Woodburytype press, after which our informant led us to the other end of the room to see the first mould—an electrotype—and an impression from it. In other parts of the room, abundant illustrations of the various methods of practising the Woodbury process were to be found, including the old mode of working with the hydraulic press, and the new tinfoil method; also a mould in fusible metal, with the relief from which it had been cast, and a print on glass. Besides these, the so-called photo-chromie, in which a Woodburytype print is placed over a roughly-coloured ground, was well illustrated by numerous specimens, and examples of the work at various stages. Other photo-mechanical methods were duly represented, the Autotype Company sending a collection showing the various steps in collotypic printing; while Mr. Dallas and Mr. Wm. Griggs contributed good examples of block work on the one hand, and photo-lithographic work on the other hand; in each case chromo-printing being exhibited side by side with plain black-and-white. Examples of the highest merit in block and intaglio printing by Messrs. A. & W. Dawson, of Hogarth Works, Chiswick, are placed on the staircase, a block reduction of a page of the *Times* being a model of technical excellence and sharpness, while a "photo-intaglio reproduction of Mr. A. Dawson's picture "A Rainy Day under the Purbeck Hills," is far superior to anything of the kind which we have seen before, as it includes a fuller, deeper, and more extended range of light and shade than is usual in reproductions by processes of this nature; but in this case the plate had been to some extent retouched or worked on by the artist's own hand. The Pretsch process is represented by several old prints, and two or three copper plates, together with a reverse.

Archer's first camera for working the wet process in the field, one of his early fluid lenses, and other inventions of the discoverer of the collodion process, are shown. A small erection in glass and wood illustrates Messrs. Grover and Co.'s system of glazing without putty, the panes being fixed by means of strip pieces of very thin and flexible lead. Many advantages might result from the adoption of some method of this kind for studios, as in bright summer weather, obscured or ground glass could readily be inserted to replace clear glass. Mr. Galton's camera for composite portraiture stands in one of the glass cases together with numerous examples of composites and their component elements; while in another case will be found the arrangement used by Professor Piazzi Smyth in photographing the pyramids; and the negatives, though only an inch square, afford a good illustration of the wonderful technical perfection which may be attained by intelligent and careful work. One of these negatives enlarged to ten inches gives a picture which is itself remarkable for sharpness and fineness of detail.

The numerous appliances which have either been introduced in consequence of the present widespread use of gelatino-bromide plates, or have suddenly taken a new position of importance, is very considerable. Most of the quick shutters which have been described in the Photographic News from time to time are shown, and Mr. Warnerke exhibits a well-devised rotatory apparatus for testing their speed. Boca's new chronometric shutter is sent over by Mr. Stebbing, of Paris, and this gentleman also contributes an interesting series of negatives taken on his film-plates. Cheap and efficient portable dry-plate cameras are shown by the Sciopticon Company, Messrs. Jas. Lancaster and Son, of Birmingham, and others, while more highly-finished articles of the same kind are shown by Messrs. Rouch, Watson, Marion, Hunter and Sands, and other firms. The last-mentioned firm also show their new changing-box, which possesses features of novelty and convenience which are likely to give it the first position among apparatus of this kind. A double slide is used, and each pair of plates is in a separate frame. The changing-box is large enough to hold six of these frames, an opening at one edge serving to introduce the frames containing exposed plates, while a corresponding opening at an opposite edge serves to transfer frames containing unexposed plates into the double slide. As the column of six frames readily falls by its own weight from one side of the changing-box to the other, interior grooving is rendered unnecessary, and, moreover, it is impossible to remove the frames, except in their correct order, and no over-sailing or projecting parts exist, even while the box is being used. The box is about two-thirds the size and weight of the older forms, and the double slide can be used in the ordinary way when necessary. Messrs. Hunter and Sands also exhibit the photographic gun, recently described in the News, and several other objects of present and past interest.

Enamel photography is well represented; Mr. Henderson showing illustrations of the various stages in his method of working, while finished results are contributed by the Autotype Company and Mr. Henry N. White, of Finsbury Circus, this latter gentleman employing a powder process, while the Autotype Company make up a tissue with the required vitrefiable pigment, and after developing a print on the tile to be ornamented, destroy the organic matter in the enamelling kiln.

Some of the same series of decorative photo-reliefs which were shown in the Paris Electrical Exhibition, and referred to in the Photographic News, are on view here; but, although artistically excellent, it is evident that many of their good qualities depend on after-work of the nature of retouching or beating up.

A frame of magnificent transparencies made by Dr. Eder on gelatino-chloride plates stands opposite the entrance, and it is instructive to see what a great variety of tone has been realised. Dr. Eder's methods are fully detailed in his small treatise on the subject, which we observed to be attached to the frame; but our readers will find a translation in abstract by referring to the Year-Book.

Moule's Photogen lantern, together with a series of pictures taken by its light, will prove of interest to those who wish to practise portraiture of an evening.

A further description of numerous interesting exhibits must stand over for the present, there being about 400 exhibits, contributed by nearly a hundred exhibitors.

ON ACTINOMETERS.

BY DR. H. W. VOGEL.

Most of the actinometers hitherto introduced, and generally in use, consist of semi-transparent scales, whose thickness gradually increases from one end of the scale to the other. Under these scales are exposed sensitive paper or sensitive plates, and the degree of sensitiveness is ascertained by observing how far within a certain time the action of the light has proceeded towards the thicker end of the scale. These semi-transparent scales are either constructed of separate layers of paper under each other, the number of which increases as we proceed from the thinner to the thicker end of the scale—such is the actinometer for carbon printing—or they consist of a Woodburytype, as in the case of Warnerke's sensitometer.

These instruments have two defects:—1. The change of colour proceeds at first with great rapidity, afterwards it becomes slower and slower; 2. In penetrating, the light undergoes considerable modification, so that the more or less highly-coloured scale only permits certain rays to pass with readiness, the others with difficulty. Suppose we take the case of a scale constructed of several uniform layers of paper, and let us assume that in penetrating one of these layers the light is reduced to $\frac{1}{5}$ of its original intensity, then, after passing through a second layer, the intensity will have sunk to $\frac{1}{25}$ of the original, through a third layer to $\frac{1}{125}$ and so on. In general, if the light is reduced in intensity to $\frac{1}{n}$ of the origiual in passing through one layer of paper, then, after passing through x layers, it will be reduced to $\frac{1}{n^x}$. The intensity is therefore not in proportion to the numbers of layers 1, 2, 3, 4, 5, &c., but in that of the series 1, 5, 25, 125, 625, &c. For instance, if we take eight kilog. photographic paper, in passing though a layer of which the light is, in fact, reduced to very closely $\frac{1}{5}$ of its original intensity, and use it for the construction of such an actinometer, then the intensity of light, which in a certain time produces the discolouration of the fifth degree, must be 625 times as great as that of light which in the same time will produce the discolouration of the first degree. This circumstance is of the highest importance in considering the accuracy of the degree indicated, since the error of only a unit may lead to very considerable differences in the intensity to be found. In Warnerke's sensitometer the same fault exists, although in that case the relation depends on something of a different kind to a number of uniform layers of paper. That the colouration has also an effect in the quality of the light I have already shown.

For these reasons I have been endeavouring to obtain a photometer in which the intensity of the light is reduced more gradually than in the above-mentioned scale instrument, and which shall not contain any medium capable of producing a modifying effect on the quality. An instrument of the kind required will probably be formed by making use of the principle of the stop. In 1861, Dove, the late eminent physicist, adopted this principle in the construction of an instrument for general photometry, and

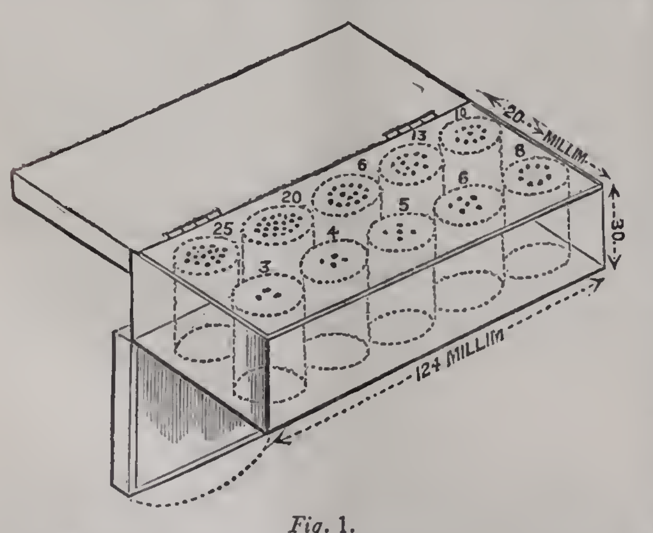

Fig. 1.

In 1869 Mr. A. Taylor recommended one of the same kind adapted to photographic purposes; the latter will be found described at page 19 of the Photographic News for 1869, and the accompanying wood-cut is reproduced from the same article.

"In a rectangular block of wood 108 millimetres in length, 58 wide, 41 millimetres in thickness, eight holes, 20 millimetres ($\frac{3}{4}$-inch) in diameter, are bored through the thickness of the block. These perforations are placed on two parallel lines, and each one is closed by a thin metallic diaphragm, the whole forming a group of cells, each of which is 40 millimetres in depth. The diaphragms are pierced with several small holes, all exactly of the same diameter, but the number of holes is different in each diaphragm. In the particular instrument now described, the diameter of this orifice is 2 millimetres. The first diaphragm has 3 orifices, the second 4—the following ones 6, 8, 10, 13, 16, and 20 respectively.

"It was no doubt to be supposed beforehand that the intensity of the action in each cell would be directly proportional to the number of the orifices in the diaphragm."

Thus it would appear that more than thirteen years ago an instrument had been proposed fulfilling the required conditions. It contains no absorbent medium, and the intensity in the cells is proportioned to the number of holes in the diaphragm. It is all the more interesting to notice that a similar instrument has been very recently introduced by Messrs. Mucklow and Spurge, the only difference being that it has only one orifice, whose size is different to that of both the diaphragms. Now Mr. Taylor had also provided for this construction; but he stated at the time that in such an arrangement the effects of diffracted light would be unequal, whereas in his own scheme this effect would be the same at all the orifices.

Soon after this description was published I had one of Taylor's actinometers made for my own use; but I found it to be not well adapted for the carbon process, although the author had expressly intended it for that purpose. This was due to the fact that the instrument, when placed in a horizontal position, received its light only from that portion of the open sky which was directly over the cells, while the printing-frame containing the carbon print was illuminated by the light of the sky from the sides as well. It occasionally happened that a white cloud covered the lower portion of the sky at an elevation of about 50°, which would have an effect on the print in the frame, but not on the actinometer.

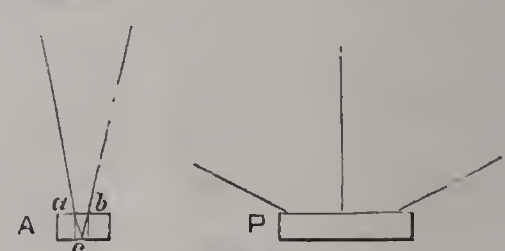

Fig. 2.

Suppose o to be a point at the bottom of one of the cells of such an actinometer; this point will be illuminated by the light of the sky included between the legs of the angle $a\ o\ b$. The negative in the printing frame, P, on the other hand, is exposed to light coming from a much larger part of the sky. Owing to this circumstance the indications of the instrument are not perfectly reliable, more especially in changeable weather.

For this reason I had given up the use of Taylor's actinometer until lately, when I again had recourse to it, for the purpose of ascertaining the sensitiveness of negative plates. If two plates be exposed in the instrument under precisely similar circumstances, and one of these, after development, gives a result of the third degree, and the other of the sixth degree, then the relative sensitiveness of the plates is in the inverse ratio of these numbers.

Now if, instead of this instrument, we use, as Mucklow and Spurge do, apertures of different diameters, this important advantage would be lost, for to regain it we should have to bore holes whose diameters increase in proportion to the square roots of the corresponding numbers; that is, for the series of numbers 1, 2, 3, 4, 5, the diameters must be in proportion to the numbers 1, 1·414, 1·732; 2, 2·236, &c. To bore holes with diameters corresponding to these decimal numbers is technically no easy matter, whereas there is not the slightest difficulty in boring any number of holes of the same diameter merely by using the same auger.

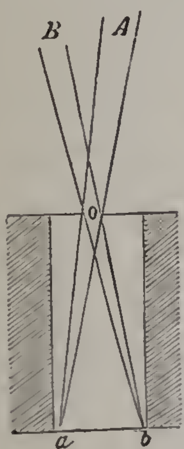

Fig. 3.

Still, in using the instrument, there are further difficulties to be overcome. When the instrument is exposed to the light of the sky, it is evident that the point *a* receives through the orifice, *o*, light from a different part of the sky to that which is received by the point *b*. Hence, if the whole of the sky be not equally clear—that is to say, if there be clouds present—the instrument will not give uniform results. It further appeared that the light from the sky acts much too intensely; even in cloudy weather, and with wet plates, all the parts under the cells are, in a very few seconds, so far affected, that, after being developed, they show a distinct impression. To reduce the intensity by covering the apertures with ground glass was found to be impracticable, since the glass does not diffuse the light evenly, and it would be almost impossible to obtain for different instruments a number of ground glass plates of exactly the same degree of transparency. The attempt to use the direct light of the sky was therefore given up, as also that to reduce its intensity by means of ground glass.

I then endeavoured to produce artificially an evenly illuminated surface, and succeeded in effecting this by means of a screen covered with ordinary photographic paper. This substance is the whitest fabric in existence, and is prepared from the very best material with the greatest care. No other substance is so uniform in texture, and no other, except, perhaps, freshly-fallen snow, reflects white light so completely; at the same time, no other substance of all that can be considered can be so available in photographic practice.

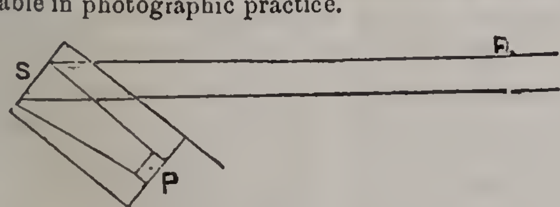

Fig. 4.

A screen of this kind, S, placed opposite to and at a proper distance from a window open to the sky, F, may be considered as perfectly uniformly illuminated.

(*To be continued.*)

By-the-Bye.

THE ELIXIR VITÆ OF PHOTOGRAPHERS.

It is not so long ago that at the London Photographic Society there arose a discussion upon the fleeting character of albumenized prints, and that one of the members, out of patience with the frequency with which the subject had been discussed, and the repeated fruitless attempts made to overcome the difficulty, suggested to the president the appointment of a committee then and there, who should go thoroughly into the matter, and once for all tell photographers how permanency in silver printing could be ensured. We call to mind even now the indignant, not to say defiant manner of the member in question, at being worried day after day by the vexatious problem, and his determination to put the matter down, as it were, by sheer force. The proposition met with little favour, for one reason because of the excited tone adopted, and for another, doubtless, because the Society were not so sure of the efficacy of the remedy suggested. Anyone "can call spirits from the vasty deep," they remembered, but like Hotspur, no doubt thought "But will they come when you do call them?"

This brings us to our text. Chemical and physical research is a mighty thing in its way, but it is not all-powerful as some photographers think. There is no harm in trying to find out the cause and remedy of a difficulty; indeed, unless we do try, we shall never be able to remove any of them. But, on the other hand, it does not follow that because we try, we shall succeed. Some time ago we listened to a lady dilating upon cremation. We agreed with her on many points; but for want of a better, we brought forward the well-worn argument about death by poisoning. Supposing some days after the body was burnt, there was a lurking suspicion that the man had been poisoned: what was then to be done, we asked? Her triumphant reply was that chemists, if requested, would soon furnish a series of "test papers," and these applied before cremation by doctors or friends would proclaim whether the deceased had swallowed anything poisonous. Our lady friend had evidently heard of blue and red litmus paper, or of turmeric paper, and knew how readily these proclaimed the presence of acid or alkali, and so rushed to the conclusion that chemists can give us any tests they may be asked for.

Now there is nothing more praiseworthy than investigating, and on every hand we find chemists hard at work upon original research. A bye-way of chemistry is taken up, and all the ramifications on this hand and on that are investigated. The colours we get from coal tar is a capital illustration. Perkins' purple or magenta, found out some twenty-five years ago, was the forerunner of a magnificent series of colours which have gradually been evolved from coal tar by chemists steadily working away at the subject, and jealously watching every action and reaction. Permutations and combinations are tried and re-tried, and, as a reward of all this labour, we have a most varied range of tints. But, it appears, a satisfactory aniline black has not yet been discovered. Over and over again the dyer has said to the manufacturer of these dyes, "Why don't you make a black? Get a chemist to find out one for you." For the chemist, to many people, is the *deus ex machina* that shall invent anything at will. But the dye manufacturers have done this: they have not only employed year after year the most skilled chemists to find out the desideratum, but they have, moreover, offered large sums of money for the process, should any outsider discover it. But notwithstanding the circumstance that nearly every other tint can be prepared, a good black is still unfound.

We do not believe there is a solitary case on record of any important discovery in chemistry or physics having been made in the hope of winning a prize. Of course, no investigator investigates for nothing; he is always alive to his interests. Either he desires to make a name or money by his labour, and if he is successful, he makes both. He is simply like any other workman, and workmen do not, as a rule, work without some chance of profit. But bidding a chemist discover a certain nostrum is like asking a man to unearth a hidden treasure whose very existence is doubtful. There are two elements necessary for his success: first of all, there must be a treasure; and secondly, he must dig at the right spot. Success must at least be *possible*, or it cannot be attained, whether it is a chemist or anyone else who works. Chemists are busy every day with the solution of problems, and "Nothing venture nothing win," holds good in their case as in any other; but, for all that, you cannot *buy* a discovery until it has been made, those photographers should remember, who contemplate the expenditure of money or time in the acquisition of something they are yearning for.

The past is a very good lesson for the future. The offering of prizes in money or gold medals for successful research is not a novelty. Most photographers remember the munificent prize of many thousand francs instituted by the Duc de Luynes, and in Italy and Austria similar incentives have been given. Nay, at this very moment there are prizes offered by Paris and Vienna for the attainment of certain results in photography, while the Paget Prize of fifty pounds was but awarded a year ago. Of all these we do not think there is one that has been given for the original object. The prizes have been awarded to persons who most nearly fulfilled the requisite conditions, and not one of the fortunate recipients, we make bold to say, ever gave the prize one thought while he was hard at work. If the discovery tallied pretty well with the conditions, this was a pure coincidence, and nothing more. The discovery would have been made just the same, even if there had been no prize. In fact, the prize is generally awarded in the end, not because the recipient has fairly gained it, but because the donor naturally does not like to withdraw the gift. Poitevin, who received the lion's share of the Duc de Luynes' prize, had it decreed to him because of a long list of researches which the prize committee specified. These had been undertaken year after year in his laboratory, quite irrespective, of course, of the chance of winning a premium. Poitevin, we hold, was more entitled to the award than any one else; but according to the strict terms of the competition, he was not entitled to it at all.

One word more. If other proof were wanting that prizes in money spontaneously offered are valueless in influencing research one way or the other, it is afforded by the fact that the Government has, during the past five years, spent twenty thousand pounds in the endowment of research. The money may have been well or ill-spent—we fear those who had most influence got most of it, and the needy inventor without friends is as needy as ever—but can any one point to a single investigation of value which would not have been undertaken but for this grant? So we say to photographers: research is always valuable; but do not suppose that you have simply to pay an investigator in order to get the panacea you require.

The "At Home" next week will be "Herr Koller in Pesth—A Studio with no Side Light"; the following "By-the-Bye" will be "What Photography does for Science."

Notes.

The Dundee Exhibition opens next week. We hear that the exhibits are likely to be both numerous and important, and that the photographers of Scotland are doing their best to make the gathering a successful one.

Mr. Alexander Ayton will, we hear, at the March meeting of the Edinburgh Photographic Society, give demonstrations of a new way of finishing prints, whereby permanency, if not rendered absolute, will be greatly enhanced. The chief point is the transformation of paper into vegetable parchment by immersion in sulphuric acid, which will greatly improve a picture. When suitably mounted, these prints colour well from the back.

Mr. W. J. A. Grant writes of his last Arctic journey that there was an immense deal of ice in the sea between Greenland and Novaia Zemlia, and for this reason the voyage was much delayed. He gives the following particulars of the stout little craft in which he made the journey:—"The *Willem Barents* is a little schooner, built by voluntary contributions, and kept going in the same way, in addition to help from the Dutch Government in the way of officers, &c. She is sent purely as a scientific ship to explore the sea in certain directions, and the work mainly consists in taking a large number of serial deep sea observations and dredgings, together with magnetical and meteorological observations, in which we all help. We have also to determine the average ice limit late in the season between Spitzbergen and Novaia Zemlia, and work as far north as possible."

Mr. Grant's photographic work this season was less than usual, as they had few opportunities. "This is my fifth voyage to the North," he writes, "and I suppose I shall go until I come to grief." We sincerely hope not, albeit Arctic exploration is certainly a most dangerous enterprise. "Mr. Leigh Smith's yacht—*Eira*, the ship I was in last voyage," writes Mr. Grant, "has not yet returned from her last expedition, and there are grave doubts as to its having shared the fate of the *Jeanette*."

M. Cornu suggests making use of a colourless fluor spar for lenses in photo-spectroscopic observations. "It is," he says, "quite as transparent for the ultra-violet rays as quartz, and its law of dispersion is so much in harmony with the latter, that with the two, a system of lenses of nearly perfect achromatism may be had." To give an idea of this achromatism, M. Cornu, according to *Nature*, can obtain on one *cliché*, with very satisfactory distinctness, the spectrum of all the photographic lines of metals from the three blue lines of zinc to the lines No. 32 of aluminium.

The general examinations in chemistry held throughout the country to test the knowledge of aspirants in that science, give rise to some curious answers by those who are not very clear as to the combinations and reactions of various bodies. Thus, to make quicksilver, a would-be chemist recently suggested the mixture of nitrate of silver and quick-lime, when nitrate of lime and quicksilver would result. This straightforward explanation reminds one of Mr. J. L. Toole's famous lecture on astronomy, in which, alluding to the stars, he naively remarks: "Eleven of these are called primaries, because they come first, and eighteen secondaries, because they come second."

Mr. William Bedford says that an admirable preservable sensitive paper may be obtained by sensitising in the usual way for about three minutes, and then floating for one minute on a bath containing 30 grains of citric acid and 30 grains of silver nitrate to each ounce, and that this paper tones well.

We are glad to hear that Mr. Jarman's very practical apparatus for electric illumination of the studio has been adopted by several firms in this country with success, not only for evening work, but as a valuable aid during the murky weather we have been troubled with lately. M. Levitsky, the Court photographer at St. Petersburg, as we recently stated, employs electricity in the studio for the same purpose, namely, to accentuate the high-lights in bad weather. A full description of Mr. Jarman's apparatus appears in the Year-Book.

The Lamson poisoning case, according to Mr. Wontner, the solicitor for the prosecution, is likely to lead to further restrictions in the sale of poisons, it being contemplated to amend the Act of Parliament on the subject. We are not sanguine as to the result. In any case, medical men must be trusted with poisons, and no Act can prevent the application of noxious drugs to patients in an illegal manner. If we are going to interdict the traffic of poisons generally, it will be necessary to fetter every profession and trade in the country.

Thus, among the photographer's paraphernalia, cyanide of potassium is usually singled out as the bugbear. It is a most virulent poison, no doubt, but there are other compounds to be found in every photographic laboratory very nearly as deadly, while far more painful to the patient. Pyrogallic acid, for instance, to which no second thought is ever given, is a terrible poison, and so, too, is bichromate of potash, which we are wont to handle in the most innocent manner. Nitric acid and its fumes are excessively dangerous, and as Mr. Vincent Elsden has pointed out in the Year-Book, of hydrochloric acid and sulphuric acid but a drachm or two only are necessary to cause death. We need hardly refer to oxalic acid, the lead and mercury compounds &c., as their poisonous nature is proverbial; but obviously, it will be impossible for the photographer to work unless entrusted with most of these

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Topics of the Day.

THE SYREN—PHOTOGRAPHY *VERSUS* ART.

BY WALTER B. WOODBURY.

Anyone who is in the habit of giving a passing glance into the various shop windows where photographs and engravings are on sale, whether in London, Paris, Brussels, or other Continental cities, must have noticed one particular picture—whether in the form of a photograph of different dimensions, or as an engraving or "photogravure." It represents a calm sea and a clear sky, with a steam yacht lying some little distance from the shore; at the right hand, and in the foreground of the picture, is a portion of a pier or jetty, down whose steps a young gentleman in sailor costume is handing a young lady in a tight-fitting jersey to a boat lying in wait, manned by sailors. She has just descended the first step, and so the picture is in some cases called "Le Premier Pas," and in others, "La Syrene," presumably the name of the yacht which forms a part of the picture. This painting is now the subject of a lawsuit, and is creating quite a sensation in the city of Brussels, where the case is being tried. We shall, therefore, soon learn whether photography or art were the producers of this masterpiece. If it is proved that photography did it, then it will doubtless be a strong slap in the face for those who say there can be no art in photography.

That painters do make great use of photography, although they are loth to own it, is an acknowledged fact. There is a new class of shop lately sprung up in Paris, whose speciality consists in studies of all kinds—trees, rocks, stones, bits of foreground, cattle, sheep, figures, in costume and out of it, whose customers, I am told by the proprietors, are mainly artists. How is it that they seem to be ashamed to acknowledge the great assistance they derive from our art?

A Belgian writer on the subject, speaking of the use photography *might* be to artists, says: "An artist who finds it superfluous or beneath his dignity to use the resources that science has placed at his disposition, gives us the effect of an individual who prefers to go to Paris *en panache*, as was the custom thirty years ago, instead of using the railway. He would be mocked at, and with reason."

Up to within the last year or two artistic photography was almost restricted to still life; but since the introduction of gelatine plates and instantaneous shutters *ad. lib.*, facilities are given for securing the most artistic and natural studies of figures. Note some of the instantaneous studies in our last Exhibition. What artist could rival some of the quaint market groups of Whaite, or the marine studies of various other photographic *artists?*

The trial in this remarkable case commenced on the 4th of January, and, as there are many points of interest to photographers, I propose giving a short *resume* of what took place. Monsieur Lucien Solvay, a newspaper critic of some celebrity, publicly accused (in *La Gazette*) M. Van Beers of employing photography as a basis for his paintings, thus imposing on the public. M. Van Beers, with natural indignation, then writes to a friend: "They no longer criticise my works; they accuse me of falsifying my merchandise. I have never before taken notice of critics, but this time I shall do so." "After having read M. Solvay's article," says M. Van Beers' counsel, "persons who have purchased his pictures will have the right to say, 'Have I not simply got a coloured photograph instead of an artist's veritable work?' Is not this enough to cause a grave prejudice to my client, and give rise to the following question?—'Is M. Van Beers an honest man, or a '*grec*' (swindler)) in his artistic profession?' M. Solvay says to M. Van Beers, 'This is not a *tableau* that you sell for 20,000 francs (£800); it is only a coloured photograph, which has only a small value.' Is not this accusation of a nature to destroy the artist's reputation? Suppose a purchaser presents himself to M. Van Beers, would he not have the right to say, 'You have deceived me as to the value of the merchandise? And would not M. Van Beers then fall under the penal code, article 496? In France, it seems, M. Lisbonne, the regulator of the press laws, in reply to a letter of M. Sarcey, expressed his opinion that the painter could be prosecuted if the fact was established. In concluding his address, M. Van Beers' counsel says: "You have not proved your case, and, notwithstanding the opinion of the jury, you still hold your views. It is true you no longer talk of collodion, but of a photographic transfer and the camera (*claire*)! You, the man of material certitude, can't even suggest what process was employed! It only rests with me to call attention to the various proofs M. Solvay contemplates producing before the tribunal. These are: photographs on canvas, coloured photographs, and a picture representing two donkeys and their driver, and signed by M. Van Beers. They pretend that this painting was made over the photograph. If M. Solvay proves a hundred times that one can paint over or under a photograph, he has not yet shown that either the 'Syrene' or 'Lily' were done by a photographic process."

M. Moreau, the council for M. Solvay, in replying, began by saying, that M. Van Beers was an artist of talent; there was a time when he made grand pictures, to-day he makes grand lawsuits—this is a falling off. The public had a perfect right to criticise his works. Before this trial he was very little known, and could not easily dispose of his pictures, even when offered for nothing. Witness his "Van Artenelde," refused by the town of Ghent, to whom he offered it gratuitously, and which was finally sold by auction for 1,400 francs. It was little in comparison to the price he now asks for his pictures, which some people say are of less value than their frames. To-day, what do we see? An Antwerp painter of European reputation, photographs of whose painting, especially the "Syren," being exposed for sale all over Europe, often accompanied with a dolorous description of his misfortunes. Celebrity has arrived to him, and through the critics. "*Qui expose s'expose.*" The critic is provoked by the artist to give his opinion, and he finds himself in the position of a person to whom you address this question: "Come, now, give me your opinion as to my probity," and who replies, "You are a thief."

In conclusion, M. Moreau remarks that many painters make use of photography, and cites a pamphlet lately published by M. Thiel on the subject, which cites four different methods employed:—

1. A photographic image on canvas by salts of silver.
2. "Encre grasse" (collotype), which even by scratching could not be discovered, the materials being the same as the painting.
3. By the powder process.
4. By painting under a photograph.

M. Moreau then showed specimens of these four processes, which concluded the day's proceedings. The following day, in continuation, he called attention to the fact that the principal newspapers of Belgium and France, in their reviews of the "Salon," had all remarked the extraordinary photographic appearance of M. Van Beers' pictures; therefore, as this peculiarity struck all the world, it was not to be wondered at that M. Solvay should also be struck by it. Beyond that M. Solvay knew the different processes which certain painters avail themselves of to simplify their work. In proof of this he then exhibited the photograph of the "Donkeys and their Driver," which was *identical* with the painting. Is it to be believed that we are in presence of a painting to which the artist has consecrated several months, or one that has been (*baclé*) knocked up, in a few days by the aid of photography?

A reason why all ideas of photography being used should be put aside was, because photography presented always faults in perspective and disproportion. However, every photographer who is well up in his science knows that in the present day these faults in perspective and disproportion no longer exist. The jury have therefore retarded by twenty years.

The case was then adjourned for a week, and on the re-opening, the court was densely crowded, many artists and literary men being present. M. Jannsen, the counsel for Van Beers, began by remarking that, although Messonier painted from photographs, the most careful examination had failed in proving in his client's case either the use of silver salts, collotype, or powder processes. The first could have been easily discovered by chemical analysis—that in using fatty inks collodion was not called into play, while that substance had been mentioned; and as for powders, there were none that were transparent. That the opposite side had attacked the jury, pretending that not one of them knew anything about photography; while one of them (alluding, doubtless, to M. Rommelaire) had translated English works on the subject. In reply, among other remarks interesting to your readers, the following were made.

Has painting the right to call in the aid of photography? Opinions are divided, but the question is one of the greatest gravity. Without doubt photography should aid painting in certain cases, but the elect should not allow photography to lead them by the hand. We say that photography is found in your picture, you give us reality without art, and so squander your magnificent gifts. To judge this trial we must put aside, on the one hand, M. Solvay, and on the other M. Van Beers, and not dream of anything but the interests of art, the question being one of arresting the tendency of our epoch, viz., naturalism in our literature, and photography in our painting.

The President then ordered the papers to be placed in the hands of the Procureur, who would give his verdict at a future time.

As this is one of the first occasions when the relative positions of photography and art have come into a court of justice, and as I have thought the subject one of particular interest to photographers, I have been led into giving a more extended notice than I originally intended, for which I hope your readers will pardon me.

Correspondence.

EMULSION MAKING.

SIR,—I asked you a short time ago if you could tell me why, in preparing emulsions, I always had a sediment of silver bromide at the bottom of the vessel. You replied that it may have been because I filtered the emulsion through dirty muslin. My further researches, however, proved that the cause was in mixing the emulsion too hot. The warmer the gelatine, the more liquid it becomes; and the bromides combine too quickly and too roughly with the added silver solution. When the gelatine, on the contrary, is only heated to about 35° C., the liquid seems to be thicker, and the added silver nitrate can only slowly combine with the bromide in the gelatine, thus giving much finer bromide of silver particles, which are of course kept better in suspension, and the emulsion is much improved. Afterwards you may heat it as much as you like, even to boiling point, and it will not give this sediment.

Two to three grammes of a one per cent. solution of tannic acid to a hundred grammes of emulsion is the best thing I know to prevent frilling. Chrome alum is good, but it does not suit every gelatine and at all seasons. I also tried to mix tannic acid and chrome alum for the same purpose, as recommended in a recent formula, but that gives plates nearly fogged, with an appearance of over-exposure, and without any density.

Plates prepared by chrome alum are very easy to intensify by chloride of mercury. Tanned plates, on the contrary, are very difficult to intensify without getting a yellow veil. Mercuric salt and tannic acid mixed in solution gives a yellowish-brown mixture, and this instantaneously. Now could not this have been one cause, and is there not a medium to destroy or take off the tannic acid in the film, to prevent this yellow staining?

I hope there is in this matter something worth discussion, as it is only by reciprocal assistance that we can get over difficulties in new processes. Some have success in one direction, some in another, and by study of both we can often avoid mischief.—Yours truly, O. PFENNINGER.

DURABILITY OF CARBON PRINTS ON CANVAS.

Sir,—I had a carbon print done on canvas, for the purpose of painting on, about seven years since. The picture was duly painted in oils; but it soon showed minute signs of cracking, mostly where the gelatine was thickest, with a correspondent contraction of the canvas at the back. Now the cracks have so far developed, that wherever the shadows were darkest—*i.e.*, the gelatine the thickest—it is flaking off in patches, clean from the priming of the canvas; so that what should be a mass of black drapery is now like the sealed bark of a plane tree, and the back of the canvas shows nothing of the contraction before mentioned.

If you, sir, or any of your correspondents, should have had similar experience, or can throw further light on the subject, I and others might be glad to learn.—Yours truly,

A. Pierpoint Chambers.

PS.—It would appear as though the gelatine had temporarily contracted the canvas, and the subsequent expansion of the canvas threads had cracked the gelatine and the paint.

[Of course, if the transfer is faulty, a defect of this kind may arise; indeed, the application of a carbon film to canvas is at best a difficult job.—Ed. P.N.]

AN INTERNATIONAL PHOTOGRAPHIC EXHIBITION.

Dear Sir,—A desire has been expressed to have in England at an early date an International Photographic Exhibition or Convention, and the manager of the Royal Aquarium has kindly placed his building at the disposal of the profession for the purpose.

A meeting of the leading photographers will shortly be called for the purpose of considering the question, and, if favourably entertained, nominating a committee to carry it out. Medals and certificates will be offered for competition. In the meantime I shall be glad to receive the names of any gentlemen who may be willing to assist.—I am, &c.,

C. G. Cutchey.

Proceedings of Societies.

Oldham Photographic Society.

The annual soirée and exhibition of the above Society was held on Wednesday, the 25th Jan., at the Spinners' Hall, Oldham, under the presidency of the Mayor, James Yates, Esq., M.D. The rooms were tastefully decorated, on the wall were displayed a selection of choice photographs, and on the tables a collection of the latest inventions in apparatus.

His Worship, in the course of his remarks, said that he was glad to find that in a town so entirely devoted to manufactures, there was some attention paid to art, and he was only too pleased to be present and help to further the success of a society with such an object.

Among the photographs exhibited was an interesting collection of views by Mr. S. R. Platt, J.P., taken on board his yacht during a voyage to the coast of Norway. Most of the views were specially noticeable as being taken by the midnight sun.

Mr. W. G. Coote, of Manchester, kindly lent a series of well-executed photographs of North Wales, &c.

Messrs. Marion and Co. exhibited photographs of athletic sports and a variety of new apparatus.

A large collection of photographs from the works of Messrs. Payne Jennings, H. P. Robinson, V. Blanchard, W. England, &c., &c., were also shown.

Amongst the numerous local exhibits may be mentioned a series of enlargements, and specimens of gelatine photographs of interiors, by Mr. L. Knott; stereoscopic views, &c., by Mr. James Hall; views and enlargements, by Messrs. James Gartside, W. Thorpe, Jackson Brothers, &c.; microscopic photographs by Mr. H. Braddock. The apparatus exhibited were Marion's pocket camera and cutting boards, Warnerke's sensitometers, microscopic camera, enlarging apparatus, &c.; the various merits of each being described at intervals by the members.

A lantern exhibition worked by Mr. J. Wrigley was given during the evening, when slides from the members' negatives were thrown on the screen, explanatory notes being given by the Hon. Secretary.

The rooms were crowded with visitors the whole of the evening, and the soirée was considered the most successful the Society has had.

The ordinary meeting of the Society was held on Thursday, the 20th inst., Mr. G. Hall in the chair.

The business was chiefly in connection with the exhibition and soirée, and votes of thanks were passed to all who had kindly contributed.

Votes of thanks were also awarded to the editors of the journals for the annuals they had kindly sent, and Messrs. Cussons and Co. for their pocket manual, a parcel of which had been sent for distribution among the members.

Thursday Evenings for Photographers.

At the meeting held on the 26th inst., Mr. F. Reiman occupied the chair.

In reply to a question as to the effect of a little quite ripe (?) emulsion being mixed with a newly formed one, and so carried on through all the stages again, as, for instance, by using the same utensils without washing,

Mr. Henderson thought that by re-boiling the emulsion the sensitiveness would be increased, but that the particles of bromide would become more granular, and would probably be left on the filter.

Mr. Brown said he frequently used the same utensils without first thoroughly cleansing them, and noticed no ill effect.

Mr. Henderson said he found he could prepare a very good emulsion without excess of bromide, by using rather less than the usual equivalent of bromide of ammonium, and adding, after the bromide and gelatine is mixed with the silver, a solution of chloride of sodium, which converted the remaining free nitrate of silver into a coarse chloride, which could be nearly all filtered out.

Mr. Brown had prepared a very successful emulsion with the following formula, viz.:—

Gelatine	2	drachms
Silver nitrate	1½	,,
Ammonium bromide...	1	drachm
Water	4	ounces

When washed, well drain and saturate with alcohol, then drain again; this made 3 ounces of a rich sensitive emulsion, and allowed the plates to be drained after coating.

It having been stated that as much as 15 grains of nitrate potash could be added to each ounce of finished emulsion without causing any apparent crystallization, Mr. Henderson passed round three plates coated with an emulsion containing 10 grains of nitrate potash to the ounce. No. 1, unwashed, showed decided crystallization; No. 2, washed thirty seconds, slightly crystallized; No. 3, washed one minute, no apparent crystallization.

In the course of conversation it was mentioned that it had been stated by Mr. Bolas that if a plate was coated with a film of gelatine about one-sixteenth of an inch thick, and afterwards coated with an unwashed emulsion, the gelatine film would absorb the salts from the emulsion, and render washing unnecessary.

A discussion on Coignet's spots and their cause then took place. The Chairman and Mr. Debenham did not think they were caused by grease. Mr. Henderson considered that carbonic acid gas was the cause of some, at least, of the spots.

Mr. Brown exhibited a plate coated with a mixture of zinc oxide and gelatine in equal proportions, which he proposed to use as a substitute for opal glass. He also showed two pictures—one taken on a plate coated with emulsion over the oxide film, the whites in this case having degraded while in the hyposulphite solution; in the other plate, the oxide was mixed with the emulsion, and, in this case, the whites were but very slightly darkened.

Mr. Henderson passed round a gelatine plate which had been placed, while wet, under a Warnerke's "Actinometer," the marginal lettering, and also the grain of the cloth which masked the margin of the plate, being distinctly visible.

Mr. Haddon said an amateur had recently recommended to him Eau de Javelle as a preservative for prints; it was found that prints washed in a few changes of a weak solution of Eau de Javelle were much more permanent than others which had received prolonged washing in the ordinary way; and at the request of some gentleman present, he said Eau de Javelle was composed as follows:—

Hypochlorite of lime	2 ounces
Carbonate of potash...	4 ,,
Water...	4 ,,

Mr. Debenham had used a weak solution of alum for the same purpose.

Mr. Henderson had used the following formula successfully for restoring prints. Well wash the print in boiling water to remove as much of the starch and size from the paper as possible, then immerse in the following solution:—

Bichloride platinum	5 grains
Iodide potassium	1 drachm
Hydrochloric acid	1 ,,
Water	1 pint

Saturate the whole with iodine. When placed in this solution, the paper instantly becomes blackened; it should be left for about half an-hour, then removed and washed in several changes of water for two days; this eliminates the iodide of starch formed in the paper, and leaves an image composed of platinum. He had not succeeded in some cases, but attributed the failure to the presence of an insoluble compound of silver left in the albumen. He also exhibited an experimental lamp for darkroom purposes; it consisted of an ordinary paraffin lamp with a plain glass chimney enclosed in a box, the light passing through two glass baths, one containing a saturated solution of bichromate of potash, the other a weak solution of litmus. The light when passed through this in conjunction with the bichromate solution gave a very red light, which was pronounced to be wonderfully safe.

Dundee and East of Scotland Photographic Association.

The second popular meeting took place on January 25th, in the Hall of the Young Men's Christian Association. Mr. John Leng presided, and in opening the meeting said the Society, though only in the second year of its existence, was in various ways displaying great energy and vitality. This was the second meeting of the season at which photographic illustrations had been given by members of the Society. The first consisted of views of Scottish scenery, and on the present occasion they were to be favoured by illustrations of Norway and Sweden. Their friends, Mr. David Ireland and his son, had a holiday trip there last summer; and by the aid of the sun and the limelight, the audience were now to see very much what those gentleman saw, without the trouble, the weariness, and the expense to which they were subjected. The Chairman mentioned, as another instance of the vigour of the Society, that in the course of a few days it was to open an Exhibition which, there was every reason to believe, would not be second to any exhibition of photographs yet held in the kingdom. There were a number of enthusiastic amateurs in the Society who had come forward and offered such medals and prizes as had induced not only the leading amateurs, but also the principal professional photographers in the kingdom, to become exhibitors. He was happy to state that the Royal Engineers, Colonel Stuart Wortley, Captain Abney, and the veteran Horatio Ross, would be amongst the exhibitors. In addition to the photographs, all the latest and most scientific photographic instruments and appliances were to be exhibited. That there might be no suspicion of favouritism, it had been arranged that a number of distinguished critics from a distance should be the judges at this exhibition. These included Messrs. H. Baden Pritchard, H. A. H. Daniel, John Fergus, and Mrs. D. O. Hill. The only local judge would be Mr. W. D. Valentine, who was to be a large exhibitor, but not a competitor. The galleries were to be illuminated by the electric light, and the Council had decided that the season tickets should be issued at so moderate a charge as to preclude no one from attending. They would all look forward to the forthcoming Exhibition with great pleasure, and he trusted it would prove a decided success.

A very fine series of views in Norway, Sweden, and the Mediterranean, photographed by Mr. David Ireland, jun., was then exhibited by means of the oxy-hydrogen light, and a descriptive lecture was delivered by Mr. Frank W. Young.

A large number of slides of animals in the Royal Zoological Gardens, kindly lent by Mr. Frederick York, London, were also shown.

At the close, in moving a vote of thanks to the Messrs. Ireland, the Chairman said that, so far as form and shade were concerned, photography seemed nearly to have reached perfection; but there was still an important discovery to be made—that of photographing colours. Any young man in the room might attain both fame and fortune by making that discovery, and the Chairman commended it to the attention of the students in chemistry and photography.

A vote of thanks to the Chairman followed, and it was announced that there would be another evening devoted to a miscellaneous exhibition of slides by amateurs.

The next general meeting will be held on Thursday, February 9th, in place of the first Thursday in the month. As the Exhibition opens on the 10th, the 9th will be the judging and private-view day, when it is hoped that at the general meeting in Lamb's Hotel in the evening, a pleasant reunion of photographic celebrities from all parts of the United Kingdom will express opinions on the art.

Liverpool Amateur Photographic Association.

The monthly meeting of this Society was held on Thursday, the 26th ult., at the Free Public Library, Mr. W. H. Kirkby (President) in the chair.

The minutes of the last meeting having been read and confirmed, Messrs. R. Crowe, W. J. Little, P. Macdonald, P. H. Phillips, W. P. Riley, W. Ryland, K. B. Suckling, and the Rev. A. T. Scott were elected members of the Association.

The Hon. Secretary then read the following report of the Association's department at the *soirée* at St. George's Hall, on the 21st December last:—

"The Liverpool Amateur Photographic Association took a prominent part, as usual, in contributing to the interest of the proceedings of the evening; the Revs. T. B. Banner and H. J. Palmer, together with Messrs. Bean, Corkhill, and Maycock, having been appointed as a committee to make the arrangements for the Society's exhibition, devoted the whole day to this purpose. The executive committee allotted to the Association the Chancery Court and the barrister's robing room as their special department, and a good display of prints and apparatus was made. The appeal of the Secretary to the members to contribute Daguerreotypes, calotypes, and early specimens of collodio-bromide and gelatino-bromide work met with no response whatever, and, therefore, the proposed historical exhibition had to be abandoned. The display of photographs and apparatus, however, was a very fine one, and the rooms were crowded during the whole evening. About five hundred pictures were exhibited, contributed by Messrs. J. W. H. Watling, J. H. T. Ellerbeck, B. Boothroyd, W. H. Kirkby, H. A. Wharmby, and by the Revs. T. B. Banner and H. J. Palmer. The Autotype Company and Messrs. Robinson and Thompson exhibited some very fine enlargements. In the course of the evening a lecture was delivered by the Rev. H. J. Palmer, on 'A Popular History of Photography,' and later on Mr. J. A. Forrest showed a large number of transparencies with the lime light on a sheet of opal glass. Mr. Forrest delivered an explanatory lecture upon the slides, which were illustrative of some of the finest ancient specimens of ecclesiastical architecture in Europe. This entertainment excited the greatest interest, the room being densely crowded. On the whole, the Association may congratulate itself on taking so prominent and useful a part in the proceedings of the associated *soirée* of 1881."

An open meeting of the Association was held at the Free Library, on December 22, 1881. The lantern was exhibited to a large and appreciative audience in the Lecture Hall, the slides being contributed by Messrs. W. H. Kirkby, E. Twigge, J. H. T. Ellerbeck, A. W. Beer, and the Rev. H. J. Palmer. The walls of the adjoining room were covered with photographic prints exhibited by Messrs. Watling, Ellerbeck, Kirkby, and the Rev. H. J. Palmer.

The President for the past year, Mr. W. H. Kirkby, made a few valedictory remarks, and then vacated the chair, his place being taken by Mr. W. E. Roberts, the President for 1882, of whose interesting address we are unable, owing to late receipt of report, to give more than the following abstract:—

"Being one of the 'old originals' who well remembers the evening in December, 1863, when we held the large meeting in this room, and sat round these tables to draw up the rules and elect the officers and members of our new Association, I cannot rise to address you this evening without experiencing feelings somewhat 'mixed.' First, a feeling of regret that so many of those old faces should have been removed from our midst; and, secondly, a strong feeling of pleasure that there are still so many of those old members left who attend our meetings as regularly, and take as lively an interest as ever in the welfare of our Society. Few of the rising generation have any idea of what was involved in becoming an amateur photographer twenty years ago, and in these days of bought plates and small cameras —for in those days we had to do everything for ourselves—sensitise our own papers, prepare all our own plates, and in many cases we prepared our own collodion. And to see our members turn out for a day's excursion to Bettwys-y-Coed, Llangollen, Chirk, Corwen, or some other of the lovely spots in North Wales, was a sight indeed—each man loaded like a pack-horse, with a 12 by 10 or a 15 by 12 camera strapped on his back, a lens about the size of his two fists slung over his shoulder, and often a small stereo-camera in his coat pocket just to pick up any 'tit-bits' he might come across; and, in addition to all this, he carried under his arm what alone weighed as much as any modern outfit. It is no wonder, then, that we hailed with delight the introduction, in 1865, of the collodio-bromide emulsion process, which at once relieved us of a vast amount of work, and proved to be a first instalment of the good things coming. In 1839 we got Durand's sensitized paper, and began to feel that we were getting into smooth water; but it remained for Mr. C. Bennett to put the finishing touch to our happiness when, in 1878, he published his gelatino-bromide emulsion process, which at once revolutionised all our proceedings, and gave us what we had been longing after for years—a dry plate for instantaneous work. With gelatine dry plates we became at once possessed of quite a new power, and were able to shoot at game which before was much beyond our reach; and immediately there was a rush for small cameras wherewith to carry out the dreams of our youth, that, with small cameras and rapid dry plates, we might be able to take negatives for subsequent enlargement. Well, we have got our small cameras, and beautiful little things they are. We have also got our small negatives; but we have not yet got the enlargements, and I venture to express a hope that, during the present year, our members may show us some enlarged work, for I feel sure many of these small negatives, if enlarged up to 12 by 10, or 15 by 12, or even larger still, would make delightful pictures, and we should then have the satisfaction of seeing our tables covered with prints, which would prove a pleasure to the owner and a credit to our Society. There seems now only one thing wanting to make the art-science of photography complete—that is, to be able to secure the natural colours; but our experience of the past gives us hope for the future, and, knowing that there are some ardent workers in the field, we have no doubt that ere long this, too, will be an accomplished fact. I must be allowed to say a word or two on behalf of the stereoscopic camera, which seems to have gone out of fashion; but I really do not know why it should, for there is no class of photographic work that brings a view so 'home' to the observer; and with gelatine plates we can now get subjects which before were impossible. And then a well-made little bellows stereo-camera is quite as portable as any of our modern satchel cameras, and we have a much more useful negative. The past year has not produced anything very new or striking in apparatus. We have seen some ingenious cameras and slides from America and other places, but have seen nothing to beat our first-class English work. Lenses also remain much as they were; indeed, it is difficult to see how they can be improved, our opticians having brought them to such a high state of perfection. Instantaneous shutters, I think, have been about the most prolific crop of the season, and we have seen them of all shapes and sizes; but to my mind they nearly all have the most objectionable fault of being too large. This fact makes it all the more gratifying to be able to single out the small arrangement of our own member, Mr. Bruce, which, for portability and efficiency, leaves nothing to be desired. We still want a really good walking-stick-stand. Of the future of photography I scarcely dare venture an opinion. The electric light makes steady progress, and perhaps before long we may be able to take street views and other subjects by its means; but at present we must hope that the Sun, the best friend of the photographer, may favour us with a little more of his presence during the coming summer than he has done during the past few seasons."

A hearty vote of thanks to the late President, Mr. W. H. Kirkby, was carried by acclamation.

The Hon. Secretary described the Society's seal, which he had designed in accordance with the instructions of the last meeting. The badge consisted of a rising sun on a vesica-shaped shield, with the motto, "*Sol optimus pictor*," and the words, "Liverpool Amateur Photographic Association, 1863," round the margin. He had used the new seal for the first time upon the certificates of honour, and upon these would be found a line from Virgil's Æneid—

"Cuncti adsint meritæque expectent præmia palmæ."

This, translated freely, might be rendered—"Let all the members of the Liverpool Amateur Photographic Association join in the annual competitions, and let all aim at gaining the prize for the best picture in each of the competitive subjects."

The Chairman announced that the Council requested all members possessed of negatives suitable for enlargement for last year's presentation print to send the same to Mr. Ellerbeck's, Bold Street, on or before Thursday next, the 9th inst. In the event of no such negative being produced, the council would then select a negative for the purpose from the works of Mr. Bedford or of Mr. W. England, both of whom had sent down for exhibition prints of the highest excellence.

Dr. Kenyon then proceeded to demonstrate the process for preparing gelatino-bromide emulsion, which he had successfully carried out by daylight:—The solution of bromide, with a small quantity of gelatine, having been placed in a white earthenware jar, the silver solution, placed in a wash-bottle with mouthpiece and syphon jet, was blown in a fine stream into the bromide solution, stirred meanwhile with a wooden salad fork. The mixture completed, the jar was closed lightly with a cork, and supposed to be boiled for one hour. After cooling, the strong solution containing the full quantity of gelatine was added. He (Dr. Kenyon) insisted on the importance of getting the emulsion well set before attempting to wash. The setting is best effected in the jar in which the mixing and boiling has taken place by allowing it to stand in a cold place for twenty-four hours. Some previously-prepared set emulsion was then squeezed through fine napless canvas into a basin of iced water containing bichromate of potash ten grains to the ounce. The contents of the basin was afterwards thrown upon a fine horsehair sieve, and plentifully doused with iced water. The comminated emulsion was then collected, measured, replaced in the jar, and made up to the full quantity with water and spirits of wine at the rate of one ounce to ten ounces of finished emulsion, the precaution having been taken in the first instance to employ only four-fifths of the total water intended to be used. He (Dr. Kenyon) said that, although brilliant results were obtainable in this manner, he did not recommend the operations to be carried on in the daylight by preference, for then the negatives, though perfect in every other respect, were generally thin and frequently required intensification. He directed especial attention to the advantage of employing ice in the washing process, by which certainty and facility were absolutely ensured. In the absence of ice the water might inadvertently prove insufficiently cold, resulting in softening of the threads of gelatine and obstruction to the flow of water between, causing great annoyance and delay—a difficulty which, once encountered, could only be allayed by a free use of methylated spirit. He thought the secret of success in the preparation of sensitive emulsion would be found in the combination of a chloride with iodide and bromide.

The details of the process were watched with much interest, and gave rise to a discussion, in the course of which

The Chairman remarked that he had, many years ago, prepared a batch of tannin plates, collodionizing and placing them in the silver bath in bright sunlight. They were removed from the bath in the sunlight and taken into the dark-room, where the real sensitizing took place by the application to the films of the preservative solution of tannin. These plates were entirely free from fog; but negatives taken upon them were blue and thin.

Mr. W. H. Kirkby asked Dr. Kenyon if he could say whether silver had greater affinity for a bromide, a chloride, or an iodide; that is, supposing the addition of nitrate of silver to a solution containing bromide, chloride, and iodide, would the resulting combination be bromide, chloride, or iodide of silver?

Dr. Kenyon replied that this could only be ascertained by careful experiment.

Mr. W. H. Kirkby described an accident which had occurred to himself in making an emulsion with a glass diffuser like that employed by Dr. Kenyon for diffusing the silver in a fine stream through the bromised gelatine. The fine glass tube became plugged by some obstruction, and he had used considerable force in blowing the silver, hoping thus to carry away the clot; but on withdrawing the pressure a rush of silver into the mouth took place, with results the reverse of pleasant.

Mr. E. Phipps introduced the question of the relative sensitiveness of wet and dry gelatino-bromide emulsion, and was inclined to be incredulous as to the asserted superior sensitiveness of the former.

The Rev. H. J. Palmer gave a lantern exhibition of a large number of transparencies of Switzerland, by England, Ferrier, and himself.

Votes of thanks were cordially passed to the President for his inaugural address, to Dr. Kenyon for his demonstration, and to the Secretary for his lantern display. The meeting, which was very largely attended, was then adjourned to Thursday, Feb. 23rd. The exhibits were some beautiful stereoscopic transparencies made by the Chairman (Mr. E. Roberts) from his own negatives, and mounted on ground glass; a volume of prints from negatives taken last year by Mr. Ellerbeck; and an enlargement in autotype of a negative taken in Brittany, by Mr. E. Phipps.

Talk in the Studio.

Refraction of Light and Lenses.—Mr. W. K. Burton, C.E., will lecture on this subject before the Science Society at King's College on Wednesday next.

Photography in the Provinces.—On Wednesday, January 25th, 1882, Mr. Lyddell Sawyer delivered a lecture on "Photography," before the members of the Literary Society, Bath Lane Science and Art College, Newcastle-on-Tyne. The lecture was concisely and succinctly given, and was attentively listened to; and the lecturer dealt with his subject under three headings. 1st. The uses and adaptabilities of this art-science, its commercial value and importance, and its influence upon humanity. 2nd. Its history, discovery, and development, devoting special attention to the labours of Scheele, Wedgewood, Davy, Niépce, Daguerre, Fothergill, and Scott Archer, to whom we are indebted for our beautiful collodion pictures. 3rd. Practical experiments on the physical and chemical nature of the collodion and collotype processes. Mr. James Blakey (connected with the firm of Mawson and Swan) was chairman, and he paid a tribute to the lecturer which was evidently representative of the feeling of the Society. A hearty vote of thanks to Mr. L. Sawyer, terminated the meeting.

Ink for Photo-lithography and Photo-typography. By Toovey (*Chem. Centr.*, 1881, 288).—10—15 grams of white wax are dissolved in 100 grams of benzene, and treated with 12 grams of lithographic ink. A small quantity of the mixture is then spread over a lithographic stone and rolled with a lithographic roller in very thin layers on glass plates. Finely-ground chrome-orange is then sifted over the varnished plates. After drying, a mixture of 3 parts lithographic ink and 7 parts of turpentine is poured on the plates, and when dry a coating of fine "argentan" sprinkled on the plates. The draughtsman scratches with a point on this layer, having laid the plate on black paper. Through this his work is seen in black lines on a white ground. When the drawing is finished, it can be printed like a negative, the layer of chrome-orange effectually preventing the admission of light.—*Journal of Chem. Soc.*

A Gas Light Photograph of the Manchester Exhibition.—Mr. William Blakely kindly sends us a twelve-inch photograph of one of the walls of the exhibition, taken by a Ross doublet lens, which, if only as a feat in photography, deserves to be recorded. The exposure was two hours, and the only illumination the ordinary gas jets of the gallery. Of course the jets themselves are simply represented by patches of white, but in many cases the pictures are to be made out distinctly, and taken altogether the result is a most interesting and instructive one.

Estimation of Ferrous Oxide in the Presence of Ferric Oxide, Organic Acids, and Sugar. By Dr. J. M. Eder (*Chem. Centr.*, 1881, 469).—This method depends on the fact that potassio-ferrous oxalate precipitates metallic silver from a solution of the nitrate, being converted into ferric salt in presence of a sufficient quantity of silver nitrate; when the solution contains tartaric acid the precipitated silver is free from oxalate, and can be at once weighed. The process is carried out as follows:—The feebly acid liquid is treated with excess of neutral potassium oxalate, and then with excess of silver nitrate. After a few minutes, tartaric acid is added to prevent the precipitation of ferric oxide by ammonia, and then excess of ammonia with a little ammonium chloride. The latter serves to cause the precipitated silver to flake together; the silver is then washed with ammonia and ammonium chloride, and weighed. The presence of chlorides does not affect the result so long as silver nitrate is added in excess.—*Journal of Chemical Society.*

To Correspondents.

All Communications connected with Advertisements and Business to be addressed to Messrs. Piper & Carter, "*Photographic News*" *Office, 5, Castle Street, Holborn, E.C. Advertisers are requested to make all Cheques payable to* Messrs. Piper & Carter, *and crossed* "*Union Bank, Photographic News Co. Account.*"

Thanet.—You had better employ the varnish ordinarily sold as "crystal paper varnish."

Argent.—Nitrate of silver 180 grains, water 1 ounce; dissolve, and add sufficient ammonia to re-dissolve the precipitate. Next add 120 grains of powdered gum, sufficient indian ink to tint the mixture, and enough water to make up the quantity to two ounces.

H. F.—1. Three parts of a suitable gelatine (see article in last number of the Photographic News), one part of sugar, eight of water, and one-fortieth of a part of finely-ground lampblack or other suitable pigment. 2. The usual mills, as employed for grinding water-painters' colours, are used.

D. M. A. (Glasgow)—Probably an orthographic lens; but your description is not sufficiently detailed for us to speak with certainty.

Charles Banyard.—A quarter-plate portrait lens.

G. Hillidge.—We will communicate with you by post.

A. B.—1. Use Coignet's gold label gelatine, and saturate the hot solution with olive oil; that is to say, shake it with oil, and draw off from the excess. 2. When the mould has once become denuded of its film of oil, and has bonded itself with the gelatine, it is often less trouble to make a fresh mould than to get the old one in work. Write to us again if any further difficulty crops up.

E. G.—Three or four times as much as you have charged would have been a moderate fee for taking the negatives; but we think it would be to your advantage to charge less for the prints, as this is work which does not involve a similar delay; neither does it require the exercise of so much careful judgment.

Indebted.—Under the circumstances it will be best to print them singly; if enlarged, so much the better. Then paste them on the ground, retouch, and copy. They should not be vignetted, and a rather dark ground is best.

G. W.—Fine Paris black ground with the varnish you name will prove effectual.

C. T. H (Bradford).—1. No such compound as $CaCl_3$ is known; $CaCl_2$ is calcium chloride, and a tolerably pure article can be bought for two or three pounds a ton. 2. If a careful inspection and individual study will not help you, a few words here would be of no value.

G. Collier.—We have never tried, but probably no harm would result.

Young Tradesman.—1. They are due to the crystallisation of the superfluous salts in the emulsion, and you cannot remove them. Send the plates back to the maker. 2. Nothing is better than soaking in dilute cyanide, but this often fails to do good. In any case you should make a transparency from the negative before treating it.

J. Berryman.—Obtain the translation of Dr. Eder's book on "Modern Dry Plates," published at our office.

Enquirer.—Prussian blue as sold in the moist state for water colour painters is the best material to use, but you must provide yourself with a small sable brush of good quality for applying it. After some practice you will be able to judge the amount required in each case, and to avoid making the opaque rings to which you refer.

A Very Old Subscriber.—You have anticipated our intentions.

Judex.—We quite agree with you that a photographer who, without permission, publishes a portrait which he has been employed to produce, and of which the copyright is not his own, is much to blame, and he can be proceeded against for damages. If, however, he has taken a portrait for his own satisfaction, the case is different, as the copyright is then his. This latter remark would not apply to a duplicate plate exposed during a sitting in which the photographer was employed by the sitter.

T. Brandebury.—Probably from the use of impure or discoloured pyrogallic acid.

B. Meyers.—1. Not unless a definite agreement was made at the time. 2. Very doubtful.

Theodore Bell.—1. Reduce the proportion of iodiser somewhat, and sensitise in a weak bath. 2. Either French chalk or wax will answer very well, but we prefer the latter. 3. A very good method is to coat the tissue itself with plain collodion; this operation being performed either before or after exposure.

One in a Fix.—Evidently from the use of imperfectly cleaned plates. Soak for a few days in a chromic acid mixture. Ten parts of water, two of sulphuric acid, and one of potassium bichromate forms a suitable mixture.

Hypo.—Add a solution of crude sulphide of potassium until there is no further precipitate.

THE PHOTOGRAPHIC NEWS.

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THE DUNDEE PHOTOGRAPHIC EXHIBITION.

Bonnie Dundee may congratulate itself upon its exhibition. The judges met on Tuesday to consider their awards, Wednesday and Thursday were set apart for the private view, and this morning the exhibition opens in earnest to the public.

The gathering is a very fine one, and says much for the pluck of the Dundee Society. Its creation is due in the first instance, we believe, to the spirited president, Mr. J. C. Cox, of Beechwood, Lochee, a wealthy amateur of the north, who takes a keen interest in the advancement of photography. His unflagging spirit is the source of much of the energy of the Society, one of the outcomes of which is the fine gathering of prints in the Albert Institute, representing photographic work from every corner of the United Kingdom. But if Mr. Cox is recognised as the originator, there is an executive body of three to whom most of the actual work has fallen, and these, who have borne the heat and burden of the day, deserve no less honorable mention. Mr. Silvester Rollo, the Honorary Secretary of the Exhibition, Mr. Lamb, and Mr. George Valentine may be said to have ushered the exhibition into being between them, and the careful way in which the exhibits have been handled, catalogued, and fixed—there are between five and six hundred frames—reflects high credit on these gentlemen.

We may begin by stating the awards, merely premising that several of the most distinguished exhibitors were out of the running, so far as the gold medals were concerned, for the simple reason that the conditions laid down were somewhat arbitrary, or perhaps, we should say, a little exacting. At the same time, they had been published to the world, and as it is the exhibition of the Dundee Society, no one can grumble at the Council of the Society arranging matters after their own will. To take a gold medal, a series of six landscapes or six portraits were necessary; this seems pretty definite at the outset, but presently the question arises, what is a landscape, and what is a portrait? A pure landscape or a pure portrait is easily determined; but there are many pictures exhibited now-a-days for which, without any very special pleading, the claim may be advanced that they are landscapes, because, besides the figure or figures, there are trees, ferns, woodland, water, &c.; and that they are equally portraits, because the figure or figures may represent Mrs. Blank, or Miss Blank, or both. Unless it is definitely laid down in future what is meant by a portrait, and what is meant by a landscape, we foresee that difficulties are likely to arise. Of course there is always the word *genre* to fall back upon, but then it is just as difficult to decide what is a *genre* picture—or rather, what is not a *génre* picture—when a series of photographs come to be displayed; while frequently, as in the present instance, this class is not eligible for a high award. One more word as to the conditions: the Dundee Society, rightly or wrongly, have set their faces against pictures placed upon glass, and hence it was that the charming contributions of Messrs. Payne Jennings, Whiting, Brightman, Hills and Saunders, &c., could only compete for a bronze medal.

The gold medal, for a series of six portraits, fell to the lot of Mr. Abel Lewis, who sent a fine frame of magnificent photographs. One of them, a young lady in jockey cap and smart riding habit (three-quarter length) leaning against an oak tree, was particularly charming; and so, too, was a little girl making her entrance between two curtains which she holds in her hands. Other portraits had tapestry backgrounds, which were managed with very good effect, and imparted an unconventional appearance to the pictures. The silver medal for large portraits was awarded to Mr. Marshall Wane, whose collection included several stupendous 24-inch pictures produced direct. Of these we have already spoken in praise, in our "At Home" at Mr Wane's, so that we need merely say that they are the same as called forth our admiration on that occasion. Mr. Nesbitt, of Bournemouth, took the bronze medal in this class. He shows a very large collection of good work, but all of it is familiar to the visitors of former exhibitions in England.

A silver and bronze medal were also given for small portraits. Of these, the first was awarded to Messrs. W. and D. Downey, of Ebury Street, for a collection of most elegant little pictures, including an exquisite portrait of Miss Violet Cameron as *La Mascotte*, and another of Miss Kate Vaughan. The bronze medal fell to the well-known Edinburgh portraitist, Mr Moffat, whose high-class work well deserved the distinction.

The gold medal for landscapes was decreed to Mr. Harvey Barton, of Bristol, and there are few who will grudge that worthy recipient the honour. Mr. Barton also sends a large collection, some of them exhibited for the first time. His rare treatment of bowery foliage hanging over limpid water is well known to most of our readers, as also his soft, sweet rendering of distant hill and sylvan woodland.

The silver medal for large landscapes fell to Mr. Pettit, whose fine series included the fascinating scene of placid lake and distant hills that gained a silver medal at Newcastle. Mr. Pettit's work combines softness and brightness in an unusual degree—qualifications that are especially enhanced by choosing his pictures in Lakeland. The bronze medal in this class went to Mr. Andrew Pringle, for the magnificent series of Italian views that have already earned him a medal at the Pall Mall Exhibition.

The silver medal for small landscapes went to Mr. Frank Sutcliffe, whose pictures included the "country lane" that took a medal at Newcastle-upon-Tyne, and some sunset effects which have been previously shown. The bronze medal was given to Mr. William England, who showed the grand collection sent by him to the Bristol and London gathering, works that stand in no need of further praise from us.

The medals for the best *genre* pictures, a silver and a bronze one, were awarded respectively to Mr. Adam Diston, and to Mr. H. P. Robinson. Mr. Diston's pictures are well known to all visitors of recent exhibitions, and right glad are we that he has received a medal on this occasion. But it is no less than ridiculous to find Mr. Robinson's name in the position it is, especially when among his contributions is, "When the day's work is done," a picture that has been recognised by the gold medal of the Paris International Exhibition, and by silver medals at the Bristol Exhibition and London Exhibition. As the picture has already taken gold and silver awards, it may have been for that reason why bronze was dealt out on this occasion. However, Mr. Robinson is in very good company, since Mr. William England, as we have said, received but a bronze medal, while Mr. Payne Jennings has no more. The latter gentleman's landscapes, being mounted upon glass, could not compete for gold or silver medals.

In the case of enlargements, there was practically no competition. The Autotype Company secured the silver medal generously placed at its disposal, and Mr. H. N. King, for his magnificent series of transparencies of Windsor Castle, &c., which he exhibited in London, took a bronze medal given for this class of work. An extra bronze medal was subsequently awarded to Mr. Manfield for two fine transparencies of exceeding fine tone.

One silver and one bronze medal was reserved "for the best and second best series of landscapes of 8½ by 6½ or under: limited to amateurs actually members of this association." Of these, the silver award was given to Mr. S Rollo, and the bronze award to Mr. J. C. Cox, an extra silver award being made to Mr. Ireland for some capital pictures of Norway. Why amateurs who made pictures above 8½ by 6½ should be deemed ineligible to compete is another inscrutable point in the programme of the Dundee Society that we were unable to compass.

Of apparatus there was but a limited exhibition; a large roller for burnishing prints, to be worked either by steam or by the foot, and in which a clever reversing action was noticeable, to work the plate to and fro, received a bronze medal. It was from a design of Mr. Cox, the president, and was exhibited by him; another machine of similar construction being at the present moment in use at the establishment of Messrs. Valentine, in Dundee. Mr. George Hare, of Calthorpe Street, received a bronze medal for a camera of superior workmanship, in which the adjusting back was particularly well-designed. Mr Husbands, the well-known optician of Bristol, also received a bronze medal for a light and efficient camera, with zephyr-like dark-slides, in which the diaphragms were constructed of thin ebonite.

The Albert Institute, in which the Exhibition finds room, is admirably adapted to the purpose. The gallery is divided into six alcoves, each lighted by a large window by day, and at night, by an arrangement of Swan's incandescent lamps. As the Dundee Society proclaims with pardonable pride, it is the first photographic exhibition illuminated by electricity. From the circumstance that there were so many pictures to hang (the Society considered themselves bound in honour to hang all), the pictures are, many of them, hung too high and too low. However, it must be conceded that there is scarcely a photographer who has not some of his contributions on the line, and where a long list has been sent, of necessity, if all are hung (which we consider a very grave mistake indeed), some must be skied. Thus, ludicrously enough, Mr. Robinson's picture, to which we have referred, and which has received higher awards than any other pictorial photograph, is "skied," and so, too, is another well-known medal picture —Mr. Nesbitt's "Tired Companions."

All contributions from the members of the Dundee Society are wisely put together in one alcove, and thus the exhibition is at once a local and a general one. We have no space this week to notice these—which should have our first care—nor, indeed, any other of the new exhibits, but they shall receive attention in our next issue. It is only natural, in a gathering of this kind, that by far the majority of the exhibits should be composed of work already known. We append a list of exhibitors, which we believe to be correct:—Messrs. T. M. Brownrigg, A. Williamson, H. Manfield, Colonel Fraser, Messrs. Marshall Wane, F. M. Sutcliffe, Marsh Brothers, A. Donald, W. Harvey Barton, H. B. Berkeley, Cecil V. Shadbolt, T. and R. Annan, A. G. Pettitt, Matthew Whiting, Edward Fox, Magnus Jackson, Mrs. Bingham Mildmay, Messrs. Horatio Ross, E. Yeoman, G. Renwick, Valentine and Sons, Lyddell Sawyer, A. A. Campbell Swinton, H. P. Robinson, John Jackson, John Annan, Andrew Pringle, Abel Lewis, W. England, Silvester Parry, A. Hendrey, E. Day and Son, Robert Murray, Autotype Co., Messrs. J. C. Cox, J. Mathewson, Silvester Rollo, Peter Kerr, jun., D. Ireland, jun., W. McLeish, N. H. Geddes and Son, G. Bremner, J. Chaflin and Sons, John Henderson, G. F. Rodger, W. J. Anckorn, J. Moffat, Alexander Donald, D. Prophet, W. and D. Downey, G. Nesbitt, J. Robertson, J. Terras, Hills and Saunders, J. Abbot, J. Lamb, G. F. Roger, Platinotype Co., A. Diston, E. Brightman, T. G. Whaite, Payne Jennings, W. Gillard, D. Hedges, T. J. Dixon, D. Johnson, J. Milne, A. F. Mackenzie, R. H. Buxton, A. T. Bothamley, and Mrs. D. O. Hill.

ON THE SENSITIVENESS OF THE RETINA.

Any photographer who has ever considered the subject of the human eye as a camera and lens must have been struck with the marvellous sensitiveness of the retina, the part of the eye which represents the photographic plate or film; but probably it has never come under his notice that this sensitiveness varies, and to a very great extent. We know that the iris of the eye changes in diameter without our being conscious of it, and that it forms, in fact, a most perfect self-adjusting diaphragm, and we know that by this means a larger proportion of the light reflected by surrounding objects is allowed to enter the eye when these are dimly lighted, than when they are brightly; but it is not generally taken into account, that there is a far greater change than this—that besides the change in the amount of light admitted, there is an enormous change in the sensitiveness of the retina. The very change is of such a nature as to prevent us from perceiving how very great is the range of light through which we can see distinctly. We shall take an example.

On a brilliant moonlight night, some hours after sunset, our friend, on looking round, remarks, "Oh, how beautiful, how bright the light; almost as bright as daylight," and really it almost seems to be so; yet we know that the light is in reality vastly less bright than sunlight. Let us look a little into what really is the ratio of the brightness of moonlight and sunlight. We all know, of course, that the light of the moon is but borrowed light—light received from the sun and reflected from its surface. Now, were the surface of the moon a perfect reflecting medium—that is to say, were it to reflect all light which reaches it, the amount which we should receive from a full moon would be only about a one hundred and eighty-thousandth part of what we receive from the sun in the day-time. But it is evident that the moon's surface will reflect but a small fraction of the light which reaches it. Probably its average colour is about the same as the colour of the rocky parts of the earth's surface, and it is likely that we are overstating the amount actually reflected when we say that it may be a fifth or a sixth of the whole received, yet this assumption leads us to the astounding conclusion that the bright moonlight which we have so much wondered at is really about a million times less bright than sunlight. It is quite evident that, besides the alteration in the area of the iris of the eye which has taken place, there must, in the few hours between sunlight and moonlight, have been an enormous increase in the sensitiveness of the retina.

We have stated the ratio of the brightness of the sun and moon as perhaps a million to one; but certain experiments in moonlight photography, which we made some time ago, lead us to the conclusion that the ratio is probably considerably higher—likely about two millions to one.

The limit of sensitiveness which may, so to speak, be excited in the retina, does not, however, stop here. Under certain conditions it may be still more increased, so much so that moonlight may in its turn appear by comparison an almost unbearably strong light. It is not, as might be expected, by remaining in total darkness that the maximum sensitiveness may be reached; it is by working and continually using the eyes in the least possible light for a considerable time. We have experienced such a sensation when experimenting with extremely sensitive emulsions. We have worked for several hours in our dark-room at night time by artificial light, and have kept the light just to the lowest point at which it was possible to see at all. On emerging from our room into the open air, the moonlight appeared so powerful that, for some seconds, it was painful to look at any white object lying in it. From this we conclude that the sensitiveness of the retina may become so marvellously great, that it can perceive objects, and follow the rapid motion of those objects, in a light which may be white, but so dim that, were the retina replaced by the most sensitive gelatine film, it would take weeks or even months for a developable image to be impressed upon it.

But what is the practical outcome of all this to photographers? Well, we deduce from it a lesson which all of them might take to heart. There is the most extraordinary difference of opinion as to what is, and what is not a safe light, in which to work in the dark room. Now, we believe that a great deal of this difference of opinion is due to the fact that the constant change in the sensitiveness of the retina makes it most difficult to judge of the amount of red light which is being used. For example, one man is in the habit of leaving his brilliantly lighted studio, and immediately entering his dark-plate room. At this time his retina is at its lowest sensitiveness. He will tell you: "I work in a place about as dark as pitch, and yet my plates fog if I do not keep them shaded from the apology for a light which I do have."

Another man exposes plates in the field. He brings a number home and develops them a few hours after sunset. He will tell you, "I use plenty of light. Ruby, doubtless, but a perfect flood of it, and my plates never fog." Now it may seem astonishing, but it is more than likely that the first photographer was working in a very much more bright light than the second, even although the non-actinic medium may have been of the same colour in both cases.

A room which will—for developing—appear brilliantly lighted when entered some hours after sunset, will appear absolutely dark if entered from the open air at mid-day. We believe we do not exaggerate when we say that the photographer sometimes works in the daytime with a light a hundred times more bright than one which he would not consider safe if he entered his room at night.

A PERMANENT PHOTOGRAPHIC MUSEUM.

When Mr. H. Trueman Wood set his project of a Technical Photographic Exhibition on foot, we suggested the desirability of forming a standing collection of objects of historical or technical interest, so that the collection should be available to future generations of photographers as an illustrated history of progress in the photographic art; and we suggested that the Society of Arts should take charge of the collection. Some difficulties have, however, arisen in connection with this proposal, and we have reason to believe that the Council of the Society in question will not take action as regards the institution of anything in the shape of a permanent collection, as the limited space which could be spared would hardly suffice for the adequate display of the objects which might be reasonably expected to come in were a call made.

A letter from Captain Abney, which we publish in our present issue, affords a satisfactory answer to the oft-repeated question as to what should be done with the various specimens of photographic interest which are now not only distributed among those who take an especial interest in photography, but are in many cases possessed by people who neither value them nor take care of them, merely regarding them as somewhat dingy and unsatisfactory pictures. As will be seen by reference to the Captain's letter, the Director of the South Kensington Museum proposes to devote a portion of that Institution to the housing of a collection illustrative of the history of photography from its earliest phases to the present time, and we are informed that suitable arrangements will be made for taking proper care of the collection, and adding examples illustrative of each step in advance as it is made.

CAPTAIN ABNEY'S SECOND CANTOR LECTURE.

On Monday evening last there was the same earnest competition for places as a week previously, and as early as seven o'clock a small cluster of people might have been seen waiting outside the door of the house of the Society of Arts; and the reply of the porter that there could be no admission till half-past seven did not appear to give universal satisfaction.

Attention was called to the ferrous citro-oxalate developer, and as this requires no restrainer, a more perfect rendering of the results of feeble radiation is attained when it is used.

Next in order came a study of Mr. Berkeley's method of adding sodium sulphite to the pyrogallic developer, this salt serving to absorb any free oxygen, which, under ordinary circumstances may oxidize the pyrogallic acid; by its use the pyrogallic solution is retained for a long time in a fit condition for work, and more actual useful work is effected, as the reducing action of the pyrogallic acid is now almost exclusively directed towards the decomposition of the silver bromide. A solution which contained four parts of the sulphite to one part of the pyrogallic acid was found to be quite good and fit for use after being kept for a month.

The hydrochinon developer was very highly spoken of, it also working without a restrainer, and in referring to recent reductions in the price of hydrochinon, the lecturer expressed a hope that this valuable developing agent may soon be manufactured on a considerable scale and at a low price. A collodio-chloride film on opal glass was then developed in a most satisfactory manner by hydrochinon; and as the operation was performed in a dipping bath with parallel glass sides, the gradual unfolding of the image was well seen by all present. A pure iodide film was next exposed, and the possibility of developing it with ferrous oxalate was proved, the image appearing with great rapidity and vigour.

The function of the so-called chemical sensitizers is immediately fixing or uniting with chlorine, bromine, or iodine liberated from the silver compounds by the action of light, and to illustrate the necessity of employing a sensitizer in order to attain a useful degree of sensitiveness two sealed bulbs were shown, one containing perfectly pure and dry chloride of silver, while the other contained a minute globule of mercury in addition. The former was unaffected by a prolonged exposure to sunshine, while the latter had become considerably blackened, as the mercury absorbed the liberated chlorine.

The relative effect of the various rays of the spectrum on silver chloride, bromide, and iodide was next demonstrated, and it was shown how those rays which are obstructed by a sensitive medium are alone effectual in changing its chemical character; and it was proved that in the case of the various physical modifications of silver bromide, the spectral position of the maximum of action was identical, although the relative activity of certain rays differs notably.

The question of a safe light for the dark-room was next brought under review, and several samples of ruby were shown which allowed a notable proportion of green and blue rays to pass, while the yellow and orange glass which was usually considered safe for wet plates was demonstrated to allow abundance of actinic light to pass. A combination of stained red and cobalt blue, or the usual green, was found to be of the safest possible character in almost every case; and for a varnish, a mixture of magenta dye and aurine formed an extremely satisfactory colouring matter; while a cell filled with somewhat old ferrous oxalate developer was by no means to be despised as a non-actinic medium. The lecture terminated with a study of the supposed action of some colours as optical sensitizers.

Several additions have been made to the Technical Exhibition, to which we shall probably allude next week.

PHOTOGRAPHY IN AND OUT OF THE STUDIO.

A Professional Beauty Show—Photography and the Transit of Venus—Photography and Tricycling.

A Professional Beauty Show.—The "professional beauty" craze has penetrated to New York, and has been seized upon by the wide-awake Barnum as a new feather wherewith to tickle the public taste. He has offered a prize of 20,000 dollars for the handsomest woman, the claims to be sent in by the 1st of February; and beauty in New York, we may imagine, is in a flutter in consequence. Probably foreseeing the overwhelming rush which would follow if applications were to be made by the ladies in person, the astute showman wisely announced that applications were to be sent through the post, and the award made after a careful examination of the competing photographs. A Chicago paper, commenting on this beauty show, says: "Barnum must be aware that the photograph often fails to do justice to the original. Some very fine-looking women will not take (except at a disadvantage), while others of ordinary appearance appear much improved; hence it is impossible to depend on a lady's photograph." This is true; but in these days of retouching there is more chance of a lady being flattered than the reverse. If Barnum adjudicates upon the faith of photographs alone, we fancy when the winner of the prize appears in person to receive the acknowledgment of her superior claims, that everyone will be disappointed. It is, however, rather unkind for the paper already quoted to hint that Barnum has probably long ago selected the woman he intends shall win the prize, and that the 20,000 dollars is only to give *éclat* to the exhibition.

Photography and the Transit of Venus.—From a remark made by Mr. I. R. Hind, the President of the Royal Astronomical Society, at its last meeting, it does not yet seem settled whether photography will be employed in connection with the observations of the transit of Venus of 1882. According to Mr. Hind, there has been a general feeling that photography should not be employed again; and if so, it would be interesting to know why. It is all the more important that some satisfactory reason should be forthcoming, since at the same meeting some valuable suggestions were made in a paper on the subject read by Mr. Maunder. Mr. Maunder pointed out that it would be much more likely accurate results would be obtained if the position of the planet were taken in regard to some particular spot or faculæ on the sun's surface, rather than in regard to the limb of the solar disc as a whole. He suggested, therefore, that under-exposed photographs should be taken at the various stations, by which the parallax of the planet (as observed upon such solar details) may be determined. Mr. Maunder further observed that the great difficulty in measuring the photographs taken during the transit of 1874 was found to arise from the fact that the light of the sun's disc fades off very rapidly towards the limb; so that, to get a good impression of the limb, it is necessary to give a comparatively long exposure, and the central portions of the disc are over-exposed. But for the method now proposed, it would only be necessary to give a slight exposure, and the parallax of the planet may be determined from any two stations, whether the place of the planet appears to shift towards the limb of the sun, or in any other direction, if there are suitable details in the immediate neighbourhood of the planet from which to measure. It is gratifying to find that Mr. Maunder's suggestion received cordial support from such eminent authorities as Mr. Norman Lockyer, the Astronomer-Royal, and Mr. Ranyard. Mr. Lockyer showed that observations by means of the sun's spots were the more reliable, because the limb of the solar disc depended upon the collodion employed. The absorption, said Mr. Lockyer, in the solar atmosphere seems to lie chiefly in the region of the spectrum between G and H, and consequently if any departure is made from the collodion ordinarily employed, you get a considerable difference in the intensity of the limb as compared with the centre of the sun's disc. We may remark on this, that now so much advance has been made in regard to gelatine, the reference to collodion sounds almost antiquated. Is it possible that our astronomers have not yet made themselves familiar with the powers of gelatine? Mr. Lockyer, we also notice, advocates the taking of photographs on a large scale (a suggestion which the Astronomer-Royal afterwards scarcely endorsed, remarking that the same results could be obtained if proper mechanical means were used to give a shorter exposure), and is of opinion that most detail comes out with an under-exposed picture, which does not come out immediately on being developed, but which needs to be intensified, and the details slowly brought out. Mr. Ranyard was also in favour of photographs of short exposure taken at short intervals and afterwards compared, and referred to M. Janssen's method as a case in point. In M. Janssen's astronomical photographs the exposure is reduced to such an infinitesimal fraction of time, that all the distortion of the moment of exposure is recorded, whereas the eye takes note of the mean position. The chief reason, said Mr. Ranyard, of the success of M. Janssen's photographs arises from the fact that the part of the solar spectrum near G is the first to impress itself upon the photographic plate; and to M. Prazmowski is due the credit of perceiving that this fact might be made use of. The idea was adopted by Janssen, and Prazmowski arranged for him a system of lenses, so as to throw an image which would be practically perfect for the G rays upon the plate. Looked at with the eye, the sun's image, as seen upon the plate in this Janssen instrument, is not optically good; but the photographic effect is so sharp, because the plate is accurately placed in the focal plane of the G rays. The tone of the discussion was universally in favour of photographic observations in respect to the sun's markings being reliable as points of measurement, and we trust that when Mr. Hind afterwards said, "it would not be too late now to make arrangements to use the photographic method partially," he spoke with authority. It seems, however, doubtful whether any but the Daguerreotype process can be relied upon for scientific measurements.

Photography and Tricycling.—The practice of photography is yearly being made easier—that is to say in the reduction of the impedimenta which used formerly to make landscape photography literally a "*labour* of love." We see no reason why this impedimenta should not be further reduced. The tricycle is only comparatively speaking in its infancy, yet it has become something more than a mere toy. So far as the photographer is concerned, what is wanted is not speed, but lightness and a proper adjustment of weight for which a certain amount of baggage may be carried without entailing treadmill work. At the present time there are many excellent tricycles in the market, but they all fail in one important particular—the capability of climbing a hill. As nature has not made England like Holland, this want of climbing power is a great drawback. But even as they are now made, it is possible to use them with convenience for the carrying of a small camera and dry plates, and we anticipate in the coming season that many outdoor photographers will combine photography with tricycling. *Apropos* of this subject, we might mention that during this month an exhibition opens at the Agricultural Hall at which tricycles will form an important feature. An opportunity will then be afforded of examining the advantages and disadvantages presented on the different vehicles which cannot fail to be useful. We might add that so far as our experience has gone, a small wheel machine is much better for hill climbing than the large wheel variety.

FRENCH CORRESPONDENCE.

Accumulators of Electricity—Platinum Printing in France—The Old Iron and Uranium Process—The Examinations of the Chambre Syndicale.

Accumulators of Electricity.—It is a pleasure to observe that in the photographic world we are beginning to take advantage of the applications of electricity. The remarks of Mr. Swan have not fallen on deaf ears, and the time cannot be far distant when this form of energy will be utilised in all our principal laboratories; by means of the electrical accumulator we are able to store it, and to draw off and distribute it as it may be wanted. I have myself been busily engaged in studying these contrivances, and I have succeeded in constructing them for my own use; but, unfortunately, the treatise of Mr. Gaston Planté, on secondary batteries, in which several forms of accumulator are described, is already out of print. Notwithstanding, the construction of a secondary element or electrical accumulator may be stated in a very few words, and nothing is easier or more simple. It consists of a couple of sheets of lead, each from 50 to 60 centim. long, and from 20 to 25 centim. broad, placed one flat on the other and then worked up, the two spirals being kept from contact with each other by means of four strips of india-rubber of the same length as the sheets of lead, and about 3 millim. in thickness. These india-rubber bands are placed between the metallic plates in such a position as to secure their being kept well insulated from each other. The first sheet of lead is laid flat on the table, and then two of the caoutchouc bands are placed upon it, parallel to the edges and at about 6 centim. distant from them; on these is then laid the second sheet, and on this again the two remaining bands in about the same relative position as the first two. When thus arranged, the whole is rolled up round a cylinder of wood. Care must be taken to solder to the opposite end of each sheet a metallic tongue which projects some two or three centim. beyond the spiral in the direction of its breadth, in order to be able to attach the conducting wires. The roll is now placed upright in a glass vessel of corresponding dimensions filled with water acidulated with 10 per cent. of pure sulphuric acid, taking care that the tongues or poles of the plates shall project beyond the vessel, and the whole is then sealed down, only allowing a small orifice for gas produced by decomposition to escape. Before placing the roll in the liquid, it is well to assure oneself by means of a galvanometer of the perfect insulation of the plates from each other; should any fault in the insulation be detected, they must be unrolled, and the defect remedied. It will be seen that such a secondary battery, by which we can accumulate for our own purpose the chemical work of a primary current, can be most readily made without having recourse to the instrument makers, whose prices are never of the lowest. Three of Daniel's or Bunsen's ordinary elements are sufficient to charge a battery of a dozen secondary elements as above described. When using the instrument, we arrange the elements in tension, and we have in a very short time at our disposal an energy equivalent to that produced by the long continuous action of the primary battery; we can by this arrangement obtain for a short time a very bright light, set a small motor in action, produce magnetic attraction, &c., &c. Not having seen anywhere in the Photographic News an account of these valuable instruments, I thought it might be of interest to my readers to give a rather detailed description of them, and I hope to be able to recur to the subject and to complete it.

Platinum Printing in France.—There is a good deal of reasonable surprise that the process of printing in platinum is not more cultivated in this country. Although Mr. Willis's process is specially worked in one of our most important establishments, the sum demanded for the Royalty, and the price of the papers sensitised with chloride of platinum, are so high as to effectually prevent its being more generally used. It may be added that the black tone of the prints produced seems no recommendation in the eyes of portrait photographers. The result of this state of things is that we have only the carbon process to fall back upon, in cases where only a limited number of prints is required which shall be of undoubted permanence. Now, much as I admire the carbon process, it must be confessed that it is difficult to carry out, unless one is equipped with all the special instruments and arrangements necessary for working it.

The Old Iron and Uranium Processes.—But, while we are still waiting for the invention of a simple and easily workable permanent process, why should we not have recourse to some of our old favourites, which seem to be already sinking into oblivion? There is, for example, the nitrate of uranium process; in this, the paper is sensitised by floating for only about half a minute on a bath composed of 15 grams of uranium nitrate dissolved in 100 grams of water. It is then quickly dried, and kept carefully protected from the light. The exposure takes place in the ordinary way, but requires, perhaps, a little longer time, and the plate is then washed in warm water. It is next dipped in a mixture of solutions of chloride of gold and chloride of platinum (each in the proportion of 1 gram of the salt to 1,000 grams of water), to which a drop or two of hydrochloric acid has been added. The image is formed of gold and platinum, and its development can be stopped at any required moment. This is the whole of the process, and it gives a print of perfect stability. Another method consists in using a direct mixture of the solution of uranium nitrate, and of gold and platinum chlorides, or, still better, perhaps, the following process may be employed:—Equal parts of 10 per cent. solutions of perchloride of iron and the chloride of platinum are mixed, in which the films are sensitized, and are then dried and exposed; the action of the light produces a white image on a yellow ground, which may be developed in a bath of chloride of gold, thus giving an image formed of gold and platinum. There is an infinite number of processes of this kind, from which it is easy to select one which gives rapidly and readily a permanent print. I hope to be able to publish the results of my investigations in this special line.

The Examinations of the Chambre Syndicale.—These examinations will bear more especially on the candidate's knowledge of practical photography, but there must necessarily be also some questions in theory in order to test specially the examinée's acquaintance with the principles on which the special branch of his art rests. Certainly, the examination as a whole must be thorough, that it may be a real guarantee of the ability of those who pass it.

Leon Vidal.

Notes.

Prince Leopold is to be president of the British Association at Southampton.

His Royal Highness is a member of the Royal Institution, and enjoys the reputation of being a good chemist. At Clermont, which is to be his residence after marriage, there is to be a well-appointed laboratory fitted up for scientific investigation.

The jurors who awarded the medals at the Dundee Exhibition were Mr. W. D. Valentine, of Dundee; Mr. Sinclair, late hon. secretary of the Edinburgh Society: Mr. H. A. H. Daniel, hon. secretary of the Bristol Society; and Mr. H. Baden Pritchard.

Vegetable gelatine, or *agar-agar*, as it is sometimes termed, has frequently been suggested as a substitute for gelatine in collotype work, and at the last Technical meeting of the London Society a question was asked as to its suitability for emulsion. It is interesting, therefore, to find that Captain Mitchell, Paymaster R.A., has actually employed the material for dry plates, the results he sends us being exceedingly promising, and far better than some of the earlier gelatine productions.

In a German contemporary, a correspondent naively puts the question: "Where can I best obtain specimens for my show-case?" Our answer to such innocence would be: "Where you choose, so long as you do not make them yourself."

M. Zenger commends to the Transit of Venus Commission a method of taking photographs which is likely to give more accurate results than the photo-spectroscopic processes in present use. Seeking a medium which, while strongly dispersing the rays, is at the same time perfectly transparent, and reflects totally red and violet light, he found that benzole combined with quartz eliminates the extreme red of an angle about 75°, while pure anethol at the same angle eliminates the extreme violet. Therefore, M. Zenger recommends a double liquid medium of this nature to be placed before the spectroscopic camera as the best means of observing solar protuberances and similar phenomena.

The price of incandescent lamps is lowering rapidly. For a long time the Swan lamp was the only form in the market, and these sold for twenty-five shillings each, unless a large quantity were taken. In view of the Edison lamp becoming a commercial article—we do not say that it is, for Edison has cried "Wolf" so often that people are growing sceptical—the Swan lamp has been reduced to twelve shillings and sixpence, and no doubt a further reduction will be made very shortly. The carbon filament in the Swan lamp, which becomes incandescent, is charred parchmentized thread; in the Edison lamp, it is charred bamboo fibre.

It is very common to see cameras in which the lens can be raised above the centre, but one rarely finds apparatus permitting the lens to be lowered below the centre. On this subject, we remember one of our best architectural photographers, Mr. Harvey Barton, saying: "I do not know if there are other cameras like mine, that permit the lens to be lowered, but I have never seen one."

Messrs. Valentine Brothers, of Dundee, employ zinc to deposit the silver from their waste hyposulphite washings. The washings are simply run into a tank in the yard, in which some pieces of zinc—old roofing and worn-out piping, for the most part—have been put. The silver, in metallic form, deposits itself upon the zinc surface, from which it is shaken or brushed from time to time. They find this more satisfactory than treatment with hepar sulphuris, or liver of sulphur.

The pocket Geneva time-piece is made, as the well-known advertisement informs the public, with steel works, balanced action, glass dome, enamelled dial, and metallic case. It is moreover guaranteed to indicate correct solar time in any climate, and can be had post free for 13 stamps.

It turns out to be a pocket compass, the card, which is attached to the magnetic needle, being in reality a small sun dial. If placed on a map, the map being ranged true to the points of the compass, the "Geneva timepiece" may give the photographer useful information as to how the sun's rays may be expected to fall in a given locality at any particular hour of the day, and it should save needless journeys or unnecessary waiting. Some slight allowance may be made for the season of the year in using the instrument.

The photographer who talks freely about art, and discusses points of view with much circumstance, will no doubt prefer to spend half a day studying his building; but when the man of business wishes to make the most of a day which promises sunshine, the case is altogether different.

'Cycling and photography. Many photographers have tried to combine the two arts, and, strange to say, their development has from the first been connected. Nicéphore Niépce, before he first secured a photograph in the camera, invented, in conjunction with his brother Claude, a species of velocipede. It was at the time when people were seeking after perpetual motion, and this invention seemed to the brothers Niépce to go as near perfection as possible. Accordingly, Claude was despatched to England—which then, as now, was considered the best market for inventions—to dispose of the machine. Claude died in England without effecting the sale; but indirectly, the world benefited by the invention; for if his brother had not been abroad, Nicéphore would never have written those interesting letters about his early experiments in photography, and in all probability there would have been no record of them.

Dr. Warren de la Rue, whose superb moon photographs are still among the best we have of that orb, has been elected manager of the Royal Institution.

The moral of *A Photographic Fright*, which has been played nightly for some time past at the Princess' Theatre, is a most whole some one—from a photographer's point of view. The heroine obstinately refuses to have her photograph taken even to oblige her husband, and, as a natural consequence, she gets involved in serious difficulties. And for this reason : as she will not be photographed by fair means, a photographic friend, who knows how much the lady's husband desires a portrait, depicts her surreptitiously as she sits on the Margate beach one sunny morning. Unfortunately, a gentleman in close vicinity is depicted in the photograph as well, so that when the husband gets hold of the picture his jealousy is aroused, and plenty of material for a farce is obviously at hand.

A NON-ACTINIC FILM FOR ETCHING OR TRACING WITH A NEEDLE.

We have received the following communication from Mr. H. Trueman Wood, the Secretary of the Society of Arts :—

There are many purposes in photography for which an opaque film capable of being etched with a sharp point might be useful. Such a film can be obtained by use of the following formula :—

Negative collodion	½ ounce
Ether	6 drachms
Alcohol	6 ,,
Shellac	30 grains
Aurine	2 ,,
Judson's mauve dye	30 drops
Water	30 ,,

A collodion thus treated gives a film which is perfectly non-actinic, and which allows the finest tracery to be executed upon it, without any tearing or chipping whatever. The film is the result of a good many experiments, and was devised by a friend of the writer for the purpose of reproducing tracings made by a geometric chuck in the lathe. As a general rule, these patterns, which form the delight of so many amateur turners, are either traced with a pencil suitably held, or by a glass pen charged with aniline ink, the latter being the more recent device which has superseded the old pencil. They are, of course, also cut upon wood or metal with suitable tools. By the use of a plate coated with a film of the above-described mixture, a steel point can be used. The glass plate is properly held in the chuck, and a steel point, which may be fitted with a spring, so as to prevent undue pressure or risk of breakage, is placed in the position usually occupied by the pencil. The pattern is thus traced in perfectly clear glass, and from the negative—if the term may be used—thus produced, prints can be taken on ordinary albumenized paper. As the film itself transmits practically no actinic light, the printing can be carried to any extent, and a perfectly black print produced. The film may also be etched upon with an ordinary etching needle, or even with a common needle, and prints produced from the plate thus obtained.

Another use of the formula is for the preparation of lantern diagrams. Any diagram can be rapidly traced upon a coated plate, and the diagram can then be thrown on the screen in the ordinary manner, appearing, of course, in bright lines on a black ground. A diagram of this sort is quite as effective as, if not more effective than, the ordinary black lines on an illuminated ground, as was shown by the very vivid way in which a negative diagram, recently employed by Mr. Bolas at one of his Cantor lectures, shone out upon the screen. It would, of course, be easily possible to obtain a printing-block by any of the ordinary methods from a plate etched in this manner.

The mixture requires some little care in its preparation, and especially as regards the addition of water. It is better to add the water gradually, coating the plate occasionally after each addition of a few drops. The formula might doubtless be susceptible of considerable modification ; but the one given above has been proved to give the best results of any which have yet been tried.

SEAWEED GELATINE.

BY CAPTAIN MITCHELL, R.A.

When I was at Rangoon, some time since, I had, without success, endeavoured to make gelatine emulsion plates. The cause of my non-success was my inability to get the gelatine to set, owing to the great heat and dampness of the atmosphere. This caused me to look about for something else which would answer the same purpose.

Walking through the native town I noticed that some of the shops sold a beautiful jelly for food. After some difficulty I found this jelly was made of a seaweed, which, I think, must be *agar-agar*.

With this seaweed I made an emulsion and some plates, and I found them answer very well indeed. I have two or three of the negatives with me now. Those of short exposure were hardly dense enough to please me ; but fifteen seconds to two minutes produced printable negatives. Of course they are but very rough experiments, but they are sufficient to show what can be done with seaweed.

The weed dissolves in boiling water, and with this solution the emulsion is made, carefully avoiding excess of silver. Thrown out into a dish, it sets immediately, when it can be cut up into small pieces, and washed in a bottle. Re-melt, and coat plates quickly ; they set at once, and can then be dried. The film is very tough, and can be floated on and off the glass.

The fault I found with this seaweed was that it contained small particles—I suppose seeds. These could be eliminated, I dare say, with suitable apparatus. All my apparatus consisted of two teacups, a bottle, and a spirit lamp. With this it is difficult to work on board ship in a small cabin.

I have no doubt that some of my brother amateurs would like to try a new process; if so, I have a small quantity of the weed, which I shall be glad to send you.

I enclose you three prints and a sample of the seaweed.

SYMBOLISM OF NATURE IN LANDSCAPES.

BY WILLIAM NEILSON.*

This subject is so extensive and involved that, dealing with it in limited space, I can only give some scattered thoughts in an abrupt and desultory manner. Though bearing neither on the science nor art of photography, I bring it forward as suitable for the consideration of the artist, whether he works in colours or chemicals, believing that any theory connected with art, if founded on truth, has a practical tendency.

In order to be successful in any line of life, a man must undergo two educations—one derived from the experience of others, and one derived from his own experience. This remark applies especially to the artist. His education in the academy is chiefly derived from the experience of others. In it he is taught to draw, colour, and deal with the technicalities of landscape. But, besides the academy, there is the school of nature in which his education must be derived chiefly from his own experience. This requisite education cannot be acquired by taking social trips to the country, and sitting down here and there to concoct a picture. Such pictures may be excellent in their way, and excite the admiration of those whose acquaintance with nature does not exceed that of the artist. But he who would truly interpret nature

* Abstract of a paper read before the dinburgh Photographic Society.

must be thoroughly acquainted with nature. Education is the completion of a long habit. His must be the habit of being alone with nature in all its aspects and conditions—hill, valley, wood, water, sunshine, and storm—not for the purpose of thinking, but in order to comprehend and feel all the expressions of nature. His delight will be to become imbued with the beauty and grandeur of nature—to feel as if the soul of nature, so to speak, had passed into his being. Then he will be able to put a charm into his pictures, which is alike beyond the reach and comprehension of the mere academy man. Many photographers have not the opportunity for acquiring such a knowledge of nature; but by picking up hints on the subject and meditating on them, they may turn to better account what opportunity they have; not that these will give him a personal acquaintance with nature, but they may shunt him into the right direction for acquiring that.

What is meant by symbolised emotion? The two words emblem and symbol have much the same meaning attached to them, being used to denote an object which embodies in itself the idea of something else. Having no fitter word for the occasion, I use "symbol" with a different meaning; the difference being that whilst "emblem" embodies thought, "symbol," as I use it, embodies feeling. When the eye rests on a drooping flower, and then on a mountain, we are conscious of a pleasant emotion arising from each; but in each case the emotion is as different as are flower and mountain. I may think of the flower as an embodiment of grace—call that the first result; the flower has become an emblem. But, without having ever thought of the flower as an emblem of grace, on looking at it I may feel the emotion that is excited by the idea of grace—call that the second result; the flower has become a symbol. And so with the mountain; as an emblem it gives the thought, and as a symbol the feeling of grandeur. In other words, flower and mountain, without suggesting the ideas of grace and grandeur, may none the less give the feeling connected with grace and grandeur. This feeling is symbolised emotion. Remember that if flower and mountain did not in some way express certain feelings, they could not excite these feelings in the beholder.

It may be asked, if flower and mountain naturally symbolise the feelings of grace and grandeur, why are these not experienced by every person with a like intensity? As a special faculty appreciates correct reasoning, so a special faculty, not always equally developed, appreciates the symbols of nature,—the æsthetic faculty, which is imagination influenced by the emotions. It perceives what is imaged by an object in nature; but, whilst it perceives what exists, it cannot alter the character of the image expressed; be it drooping flower, or mountain, or whatever else, it can only appreciate in each object the symbol of the emotion which nature has fitted it to express.

Here I must ask, What is beauty? No word, on this side of Bedlam, is so frequently misapplied; people are apt to apply it to anything that is merely satisfactory. It has been propounded that beauty is utility; if so, the beauty of the frying-pan can only be excelled by such things as the compost the farmer spreads on his fields. The last theory is, beauty is association. Association is a subtle power, by which it may raise the ugliest of our race into the highest region of esteem and admiration; but it can no more turn ugliness into beauty than make black white. The moon becomes a more interesting object when we think that all the men and women who have lived, savage and civilised, have gazed and gazed upon that pale face in the blue heavens; but such association does not add a jot to its beauty. A man who devotedly loves a very ugly woman may, by force of association, really think her beautiful; but that will not alter the shape of her nose, the colour of her eyes, nor the size of her mouth: the woman is the same; and the man has merely, in the insanity of love, trained himself to admire her ugliness, calling it by a wrong name. That "beauty" has never been resolved in satisfactory definition may be accepted as evidence that it is specially involved in the element of the mysterious which surrounds us, and cannot therefore be expected to be explained with the distinctness of a theorem in mathematics. Logic has its own jurisdiction; but in the region of beauty the æsthetic faculty is sole judge. We can only pick out some hazy facts, and piece them together as we may, and feel that there is a coherency among them. Certain as it is that we cannot fathom mysteries, it is no less certain that we may see them unite at the edges in practical result. What, then, is beauty? Is it wholly physical? If so, why do not all men see it alike, as they do a house or a horse? Then is it wholly mental? If so, why do you require to open your eyes before you become conscious of it? I believe beauty is neither mental nor physical, but a conjunction of the two,—a peculiar mode in which, by natural adaptation, matter responds to mind; in short, symbolised emotion.

The fine arts, after the pattern of nature, express themselves in symbolism.

A symphony consists of different passages, each with a different emotional expression; so that we say one passage is plaintive, another gay, another sad, and so on. The chief powers that give musical expression are variety and contrast—hope and fear, joy and woe, tenderness and rage, and so on in endless combinations, being symbolised by the thousands of notes that make up symphony. Whilst these notes conduce to the character of the different passages, they have at the same time an undercurrent of their own, swelling, rising, and sinking in infinite variety and contrast of symbols of a universality of emotions. The glory of fine art is to convey a feeling of the universal. Such a flood of emotions, if distinctly emphasised by the symbols of music, would distract and overwhelm the mind of the hearer as in a thousand-fold entanglement. But art controls all these, so that the result is wholly pleasant; subduing the interwoven symbols so that they excite in us the consciousness, not of distinct emotions, but merely the ever-varied kinds and degrees of pleasure connected with these; so that the harmonised progress of the symphony, in its necessary vagueness combining endless grades of beauty and grandeur, blends the whole in one ever-increasing vastness of delight—

"A mighty maze, but not without a plan."

Shall we be told that association can explain this mysterious music! He must be far astray in the land of modesty who thinks that it is his associations that give beauty and grandeur to Beethoven's music; as if one should read "Paradise Lost" and say its all owing to my associations. Association cannot create, but it may enhance, as when to the native ear it adds a charm to national music, making even the screams of the bagpipes not unpleasant—at a distance.

The symbolism of poetry consists of interwoven thoughts, figures of speech, and rythmic cadences. Mere ingenious thoughts that have no bearing on the emotional development of the poem, have no business in it.

A sentence or two must serve to apply the gist of what has been said to the landscape. Like music, the landscape may have prominent divisions of different character, to which conduce the endless thousands of objects, which yet have a vague symbolism of their own, the infinite variety and contrast of which constitute the enchantment of the view. What the symphony is to the ear the landscape is to the eye. A landscape cannot be analysed, but we may pick out two or three emblems in illustration. Suppose on the right hand a hill, at whose base some pine trees slope in different directions, as if with advancing decrepitude. Beneath them lies prostrate a noble birch tree, its white bark half-smothered with moss, typing the universal decay. Above the pines a slant of heather lies with its purple laugh on the brink of a solemn ravine, the hill tapering upward like aspiring hope. On the left hand is a precipice of rock typing the unattainable; yet, someway up, a foxglove hangs out its bells like a signal for encouragement; whilst on top of all an old Scotch fir stands like the hero of a thousand storms. In the centre ground a streamlet, kissed by drooping ferns, prattles like a child towards a lake, which lies in the calmness of content. The very silence gives a thought of infinity. The sky hangs like a blue dome hallowing the temple of nature; whilst above the hills, at the far end of the lake, the dying day lies in streaks of crimson and gold, like a vista to the immortal land. Now he who dissects nature in this fashion is not admiring nature; he is only admiring his own thoughts. Nature, like music, symbolises a symphony of feeling, and he who has the faculty to appreciate that, gives himself up, wholly receptive, to the exhaustless delight. A difference may here be noted. Associations connected with an object may be as different as the people who indulge them; but the symbolism of nature never changes, but invariably tells alike on all competent beholders.

It is said the artist must be true to nature; but how? When Shakespeare wished to give intense expression to the feelings of our nature, he so departed from the habit of nature as to make his heroes talk in blank verse, and so doing, he was true to art giving likeness of the one in unlikeness of the other. Artists are not true to nature in its magnitude and its endless details; but they may be true to art, not by mimicking whatever they can of all that lies before them in a scene, but by noting what are the chief symbols that give character to the scene, and putting these on their canvas, enhanced by what variety and contrast are suitable, and leaving out what, in their small canvas, would detract from the general effect; and thus they will be true to nature also, giving the same feeling that is experienced when gazing on the scene in nature. That is the end for which the rules of art should be applied. Then it has been said a picture should be suggestive. Surely it is a poor compliment to say that when one looks at a picture, its excellence lies in his thinking of things outside it. A picture should be sufficient in itself, and not need to be enriched with the alms of the spectator's imagination.

Correspondence.

DRAINING AND FILTERING GELATINE EMULSION.

Sir,—Having tried draining gelatine emulsion on muslin, canvas, and on a hair-sieve, as usually recommended, without getting the desired result, I thought I might try what coercion would do; so after it had lain on the hair-sieve for over two hours, I took it up and put it into the centre of a piece of good strong wash leather, free of holes or thin places, and twisted it with one hand and squeezed it with the other, and made it disgorge a good quantity of water. Now I take it from the washing apparatus, and put it into the wash leather, and squeeze and twist with all my force, and can do in a minute what hours of draining could not do. Then I scrape the emulsion off the leather with a china medicine spoon, and after the emulsion is melted, I pour it into a basin or bowl with a convex bottom. I have a paraffin lamp funnel, with its lower edge turned over, and the two plys of thick washleather over it: then I put the leather-covered end of the funnel on to the emulsion, and suck with my mouth at the other end of the funnel; the emulsion comes through in a very short space of time. When all the emulsion has come through, I pour it out at its upper end.

I would advise all to look through the wash leather towards a strong light, and reject all that has thin pieces or holes in it, and, when buying, look for it good and thick. The want of knowing this has caused me the loss of a good deal of time, money, and trouble.

Since sending the description of the washing apparatus, I put the hole near the bottom, and lead the syphon up outside. By this arrangement the tube never gets near the emulsion, and the water can all be drawn off at any moment by simply lowering the syphon.—Yours truly,

William Birrell.

SOUTH KENSINGTON MUSEUM.

Sir,—The Director of the South Kensington Museum is anxious to obtain a collection illustrating the history of photography from its commencement, and I have been requested to aid in this good work. Illustrations of early processes would be most valuable, also apparatus of an historical character. May I enlist the sympathy of the readers of the News in promoting the formation of a national collection? There are many, no doubt, who possess valuable specimens with which they would consent to part when they know that such will be housed and treasured in our National Art Museum. There is much of value at the Exhibition now open at the Society of Arts, and I hope that we may be able to induce the exhibitors to place them in the new collection.—Yours faithfully,

W. de W. Abney.

Proceedings of Societies.

South London Photographic Society.

The ordinary monthly meeting of this Society was held on Thursday, Feb. 2nd, at 8 p m., in the room of the Society of Arts, Adelphi—Rev. F. F. Statham, president, in the chair.

The minutes of the annual and lantern meetings having been read and confirmed, Mr. Robert Lindley was duly elected a member.

The Chairman said that with regard to the artistic competition, last year was not such a success as the first year had been; perhaps the novelty had worn off. The Committee had made arrangement for having the pictures for last year judged, and at the next meeting hoped to announce the name of the recipient of the medal. The Committee would also specially consider before the next meeting how the competition could be carried on so as to make it a success.

The Secretary acknowledged the receipt of photographic annuals, as also of tickets from Mr. Trueman Wood for the exhibition now open at the Society of Arts, Adelphi. These having been duly accepted,

Mr. W. Cobb then read a paper on "Co-operation in Matters Concerning Photography."

The Rev. F. F. Statham, in the course of some remarks, said that the field for discoveries was large and open, and it needed us to put shoulder to shoulder, and so co-operate for the general good. With regard to the matter of papers, the Chairman said it was not necessary for members to read long papers, but short papers that were merely to elicit comment and bring forth thought would be of great value. He also said that perhaps some of the members might not be able entirely to write a paper, but if they could jot down some crude ideas and forward them to the Secretary they could be put into shape by some one, and thus papers of interest might be forthcoming. The Chairman also remarked upon the amount of co-operation that was necessary to produce such a grand exhibition as Mr. Wood had recently got together The Chairman further mentioned the almanacs as exemplifying co-operation to a marvellous degree.

Mr. Edwin Cocking said he was reminded by the reading of this paper, of one read by Mr. Jabez Hughes some years since, before the members of this Society; the subject was the desirability of forming a gathering of photographers for the purpose of considering many matters affecting their interests, and which matters were quite outside and beyond the scope of any existing society. He could not but think that the time had arrived when such a meeting had become absolutely necessary, and which might be somewhat after the fashion of similar gatherings in America, which are called conventions. This would certainly be one way of carrying out Mr. Cobb's suggestion of co-operation.

Mr. E. W. Foxlee said that he thought, as the South London Photographic Society was able to establish the Technical Meetings—which had proved such a great success—he should like to see it (the Society) start a convention of photographers. The "copyright" question was one which might well be studied.

Mr. Fry said he had been told by a gentleman who had visited the American Convention, that he had seen more than double the number of photographers at one of the South London Society's meetings, and that not when anything special was going on, than attended the convention. He did not say this as wishing to throw cold water upon the idea, but merely as a fact.

Mr. Trueman Wood thought that photographers were the last to be scolded, as all seemed to come together and help each other; not so with other sciences, where each made out for himself, as it were, a piece of ground, and no one was to come near on pain of death. With regard to what the Chairman had said about the Exhibition, he had found all were willing, but some wanted stirring up, and those few who had held back would wish they had exhibited now it had proved such a success.

Mr. Pearsall said he could not tell what Mr. Cobb had been driving at. Could Mr. Cobb not give a number of heads under which co-operation in photography would be useful? The British Association was a glorious example of co-operation. The French, he said, nearly always worked in couples, and it was a fine and noble thing to see the way scientific men worked together.

The Chairman remarked that Mr. Foxlee's motion was one of great importance. This Society had always been useful in throwing out hints which, perhaps, others made more use of than the Society could. Mr. Pearsall had referred to the British Association, but they tabooed photography altogether, and it was said that people would not read papers before them because they were crowded out; but he believed that was altered now.

Mr. G. F. Williams suggested that heads should be given for papers, to see if any good would come of members writing upon a given subject.

Mr. W. Brooks, in alluding to the Falmouth Exhibition, said it was almost a co-operative society. As this year was the fiftieth jubilee meeting, he hoped all would co-operate, and so make a great success.

Mr. Cobb having replied, and a vote of thanks having been passed to him for his paper,

Mr. Trueman Wood said he wished to know if he could arrange such a thing as a night for the practical trial of different means of artificial light. He had a dynamo machine upon the premises for the electric light, and one of Sugg's immense gas burners, and no doubt Messrs. Sugg would fit it up, and perhaps other means of artificial light would be forthcoming.

Mr. Williams said he should be happy to co-operate with Mr. Wood, and he would lend one of Mr. Siemens' lamp.

A long discussion ensued relative to the different methods of artificial light and the general utility of them.

Mr. E. Dunmore then promised to read a paper at the next meeting on "Common Objects of the Studio." After a very pleasant evening had been spent, the meeting adjourned till March 2nd.

Edinburgh Photographic Society.

The fourth meeting of the current session was held on the evening of Wednesday, 1st inst., when Mr. Lessels, who was still suffering from recent indisposition, occupied the chair.

The Secretary having read the minutes of council and committee meetings, and those of the last ordinary, the latter were duly passed, and Messrs James Sclater and James Moore were admitted ordinary members.

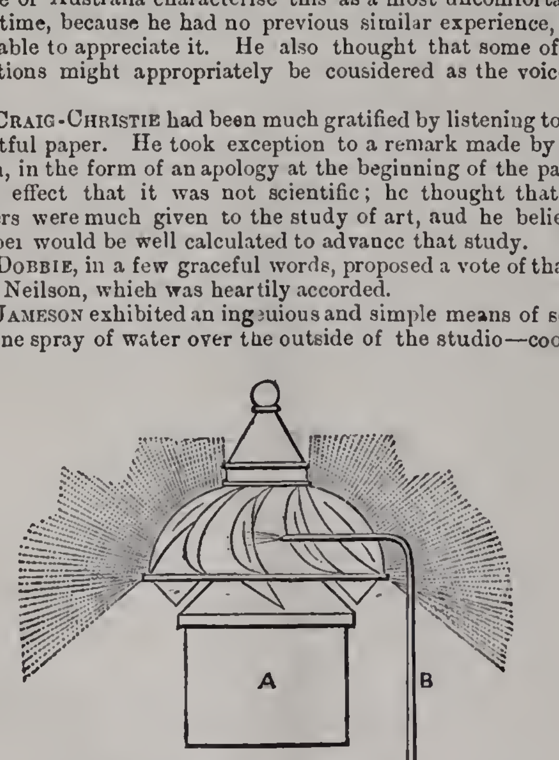
Mr. W. Neilson read a paper entitled, "Symbolism in Landscape" (see page 67).

Mr. Bow said he was impressed with the beauty of the paper, but thought that much of what Mr. Neilson designated the symbolism might legitimately be called association. It would be difficult to say that *anything* was pleasing to *everybody—e.g.*, the long "gloaming," so much admired by Scotsmen; he had heard a native of Australia characterise this as a most uncomfortable, dreary time, because he had no previous similar experience, and was unable to appreciate it. He also thought that some of the illustrations might appropriately be considered as the voice of nature.

Mr. Craig-Christie had been much gratified by listening to the thoughtful paper. He took exception to a remark made by Mr. Neilson, in the form of an apology at the beginning of the paper, to the effect that it was not scientific; he thought that the members were much given to the study of art, and he believed the paper would be well calculated to advance that study.

Mr. Dobbie, in a few graceful words, proposed a vote of thanks to Mr. Neilson, which was heartily accorded.

Mr. Jameson exhibited an ingenious and simple means of sending a fine spray of water over the outside of the studio—cooling



A. Howorth's Patent Ventilator. B. Water, pressure from the main.

the air within, cleaning the glass, and at the same time ventilating the premises. He said:—"We had a few years ago a paper and pretty lively discussion on ventilators, and it was remarked then, that when there was no wind to work them, we must send a boy to the top of the house to blow with a pair of bellows: if we have not a boy to send, we must employ some other motive power, and it is here that my *patent* comes in. It is more than a ventilator, it is a roof-cooler, and it is a glass roof cleaner. Instead of using the motive power to drive pulleys or blowers, I take the motive power—water from the main—through a quarter-inch gas-pipe with the end drawn to a point, and pierced with a fine needle; the water is made to play direct on the fans at the top of of the ventilator, at the same time producing a fine spray over the roof. You can take the pipe any direction you please over the house top, and with the stop-cock below you regulate the speed. I am sorry that I cannot give you a practical demonstration. It would have been a pleasure to me to have given you a duplicate copy of the late Royal Review to have saturated you with the elements, but respect for the table-cover prevents me; however, by means of a foot-blower, I can illustrate its mode of action: as soon as a current impinges on the exterior curved vanes, the hood revolves, and distributes a fine spray in a circle about ten feet in diameter, and at the same time sets in motion an interior Archimedean screw, which exhausts the air from the interior."

Mr. Christie, in proposing a vote of thanks to Mr. Jameson, said that it often happened when ventilation was most required, there was not sufficient wind to work the ventilators, but Mr. Jameson's device seemed to entirely overcome the difficulty.

The following questions were found in the box:—1. "Can a photograph, portrait or landscape, be enlarged (say) four diameters, and be equal in every respect to the original? and if so, by what means?" 2. "What is the best mode of mounting photographs in ordinary scrap books?" 3. "What is the best means of enamelling a photograph that is to be afterwards mounted?"

Mr. Bashford said it was not a difficult matter to produce enlargements of four diameters from negative or paper prints, which should be quite as good as, even better than, the original. One way which he preferred to employ was to make a good transparency the size desired, remove any imperfections from this, and then by contact produce a negative, which might require a little work, but could easily be made to produce prints quite equal to, or better than, the original, the enlarged prints requiring no touching.

Mr. J. M. Turnbull endorsed what had just been said, and mentioned the splendid enlargements of Mr. England which were exhibited at the Edinburgh Exhibition; they were produced from small stereos, and many were better than the originals.

Mr. W. D. Valentine had always failed to get the high-lights in the enlargements as clear as the originals. He thought this due to the enlargement of the spaces between the atoms forming the image being more pronounced than the atoms themselves; his enlargements had always appeared flatter than the originals.

Mr. M'Kean had had a similar experience, and said he had never seen an enlargement equal to the original.

Mr. Mathieson had recently seen a series of splendid enlargements produced by an Edinburgh amateur for the Dundee Exhibition, and they were certainly not inferior in vigour to the originals.

Regarding the question, "What is the best means of enamelling a photograph that is to be afterwards mounted?" Mr. Ayton proposed that the discussion of this matter be postponed till the next meeting of the Society, when he promised to make that the subject of a paper. He also made the important and startling announcement that he had discovered a process whereby the albumenized print was rendered absolutely permanent, improving the lights, giving them a pearly whiteness as in the opal picture, while the shadows were more velvety. As he wished the members to try it for themselves before the next meeting, he stated that the print after being dried was converted into vegetable parchment by immersion in strong sulphuric acid, and afterwards enamelled with collodion. Specimens of this mode of finishing he would submit to the meeting.

A vote of thanks to the Chairman terminated the proceedings.

Glasgow Photographic Association.

A meeting of this Association was held in the Religious Institution Rooms on Thursday, 2nd inst., at 8 o'clock p.m., Mr. T. Gilfillan, V.P., in the chair.

The minutes of last meeting were read and approved of.

Messrs. Wm. Lang, Jun., and Lorn Campbell were unanimously elected members.

The following questions were found in the box when opened,—viz., 1. What about the supper? This was not discussed with any degree of spirit. Mr. Goodwill ultimately moved that we have a supper, which was seconded by Mr. Thompson. 2. Have any members used iodide in the making of emulsion? Mr. Reid said that he had used it, and found plates containing it to be much slower than simply bromized plates. The secretary remarked that this also was his experience, and mentioned a curious result that he had observed. He said that he had found that an iodio-bromide plate, when exposed to direct sunlight under a negative, printed quicker than a simply bromized plate under similar conditions, but when exposed in the camera was much slower.

Mr. James McGhie then gave a description and demonstration of some recent advances in photography. Amongst the novelties he brought forward was Moryson's intensifier, with which he successfully intensified some otherwise valueless negatives, producing full detail in the shadows. Mr. McGhie spoke in very high terms of the qualifications of this method, and showed some magnificent photographs that had been submitted to its action. He also demonstrated the preparation of dry plates from Dr. Vogel's collodio-gelatine emulsion. The plates, when carefully prepared, were said to be quicker than the average *rapid* gelatine dry plates. Amongst the remaining novelties were a plate-washing machine, a handy little dark-room lamp, Chadwick shutter, and some beautiful specimens of the Lichtdruck process, all of which were examined with much interest, and carefully described by Mr. McGhie.

The Chairman invited questions, when

Mr. Urie asked if the ether and acetic acid would not evaporate from the emulsion and tend to leave it too thick? The remedy was to add a mixture of alcohol and ether as used in thinning collodion; it was also asked if the solution composing Moryson's intensifier consisted of mercuric chloride and sodium hyposulphite respectively.

Mr. McGhie could not say, the composition being a secret in the hands of the inventor.

A quantity of photographs were then balloted for amongst the members present, some of which, presented by Mr. Thompson, took a medal at Mr. Swan's exhibition in Newcastle.

At this stage the President joined the meeting and reported that Professor Grant could not at the present time find it convenient to deliver a lecture on Astronomy before the Association, but volunteered to open next session with an inaugural address, and very kindly invited a dozen of the members to visit the Observatory and inspect the photographic arrangements of that important institution.

The meeting then closed with votes of thanks to Mr. Mc Ghie for his instructive demonstration, and to the Chairman.

Thursday Evenings for Photographers.

At the meeting held on the 2nd inst., the chair being occupied by Mr. W. M. Ashman, the following questions from the box were considered:—

Does fog in the atmosphere cut off the actinic rays of light in the same proportion as it does the luminous rays? The opinion of the meeting seemed to be that it does in a larger proportion, the actinic rays being absorbed by the yellow colours of the fog.

Why is it that the ferrous oxalate developer is not used by professional photographers? In answer to which, it was thought that the objection to ferrous oxalate was that it was slow in action, and there was less latitude of exposure than with the alkaline developer.

Mr. Henderson enquired if anyone had tried Captain Abney's ferrous citro-oxalate developer?

Mr. Collins had carefully prepared the solution according to Captain Abney's formula, and obtained a picture after twenty minutes' developing which looked very like a wet plate. He did not find it necessary to use a restrainer.

A series of experiments, commenced at the last meeting, on the action of red light on phosphorescent tablets, then took place. A lamp was enclosed behind several coloured solutions and mediums, and the tablets, after being excited with magnesium wire, were exposed to its rays, when a slight de-sensitizing action took place; a tablet was then excited by gaslight, and exposed to the lamp for the same period, when it was found to be further excited; an unexcited tablet was rendered highly luminous by exposure to the ruby lamp. A solution of alum was then placed in the lamp in addition to the coloured mediums, with a view of testing whether the heat rays had any effect on the tablets; but it produced no apparent change in the result of the experiments.

Photographers' Benevolent Association.

On February 1st this Association held its annual general meeting, the attendance being above the average. Mr. W. S. Bird occupied the chair.

The minutes of the previous meeting having been confirmed the Chairman called upon the Secretary for his report, which was followed by the Report of the Board of Management.

Secretary's Report.

Gentlemen,—It affords me considerable pleasure to submit my Report to you, inasmuch as the receipts for 1881 are higher than in any previous year—viz., £50 16s. as compared with £42 12s. 6d. last year; the expenses for the same period being £23 10s. 11d., there results a clear gain of £27 5s. 1d., which carries the assets from £87 6s. 9d. to £114 11s. 10d.

The subscriptions from honorary members, I regret to inform you, shows a lamentable decrease.

The ordinary members' subscriptions have this year reached £18 15s. as against £11 9s. for 1880, thereby confirming the opinion expressed in last year's Report, that 1881 would see an improvement in this important item; and it only requires that this improvement should continue to place the Association on a sound basis, and prevent any falling off in either branch of its revenue.

I should then soon expect to have the extreme pleasure of congratulating the Board of Management and members upon this Association taking its proper rank among similar societies.

What is required is that every member should bring the existence of the Society prominently under the notice of every non-subscriber in the profession with whom he may be brought in contact. H. Harland, Secretary.

Board of Management Report.

In accordance with the usual custom, the Board of Management places before the members and subscribers a statement of the position of the Association.

Attention may be drawn to the fact that the Association, after having remained stationary for a considerable period, has, during the last two years, been steadily improving both as regards its funds and the number of its regular subscribers. As will be seen by reference to the annexed report of the Secretary, there has been a favourable increase in the number of ordinary members, which is now larger than at any previous time. This fact is of importance as a sign of more vigorous life; the prosperity of a society depending more upon the number of paying members than anything else.

The condition of the finances is more favourable than at any previous time, there being a nett gain of £27 5s. 1d. on the year, bringing the total reserve up to £114 11s. 10d.

The subscriptions from honorary members have decreased, a falling off due almost entirely to the fact that the Association made little progress in enlisting what may be called the working members, and apathy on the part of assistants is apt to make employers indifferent. Honorary members may be again expected to contribute liberally if the forward movement evident in the past year continues.

The evening at the exhibition resulted in a nett profit of £8 16s. 9d., for which your Board ask you to join with them in expressing their gratitude to the President and Council of the Photographic Society. The Board also offers sincere thanks to the Photographic Club for its kindness in devoting the profits of the soirée, £11 17s. 3d., to the funds of this Association, and to the honorary members for their support during the past year.

The Board also desires to acknowledge its sense of the favorable attitude of the editors of the photographic journals, as shown by notices and reports of the proceedings of the Association.

At present the operations of the Association are necessarily confined to giving temporary assistance to members in sickness or distress; but your Board is not discouraged by the slow progress of their benevolent work, but believing it will grow into power and success, will at the right time indicate further lines of usefulness, among which the subject of yearly pensions deserves the attention of the profession. It remains only to reiterate the advice that photographers generally should consider the desirability of the existence of a Benevolent Society to lend a helping hand to brothers of the craft needing it and should note that your Board sticks quietly and steadily to its task.

W. S. Bird, Chairman.

The report and balance-sheet were unanimously adopted, after which the meeting proceeded to the election of officers for the ensuing year, as follows:—

Vice-Presidents—Rev. F. F. Statham, Mr. J. H. Dallmeyer.
Trustees—Col. S. Wortley, Captain Abney.
Treasurer—Mr. H. B. Pritchard.
Auditors—Messrs. G. Taylor and L. Sisman.
Board of Management—Messrs. W. S. Bird (Chairman), H. J.

Thorne (Vice-chairman), W. M. Ashman, H. J. Burton, T. Bolas, F. H. Berry, C. G. Collins, J. A. B. Hall, J. O'Conner, J. Rolph, A. Strivens, S. Saunders, and R. E. Wilkinson.

Secretary.—Mr. H. Harland.

The meeting terminated with a hearty vote of thanks to the Chairman.

Talk in the Studio.

Photographic Society of Great Britain.—The annual meeting of this Society will be held on Tuesday next, February 14th, at the Gallery, 5a, Pall Mall East, when the election of officers will take place, the Report of the Council be read, and other business transacted.

The Newcastle-on-Tyne Chemical Society.—At the last meeting Mr. Swan read a paper on electrical accumulation, in which he referred to the gradual breaking down of the old distinction between the so-called static electricity of the frictional machine, and the currents obtained from batteries or dynamo machines. A striking experiment of M. Gaston Planté was referred to, a series of eight hundred tinfoil plates separated by sheets of mica being charged, when connected laterally, by a couple of Grove's cells. On placing these in series, by means of Planté's commutator, a flash which passed through several inches of air was the result. Planté's well known secondary battery was shown in some of its various forms, and Mr. Swan said that he had improved it by making the plates cellular, and filling the cells with spongy lead. We ourselves, some time ago, made a Planté battery by folding the lead plates over zinc wires or strips, and then immersing these plates in a solution of acetate of lead until the whole of the zinc had dissolved and was replaced by spongy lead. This battery worked well, and we may mention that thin lead answers best; that which we employed weighed four ounces to the square foot, and was obtained at the tinfoil works in Leather Lane.

An Evening for Photography by Artificial Light.—It is proposed to devote an evening at the Society of Arts to experiments in photography by artificial light, and for this purpose next Thursday, the 16th inst., has been fixed. The lights available on the occasion will be a Siemen's arc lamp, a Sugg gas-burner 200 candle power, magnesium lamps, and probably several pyrotechnical lights. It is also probable that some enlargements will be made from microscopic slides by means of the light of a paraffin lamp. Portraits will be taken by the various lights with various exposures, and perhaps a few direct prints may be made. So far as possible, opportunity will be given for any photographer who likes to appear on the scene with a camera, to make a few exposures. It is also proposed to try and take a general photograph of the whole of the room. Any photographer who is not a member of the Society of Arts, wishing to attend, should apply to Mr. H. Trueman Wood, the Secretary, and we have no doubt he would be furnished with a ticket of admission.

South Kensington Museum.—Until recently, considerable difficulties were put in the way of those who wished to photograph in the Museum; but we are pleased to be able to state that the following satisfactory regulations are now in force:—1. Application for authority to take photographs in the South Kensington Museum must be made in writing, addressed to the Secretary, Science and Art Department, South Kensington, London, S.W. 2. Applicants must state the purpose for which the photographs to be taken are required, and may, if thought necessary, be called on to furnish evidence of proficiency in the art of photography. 3. Objects on loan, and works by living artists, can only be photographed on production of the written authority of the owner or artist. 4. No permission can be granted for photographing oil-paintings or water-colour drawings. 5. Small objects which can be safely and conveniently shifted from the cases may be removed by the Museum attendants to suitable positions for photographing, but no large or heavy objects can be thus removed, and no change in arrangement can be made which will cause inconvenience to the public. The Museum attendant who removes an object will be present, and will remain in charge of it during the whole process of photographing, and no one else can be permitted to handle it. 6. A glass house is provided in which all chemical apparatus, &c., must be kept. No larger quantity of chemicals is to be brought in than is necessary for the work of the day, and no combustible chemicals may be introduced without the express consent of the Director. Only one photographer can work at one time. The use of the glass house will be allotted to each in succession according to the order in which the applications have been received. All apparatus, &c., must be removed on the expiration of the assigned term. 7. Two copies of each photograph taken in the Museum are to be furnished to the Secretary for preservation in the Art Library.

To Correspondents.

*** "At Home," and several other articles of interest, are crowded out this week.

R. Leamon.—The information you ask for will be found in the report of Captain Abney's lecture.

J. Gordon Rouse.—1. We do not think it would be practicable. 2. There are several methods, but, for the reasons pointed out in the article in question, they are not quite satisfactory.

Frederick Hurcham.—1. Probably not; you would therefore do well to make arrangements for a supply, or at any rate take the materials for their manufacture. 2. Things have improved of late, we are told.

T. K. Galland.—It is unreasonable to expect us to exercise any control over the business arrangements of advertisers. The usual course in such a case as your own would be to take proceedings for the recovery of the value sent.

M. C.—1. Use the solution while tolerably fresh, and employ distilled water for rinsing. 2. Quite as good, and more convenient. 3. Stretch the paper on a frame to dry, then it will be free from folds or irregularities. 4. Both methods are in use, but the latter is preferable for the finest work, as ensuring better distribution.

O. S.—1. The lens you now refer to would suit your purpose very well, and under the circumstances the exposure would often not exceed one second. 2. Merely a figure of speech.

H. S.—A mere formula is not much use, as you would require detailed instructions. See Captain Abney's book on Emulsion Processes in Photography.

A. Berry.—No two samples are precisely alike, so the information you require cannot be given.

H. G. M. Conybeare.—Received with thanks.

F. Sutcliffe.—To publish a wood-cut reproduction is certainly an infringement of any copyright which may exist in the case of a photograph.

J. Stevenson.—Thanks for your kind wishes. Our own experience with regard to the use of alum alone in very hot weather is confirmatory of your own.

Peel.—The defect appears to arise from an insufficient hardening of the film. Either sensitize on a stronger silver bath, or float on strong alcohol for an instant, and dry before sensitizing. Of course, when the film is tender, you must guard against mechanical injury, as from pressure against the blotting-paper which may be used in drying.

Inquirer.—We very strongly suspect that you either do not exercise sufficient care in cleaning your vessels after use, or that they consist of an unsuitable porous earthenware.

J. Berryman.—1. Try the application of a gentle heat. 2. The ring is seldom sharply defined, excepting in the case of certain instruments.

G. H (Preston).—The clear gelatine in uniform sheets, as used for making swelled gelatine reliefs, is to be obtained from Mr. Cornelissen, artist's colourman, Great Queen Street, Long Acre; but the special quality known as "Nelson's transparent sheet" is manufactured by Messrs. Dale and Co., of Dowgate Hill, Cannon Street, and can be obtained from any of the usual agents.

Saucy Samuel.—In such a case you would do well to employ collodio-chloride of silver; and we know that the article supplied by the firm you mention is excellent, but you should obtain it direct, as otherwise it may have become spoiled by long keeping.

Maynard.—Nothing is gained by such a procedure, and it is calculated to somewhat prolong the exposure.

Richard T——.—A full description of the apparatus in our Year-Book.

A Constant Reader.—Considering that the subject was fully treated of in an article which appeared in the Photographic News three weeks ago, you can hardly be a "careful reader."

Printer.—Soak some of the cardboard in distilled water, taking care not to use an over large proportion of water. At the end of a few hours, pour off a little of the liquid, and add a small quantity of the blue iodide of starch solution. If the blue colour disappears, you may consider that hyposulphite is present.

L. B.—If you warm your glass plates slightly, the difficulty will be overcome.

T. J. J.—In ordinary cases, each sheet of coated glass is placed in position over the surface of some dry calcium chloride contained in a drawer; but we have found it quite practicable to dry it in an ordinary room with a good fire.

THE PHOTOGRAPHIC NEWS.

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CONTENTS.

RECIPROCAL DISPLACEMENT OF THE HALOGENS.

Photography is so intimately connected with the haloid silver salts that any advances in our knowledge of the chemical relations of the halogens will be read with particular interest by all who take an interest in photographic chemistry.

The mutual reactions of the halogens, as well as of the haloid salts, has frequently been made the subject of investigation by chemists; and the results hitherto obtained at are somewhat remarkable on account of the apparently opposite results which have in some cases been obtained. For instance, it is well known that all the bromides are decomposed by chlorine, either at ordinary temperatures or upon heating, a metallic chloride being formed and bromine liberated. Upon this reaction depends the well-known method of preparing bromine from bittern, the liquor remaining after the less soluble salts have crystallized out from concentrated sea-water. The iodides are similarly decomposed by chlorine; and Davy succeeded in decomposing silver fluoride with chlorine, with the formation of silver chloride. In his efforts to isolate fluorine, Kämmerer also decomposed silver fluoride with iodine at a temperature of 80° C., with the formation of silver iodide; but Gore found that perfectly dry silver fluoride is not decomposed even at a red heat by chlorine, bromine, or iodine, but is decomposed at a higher heat, the liberated florine immediately combining with the substance of which the vessel in which the salt is heated consists.

Thus, with respect to the haloid salts, the affinities of the halogens appear to bo in the following order:—Chlorine, bromine, iodine, fluorine. These displacements of bromine and iodine by chlorine, and of iodine by bromine, are in strict accordance with the thermo-chemical theory. But apparently the reactions are not always so uniform, for Potilitzin's experiments seem to show that under certain circumstances the displacements take place in the reverse order. Thus, he found that bromine would displace chlorine from anhydrous metallic chlorides, and that if the bodies were present in equivalent quantities, then the percentage of chlorine liberated depends upon the atomic weight and atomicity of the metal in such a way that $\frac{A}{pE}$ is constant; where A is the atomic weight, p is the percentage of chlorine displaced, and E is the atomicity of the metal.

This apparent anomaly Berthelot has attempted to explain on thermo-chemical principles by dissociation of the primary combinations and the formation of secondary combinations, the inverse displacements being possible, if, in the formation of the secondary combination, a quantity of heat is evolved greater than that absorbed by the direct substitution in the primary combination. He found, moreover, that, in an atmosphere of pure and dry nitrogen, using porcelain vessels, when potassic chloride is heated with bromine, or potassic bromide with iodine, it remains unaltered, even at a temperature of 400° C.; hence he concludes that the inverse displacements of the halogens from haloid salts depend upon the presence of oxygen.

But this conclusion is again disputed by Potilitzin, who obtained the results both in nitrogen and in *vacuo*.

Thus, although the present condition of our knowledge in this respect is not quite satisfactory, it appears both theoretreally and practically possible that bromine liberates chlorine from metallic chlorides, and that the halogens may behave, under certain circumstances, in the inverse order of their apparent affinities. Such a condition of things might be easily understood to take place at the temperature at which the metallic salt is dissociated, for, in this case, the re-acting element would be able to unite with the free metal.

Action of the Halogens on Oxy-salts.—It is generally believed that the affinities of the halogens, in this case, are in the reverse order—viz., that iodine decomposes bromates and chlorates, but that neither chlorine nor bromine decomposes iodates, nor will chlorine decompose bromates. It has, however, recently been found that chlorine decomposes silver chlorate, silver iodate, and silver bromate, the result being the formation of silver chloride, and the liberation of oxygen; a bromide or iodide of chlorine being likewise formed. Here again is an apparent anomaly in the behaviour of the halogens, and in the order of their affinities.

Action of Haloid Acids upon Haloid Salts.—The action of haloid acids on haloid salts is generally the reverse of that of the halogens themselves. Hydriodic acid displaces hydrobromic acid, and hydrobromic acid displaces hydrochloric acid. These facts agree with thermo-chemical theories; but bromides are also decomposed by hydrochloric acid, although much less readily than the decomposition of chlorides by hydrobromic acid. In the same way, although the attraction of chlorine for silver is greater than that of iodine for silver, yet, when hydriodic acid acts upon silver chloride, mutual decomposition ensues, and iodide of silver is produced.

This reaction would appear incomprehensible, but for the thermo-chemical law, that in double decompositions the reaction always takes place, so that the greatest amount of heat is developed.

Reciprocal Action of Haloid Salts.—Field has shown that silver chloride is completely decomposed by digestion with potassic bromide, the chlorine and bromine changing places, thus:—

$$AgCl + KBr = AgBr + KCl$$

In the same way potassic iodide decomposes both silver chloride and bromide, thus :—

$$\left.\begin{matrix}AgCl\\AgBr\end{matrix}\right\} + KI = AgI + \left.\begin{matrix}KCl\\KBr\end{matrix}\right\}$$

These reactions are so complete that an ingenious method for the quantitative estimation of chlorine, bromine, and iodine, when mixed in solution, is based upon it.

To sum up the conflicting results of these investigations, we have the following facts confirmed by experiments.

1.	Chlorine	decomposes	metallic	bromides	Action of halogens upon haloid salts.
2.	,,	,,	,,	iodides	
3.	,,	,,	,,	fluorides	
4.	Bromine	,,	,,	iodides	
5.	,,	,,	,,	fluorides	
6.	,,	,,	,,	chlorides	
7.	Iodine	,,	,,	fluorides	

1.	Iodine	decomposes	metallic	bromates	Action of halogens upon oxy-salts.
2.	,,	,,	,,	chlorates	
3.	Chlorine	,,	,,	iodates	
4.	,,	,,	,,	bromates	
5.	,,	,,	,,	chlorates	

1.	Hydriodic acid	decomposes	metallic	chlorides	Action of haloid acids upon haloid salts.
2.	,, ,,	,,	,,	bromates	
3.	Hydrobromic acid	,,	,,	chlorides	
4.	Hydrochloric acid	,,	,,	bromides	

1.	Potassic iodide	decomposes	silver	chloride	Action of haloid salts upon each other.
2.	,, ,,	,,	,,	bromide	
3.	Potassic bromide	,,	,,	chloride	

Now let us see how these reactions apply to photography. In almost every photographic operation the halogens play a most conspicuous part, and without doubt many of the above replacements are, to some extent, continually occurring. There is, however, one instance in which we have a most important application of the chemical changes just explained—viz., in the at present most important branch of emulsion making. Without entering into the discussion as to the advantages or disadvantages of small quantities of iodides or chlorides in the gelatino-bromide emulsions, we may take it as a fact that many prefer such an addition, and endeavour to obtain it by precipitating silver nitrate with soluble bromide containing the required amount of soluble chloride or iodide. Since chlorine and iodine have a stronger affinity than bromine for silver, without doubt the chloride or iodide of silver will first be formed, even although, as is usual in emulsion making, the soluble bromide should be in excess. It is doubtful, however, *if the finished emulsion contains any chloride or iodide at all;* for a prolonged digestion, in presence of excess of soluble bromide, would, according to the experiments of Field, described above, convert the small amount of chloride of silver into bromide. It would be interesting to know if gelatino-chloride and gelatino-iodide of silver are decomposed by soluble bromides as effectually as in Field's experiments. If this is the case, those who have hitherto dwelt so emphatically upon the superiority of emulsions containing certain proportions of iodide or chloride, will do well to test their emulsions in order to be quite certain that the silver chloride or iodide has not been changed into bromide in the process of cooking, in which case it will be necessary, in future, that they should not emulsify in presence of excess of soluble bromide.

CAPTAIN ABNEY'S THIRD CANTOR LECTURE.

The special consideration of dry plate processes formed the staple of last Monday's lecture, and collodion emulsion was first brought under consideration. The conditions necessary for perfect emulsification differ somewhat in the case of the different haloid salts of silver, as but little difficulty occurs in obtaining the chloride or bromide in a satisfactorily fine condition, while the iodide has long been regarded as incapable of being properly emulsified. If, however, the silver nitrate solution is added to the collodion, partial precipitation takes place, and an emulsion of silver nitrate is the result. The previously dissolved iodide is now added, and double decomposition sets in, the result being a perfectly emulsified form of silver iodide; whereas, if the order of things had been reversed by adding the silver last, a coarse granular precipitate would have been formed. The above described method of working is also available and advantageous in preparing bromide and iodide emulsions, and might even be applied to the preparation of gelatine emulsion.

The greenish blue or green collodion emulsion which was used by the lecturer in photographing the ultra red rays of the spectrum was next brought under consideration, and its peculiar colour was shown on the screen. It was shown that those rays which can pass through a thin piece of ordinary ebonite will produce a sensible effect on the emulsion, and that a somewhat prolonged exposure to the radiations from a kettle of hot water will suffice to impress it. Ebonite in thin sheets is permeable to some of the visible orange and red rays, and also to a considerable proportion of the ultra red; and it is an interesting fact to note that the photophone is considerably affected by radiant energy which passes freely through ebonite.

After having practically illustrated most points bearing on the development of collodion emulsion plates, the rise and progress of the gelatino-bromide process was traced; the labours of Maddox and Kennet, as pioneers, and of Bennett, the first to thoroughly appreciate the advantages of prolonged emulsification, being alluded to; after which the Captain paid a striking tribute to the value of Dr. Eder's painstaking, exhaustive, and detailed investigations, which, as our readers are aware, have served to bring our knowledge of the minutiæ of the gelatine process to its present advanced state. Theoretical details having been now discussed, the extreme rapidity of gelatine plates was illustrated by allusions to Mr. Henderson's moonlight picture, which is shown in the Exhibition, and the results obtained by Mr. W. Brooks when paraffin oil is used as a source of light, these remarks being supplemented by an actual experiment in which a rapidly rotating disc was photographed by the light of the discharge from a small Leyden battery.

Vogel's emulsion was then stated to possess a degree of sensitiveness strictly comparable to that of ordinary gelatino-bromide; and Warnerke's new method, in which advantage is taken of the property possessed by gelatino-bromide films of becoming insoluble when exposed and developed with pyrogallic acid, was referred to, and the principal phases of the process were demonstrated, including the development of a picture from a film charged with pigment. Captain Abney's theory on this point is, that the bromine liberated by exposure reacts on the gelatine, and renders it insoluble; but this explanation hardly serves to account for the fact that a notable degree of insolubility sets in only when pyrogallic acid is used as a developer.

A considerable portion of the time was next occupied with a discussion of the conditions required for the production of the most satisfactory enlarged photographs, whether negative or positive; and Mr. Blanchard's method of first preparing an enlarged transparency, and then making a negative on ordinary albumenised paper, was highly spoken of. An interesting series of demonstrations then followed, enlarged pictures being most successfully made on plain bromide, paper, gelatino-bromide and gelatino-chloride; and the audience left at a somewhat late hour much pleased with what they had heard and seen.

The Exhibition of Photographic Appliances is still growing in interest, and the number of visitors increases daily; but we are reluctantly compelled to postpone our further notice until next week.

THE DUNDEE EXHIBITION.

Second Article.

As we have already stated, the Exhibition of pictures of amateur members of the Dundee Society is confined to one alcove. The largest collection is that of Mr. Cox, the President, who shows, among others, a series of three full-length portraits taken out of doors. The models—ladies in walking costume—are posed with singular grace and simplicity, and have a charm which more ambitious work often lacks. A couple of fisher boys, dressed in coarse jerseys and rough Scotch bonnets, who have clambered a big boulder on the seashore, is another successful work of Mr. Cox, who has besides many artistic sketches. Mr. Mathewson's pictures are, for the most part, hung in rather bad light; but of the series we like best, "Old Cottage near Aberfoyle." Mr. Sylvester Rollo, the Hon. Secretary of the Exhibition, has an extensive series of bright little yachting scenes, one of them, "The Turning Point," depicting a race of half-a-dozen little craft, in which forcible contrast to the crisp, clear water is deftly managed by showing a portion of a barge and figure in the foreground. "Highland Cottages," by Mr. Rollo, is another example of this clever amateur's work. Of Mr. P. Kerr's pictures, we like "Old Castle, Mains," the best, a bright and happy little photograph. Mr. D. Ireland's Norway sketches are, some of them, exceedingly good. "On the Baegna," for instance, we consider the best picture exhibited by the Dundee amateurs, it is so clear and soft. Lœrdalsæren and Freydenlund are also most successful pictures, since they treat with effect of Norwegian scenery—high rocks rising from the picturesque fjord, and quaint wooden villages nestling at the water's brink. Mr. Lambe is yet another amateur who exhibits good work.

Messrs. James Valentine and Sons, of Dundee, as might be anticipated, make a brave show. A series of woodland views, in which the fine lines of a silver birch, its elegant stem and graceful foilage rising from tufts of ferns and delicate undergrowth, are conspicuous, is among the best of their exhibits. But it is in coast scenery that they excel. Daybreak on the Tay is effectively rendered in several of their pictures, and in one, where the huge black hull of a vessel rising from the still water partially obscures the morning light, and creates a dark sea-way between the spectator and the monster vessel, the result is highly romantic. In all their Scottish scenery, Messrs. Valentine have preserved the spirit of rugged wildness that has rendered the land of Burns and Sir Walter Scott so famous; for the camera, as photographers know to their cost, if its idiosyncrasies are not carefully watched, has a trick sometimes of lowering mountains, decreasing grand proportions, and otherwise taming down a bold landscape. Messrs. Valentine's pictures—there are also some first-class portraits—were "out of the competition," or they would doubtless have secured a medal. Mr. A. Donald, also of Dundee, sends many of the fine laudscapes he has exhibited in London, the best to our mind being "Mains Castle." Mr. Donald, too, shows good portraiture.

Mr. A. Williamson contributes "Our Happy Hunting Ground," and several other landscapes, of which we like best "Carnock Glen." Colonel Fraser sends four characteristic views of Norway, one of which, a tearing white torrent leaping over huge silvery rocks, with some ragged black pines in the foreground, is eminently successful. Mr. H. Manfield forwards a vast collection of fine interiors —by the way, interiors were not in the medal programme of the Dundee Society at all—together with some little views of Madeira and South Africa, among the latter being a capital picture of an Ostrich Farm. Mr. Cecil V. Shadbolt's best contribution is "Middle Lake, Killarney," in which the foliage is managed with much skill and taste. Messrs. T. and R. Annan forward "Dumbarton Castle," which attracted considerable attention at Pall Mall" this year, and many other landscapes, not forgetting a frame of seven rustic little sketches, which will take the fancy of every lover of farm and homestead studies. Mr. Matthew Whiting, besides his magnificent series "Off Dover," sends another frame of bright pictures, but from the fact that they were mounted against glass, they could not compete for the landscape medal.

Of Mr. Magnus Jackson's pictures we prefer "Marshall Place, in Flood," in which the reflections in the water are most cleverly managed. Mrs. Brigham Mildmay's best exhibit is a frame of little "Devonshire Sketches," printed in platinotype; but she has also several clever portraits in platinotype. Captain Horatio Ross, a veteran photographer and deer-stalker, contributes numerous pictures representative of sport and game. Mr. E. Yeoman's scenery would have been all the better if not so deeply printed. Two charming little yacht scenes, in which the canvas and dancing waves are admirably pourtrayed, are exhibited, with other views, by Mr. A. A. Campbell Swinton. Mr. H. P. Robinson, of Tunbridge Wells, besides a magnificent series of pictures that have already gained distinction, forwards "Sheep," the sunshine which tinges the woolly backs with its silvery sheen imparting a degree of life and light rarely seen in a photograph.

Mr. J. Jackson, in Derwent Lake scenery, shows himself both clever artist and clever photographer; and in his Scottish Border scenery he is no less successful. Mr. J. Annan is represented by some architectural views in Edinburgh. Mr. Marshall Wane exhibits several landscapes, one representing a sweet weald of country encircled by softly-limned hills, being most to our taste. Mr. Robert Murray shows views in Argyllshire; and Messrs. Marsh Brothers, beyond their London exhibits, many fine landscapes of Thames scenery of large dimensions. Mr. Robert Murray, and Messrs. W. H. Geddes and Son, exhibit some good landscapes, the latter firm also showing portraits.

Mr. G. Bremner is an exhibitor of several frames of portraits, containing very good work indeed. Mr. Lyddell Sawyer's "Supplication," a fine female head artistically posed, is here, together with his well-known farm studies. Mr. John Henderson shows several portraits of considerable merit. Mr. G. F. Rodger is represented by several good portraits, and the same may be said of Mr. W. J. Anckorn. Of Mr. John Moffat's contributions—for the most part cabinets—we have already spoken highly; of Mr. R. M. Campbell's contributions, we like best "Cherry Ripe," which is modelled with much clearness and roundness. Mr. D. Prophet's portraits are vigorous, clear, and full of character, "Frank Hudson, M.P.," being the best. Mr. Robertson is also an exhibitor of portraiture, and so is M. J. Terras. Mr. James Abbot shows several frames of portraits, both of old and new, the older ones, in our opinion, being the better. Mr. John Lamb exhibits some good cabinets, as does also Mr. J. Milne; Mr. W. McLeish, besides a frame of Rembrandt portraits, sends three *genre* pictures, "Morning, Noon, and Night," which we also noticed at the Newcastle exhibition. Mr. Johnston, of Forres, forwards some good photographs, which are, however, considerably depreciated by the bright green mounts surrounding them. Mr. T. G. Whaite supplements his formerly-exhibited clever groups by others of the same character; and Mr. T. J. Dixon and Mr. Hedges show, their familiar, but no less wonderful, animal studies. Alas' the Dundee programme did not include a medal for photographs of animal life. Mr. A. F. Mackenzie sends two frames that include some marvellously fine groups, one of them, that might be aptly termed "Under the Greenwood Tree," denoting not only skilful technical ability, but the possession of most artistic taste in posing and lighting. Mrs. D. O. Hill, Mr. G. A. Simpson, Dr. Robert Dickson, and Mr. D. Johnston forward for exhibiton some interesting examples of old Collotype, Mrs. Hill's contribution including a number of portraits a quarter of a century old, which are remarkable alike for vigour, force, and delineation, and which, by reason of the absence of all retouching, read a valuable lesson to the portraitists of to-day.

Of the contributions of the following gentlemen, notwithstanding their high merit, we need say nothing, since their exhibits are practically the same as we have noticed in previous gatherings in London and elsewhere, viz., Mr. H. B. Berkeley, Mr. T. M. Brownrigg, the Platinotype Company, Mr. E. Fox, Mr. G. Renwick, Mr. Silvester Parry, Mr. A. Hendrey, Messrs. E. Day and Son, the Autotype Company, Messrs. J. Chaffin and Sons, Hills and Saunders, E. Brightman, Payne Jennings, W. Gillard, and R. H. Buxton.

At Home.

HERR KOLLER IN PESTH—A STUDIO WITH NO SIDE LIGHT.

"Mind you hear some Hungarian music," says Dr. Eder, as we shake hands at the Northern Railway Station in Vienna; "you get it to perfection in Pesth." We make a mental note of the advice, and our pleasant anticipations add something, no doubt, to the admiration with which we regard the beautiful country that lies between the capitals of Austria and Hungary. Now and then there are glimpses of the broad, placid Danube, and its green banks, with tiny villages grouped here and there—the churches surmounted by shining cupolas, which remind us more vividly than aught else that we are travelling in Eastern Europe. Near Pressburg we pass through miles and miles of vineyards; hill and dale are covered with the bright green vine, beyond which the dazzling white houses and red roofs of the town are just visible. Presently the hills grow bigger and become more rugged; the railway winds in and out beside vast precipices and giant peaks. We are among the Carpathians, and a magnificent range of mountains they are, viewing them at close quarters like this. By-and-bye, these lofty black pyramids are left behind, and the blue Danube favours us with its company once more. It is blue, of course, only in the sense that invisible green is green. But it is getting dusk now, and all one sees is a broad steel-like band in the moonlight, beyond which rise the dark irregular outlines of the Carpathians.

The proverb tells us, "All cats are grey in the dark," and it may be said with almost equal truth that all strange cities appear beautiful by night. And if this holds good with most towns, Buda Pest, which takes rank as one of the finest of European capitals, is naturally enough still further enhanced. Indeed, to the stranger who arrives on a moonlight night, who walks the acacia-bordered quays —for the broad Danube flows straight through the city— and watches the dotted lights of Buda opposite, their lurid reflection in the water at his feet—who sees the mighty fortress rising aloft in the gloom, all the more stupendous because of its indistinctness—the glitter of the palace across the water, the lamps of the bridges, the tall stone buildings that rise at every corner, the broad, lighted squares, the summer cafés—all life, mirrors, and bustle—he who sees all this must perforce believe he has entered an enchanted city. And the idea becomes stronger still when he alights at the broad steps of the hotel, and, looking beyond the corridor, sees a magnificent stone square, filled with white-clothed tables, flowers, lights, and music, where mortals are gaily supping in a scene all brightness and animation.

There is a reverse side to the picture, it is true. Our room is on the third floor, looking into the square, and we open the windows to gaze down upon the sparkling scene and listen to the Hungarian music we have been told to heed. It is pleasant, very pleasant. But when we have heard a dozen instrumental pieces, have supped our fill, and have retired to rest, we begin to think the music might be hushed with advantage. The day's travelling has been heavy, and we yearn for a good sleep; but midnight strikes, and the Hungarian music below is still in full swing. Next night there is as much and more of the Maygar strains, for it is a military band this time that comes and plays under our roof till the small hours. We begin to think there was no need for Dr. Eder's advice, after all.

And now the national music is off our mind, we will give our reason for coming to Pesth. Eight years ago a charming collection of photographs forwarded to Pall Mall from the "Seven Mountains," by Herr Koller, were very justly rewarded with a medal. Herr Koller, we heard, had settled in Pesth, and, as might have been expected, he at once took the lead among photographers in the Hungarian capital. Since we had a desire to visit one of the first studios in the kingdom of Hungary, we wrote to Herr Koller to receive us. He consented, and hence our visit.

A thorough chemist, a man of highly-cultivated taste, Herr Koller has a most amiable and winning manner. That his work is that of a master is known to our readers who saw the photographs we allude to; but to view the conditions under which that work is done is to see one example the more, that it is the man, and not the tools, that makes the mark. "You have never seen such a glass-room as this, I am sure," says Herr Koller, opening a door leading to the studio. We look round. It is surrounded on all sides by lofty buildings, and there is no clear view except over-head. Still we jokingly reply that we have: "At one of our prisons in London—Millbank, a place like your Kufstein—there is a studio with just such high walls on every side."

Herr Koller's studio is singular in this respect. *There is no side-light at all.* It has a large, low roof of glass, and all the illumination that enters gets in through the roof. Herr Koller may be said to out-Luckardt Luckardt in respect to lowness of roof; it has very little slope, and the greater portion is clear glass. The walls of the studio are painted—the upper portion a light blue, and the lower a dark brown. Of course, there are curtains; but, as a rule, only a light screen is used to modify the light upon the sitter. The illumination of the room, at its best, is never bright; but the light, if dull, is soft and pleasant, and is at once fit for photographic portraiture with very slight modifications.

As we have said, the studio is surrounded by walls. These are at a distance of some sixty or eighty feet, and rise skyward to a great height. He has painted these distant walls blue—or prevailed upon his neighbours to do so— "and for this reason," says Herr Koller, "there is more light in the studio than is at first apparent. Sometimes when I come in from the front, I wonder where the light is; but it is so diffused and manageable that I find I can take a portrait in any part of the room almost at any time of the day."

His exposures, nevertheless, are rather longer than elsewhere. He is well satisfied if he can make a cabinet picture with an exposure of twenty to twenty-two seconds. Like Luckardt, he works very much to secure delicate detail in the drapery of his sitters, and the subdued, diffused light of the studio appears to have much to do with success in this respect. Our readers may remember the in-door groups and interiors of Herr Koller, which secured him the medal at Pall Mall; their strong point was the marvellous detail in the shadows, and the absence of all inky blotches in corners and recesses. These effects are due to working with a more uniform light than that employed by most photographers.

In Buda Pest, which, it must be remembered, is the biggest city in a line between Vienna and Constantinople, there is as much life and gaiety as in any other European capital, while the people are more busy and go-a-head in their notions than their German neighbours. One sees this in photography, and Paris and London might take a lesson from Buda Pest in some respects. The finish of the pictures, the elegant mountings, and the assortment of styles is noteworthy in the show-cases of even second and third-class studios. The slender promenade or panel

—termed the *Makart*—is perhaps more popular here than in any locality in Europe; while the boudoir, which is very slow in making way with us, is almost as well known as the cabinet.

Herr Koller will accept an order for a single promenade portrait, and for this the sitter pays eight florins (roughly, sixteen shillings); then further copies are charged at a reasonable rate—namely, one and a-half florins (three shillings each). In these circumstances a dozen promenades cost forty-eight shillings—or, perhaps, more strictly speaking, forty-five—a price that compares favourably with other European studios *du premier rang*. This plan of charging for the first copy is a very good way of getting over the proof difficulty, as also the dislike of a customer for his portrait after he has paid for it. If he objects to the picture, he has always the consolation of knowing he has not disbursed a very large amount, and if he desires to re-sit, he can do so, at no great cost. At Herr Koller's establishment, as in Berlin, there is a counting-house attached to the studio, into which the customer first enters; this *comptoir* gives quite a business aspect to the undertaking, which is absent from our British studios.

Kerr Koller makes a speciality of one form of portrait, for which he receives orders frequently from places as far distant as Paris. This portrait is exquisitely coloured, very fine and transparent in nature, and does not usually measure more than twenty inches. Herr Koller puts a specimen in our hands, and asks us to guess how it is finished. It is a picture of two young girls with golden hair, and bright, hazel eyes. Its delicacy and translucent character are something extraordinary. "Is it upon enamel, ivory, or porcelain?" we ask. Herr Koller shakes his head, and will show us how it is done. The method is not novel, he admits, and success lies in the execution, rather than anything else.

To get the transparent effect he has recourse to the method which photographers are aware gives this property with effect. He employs two pictures, one over the other, as has been proposed over and over again, the last time in connection with the ill-fated "Colour Company." Says Herr Koller: "Photography plays but a subordinate part, you will perceive; success mainly depends, as a matter of course, upon the skill of the painter engaged in colouring the picture." To begin with, a photographic print upon algæine paper is produced; this may be a direct impression, or it may be an enlargement. Algæine paper permits of the most exquisite work by the water-colour artist; it is thin, and easily rendered transparent. The paper print is finely painted, and then placed upon a sheet of glass. It is now ready for treatment with an encaustic paste. "This," says our host, "is a preparation of my own, and made up with gum-dammar and Canada balsam." The whole surface of the coloured picture as it stands upon the glass is covered with the mixture, and submitted to a tolerably high temperature, which has the effect of impregnating the picture through and through with the compound, rendering the paper transparent, while it seems to heighten the brilliancy of the colours. The semi-transparent coloured portrait at this stage does not possess any particularly good effect—it looks, in fact, rather disagreeable, and it is only when it is placed over another roughly-painted sheet—the paper, in this case, being thick and coarse, and the colour only applied in patches—that the charming effect we have alluded to is produced. Herr Koller has firm faith in the permanence of the photographic portion of his picture for two reasons: There is no albumen, and there is the great protection afforded by the encaustic preparation. Herr Koller has made the process his own, and the labour he has spent in perfecting it has certainly not been thrown away.

The "By-the-Bye" next week will be "What Photography does for Science"; the following "At Home" will be "Messrs. James Valentine and Sons, at Dundee."

DEVELOPED PRINTS AND NEGATIVES ON PLAIN PAPER.

BY CAPTAIN ABNEY, R.E., F.R.S.

In compliance with your request to me, I beg to communicate to you the method of preparation of the bromo-iodized paper with which my lectures already delivered before the Society of Arts have been largely illustrated. Before the rapidity attainable by the gelatino-bromide paper, however, it cannot be hoped that it will be largely utilized. It has, however, the good quality of cheapness and ease in preparation, which the gelatine paper has not. The preparation paper was described at a meeting of the Photographic Society in 1880, and with one exception its preparation is the same as before.

The method of preparation must be adapted to the purpose for which it is intended to be used. 1st. For the production of paper negatives. 2nd. For the production of prints. In the first case the paper is soaked in the following:—

Potassium iodide	... ...	200 grains
Potassium bromide	... ...	300 ,,
Water	... ...	20 ounces

To this is added a solution of iodine in alcohol till it assumes a deep claret colour. (This is added for the convenience of knowing when the sensitizing is completed, and is not necessary.) After filtering the solution, the paper, which should be as smooth as possible (Saxe or Rives answers), is immersed in it, taking care that no air-bells cling to the surfaces, and allowed to remain soaking for half-an-hour. The sheets are turned once or twice during the operation. They are then taken out and allowed to drain and dry spontaneously, after which they are floated on—

Silver nitrate ...	... ...	500 grains
Glacial acetic acid	... ...	1 ounce
Water	... ...	20 ounces

The smooth side of the paper is floated as is done when albumenized paper is sensitized; after a couple of minutes the purple or brown tint at the back of the paper will be replaced by this yellow bromo-iodide of silver tint. After a couple more minutes the sheets are removed to a dish of water to remove the excess of silver. After another wash the paper is transferred to water containing about 50 grains of potassium bromide to the pint of water, and allowed to soak ten minutes. It is then thoroughly washed, and dried. By this plan the paper will be slow. In order to render it more sensitive, it may be given a soak in beer diluted to half its strength with water to which a little white sugar has been added, say one lump the size of a nutmeg to a pint; or it may be floated in a solution of potassium nitrate or sodium sulphate about half a grain to the ounce, and then dried. These would render the paper a good deal more sensitive than in its normal state, and can be used with safety. Any sensitizer, such as gallic or pyrogallic acid, might be mixed with the beer, but in this case care must be taken to wash it all out before applying the iron developer, since any trace left will form ink with the iron. The exposure is long, compared with gelatino-bromide paper—say thirty times longer. I now prefer to develop by brushing over the ferrous-citro-oxalate developer, using a nearly vertical plate on which to hang the paper, which should be previously damped. This is more economical than using a dish, and is a great saving in time. The ferrous-citro-oxalate gives even purer whites than the ferrous-oxalate, and I therefore recommend it. The brushes I use are three-inch flat badger hair brushes, and I have found no deterioration in them by use. From time to time the paper should be examined to see what density has been obtained, and when the image is through the paper it will be found sufficient for printing purposes. After fixing, washing in hot water (to remove the size), and drying, the paper is waxed in the usual manner.

To obtain prints, plain paper is brushed over on its smooth surface with the above solution, to which about five grains to the ounce of gelatine may be added. When dry, a second coating is given, and when that is dry, the paper is floated on the above silver nitrate solution for four minutes, after which it is washed and treated exactly as above, and developed in the same way.

Pure bromide paper answers almost as well. A solution of 30 grains to the ounce of potassium bromide is brushed over the paper twice, which is floated on the silver bath, and treated as before. To develop such paper it is, however, as well to add to each ounce of ferrous-citro-oxalate developer about five grains of common salt. This keeps the whites purer than they would be without it. Paper so developed should be beautifully bright and clear in the lights and shades, and gives excellent prints on which to work if considered desirable. There is a tendency, however, for the prints prepared with bromide alone to have a greenish tint. The use of the iodide gives a black. This is not astonishing when it is considered that silver iodide alone develops a ruddy colour. This mixed with the green gives a black tone.

I may add that many photographers apparently fail to make ferrous-citro-oxalate. The plan is as follows: Take 500 grains and dissolve in 5 ounces of water, warm the solution to boiling point, and then add to it 110 grains of ferrous oxalate powder. Shake this up immediately in a corked flask, and it will be found to dissolve. It should have a greenish-red tint, and is then in its most active state. I advise those who develop collodion dry plates, or gelatino-chloride, to try this developer, and use it without any restrainer.

Notes.

Mr. W. J. Stillman, M.A., the *Times* correspondent at Athens, whom rumour killed last week, is the well-known amateur who sat for several years on the council of the Photographic Society.

Hydrochinon, the developer proposed by Captain Abney for gelatine plates some time since, is likely to become much cheaper, a matter on which photographers may congratulate themselves, for it is but the high price of hydrochinon at present that prevents its adoption in the photographic laboratory. Nietzki has discovered a way of producing hydrochinon by oxidizing aniline with acid bichromate of potash, thereby reducing the price to one-twelfth its former cost.

At its present price, according to Dr. Vogel, it costs one shilling to develop an 8 by 5 plate with hydrochinon. In future, if Nietzki's process is a practicable one, the cost should be no more than a penny, still high enough, no doubt, but not much higher than oxalate development, which for the same size plate is put at three-farthings.

Port Said is one of the best markets for photographs in the world. Everybody going through the Suez Canal for the first time is a sure buyer. The wonderful Egyptian monuments are so close at hand, that whether the traveller pays them a visit or not, he likes to carry their photographs away with him, that he may be well posted in description, when it comes hereafter to tell tales of his journey.

The marriage service, gorgeously bound, with photographs of the bride and bridegroom by way of frontispiece, is looked upon now-a-days, it seems, as an appropriate gift to the wedding guests at "fashionable" marriages.

A delicate test for oxygen. A German chemist, Herr T. W. Engelmann, finds that very minute quantities of oxygen excite the mobility of bacteria, causing these tiny organisms to bestir themselves with considerable energy. To determine whether or no a liquid contains a little free oxygen, he proposes to introduce therein some of the species *Bacterium termo*, or other of the microscopic family, and see if these get into motion. This is all very well, but what will the Society for Suppression of Cruelty to Animals say?

Instead of fining drunkards, it is proposed, in America, to take their photographs while in a state of inebriation, and to expose them to the public gaze in different parts of the city or province. This would be a revival of the pillory by deputy.

Last week a Royal item of news was to the effect that Prince Leopold had joined the British Association; and now the Prince of Wales has allied himself to workers in "literature, science, and art," by becoming a member of the Savage Club. On the occasion of His Royal Highness's installation on Saturday last, we met several savages, whose names are well known in photographic art, either as professional members, or as amateurs. It was a pleasant novelty to have the Prince mixing with his brother savages in the homely club-room at the Savoy during one of the agreeable social evenings.

We have already referred to the assistance the stage might well derive from photography in the painting of scenery, and, as an instance of what can be done, we referred to a very pretty glacier scene produced in *William Tell*, not long ago, at the Gaiety, from one of Mr. William England's photographs. On Tuesday last, at a performance of *Tannhäuser* at Her Majesty's, we witnessed a spectacle where the aid of photography was devoutly to be wished. Wagner's opera takes place at the Wartburg Castle, beside the Hörsel Mountain, and, as the former stands now as it did in the time of the Landgraves, and the mountain is what it always has been, there is, surely, no excuse for not painting the scenes a little bit like nature.

Yet, though the opera has been newly mounted at great expense, and the utmost care taken to "dress" it correctly, the saddle-backed Hörsel Mountain is depicted as if it were one of the rocky-spired Dolomites; while the grey old Wartburg on its green pedestal has as many towers and minarets as Blue Beard's Castle. Any photographer in the Saxon duchies could have supplied photographs of the famous castle where the minstrels strove in song, and scenes could have been painted quite as romantic as the costly and unreal ones now employed in the opera.

A reaction of gallic acid, which photographers may note! Ammonium picrate produces in solutions of gallic acid a red colouration, which in a few seconds passes into a fine green. Pyrogallic acid and tannin give also a red, which remains unchanged. Possibly the latter fact might be made use of in development.

The *American Naturalist* speaks of a snail of which a lady made a pet. The snail, it is said, learned to know its mistress, would come to her when she called, and withdrew to its shell if anyone else spoke. After this, we should not be surprised to hear of a gelatine plate so sensitive as to refuse to develop when anathematized by an angry assistant in the dark-room.

Both the French and English Governments are occupying themselves witht he colours of different uniforms, with a view to choosing the least visible. Of course, the nature of background has much to do with the subject, but it is one, we should think, that photographers might aid in solving. At any rate, there would be no harm in undertaking photographic experiments side by side with the optical trials.

FRENCH CORRESPONDENCE.

Securing Exact Counterpart of Original Image—M. Chardon's Oscillating Bath—International Exhibition of Artistic Photography—Examinations for Assistants.

Captain Biny's Process for taking a Positive from a Positive, or a Negative from a Negative.—Captain Biny, to whose very interesting invention I have lately had occasion to direct the attention of my readers, communicated to the last meeting of the Photographic Society of France the details of a process by which he is able to secure on a gelatine plate an exact counterpart of the original image. Thus, from a negative plate he gets a negative copy, and from a positive plate a positive copy, an arrangement which is of great value in certain industrial processes, where it is necessary to obtain a reverse negative of the exact dimensions of the original, and yet a faithful reproduction of all its details. By the ordinary method of obtaining a reversed negative on a pellicle, it is exceedingly difficult to preserve accurately the relative proportions of all parts of the plate. The process was tried at the meeting with one of Monckhoven's gelatino-bromide plates; this was immersed for ten minutes in a four per cent. solution of bichromate of potassium, and then set to dry in a dimly-lighted place. When perfectly dry it is exposed in a copying frame, below the plate of which a copy is to be taken. By working beforehand with the same plate on bichromated paper, the exposure can be regulated so as to bring out all the tones of the original in the brown colour of chromium oxide. The plate is then taken into a dark room illuminated only by red light, and immersed in a gutta-percha bath of water, so as to dissolve out all the free bichromate. It is next rinsed in two waters, and then, being placed on the black ground of the bath, it is exposed to diffused daylight for from one to five seconds. The next operation is to develop the plate by the ordinary ferrous oxalate developer, when the image, negative or positive, will become visible according as the original from which the copy is taken is the one or the other. After this it is fixed by sodium hyposulphite, which acts in this case more slowly than in general, because it only penetrates with difficulty into the film of bichromated gelatine, rendered insoluble and nearly impermeable by the action of the light. Capt. Biny complained of his film stripping, so I recommended him to expose the back of his film to the light either before exposing it in the printing frame, or afterwards, an operation which secures the adherence of the gelatine to the glass. He now writes to me that he has adopted this plan, and finds it to answer admirably; he sent me at the same time an original plate, and its counterpart, produced by this process, and the latter seems to be perfect without the least sign of stripping. Repeating these experiments with M. Stebbing's pellicle, I found that this material, after being for some time in the bichromate bath, is affected by the light, not only so far as the potassium bichromate is concerned, but that the silver bromide which constitutes its sensitive part is not protected from the luminous influence by the bichromate; the effect observed by Capt. Biny is therefore not obtained with this pellicle. Whether other emulsions are liable to the same defect I cannot say, but with Messrs. Morgan's gelatino-bromide I have succeeded in getting the result which Capt. Biny describes.

M. Chardon's Oscillating Bath.—This bath, which I mentioned in one of my recent letters, is kept in motion by a very simple electro-motor. A flat iron bar turns on an axis in a vertical plane, and its ends make contact alternately with electro-magnets placed on each side of the axis. Foucault's commutator is the one employed; it is formed of a metal wire, of which the extremities oscillate so as to dip in turn into two cups of mercury. A groove is cut in the axis of rotation of the oscillating bar, and on this is adjusted a forked tongue, connected with a lever fixed to the movable table below the centre; on this table the bath is placed. There is also a balance long and heavy enough to regulate the oscillation, and to overcome the inertia of the dead point. M. Trouvé, the well-known electrician, has contrived this simple little machine, which he makes at the low price of 65 francs without the battery; this latter may consist of two of Grove's cells.

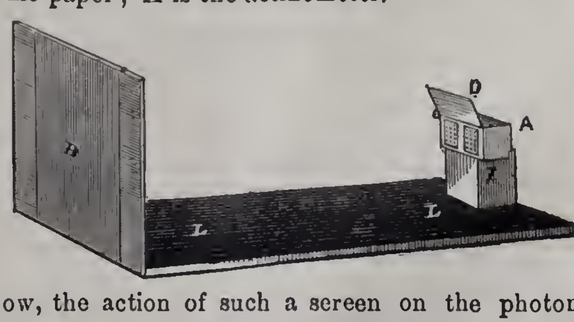
International Exhibition of Fine Art Photography.—The executive of the International Exhibition to be held by the *Union Centrale des Arts Décoratifs* have formed a committee for the photographic division; it consists of MM. Péligot, president; Davanne and Lévy, vice-presidents; and Léon Vidal, secretary. This exhibition is to have more especially a fine art character, and the prospectus, so soon as it is published, will be forwarded to the Editor of the Photographic News.

Examination of Photographic Assistants.—I have sent a copy of the syllabus for this examination to our Editor; it is to be the guide to the candidates as to the kind of questions they are likely to have set them. Already several candidates, both native and foreign, have applied to the President of the *Chambre Syndicale* for admission, and it is to be hoped that the diplomas granted on the examinations will be held in sufficient esteem to create in our profession a *corps d'elite* among our assistants. Leon Vidal.

ON ACTINOMETERS.

BY DR. H. W. VOGEL.*

The figure below shows the arrangement; B is the screen (about 40 centimetres square) covered with plain photographic paper; A is the actinometer.



Now, the action of such a screen on the photometer

* Continued from page 53.

depends very materially on its distance from the latter, since that action decreases in the ratio of the square of the distance. In order, therefore, to have the reflecting screen in a fixed position with regard to the photometer, I arranged a horizontal board, LL, of such a length that the distance of the metal plate with the orifices from the reflecting surface of the screen should be exactly one metre. On the side of the screen, opposite to the actinometer, it is lined with a clean sheet of ten kilo. photographic paper; this is done in the same way as mounting drawing paper on a drawing-board, namely, by cutting the sheet of paper accurately to the size of the screen, damping it, smearing the edges with gum, and then allowing it to dry, when it will be found to be smooth and tight.

The arrangement of the actinometer itself is extremely simple; in front is a turning shutter, *d*, and the back part is made like a dark slide. Immediately behind the apertures in the wood is placed a thin copper plate, in which figures are cut corresponding to the number of the orifices over it.

The manipulation of the instrument is self-evident. Two plates whose sensitiveness it is desired to compare are exposed, while the light remains as constant as possible. These plates are then developed in the same bath, and it is observed on which of the two the smaller number has made its appearance.

A necessary condition in using the instrument is, that the light shall have the same intensity throughout the experiment—a condition easily fulfilled in the case of artificial light, but not so readily attained with daylight. With a clear sky, the intensity of the light varies with the position of the sun; with a cloudy sky it depends on the extent to which the sky is overcast. In order, therefore, to be able to compare the two plates with certainty, they must be exposed simultaneously, and for this reason I have arranged the actinometer as a double instrument. It is fitted with two scales of exactly the same construction alongside of each other, and the number of holes in the wood under each scale amounts to 24, arranged in four rows of 6 holes each. The orifices over the holes have a diameter of $\frac{3}{4}$ m.m., and their numbers increase corresponding to the numbers of the holes from 1 to 24. The scale is at a distance of 10 centimet. from the sensitive plate, and the back part is so arranged that two plates of $3\frac{1}{4}$ by $4\frac{1}{4}$ inches can be exposed together. By this means the plates can be accurately compared as to their sensitiveness in any kind of weather, and the instrument can consequently be used as a sensitometer under all circumstances and in any kind of light.

On the other hand, it forms an equally valuable actinometer for determining the chemical intensity of daylight. In this case, we must take a number of plates of the same degree of sensitiveness, and after exposing them at different times, they must be developed under the same circumstances; the intensity will be found to be in the inverse ratio of the numbers which make their appearance.

Now, it is not possible to produce plates which have absolutely the same sensitiveness; but a number of plates prepared from the same emulsion may be considered as equally sensitive, and if it is then desired to employ a second emulsion of a different degree of sensitiveness, it will be only necessary to determine by experiment, as above described, the relative sensitiveness of the two emulsions in order to obtain results which can be readily compared with one another. Thus, the varying sensitiveness of the plates will have no effect on the accuracy of the results. It stands to reason, that in making observations in this way on the variable intensity of daylight, only one plate must be exposed at a time. With the same instrument may be compared with each other the intensities of different sources of light, daylight, electric light, gaslight, &c.

Further, different instruments of this kind possessing different dimensions may be compared with one another. For suppose that the diameter of the orifices of the scale in one instrument is o, and that of those in another instrument O, then the intensities of the light under the orifices in the two instruments are to one another as $o^2 : O^2$. Again, if the distance of the plate from the orifices in one instrument is d, and in the other D, then the brightness in the two cases is in the inverse ratio of the numbers $d^2 : D^2$. Hence the ratio of the intensity of the light in the one case is to that shown in the other as $\frac{o^2}{d^2} : \frac{O^2}{D^2}$. This advantage is not possessed by any other actinometer, and we see also that this instrument is capable of many different applications.

It may be objected that a new actinometer for the determination of the chemical intensity of light is scarcely necessary, since that of Bunsen and Roscoe (with chloride of silver paper) answers all our requirements. I may here remark, that this latter instrument is not sufficiently sensitive; Bunsen and Roscoe themselves state that when the sun's altitude is less than 12°, the instrument will not show the chemical action of the *direct* solar rays. Now, every photographer knows that even at the time of sunset, instantaneous pictures may be taken of the sun's image.

(To be continued.)

OPALS AND PAPER PRINTING BY GASLIGHT.

BY PERCY COLLES.*

The prints I show to-night are not put forward as any marvels of perfection, but will, I trust, be considered of sufficient merit to induce other amateurs to work in the same direction who have not hitherto done so. My main object in showing them is that the whole of the work—such as it is—with the exception of the exposure of the original negative, is carried out by gaslight—retouching the negative, exposure, and finishing of the prints, &c. The negatives are all taken on Swan's plates, and the opal prints are also taken (in contact) on Swan's plates. The emulsion paper on which the prints are taken was prepared by an enthusiastic photographic friend of mine, and I regret I am not at liberty to say anything as to its preparation beyond the fact that it is costly and troublesome to make.

My mode of procedure is as follows:—The negatives are retouched at an ordinary desk, with an argand gas-burner, using pot opal as reflector, with ground glass behind the negative. The gaslight should be elevated till it is about on line with the bottom of the negative when the latter is in its place on the desk; this screens the glare of light from the eyes. I make the exposure—say on a Swan's five times' opal—to a gas argand burner for forty or fifty seconds, some six or seven feet distant from the light, when a negative of average density is used; for thinner or denser negatives, I find it better to print at a greater or lesser distance from the flame, according to the character of the negatives, than to vary the time of exposure.

The vignettes are printed in the usual way—cardboard with opening covered with tissue paper (the latter must not be oiled, or the vignette will be too hard). The use of masks for opal printing somewhat reduces the sharpness, the negative and the opal not being in actual contact. Develop with ferrous oxalate—Swan's Nos. 11A and 12B oxalate of potassium ten drachms, sulphate of iron two drachms, with ten to fifteen drops of bromide (one to four). Do not spare the bromide! The image does not begin to appear for some two or three minutes, and requires twelve to fifteen minutes to complete. When I see that development has commenced I leave the plate in the tray, carefully covering the whole, turn on the white light, and prepare for another exposure. Care must be taken to use sufficient solution to well cover the plate while it is lying, otherwise the development will be uneven. With the most ordinary care, using this slow and weak developer, there need hardly be a single failure.

The plates are well fixed for at least thirty minutes in strong, clean hyposulphite (saturated solution one part, water two parts), then washed in running water for half-an-hour, and soaked in a plain alum bath for ten minutes. I have not found any tendency to frilling in Swan's plates, so I do not use alum until after fixing and washing. On taking the plate out of the alum bath, it will be found that it is very much stained by the prolonged development; but by immersing it for three or four minutes in a clearing bath of alum one ounce, water twenty ounces, oxalic acid two drachms, this stain will be entirely re-

* Read before the Manchester Photographic Society.

moved. Lastly, wash under the tap, and dry and finish by coating with a clear, colourless varnish.

Some of the opals shown are coated with an ordinary negative varnish, and have from this cause the appearance of being slightly discoloured. The light I use for developing is an ordinary gas behind a hinged frame, 3 by 4 feet, covered with two thicknesses of Swan's red paper—a comfortable and safe light. The emulsion paper prints are worked in all respects the same as the opals, except that the paper is soaked in water for a few seconds after exposure, to allow the developer to flow easily. The 8½ paper print of group is intensified with mercury, and the print in a double glass is worked up for a transparency.

Perhaps I might take this opportunity of saying to those who use ferrous oxalate as a negative developer, that the proportions mentioned for the opals (10 drachms to two drachms) will be found better for general use than those given in Swan's printed instructions A and B, the quantity of B there given being the maximum that can be used.

The two silver prints of a child dressed as an old woman are from negatives taken on a Swan's eight-times' plates, on January 8th, between two and three o'clock—a by no means bright afternoon.

Correspondence.

THE DRAINING OF EMULSION.

Sir,—Mr. Birrell will find the following a simple method of draining gelatine emulsion: place the washed shredded emulsion in a piece of fine muslin, and this again in the canvas used for shredding, and screw up as in that process; tie three feet of string to it; and go out into the garden and whirl it round until no more water will come off. Of course the operation is performed in the evening.—Yours truly, J. W. Leigh.

A SUBSTRATUM WANTED FOR PICTURES ON OPAL GLASS.

Sir,—Will you permit me to appeal through your columns for a little light on a subject which for months past has bothered me not a little? It is, how to make opal pictures to stick on the glass. I have now before me four half-plate opal pictures, clean, vigorous, and full of detail, but in every one the film is leaving the glass; the fact is, I cannot get them to stick; I have tried all sorts of remedies, but to no purpose. I have the News since 1873, but not a ray of light is there, nor in the Year-Books. I have orders which I cannot execute on account of this. Will some generous brother help a "lame dog over the stile?" I have tried the different kinds of glass, and various modes of cleaning the same, but with the same result—films flying off.

In the hope that in your next issue some good Samaritan may see his way to help, I subscribe myself,—Yours, &c., H. Howell.

THE DUNDEE EXHIBITION.

Sir,—There appear to be so many curious anomalies connected with the Exhibition now being held at Dundee, that I think it would be interesting to your readers, and perhaps useful to future exhibitors, to point out one or two of them. To do this I am aware is a delicate matter, as you were yourself one of the judges, but your liberality in the interest of all that is fair and square is so well known to your readers, that I am sure you will not object to honest criticism.

In your notice of the Exhibition you say that Mr. Payne Jennings' landscapes could not compete for gold or silver medals in consequence of their being mounted on glass. If this is true, if this photographer's contributions were disqualified for this reason, then I have no hesitation in saying that the Dundee Society has got together a large collection of photographs, and, worse still, taken money for space, on false pretences. It must be admitted by all that the only inducement that could have actuated nearly all the exhibitors was the medals offered for the best productions, and that all of them read and relied on the conditions issued by the Society. Now there is nothing whatever in these conditions prohibiting any kind of mounting or printing. Medals are offered for certain kinds of pictures, such as portraits and landscapes, but nothing is said about the processes by which they are to be produced. The wise judges, if it suited their purpose, might as well have prohibited all but collotypes or Daguerreotypes, or any other ancient process.

It is, perhaps, wrong to impute motives, but it is not difficult to infer that the object of the majority of the judges was to clear away the pictures of the best exhibitors on some side issue before the real business of judging began. Thus Mr. Jennings' exhibits were excluded from competing for the first-class medals for the cause already stated, and I find a series of well-known landscapes, which occupied a prominent position in the London Exhibition, and took a medal *as* landscapes, were, in the most arbitrary manner, classed in the catalogue as genre pictures because they contained figures—a most remarkable conclusion! These two exhibitors being "sided," gave the second and third-rate men a chance they have never enjoyed before.

I wonder if I should be thought impertinent if I asked Mr. Robinson and Mr. Jennings what they think of it themselves, and if they mean to accept these ridiculous awards. It seems to me to be their duty to uphold the honour of English photographers. Due South.

[Although we print the above letter, we must here, once and for all, declare our conviction as to the integrity of the judges.—Ed. P.N.]

Dear Sir,—I have been awarded the highest award in my class at the above Exhibition, but, unfortunately, it is a class in which I had not the remotest idea of competing, viz., that for *mounting photographs on glass.*

As photographs in optical contact with glass have never before been debarred from competition, I think this remarkable departure from the usual rules should have been expressed in the conditions in such a manner as to leave no room for doubt. I confess that I, for one, was misled. —Yours truly, Payne Jennings.

MEETING OF LEEDS PHOTOGRAPHERS.

Sir,—Photographers residing in and near Leeds will be pleased to hear that a photographic evening has been arranged for next Tuesday, the 21st inst., 8 p.m., in connection with the Leeds Naturalists' Club and Scientific Association, at their meeting room in the Leeds Mechanics' Institute. The leading idea in the mind of the proposers of the meeting is to provide for persons interested in photography a means of meeting together, and for that purpose it will probably be proposed to make permanent arrangement of some kind or other for the continuance of such meetings. I may add that various gentlemen, including Mr. Washington Teasdale, F.R.M.S., and Mr. T. W. Thornton, will exhibit various subjects of interest, and that all persons interested will be welcome to attend the meeting.—I am, sir, yours truly, B. Holgate.

Proceedings of Societies.

Photographic Society of Great Britain.

The usual monthly meeting was held on Tuesday, at 5a, Pall Mall East, Mr. J. Glaisher (president) in the chair.

Mr. J. R. Dunlop was elected a member.

Mr. E. Cocking (assistant secretary) read the annual report, which congratulated the members upon the important discoveries in photography which had taken place recently, and also upon the satisfactory condition of the Society. The technical meetings had proved highly successful, and would be continued for the future. The annual exhibition had been attended by a larger number of visitors than in any previous year, and was remarkable from the fact that there were five times as many pictures by the gelatine process as by any other process. The report also contained an obituary notice of the late Mr. R. W. Thomas.

The report was adopted on the motion of Mr. Maxwell Lyte, seconded by Mr. Berkeley.

Mr. Lyte then moved a vote of thanks to the president, council, and officers of the Society, which was carried.

Mr. J. Spiller (treasurer) read the balance sheet, from which it appeared that the receipts during the past year had amounted to £755 1s. 1d., of which £285 2s. was for entrance fees and subscriptions, and £161 14s. 4d. for admissions to the exhibition. The balance in hand was £242 17s., being £32 6s. 1d. in excess of the balance last year.

The President remarked upon the favourable nature of the balance sheet, and referred to the resignation of the treasurer, Mr. J. Spiller, who had served the Society faithfully for five years, but who now found it necessary to resign the office into other hands. He would propose that the cordial thanks of the Society be given to Mr. Spiller.

Mr. Spiller acknowledged the vote of thanks, and proposed a similar vote to the auditors, Messrs. Heaviside and Ackland.

The result of the election of the council and officers was then made known as follows:—

President—Mr. J. Glaisher. *Vice-President*—Mr. J. Spiller. *Hon. Secretary*—Lieut. Darwin. *Hon. Treasurer*—Mr. Bird. *Council*—Messrs. W. Bedford, Cowan, Dallmeyer, Payne Jennings, Lyte, and Col. Wortley.

The President then announced that since the balloting papers had been sent out, Mr. C. Bennett had resigned. Mr. Berkeley, the next highest on the list, was then elected in place of Mr. Bennett.

Col. Wortley asked if there was any objection to the numbers of those voting for the elected members being made known to the Secretary, so that anybody who wished to see them could do so.

The President, Mr. Bird, Mr. Heaviside, and Mr. Lyte objected to this course, as it was likely to cause some ill feeling, and as it had never been adopted before.

Col. Wortley said he did not wish to press the matter if it would cause pain to anybody.

The President observed that it would be better if the matter were settled once for all, and he would put it to the meeting.

A vote was accordingly taken, when the feeling was found to be almost unanimous against the communication of the numbers.

After a vote of thanks to the scrutineers, Messrs. Ackland and Payne Jennings, the President presented the Progress Medal to Mr. Leon Warnerke.

Mr. Sebastian Davis then proposed a vote of thahks to the President, remarking upon the energy and assiduity with which he carried out his duties.

Tho President having replied,

Mr. Warnerke made some remarks on lenses, the chief purport being the desirability of having a standard of rapidity for lenses. He had for some time adopted a method which he found answer well. He took Dallmeyer's 2C or "baby lens," the aperture of which was half the focal distance, as his unit, and made his calculations from that unit, marking each lens according to its rapidity. The usual method of marking diaphragms as No. 1, No. 2, and so on, in which the size of the aperture was supposed to decrease by one half, he contended was erroneous, and he showed by experiments made with lenses of the same rapidity, but of different focal lengths, that such diaphragms were very misleading. To bring about some uniformity and to settle the matter, he intended to propose that a commission be appointed to investigate the subject. The duties of the commission would be—1. To examine what system would be the best to produce the desired result; 2. To confer with the leading opticians so as to secure their co-operation, in which he believed there would be no difficulty. The matter was also simplified by the fact that the principal opticians were English, and if they ever took up the subject the foreign opticians would follow suit. Mr. Warnerke also suggested that the commission might discuss the question of the flanges of lenses. It was well known that where one did much landscape work, and had to travel with a number of lenses, great inconvenience was caused by the necessity of using a different flange for each lens. The same annoyance was experienced in regard to camera screws: whenever a new stand was bought, the old camera-screws could not be used. He could not see that any objection would be raised by camera makers in regard to uniformity, as the benefit to photographers would be so great. At the next council it was his (Mr. Warnerke's) intention to propose that such a commission as he had suggested be appointed.

Mr. England remarked that some ten years since Mr. Russell Manners Gordon had worked out a series of experiments resulting in a formulated list of stops and their relative exposures. If at that time the optician had taken up the matter, great benefit would have resulted.

After some remarks by Col. Wortley relative to Mr. Warnerke's calculations,

Mr. W. Bedford suggested that the matter be deferred until the next meeting, when a committee might be appointed.

The President pointed out that it was necessary that the matter should first be brought before the council. As to the desirability of uniformity, he thought it would be a great advantage if photographic apparatus could be made as uniform as microscopes were, so that, no matter who the maker might be, the different parts would correspond.

The subject then dropped.

The Chairman announced that the Technical meeting would take place on February 28th, and the proceedings terminated.

West Riding of Yorkshire Photographic Society.

The above Society held its eighth annual *soirée* on Wednesday, the 18th January, at the Market Tavern, Godwin Street, Bradford, when about forty sat down to tea. The walls were decorated with a number of pictures and enlargements contributed by Messrs. Passingham, Howarth, Wormald, Ledgard, Bridges, Jennings, Garratt, and others.

Mr. Forsyth exhibited two large stereoscopes and a number of admirable transparencies, principally from his own negatives.

After tea the President, in a short address, expressed the pleasure he had in seeing the faces of so many who had been connected with the Society since its commencement, and thanked the members for their adherence to the cause. The Society, he said, numbered about the same as on previous years (some fifty members), a few had retired, but new members had been elected, which filled up the vacancies. The Society had been somewhat short of volunteers to provide the necessary papers for the monthly meetings, but during the present session they hoped to do much better, as the new members, he trusted, would bring renewed vitality to the Society. The association, he was happy to say, apart from its scientific and artistic advantages, had been the means of cementing friendships which would, he trusted, outlive the Society's existence. These small reunions, he thought, were amongst the most pleasant meetings of the year, as there they could combine their art profession with its sister art of music, and also with certain creature comforts, to the charms of which they were all doubtless more or less susceptible. He wished to press home to each member the importance of furthering the cause and interests of the Society. The officers were, he believed, prepared to do their best, and they sincerely hoped the members would assist them in their endeavours. Photographic societies were springing up on all sides, and it would not be creditable that a society like theirs should sink in the background. Rather let them all do their best to keep up the standard they had all doubtless set up as their ideal of a photographic society.

After the Presidential address, a short time was devoted to dancing, friendly chat, and the examination and discussion of the pictures exhibited. During the evening Mr. Howarth gave a short lantern exhibition and reading of an extremely interesting and pathetic character. A number of songs were sung by Mr. and Mrs. Crosthwaite, Mr. Fawcett, and Mr. Kilner (the latter gentleman also ably presiding at the pianoforte). Mrs. Illingworth (of Halifax) gave several of her irresistably humourous recitations.

Towards the close of the meeting the usual votes of thanks were given to the Chairman and those who had contributed to the evening's entertainment, and the members separated with hopes of meeting again at the next annual *soirée*.

Sheffield Photographic Society.

This Society held its ordinary meeting at Freemasons' Hall on February 7th, Mr. Thos. H. Morton, M.D., presiding.

The minutes having been read and confirmed, a nomination of new members was considered, and the following gentlemen were duly elected members of the Society:—Messrs. J. H. Ainley, Frank Mottersham, S. Foxon, and J. Cartledge.

Mr. Stringfellow (the Treasurer) reported that the expenses connected with the late exhibition exceeded receipts, but that the funds in hand were sufficient to meet all requirements.

Mr. W. B. Hadfield said that now the exhibition was over, it would be well for the members to express their opinions, point out and remedy any shortcomings, so that it could be made more successful in the future. He proposed that suggestions be made in writing, and read and discussed at the next meeting.

The Chairman exhibited a print view of the interior of the room at the Cutlers' Hall, taken at noon, February 25th, on a Clarke's rapid whole plate, Grubb lens, large stop, with an hour's exposure. He said it was secured under most unfavourable conditions—a bad fog and light, and a crowd of people walking about all the time; yet the picture was fairly distinct, and showed no trace of the visitors present. It induced him to ask the question:—"What proportion of time, in a given exposure, was necessary to produce an image of a moving figure, or none at all?" We know that to get a sharp outline of a body in motion, the exposure should be more rapid than the movement of the individual, otherwise a simple blurr resulted; but it was not so easy to calculate, so as to keep the figure entirely out of a view in moderately short exposures. Practically it pointed to the use of slow plates in some cases, such as street scenes.

Mr. Hicks observed that it was not uncommon to stop down the lens for that purpose.

Remarks were also made by Mr. Yates and others, and Mr. Taylor proposed that the print be inserted in the Society's album as a record of the event, which was agreed to.

The President said that the lantern entertainment had proved a great attraction, and he moved that a vote of thanks, seconded by Mr. Stringfellow, be given to Messrs. Yates, Hadfield, Dakin, and Bromley, for their efficient services, which was carried unanimously. Thanks were also accorded to the executive committee, and the meeting then adjourned.

Photographic Society of Ireland.

The usual monthly meeting of the above was held on the 10th inst., in the Royal College of Science, Dublin, Mr. E. P. Johnson in the chair.

The minutes of the previous meeting having been read and confirmed, the following gentlemen were proposed members of the Society:—Messrs. R. Forbes, Wm. Bewley, Thos. Mason, and Theodore R. Webb.

Mr. Herbert Bewley, who has been working the gelatino-bromide paper to a very large extent, communicated his experiences of the above to the meeting, illustrating the manner of manipulation. An ordinary Sciopticon lantern with a $3\frac{1}{2}$-inch condenser and a Dallmeyer short focus lens was used in preference to the ordinary lantern lens, thus giving a greater amount of light and better definition. One of the pictures developed was from a negative of Mr. Watson's of the Gough Equestrian Memorial in the Phœnix Park, Dublin, enlarged on to 12 by 9 paper. (This size was used for convenience.) Mr. Bewley has enlarged pictures on to full size sheets, 18 by 24, which were also exhibited.

A discussion ensued as to the best way of developing, Mr. Bewley having used a very old ferrous oxalate developer, and some members agreeing that that was best.

Mr. J. V. Robinson demonstrated that it was not at all necessary to use old chemicals, and subsequently exposed a sheet of paper in *direct contact* with the negative, and developed it with fresh oxalate, the discolouration which so many operators complain of being entirely avoided by judicious use of the protosulphate of iron.

The advantage of using old ferrous oxalate for producing transparencies was upheld by Mr. Thos. Mayne, he having spent one and three-quarter hours in developing a plate with oxalate eight months old, and on one occasion left the plate in solution the whole night, his experience being that the old developer gave more satisfactory results than that freshly made up. It is intended to hold a lantern exhibition of transparencies made from negatives of the work of the members of this Society, next month.

The meeting closed with a vote of thanks to Mr. Bewley for the able manner in which he treated the subject. The next meeting of the Society is intended to be held on Friday, 10th of March.

Dundee and East of Scotland Photographic Association.

The fifth ordinary meeting of the session was held in Lamb's Hotel on Thursday, February 9th, shortly after the inaugural opening of the Exhibition in the Albert Institute.

There was a large attendance, both of members and visitors. Mr. J. C. Cox (president) occupied the chair during the early portion of the evening, Mr. W. D. Valentine (vice-president) afterwards.

The Hon. Sec. (Mr. C. Johnson) read the minutes of the last meeting, which were approved and confirmed, and the following gentlemen were duly elected members of the Association:—Messrs Frank C. Young, H. F. Fraser, and P. H. Abbot.

The President then said that the Exhibition which had been opened so auspiciously owed its success in a great degree to the energy and unwearied exertions of Mr. Silvester Rollo and Mr. G. D. Valentine; he begged therefore to move a most cordial vote of thanks to those gentlemen, which was carried with applause. The President also proposed a sincere vote of thanks to the jurors for the skill and impartiality displayed in awarding the medals, which was carried unanimously. The President then congratulated the Association generally upon the success of the Exhibition, and urged upon the members to continue their efforts to carry it to a satisfactory issue.

Mr. G. D. Macdougald suggested the desirability of holding a *conversazione* during the time, the matter being ultimately referred to Committee.

Mr. W. M. Ogilvie introduced a new automatic changing-box, which, together with a camera, had been made to his order by Mr. Birnie, the improver. Mr. Birnie, assisted by Mr. John Thomson, showed and lucidly explained the construction. The improvement consisted in bringing the slots of two metal tubes—one working in the box, and one in the dark-slide, and acted upon by studs—into juxtaposition, excluding all light, and allowing the plate to pass through safely and simply. It was suggested that the changing-box and camera be placed on view at the Exhibition, to which Mr. Ogilvie kindly consented. Mr. Birnie was complimented upon his ingenuity and excellent workmanship, and a vote of thanks was passed for the exhibit.

It was resolved that the next Popular Lantern Exhibition be held on Wednesday, the 22nd, when Messrs. Robertson, Ireland, Kerr, Ogilvie, Roger, Ferrier, Donald, &c., promised to contribute slides.

At the next general meeting in March, Mr. J. Robertson (vice-president) will read a paper, the subject to be announced.

A sample packet of gelatine from Frankfort was received and acknowledged with thanks.

Mr. W. D. Valentine offered a cordial welcome to the visitors, and a vote of thanks to the chair brought the meeting to a close.

Manchester Photographic Society.

The usual monthly meeting of the above Society took place on Thursday, February 9th, 1882, at the Manchester Mechanics' Institution, Mr. E. Leader Williams, C.E. (president) in the chair.

The minutes of the previous meeting were read and confirmed. Messrs. John Copeland and W. S. Barlow were duly elected members.

The President made a financial statement respecting the late exhibition of photography.

Mr. John Pollitt, on behalf of Mr. Percy Colles, read a paper entitled, "Opals and Paper printing by Gaslight," (see page 80) and exhibited some very excellent specimens of opal prints, on Swan's opal plates, as also some paper prints; and notwithstanding some little discussion in connection with the above, the unanimous feeling was that the results were exceedingly fine, and reflected great credit on the artist.

Mr. D. McKellen exhibited a very ingenious and portable lamp for changing plates by when away from home. It folded so flat that it did not occupy much more room in the pocket than any ordinary envelope. The same gentleman also exhibited a flap shutter with a spring so arranged that it could be used for very rapid exposures; the flat shutter was made out of ebonite.

Mr. John Schofield sent a dark slide with a deep back arranged to carry a dozen plates. The object of it is to only carry one dark slide, and to carry a light-tight bag in which this slide can be put, and the plates changed from back to front.

Mr. John Dale exhibited one of the earliest collodion pictures taken in Manchester. It was a collodion positive taken by himself about thirty years ago.

The Hon. Secretary (Mr. J. W. Chadwick), on behalf of the Albion Albumenizing Company, of 96, Bath Street, Glasgow, exhibited one of E. T. D. Benzies' lamps, for taking portraits by artificial light. Although it was not convenient fully to demonstrate the working by such a light, the lamp was of such a practical character that a favourable impression was produced.

The Chairman drew attention to some pictures on the wall by Mr. J. W. Chadwick; they were 12 by 10 enlargements from quarter-plate negatives, and he expressed himself surprised to see so much atmospheric effect in them, and doubted if such could have been shown had the picture been taken that size direct.

A hearty vote of thanks was passed to all the gentlemen who had contributed to the interest of the meeting, which was then was adjourned.

Bolton Photographic Society.

The February meeting was held on the 2nd inst., at the Baths, Mr. R. Harwood in the chair.

After the usual formal business had been transacted,

The Chairman introduced Mr. Pumphrey, who, after a few preliminary remarks, said he had been very slow to believe in the gelatine emulsion process, but in the autumn of 1880, a gentleman brought to him some negatives on Swan's plates, to have lantern pictures from them, and at the same time saw the collodion film negatives for mechanical printing, and suggested that such, prepared for the gelatine process, would lighten the labours of the landscape photographer. On finding that such an article as gelatine films was not in the market, he had, in the early part of 1881, introduced those which he had made. A few of these were taken out in May into Switzerland, and he exhibited the resultiug negatives and prints, which were much admired. Mr. Pumphrey then explained the 100-fold filmograph, as already described in the Photographic News Almanac. This was followed by the exhibition of a newer and lighter style of camera to hold 100 films or 12 glass plates $\frac{1}{4}$-size, which weighed $1\frac{3}{4}$ lbs.; Mr. Pumphrey stated that he was manufacturing on the same principle, for larger sizes, one which would fold up, so that a 10 by 8 camera would make a most convenient shaped package for carrying about 11 by 11 by $4\frac{1}{2}$ inches. This he (Mr. Pumphrey) proposed to send to a future meeting.

A picture was then exposed in the 100-fold camera and developed, and the various methods of development, fixing, and drying explained.

Mr. Harwood (chairman) then showed some pictures he had taken on Mr. Pumphrey's plan, aud thought that a great advantage had been gained in dispensing with the paper-backing.

A Member remarked that Mr. Pumphrey used tin dishes—without varnish—for developing in, and inquired if he had tried them for developing gelatino-bromide films with the ferrous oxalate developer.

Mr. Pumphrey replied that he had, and fouud them quite satisfactory.

Mr. Thomas Parkinson then proposed a vote of thanks to Mr. Pumphrey, which was seconded by Mr. T. W. Hawksworth, supported by Mr. George Wharton, and carried with acclamatiou.

Thursday Evenings for Photographers.

The meeting on the 9th inst. was presided over by Mr. Collins

Mr. Marlow (of Birmingham) exhibited an apparatus for taking portraits by artificial light, which consisted of three pans of a pyrotechnic compound, placed on brackets and enclosed in a glass case somewhat resembling a fern case about three feet high, raised on a stand; the brackets were placed one above the other some little distance apart, in order to diffuse the light. The powder was ignited by means of fixed gas jets directed into the pans, and all three pans being instantly fired by a simple turn of the tap. The fumes caused by the burning compound are carried away by a flue, which can be placed into an ordinary chimney, or carried out at any convenient window or skylight.

A number of experimental exposures were made, the results of which will not be known till next meeting.

At the close of the demonstration, a hearty vote of thanks was passed to Mr. Marlow for the trouble and expense he had incurred.

Talk in the Studio.

Cameras permitting Lens to be Lowered below the Centre.—Mr. Geo. Hare, of Calthorpe Street, and Mr. Husbands, of Bristol, desire us to say that their cameras are now usually made with falling fronts.

Mr. Abel Lewis.—The *Manx Sun*, in the account of the visit to Ramsey of H.R.H. the Duke of Edinburgh, says:—"On Wednesday morning Mr. Abel Lewis, Finch Road, received an intimation from his Excellency the Lieut.-Governor that his Royal Highness the Duke of Edinburgh would honour him with a sitting at his studio previous to going on board the *Lively*. Punctually at ten o'clock His Royal Highness arrived, accompanied by his Excellency and Lady Loch and suite, and although early in the day, Mr. Lewis obtained several splendid photographs, in various sizes, of his Royal Highness. The honour was all the more flattering because entirely unsought for and unexpected."

Warnerke's Standard Sensitometer.—Messrs. Marion and Co. have been good enough to forward us one of these ingenious little instruments. We have, so far, only been able to make a rough test with the sensitometer, but its practical value was thereby well established, for it provides a most satisfactory means of arriving at the comparative sensitiveness of gelatine plates with very little trouble.

Alpine Photography.—M. Civiale has published a remarkable work, "Voyage Photographique dans les Alpes," to prepare which he has spent twenty-five years in arduous work. It is a collection of 500 large photographs, comprising forty-one complete panoramas, in which all the most interesting places of the Alps are represented. A volume of letter-press and two large topographic maps accompany the atlas, which itself forms ten enormous volumes *in plano*.—*La Nature*.

To Correspondents.

D. M (Dublin).—1. The super-oxalate is useless for the purpose; you must make use of the neutral salt. If, however, you add carbonate of potash or caustic potash to the solution of acid oxalate until neutrality is arrived at, you will form the required salt. 2. Because it is practicable to work it with a larger aperture.

Sale.—1. Use distilled water. 2. In ordinary cases the process you mention is as satisfactory as any other. 3. By either adding bromide in varying proportions, or by omitting it altogether. 4. They will keep indefinitely under these circumstances. 5. Only in the case of the iron solution. 6. We will forward the address by post if we can obtain it.

J. M.—We have found that equal parts of the bituminous varnish which Messrs. Hopkin and Williams sell under the name "Liquid Jet," and benzole answers well for coating them especially if the film is exposed to light until the bitumen becomes insoluble. It is well to equalise the coating by spinning each plate on a turn-table.

George Lewis.—1. It is the fault of the gelatine, and if you use a harder quality, such as Coignet's "gold label gelatine," there will be no difficulty. 2. Probably you mean "resins." Pure methylated spirit must not be sold without a licence, but when a certain proportion of resinous matter is added, it is called methylated finish, and may be sold freely.

Arbroath.—You only have a copyright in the photograph you have taken, and not in the man's face generally.

Luton.—Undoubtedly you can; but the process of compelling him may prove rather expensive.

F. Cowley.—1. Any dealer in prints or photographs will supply you with it. 2. The easiest way would be to make one yourself. 3. Hardly so good as by some of the older methods; will you let us have particulars as to which article you refer to? 4. A matter of taste; but few artists would approve of its use. 5. See our Year-Book. 6. During June and July many opportunities offer themselves.

A. R. Dresser.—A safe rule is to use no more light than is required for the satisfactory performance of the manipulations; but in order to follow this rule at all times, you will require extra screens, which must be used when the external light is intense, as a medium which is safe, or a dull day is by no means satisfactory when the sun is shining on the outside.

Discoloured Toning Bath.—1. If you take the precaution of thoroughly washing the prints before immersing them in the toning bath, your difficulty will no longer occur. 2. Yes; each one having been tried by ourselves, and found quite satisfactory.

Copyist.—1. Your difficulities are unaccountable, and we can only suggest that you may have washed the film insufficiently, and that you may have failed to use distilled water f r the final rinse or for making the solutions. 2. Cyanide is preferable.

Developer.—In most cases none is required, but we have rarely experienced cases when the addition of more than four drops of a saturated solution to each ounce was advisable.

W. J. D.—It is probably due to the presence of sulphur, a constant constituent of albumen; and we should recommend you to obtain the so-called permanent white, this pigment consisting of sulphate of barium, a salt unaffected by sulphur.

Lenses.—Either would answer well in a fairly good light, but we should prefer No. 2. The exposures might range from one-fourth of a second to four, five, or six seconds.

A. B.—In most cases a strong solution of Judson's aniline violet can be used, provided that reasonable care is taken. The difference in tint is not noticed, and there is no fear of removal during the operation of burnishing.

George P. Walker.—Thanks for your communication, which must stand over till next week.

THE PHOTOGRAPHIC NEWS.

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CONTENTS.

TWELVE ELEMENTARY LESSONS IN DRY-PLATE PHOTOGRAPHY.

Introduction.

Before entering on the actual lessons which we are about to give, we should like to explain our object in taking in hand the task.

After Archer brought out his collodion process, photography for the first time became a popular amusement with those who had a leaning to art or science, or both. The scientific interest and novelty attaching to the then comparatively new process, combined with a totally false idea of how easy it would be by means of it to make a "picture," attracted enormous numbers of those who had some spare time on their hands to take up the subject as amateurs. After a time many of these found that their expectations were scarcely fulfilled, and they found, too, to their surprise, that a mere transcript from nature was not necessarily a picture, but that as much art culture, if not as much skill, was required when the tools were the camera and lens, as when they were the pencil and brush. They found, also, that the skill required was greater than they had supposed—that at least a slight knowledge of chemistry and of physics was necessary, or endless troubles would arise.

The realization of these facts greatly thinned the ranks of the amateurs. Another era has, however, now arisen in photography—the era of the dry gelatine process. The skill necessary to produce a photograph has been greatly reduced. The plate is now no longer prepared by bringing into contact immediately before exposure two fickle and uncertain chemicals—the "collodion" and the "bath"; but it may be purchased ready made, will keep, so far as we know, indefinitely, and may be exposed at any time. True, the artistic feeling is as necessary as ever; but that uncommon combination—a mind equally artistic and scientific—is required to a less degree than before, and wider scope is given to the former capacity.

The consequence of this is, that the number of amateurs is now enormously on the increase. The man who has but a few summer days to spare may take up the camera and may work it with profit. There will probably be soon —if there is not now—an army of amateurs as great as there was twenty years ago. The ranks are continually being recruited, and greatly by those who have worked no other process before the gelatine one.

Now we come to the object of our "lessons" How is the dry-plate aspirant, who takes up the gelatine process as his first, to gain the necessary information to enable him to practise the art? If he has a photographic friend—if his friend and he have coincident spare hours, and if his friend has the ability of conveying to others the knowledge which he himself possesses (an ability rarer than is generally supposed)—then the way whereby the would-be photographer is to gain his information is clear.

In very many cases, however, the beginner has no such friend; then, where is he to turn? True, there are several excellent manuals published on the gelatine process, but most are quite unsuited for beginners; they presuppose a general knowledge of photography—at least, of the "wet process." Then there are the directions contained in the boxes of plates which the tyro will purchase. They also are excellent in their way, but they are necessarily laconic—they, as well as the manuals, are addressed to those who already are not unacquainted with photographic processes. They constantly refer to the collodion process as a standard, and they use technical language which is unintelligible to the beginner. Let our general reader try to cast his mind back to the times when he was tediously wading through the beginning of whatever was the first photographic process he ever worked. Can he remember when terms now so familiar to him, such as "detail in the shadows," "density in the high-lights," conveyed no idea to his mind? Perhaps he cannot; but such a time there certainly was for each of us, and now is, for every one who first attempts to solve the mystery of the language in which the modern dry-plate manuals and instructions in the plate-boxes are couched.

We know the case of many who have commenced photography since gelatine became popular, and who, feeling the want which we have attempted to explain—of anything to guide them to a direct knowledge of the working of dry plates—have familiarized themselves with the more difficult wet process for the sole purpose of using it as a stepping-stone to the former. In speaking of the gelatine process as easier than the collodion, it must be understood that we go on the assumption that the dry plates are purchased from the manufacturer, not made by the photographer himself. No beginner should attempt to make his own plates. He will find that he has quite enough to do to learn to work those which are made for him by others. In fact, we consider that the most experienced photographer who is wise will buy his plates, unless he takes an actual scientific interest in the manufacture. Dry plates can now be had so cheaply that he can scarcely expect to save money by making them. This, however, is a digression. To return to our subject. What we intend to do is to give, in future numbers of the Photographic News, a series of lessons in modern dry plates addressed to perfect beginners. We shall use no technical terms, or only such as we have already explained, and shall assume no knowledge of any photographic process.

Our endeavours shall be to give such instructions that those beginners who will follow them carefully may, without any other assistance, after a little practice, be able to turn out, with a fair approach to certainty, technically perfect negatives on plates purchased from any trustworthy maker. We propose to avoid theory altogether, and we do not intend to enter into the question of art. All we propose to do is to teach the A B C of the subject—the purely technical. To the higher branches of photography—the artistic—the aspirant must be guided mostly by his natural gifts; but he will find much to assist him in many advanced books on photography; but we shall give short instructions in printing, so as to enable the student to complete his picture.

Our last lesson will consist of concise instructions for the making of an emulsion and coating of plates, so that the amateur who chooses, for pure love of so doing, to make his own plates, may do so. Here, again, we intend to avoid all theory, nor shall we enter at all deeply into the question of emulsion making, as the subject has been very fully treated in two different manuals published by Messrs. Piper and Carter.

We intend to devote a chapter to the subject of lenses, and to give a few very simple rules whereby the beginner may gain some idea of the exposure which will be required under different circumstances. It is common in manuals for beginners to say that knowledge of the length of exposure can only be gained by experience. This is partly true, but not entirely. *Some* idea may be given of how long the cap should be kept off the lens under certain circumstances, and this, we believe, will greatly assist the beginner. We remember ourselves how, when we commenced the study of photography, with no assistance but what we could get from the hand-books, we sought in vain for at least some faint clue to the length of exposure, and to the factors which regulated it.

The foregoing remarks have been addressed to our usual readers. We need scarcely say that what is to follow will not be; yet we hope that even they may occasionally pick up a scrap of useful information. What we hope far more they will do, however, is to refer those of their friends whom they may know to be struggling through their first attempts at working dry plates, to these lessons.

MR. WARNERKE'S PROPOSED STANDARDS FOR LENSES.

AT the last meeting of the Photographic Society of Great Britain, Mr. Leon Warnerke read a paper in which he suggested that an attempt should be made to persuade lens makers to adopt various uniform standards in manufacturing lenses.

The first and principal standard proposed was one by which to measure the rapidity of lenses. The other had relation to the screws of the flanges.

It may be recollected that about a year ago we made a suggestion with regard to a standard of rapidity. The rapidity of a lens is governed, as doubtless our readers know, by the ratio between the aperture at which the lens works, and its focal length. To establish a standard, all that is necessary is to fix upon some given ratio, and use that as a unit—in other words, to take a lens of a certain rapidity as a standard. The unit which we proposed was $\frac{2f}{1}$, or a hypothetical lens which, as we explained, would always give an image as bright as the object to be photographed.* Mr. Warnerke proposes as his unit $\frac{f}{2}$, because he says such a lens is the rapidest to be found. He states that Dallmeyer's "baby lens" works at that aperture; but, if we are not mistaken, its power is more nearly represented by $\frac{f}{4}$.

It is not for us, however, to discuss at present in these pages the merits of one unit or another, or whether it is advisable to adopt a purely empirical standard. Mr. Warnerke makes the eminently practical suggestion that the matter be referred to a committee of the parent society, and this committee will doubtless give the matter the consideration it deserves, and will weigh accurately the claim of each unit which may be suggested. As a practical matter it is of very little consequence which is adopted. The difficulty will come, not in agreeing upon a standard, but in persuading lens makers to adopt the one agreed upon, for unfortunately the lens makers seem to be a very conservative set. Had they not been so, it would be impossible for one of the best optical firms to have issued a set of lenses nominally of the same pattern, but with their stops cut so totally without system of any kind that not only does no regular ratio exist between their rapidity when using various stops of the same lens, but stops of corresponding numbers in different lenses gave such widely different speeds as in some cases to bear a ratio to each other as high as five to one! Yet Mr. Warnerke states that by comparing seven lenses issued by the same firm, and designated by the same title, he has got the result we describe.

Whatever unit be adopted by the committee, and whether or not they succeed in putting pressure enough on the opticians to move them, all will agree that our most sincere thanks are due to Mr. Warnerke for taking the matter up in the practical manner that he has done. No man we know of could have done so with as much likelihood of bringing it to an issue as Mr. Warnerke.

After showing the desirability of a standard being adopted, Mr. Warnerke went on to consider the various methods in use for finding the equivalent focus of a lens. For comparing rapidity the back one—the one, for some unknown reason, almost always mentioned in the catalogues of the opticians—is of no use, and to find the real focus is not always very easy.

In the "single lens" it may be assumed to be *in* the lens, and this is strictly correct for the middle part of the picture. In the case of a meniscus lens having a stop at some distance in front of it, the equivalent focus of the lens is *in* the lens for the central part of the picture, but considerably *behind* the lens for the edges and corners. This does not, however, need to be taken into practical account.

In all double combinations—except the old orthoscope—the true focus is somewhere between the two combinations, and there are various ways of finding out the exact spot. One is to focus some readily movable object—a foot-rule is the best of all— to draw out the camera, and to move the object until the size of the object and of the image is the same. The distance between the object and the ground glass is then four times the true focal length of the lens. This method is not, however, so easy in practice as in theory. Ordinary cameras seldom open enough to permit of the experiment being performed, except for short focus lenses. Then, again, it will be found that a great deal of adjustment is necessary. A very small alteration in the position of the object makes a great difference in the position of the ground glass. Again, the position in question is the one at which it is most difficult of all to find the exact plane in which the image has its maximum sharpness.

A far better way than the above is the second, which Mr. Warnerke mentioned. It is as follows. Focus a distant object; measure the distance between the ground glass and the diaphragm slit; reverse the lens. Make a similar measurement, and take the mean of the two. This will be the focal length, with sufficient accuracy for all practical purposes. Another method, which was published in the last YEAR-BOOK, is to focus with the camera on a well-lighted landscape, then to measure the distance between any two well-marked objects in the image. One near each end of the ground glass is best. Afterwards remove the glasses from the lens mount, and insert in the diaphragm slit a temporary stop with a very small aperture. An image will be formed upon the ground glass, and the camera can be adjusted till the image is of the same size as it was before the lenses were removed. This can be ascertained by measuring

* Vol. xxv., page 121.

once more between the fixed points. The distance between the ground glass and the temporary diaphragm will be the focal length of the lens. This method is very easy, and is capable of very great accuracy. The degree of accuracy depends entirely upon the smallness of aperture in the temporary diaphragm that it is possible to focus with.

CAPTAIN ABNEY'S FOURTH CANTOR LECTURE.

On Monday evening last the final lecture of the course was delivered, and, so far from there being any sign of diminished interest on the part of the audience, there was, if possible, more determination shown in crowding into the room, and an increased anxiety to catch every word which was said. Our prediction that Abney's series of Cantor Lectures would be the most brilliantly successful course which has yet been delivered appears to have been abundantly fulfilled, and sincere congratulations were abundantly showered on the Captain at the informal social gathering, which took place after the lecture, at Gatti's Café, in Villiers Street; over a hundred gentlemen well known in the photographic world being crowded in and around the "Photographer's Corner" on this occasion.

Mr. Henderson's well-known moonlight picture was projected on the screen at the commencement of the lecture, the transparency not having been to hand at the previous lecture when the picture was referred to. The effect was singularly good, and the picture was thoroughly appreciated by the audience.

The reversal of the image was next brought under consideration, and practical methods by which transparency can be directly obtained from transparency, and negative from negative, were discussed.

The bromo-iodide paper was first used to practically illustrate the subject of the production of reversed images; and we may here call attention to Captain Abney's article in our last number, in which he gives the result of his most recent experience as regards the preparation and use of the paper in question. After having generally exposed a sheet of the paper to the radiations from burning magnesium wire, the lecturer moistened it with a solution of iodide of potassium, and then exposed to a positive image, which was projected on it by the electric lantern. A short exposure served to locally bleach what one may call the potential general darkening which would under ordinary circumstances have arisen from the general exposure to the magnesium light, so that on applying the ferrous citro-oxalate developer a positive picture was the result. It was next explained how this reversal of the developable image requires the presence of an oxidising agent or of free oxygen, and the matter was further illustrated by projecting the spectrum of the electric light on a similar sheet of paper, in order to demonstrate how the violet end of the spectrum is principally instrumental in effecting the reversal, the red end having but little action. The disadvantage of allowing excess of bromide to remain in emulsion is well illustrated by this experiment, as, like the iodide, it favours reversal—undoes, in fact, the work of a considerable proportion of the light, so that the useful effect is merely the difference. Eder's method of subsequently treating gelatino-bromide films with nitrate of silver was explained to be founded on correct theoretical views, and also to possess great practical value.

After this followed a demonstration of the destruction of the potential or developable image by various oxidising agents, a sensitive surface being first exposed to the rays of the phosphorescent Balmain paint, and then locally treated with each of the following agents: bichromate of potash, ferric oxalate, permanganate of potassium, ozone, bromine, and peroxide of hydrogen. On applying the developer reduction took place, except where an oxidising agent had reacted. In relation to this subject, it is a matter of much practical importance to bear in mind that oxalate or citro-oxalate developer which has absorbed oxygen may partly or entirely destroy the latent image on a bromide or bromo-iodide film; hence it becomes of primary necessity to use the solution while fresh.

That bromine is liberated during the action of light on silver bromide there can be no doubt, and in some instances the free halogen may become obvious to the sense of smell, while in the case of thick films the liberated bromine may clear or unfog the underlying portions of the film, giving rise to peculiar phenomena which have been observed from time to time. The probable practical value of a reversal method for reproducing negatives was referred to, and examples were shown on the screen. In this case a gelatine film is treated with a soluble bichromate, exposed, and developed.

Halation or blurring was explained to be principally due to reflection from the back of the plate, and this was well illustrated by projecting a powerful luminous image on a thick glass plate which which was slightly roughened on the surface. It was then easy to observe a surrounding halo which was caused by rays reflected from the back of the plate. The application of red varnish to the back of the plate changed the halo to red, while the application of a bituminous varnish like Brunswick black entirely destroyed it; thus demonstrating the value of the bitumen method which we proposed for backing plates. In the case of free films, or when paper is used, there is but little tendency to either blurring or reversal, for reasons which will now be obvious; but a film on a glass plate may be rendered absolutely secure against reversal by the presence of such a salt as potassium nitrite, the liberated bromine being immediately absorbed by this compound.

The sensitometer of Warnerke was next brought before the notice of the audience, a large model of the circular scale being used in calculating the results; after which Warnerke's actinometer was shown. These instruments are not equally applicable to bromide, iodide, and chloride plates, owing to the circumstance that the phosphorescent sulphide emits a light which is almost monochromatic from a photographic point of view; but the actinometer is of especial value for bromide work, as the rays which excite the phosphorescent sulphide correspond nearly to those which exert the maximum action on a bromide plate. The difficulties of actinometrical work are much increased by the fact that the relative proportion of the different spectral rays varies considerably.

Drop shutters were briefly alluded to, and the method of determining the rapidity of the fall by means of a tuning-fork was shown; a thin branch of a feather being attached to one limb of the fork, and this is allowed to play against a piece of smoked albumenized paper attached to the falling shutter. The number of vibrations made in a second by the fork being known, the diagram traced on the smoked paper affords an easy means of estimating the speed at any part of the fall.

The lecture concluded with a short description of Mr. Galton's system of composite portraiture, several examples of which were shown on the screen.

INTERNATIONAL EXHIBITION OF PHOTOGRAPHY.

We have received from the Photographic Committee of the *Union Centrale des Arts Décoratifs*, at Paris, a copy of a circular letter which has been addressed to all the photographic societies of France and other countries, giving an account of the plan and organization of the proposed International Exhibition. The following is a translation of the circular:—

The approaching Exhibition of the *Union Centrale des Arts Décoratifs* will, according to the prospectus, contain three distinct groups, referring to the decoration of wood, woven fabrics, and paper. The art of photography will be included in all these groups, either as respects its direct application to the decoration of wood, fabrics, and paper, or with regard to the raw materials, tools, and processes proper to it.

In inviting you to take part in this Exhibition, the Committee appointed by the *Union Centrale* to arrange specially the photographic section feels it necessary to explain, as clearly as possible, the limits under which photography can be represented. The principal object of the *Union Centrale* is to extend the application of fine art to decoration, and to promote in every way the cultivation of the beautiful in the useful. Photographers who desire to be represented at the Exhibition should keep this object steadily in view, and should select for their productions those which have really a fine-art character. Among these may be enumerated views of interiors and exteriors remarkable for decorative and architectural effects; representations of the monuments of all countries; landscapes and pictorial views, valuable as fine-art studies; portraits which may be considered works of art from particular effects of lighting, pose, drapery, or costume; reproductions of art objects, of painting, aud sculpture applied to decoration; reproductions of plants, flowers, and still-life subjects to serve as studies; photographs used for illustrating books, and the application of photography to the graphic arts. It will be noticed that ordinary photographic portraits, as well as reproductions of scientific and mechanical subjects, will not find a place in the Exhibition.

From the above account it is clear that all photographs to be exhibited must essentially have a fine art character, since it is from the point of view of their artistic application that they will be estimated, without reference to the process by which they have been obtained. Nevertheless, the nature of the method employed in producing them should in every case be stated. The committee attaches great importance to the complete realisation of the object which the *Union Centrale* has in view.

Up to the present, photographic exhibitions in France, without excluding the artistic element, have been rather exhibitions of scientific and industrial processes than of the general application of photography. Now the present exhibition is to be more especially one of fine art, and we venture to express a hope that photographers who are good enough to respond to our appeal will be able to show once more that photography has made for itself a position in the region of fine art proper, of which it has become one of the most complete and indispensable auxiliaries. Particular attention is requested to the rule by which the exhibition is opened to the photographers of all countries.

Full particulars of the exhibition and forms of applications for space should be addressed to the President of the Committee of Organisation, 20, Rue Louis-le-Grand, Paris. Works and objects for exhibition should be addressed to the Secretary of the *Union Générale des Arts Décoratifs*, Palais des Champs Elysées, from the 15th to the 25th July at latest. All the exhibits must be in order and arranged by the 30th July; nothing will be admitted after that date.

FRENCH CORRESPONDENCE.

Improvement in the Process of Zincography.

Captain Biny's Improvement in the Zincographic Process.—At page 237 of the number of the Photographic News for the 20th May last, my readers will find a description of a copying process for topography, invented by M. de la Noë. For this process it is necessary to start with a positive; but there are many cases when it would be convenient to employ directly a negative, without having the trouble of transforming it into a positive. The following is the ingenious method adopted by Captain Biny for arriving at this result:—A zinc plate, about half-a-millimetre in thickness (or more, if desired) is coated with bitumen, and exposed to the light under a negative plate. After being sufficiently exposed, it is treated with a solution which removes all the bitumen that has not been rendered insoluble by the action of light. We have thus an image formed of lines in bitumen on a zinc plate. This plate is next brushed over with gum, and then rolled up with an inked roller, as if an impression in zinco-lithography was to be taken from it. No impression, however, is taken; the only object of inking the plate is to better protect the lines, and insulate them more perfectly when the plate is coppered. Before coppering, the plate is dipped in water acidulated with 3 per cent. of nitric acid, and it is then well washed in pure water. Next it is placed in a bath of the double cyanide of copper and potassium, and left there for ten to twenty minutes, when copper will be at once deposited on it. It is then washed again in water, dried, and placed in a vessel containing pure benzine; this substance dissolves the fatty ink and the bitumen which form the image, and the lines of the picture will be seen to appear in zinc on a copper ground. After again washing the plate very copiously, it is then immersed in water acidulated with 3 per cent. of nitric acid, in order to produce a slight etching of the surface. In this bath it is left for about a minute, keeping the liquid agitated, and passing a brush along the lines of the zinc so as to clear them. The acid in the bath being highly diluted, it acts very feebly on the copper, but on the zinc its action is much more energetic, so much so as at the end of a minute to produce very marked depressions. When the etching is completed, the plate is again washed, and dried at a gentle heat. A varnish of 6 or 8 per cent. of bitumen dissolved in benzine is then passed over it, and when this is dry, the plate is transferred to a stone or to a sheet of metal which has been coated evenly by means of the roller with a layer of fine lithographic ink. The squeegee is then passed lightly over the back of the zinc plate, and it will be found that all the projections have been blackened by the ink wherever they have come into contact with the stone, while the lines constituting the drawing are free from ink altogether. This black layer which covers the bitumenised surface is intended to form a screen against the action of the light, and when the whole plate is now exposed, only the direct rays act upon the bitumen of the lines which is not protected by the blackened surface. To complete the plate, it is now only necessary to lay it on a level table, with the prepared surface upwards; it is rubbed over with a metal cube, first interposing a piece of blotting paper dipped in spirit of turpentine. In this way the whole surface is cleaned, and the zinc of the ground alone appears, while the lines covered with bitumen have not been touched, and we have a plate for which a large number of impressions may be taken almost equal to copper plate, although produced in a lithographic press. By electro-depositing a layer of copper on a sufficiently thick plate of zinc, and then submitting it to prolonged etching, lines of considerable depth may be obtained; the image may be taken on the copper surface either by means of bitumen, or by means of bichromated gelatine or gum—as in the Gobert process—and we have an engraving in copper, the cost of which has been much reduced owing to the foundation being of zinc.

Leon Vidal.

FURTHER NOTES ON ACTINIUM, AND ON THE EQUIVALENT OF ZINC.

BY DR. T. L. PHIPSON, F.C.S., &c.

Since my last communication on "Actinium" in this Journal, and my letter to the Editor stating that the new metal had been isolated from its ammoniac-chloride solution by means of magnesium, I have had little opportunity of pursuing these researches. The difficulty which I at first experienced of entirely separating all traces of zinc oxide from actinium oxide, by means of caustic soda, still subsists; so that the blowpipe reaction of oxide of actinium with chloride of cobalt is uncertain. The result is a mass of a magnificent dark emerald green, a much finer and darker colour than is seen with purified zinc oxide; but how much of this is due to one or the other metal it is impossible to say at present.

The purified zinc oxide obtained during these experiments, in a crystalline state from the soda solutions, has served me for a new determination of the *equivalent* of zinc, and the results all point very distinctly to the equivalent 32, which is a multiple by a whole number of H, and so according to the law of Prout. The method employed consisted in dissolving this purified zinc oxide in HCL, precipitating with pure carbonate of soda, washing, calcining, and converting a given weight of the oxide thus obtained into sulphide. The details will be published later.

I have also obtained a sulphide of actinium (in an allotropic form?) which is only slightly sensitive to the action of light, whereas the ordinary sulphide darkens very visibly in a few minutes, and is quite black, or slate-coloured, on being exposed for twenty minutes to the sun. This intense darkening cannot be due, as some may suppose, to the presence of silver, mercury, cadmium, arsenic, &c., because the original liquor was, in the first place, submitted to HS for twenty-four hours, and next, because with actinium compounds the action does not occur under a sheet of glass.

In the latter respect actinium is interesting as bringing out a new and curious property of glass. Hitherto the compounds used in photography have been so sensitive that the action of light, even under glass, is more or less instantaneous, and no difference has been observed. But with the ordinary actinium sulphide it requires at least twenty minutes, in good morning sunshine, to produce the dark grey tint, and in such an interval the action under a piece of plate glass about 2 millimetres thick is absolutely *nil*.

Glass has, therefore, the property of arresting a certain amount of *actinic rays*, as other transparent substances are known to arrest rays of *heat*—a property which glass possesses.

The plate glass used in these observations is slightly green on its section; but very similar results are obtained with various other kinds of white glass, even when much thinner than that mentioned. A fact which is still more curious is, that a plate of dark *blue* glass, which is supposed to allow actinic rays to pass easily, *protects* the substance in question from the sun's action just as much as a plate of *white* glass does.—*Chemical News.*

PHOTOGRAPHY BY THE ELECTRIC LIGHT.

BY H. VAN DER WEYDE.*

OVER six years ago, I was challenged, during a foggy November day, by a desperate London photographer, to invent a method of taking good photographs without daylight, or, as he jocularly put it, "Why don't you Americans bottle your daylight, and send it over to us?" and he assured me there were "milllions in it." I don't know whether it was the prospect of "millions," or the great pleasure I have always felt in overcoming difficulties, that induced me to lay aside my palette, and turn my studio into a laboratory. I think my feelings were a little mixed. I had already invented an improved model for building glass-houses, on the principle that every pane of glass visible to the sitter should face him at an exact right angle; and placing the glass in the zig-zag crossing of imaginary diverging lines from the usual sitter's place at each end of the studio, effected this.

In looking at the results of all former attempts at taking portraits by artificial light, kindly shown me by the late Wharton Simpson, who was then editor of the *Photographic News*, and, I think, a member of this Society, although I found some very remarkable, they were all, from an artistic point of view, failures; even the best results suggested a metallic or varnished surface, with glittering high lights, dense shadows, and ghastly reflections.

Instead of attempting to do anything better with artificial light, I first tried to condense the actinic rays of London daylight—when I could catch them—for which purpose I constructed a plano-convex water lens out of two large plates of glass, one bent by heat to the depth of eight inches, which had to be repolished by hand. I believe it was the largest lens ever constructed; it measured six feet and six inches in diameter, and held nine hundred and eighty-seven pounds of filtered water—and the first time I tried to fill it, not having calculated upon the immense weight of this water, although the glass was three-quarters of an-inch thick, it burst over me with a loud explosion, and I was overwhelmed, but, as you perceive, not quite drowned, though the point of one of the flying pieces of heavy jagged spears of glass pierced through my forearm, between the bones, and laid me up for six weeks; but that is only a detail in the life of an inventor. So I set at it again, reconstructed my lens, and finished this experiment with a conviction that I was on the wrong track.

I then began experimenting with artificial light, such as the magnesium and the electric light from a Grove battery. I constructed a copper reflector with a silver lining, and having had enough of the water lens, ordered the largest dioptric lighthouse lens that could be made; the reflector and lens were each over four feet in diameter.

It now occurred to me that the great difficulty to be overcome had not been an inadequate quantity of artificial light, but that the construction of the relative position of its rays is diametrically opposite to that of daylight. In daylight we are flooded with a soft embrace of converging rays giving soft-edged shadows; in artificial light we are struck with the sharp darts of diverging rays from a point, throwing sharp-edged shadows; and in trying reflectors to lessen this hard effect, we only made a war of rays around the sitter, in which the direct rays always have the best of it, and over-expose the high lights before the others have had sufficient time to perform their part. The question was not to discover a better artificial light, but to turn and twist its diverging rays from a point, so as to concentrate them, and, so to speak, make them embrace instead of strike the sitter. This was the supreme difficulty I had to conquer.

In continuing my experiments, I sought to obtain, first, parallel rays from the parabolic reflector, and then to condense them into converging rays by the dioptric lens; and I at this time adopted the most important point in my invention; it was a small saucer, or concavo mirror, about four inches in diameter, placed close to the light, so as to hide it from the sitter, and prevent any direct rays from leaving the reflector. But I found that the silvered interior of my reflector was a mistake. It not only condensed all heat rays, and baked the sitter, but it also polarised the light. So I whitewashed the interior, and from that moment I saw my hopes realised, for I produced at last an artistic portrait with tender crisp high lights, which did not need retouching, and was full of modelling and transparency in the shadows. I tried to do without the condensing lens, but found my light not powerful enough; and it was not until I used a powerful dynamo-machine, worked by an engine, that I could dispense with it.

I now went to my friend who told me there were millions in it; but he, and all other photographers in London whom I approached, were too sceptical to invest; they refused the millions or any share in them, so that I was compelled to exploit the invention myself, and with that view bought the lease of my present house, now nearly five years ago. Its slate roof, ladies and gentlemen, is still intact, and I intend that it shall remain so.

The first instance on record of gas being literally turned into electric light was at my establishment. I had my gas-engine put up, September, 1877, in direct opposition to the advice of the manufacturers of my electric machine. I never use an electric lamp, but, as you see, have invented a much more practical arrangement for my purpose. I simply bring my carbons together by a movement of the hand. The positive 20-millimetre carbon is stuck right through the saucer, and can be pushed in from time to time as it burns. The negative 15-millimetre carbon, fastened in a rod which passes through the back and centre of the reflector, is also adjustable. The saucer and positive carbon being fixed to a flexible brass rod, can be made to approach the other carbon by simply pulling the cord attached, and which passes through the back of the reflector, and over a small drum. I first designed another position for the carbons, but on the same principle, but find this better, as the reflector gets the full benefit of the strongest rays.

If there are any photographers here who wish to know whether they can make use of my invention in this country, my answer is, yes. Two of the richest members of the profession, I understand, make use of it in London, and such being the case, all others are quite welcome to it. The leading photographers on the Continent are not only using my invention, but are good enough to recognise the inventor.

So, gentlemen, I continue to photograph without daylight—in fact, I never took, and never will take, a photograph by daylight.

* A Paper read at a Special Meeting of the Society of Arts.

Notes.

We commence with the spring a series of twelve elementary lessons on dry-plate photography for the benefit of beginners and of those who are not averse to retracing a beaten path to make sure they have not missed an object here and there by the wayside.

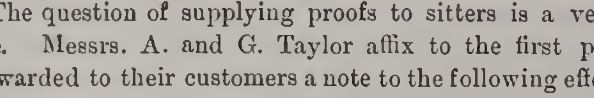
Dr. Eder has completed the first section of his Manual of Photography, treating of the chemical action of light. The frontispiece is a fine photo-engraving of Major Russell.

Mr. Warnerke has all his lenses nickel-plated; moreover, as a precaution against dust and dirt in travelling, he provides each of them with a disc of ebonite, which screws inside the lens tube.

The new bromide of ammonium, just discovered by Roozeboom, is obtained by adding a moderate excess of bromine to a strong aqueous solution of the ordinary bromide. Heat is evolved, and deep red prismatic crystals separate as the solution cools. The new salt is a tribromide, NH_4Br_3. Roozeboom thinks that even a penta-bromide may be formed in some cases, but he has not been successful in isolating this.

The question of supplying proofs to sitters is a vexed one. Messrs. A. and G. Taylor affix to the first print forwarded to their customers a note to the following effect: "This is a rough proof. Please return it promptly in enclosed envelope, as we cannot proceed with portrait until this is received back. Should you desire any modifications made in the general expression, particular lines, &c., these can be readily observed by our artist if you will please note your wishes when returning the proof."

Messrs. Sarony & Co., of Scarboro', have just produced a number of large negatives on bromo-gelatine plates measuring 54 by 40 inches, and 30 by 25 inches. Mr. T. G. Whaite, who prepared the plates and produced the negatives, has devised a simple "coater" for large plates consisting of a V-shaped trough, one side of V being thin wood, the other of double muslin, which is coated to within an eighth of an inch of bottom of V with shellac varnish. Here is a picture of it. The emulsion is sup-



plied to the trough as it is being drawn over the plate, on which it acts as a brush, "painting" the plate, free from air-bells.

Mr. Whaite says, in respect to it: "I find the above coater act admirably, but it must be very light, and easily handled with one hand, hence the necessity of only one side being wood; coating the muslin with shellac prevents too much running out over the plate; in fact, the coater acts much as the stylographic pen, the emulsion is dragged out, as it were, by drawing over the plate.

An attempt of Magatti to effect the synthesis of pyrogallic acid by treating the diazo-derivative of dimethylquinol with water was partially successful; but evidence of the formation of a pyrogallic ether was obtained. It is easy to see how these experiments may ultimately lead to a notable reduction in the price of pyrogallic acid.

Mr. William Kurtz, the well-known New York photographer, has sustained a serious loss by fire. His valuable stock of negatives was injured, and oil paintings to the value of ten thousand dollars destroyed. The fire, curiously enough, was due to the setting fire of a Christmas tree, whose needles and boughs had become dry, and therefore very inflammable.

The *Globe* so seldom talks nonsense, that one is quite vexed at its occasional want of intelligence. Under the "Iniquities of Fashion," it speaks of "the sudden rush of public opinion towards an extravagant belief in sun-pictures," and deplores that photographs should have taken the place of miniature portraits. "We now know full well," says our rosy contemporary, "that a miniature of the old-fashioned sort is far better worth the money than one of the new-fangled substitutes for it."

So that Miss La Creevy will live to see the discomfiture of photographers, after all, and when "the sudden rush of public opinion" is at an end, the weak-kneed, pink and white productions—for nine-tenths of the old-fashioned miniatures had no pretensions to art—will once more be eagerly purchased by all who would keep in mind the features of a friend. And yet we cannot help thinking that if a single little brown photograph of William Shakespeare existed at this moment, it would be more highly prized by those who love the bard than any of the numerous paintings handed down to us.

The photographer's apprentice, it seems, is not always a scientific enthusiast. The other day, the principal of an establishment in a certain town in the north, which it is proverbially unwise to carry coals to, invited his young people to a lecture and demonstration of the carbon process at the local Society's rooms. Not only did the young people respond with alacrity, but, to the joy of their principal, took their places a full hour before the proceedings commenced. "So refreshing to see lads take an interest in their work," was his admiring remark to those around. The admiration, however, only lasted till Saturday afternoon, when the studious young people presented their overtime bill, in which three hours were charged for attendance at lecture.

We hear from Dundee that many sales of pictures have been effected at the Exhibition. All the President's prints were sold the first day, and many of Mr. Nesbitt's and Mr. Diston's. If we could only make our exhibitions a better medium of publishing in this wise, their popularity would be much increased. By the way, we neglected to mention the name of Mr. Gifford in connection with the Dundee Exhibition, a serious omission, since this gentleman's labours have had much to do with the success of the gathering.

On Monday last Captain Abney again called attention to the fact that old oxalate developer was an oxidising agent, and as such, may perfectly destroy the latent image; now, as the double sulphate of iron and ammonia is well known to form a much more stable solution than is the case when simple ferrous sulphate is used, Berghe's proposal to use the double salt in making the oxalate developer is worth noting.

IODIDE IN EMULSIONS—THE THIRD CANTOR LECTURE—PRICE OF HYDROKINONE.

BY CAPT. ABNEY, R.E., F.R.S.

In your issue of last week, you have an interesting article on the reciprocal displacement of the halogens. The first part I read with the greatest pleasure, collecting together as it does the information which is to be found scattered in various chemical literature. The reference to Potilitzin's experiments are particularly welcome, since, as far as I know, they are only to be found in full in a German periodical. The affinities of the halogens for silver are placed in the following order in your third paragraph: chlorine, bromine, iodine, fluorine. This is most certainly the correct order of the affinities, and it must be confessed that I was a little staggered to find in your last paragraph the following words:—"Since chlorine and *iodine* have a stronger affinity than bromine for silver, without doubt the chloride or iodide of silver will first be formed, even although, as is usual in emulsion making, the soluble bromide should be in excess. It is doubtful, however, if the finished emulsion contains any chloride or iodide at all, for a prolonged digestion in presence of excess of soluble bromide would, according to the experiments of Field described above, convert the small amount of chloride of silver into bromide."

Luckily, the experiments of Field, which are to be found in nearly all comprehensive works on chemistry, are quoted. Thus, in the last paragraph on page 73 of the article, the experiments are enumerated in which it is shown that *silver chloride is completely* decomposed by potassium bromide, and that *potassium* (or other) *iodide will completely decompose silver bromide and silver chloride.* In this statement we have a correct view of the case, and I cannot but think that there has been a slip made in the last sentence of the quotation I have given.

If soluble iodide and bromide be present during emulsification the silver iodide *must* be formed, and that if not formed at first, the double decomposition indicated by Field must take place. There can, therefore, be no doubt whatever that the presence of silver iodide *can always be ensured.* I have taken up the cudgels as one of "those who have hitherto dwelt so emphatically upon the superiority of emulsion containing a certain proportion of iodide," and have certainly no reason to doubt the presence of the iodide. In the case of the chloride your article is in every way correct, and my belief is that very few emulsions contain any chloride of silver. The only way to secure this is to use the proportion of soluble iodide and bromide exactly to convert a certain amount of silver nitrate, then to know what amount of chloride is required in the emulsion, to add that amount of silver, and then to emulsify with an excess of soluble chloride. I may state, for the information of your readers, that as rapid an emulsion can be formed this way as by emulsifying with an excess of bromide. Separate emulsification of each haloid, and then addition after washing, is not a bad plan either.

In your notice of my third Cantor lecture, it might be inferred that the ebonite I used for an experiment intended to show the sensitiveness of a particular kind of bromide to the dark rays below the red of the spectrum allowed orange and red rays to traverse it. The ebonite I used was not permeable to any but the dark rays. I am also afraid that my theory regarding the insolubility caused by alkaline pyrogallic acid development was not understood in the sense I meant it. When sulphite of soda is used with pyrogallic acid, and also when ferrous oxalate is used, no insolubility is induced, as I pointed out at the time, whilst I indicated that bromine would render the film insoluble. When pyrogallic acid and ammonia are brought in contact with bromine, a rather complex reaction is produced, which results in the formation of a compound which renders gelatine insoluble. The full details of this, however, I defer.

In one of your notes on page 78, I see that Dr. Vogel says it costs 1s. to develop an 8 by 5 plate with hydrokinone. Surely there is some mistake. Hydrokinone can be obtained now at 6s. an ounce (though I paid 12s. a drachm for it in my first experiments three years ago), and 2½ to 4 grains will develop a plate of the size given by Dr. Vogel. Exclusive of the ammonia used, such a plate should be developed for about ½d. With pyrogallic acid the cost would be about ¼d.

EXPERIENCES IN AUTOTYPE OR CARBON PRINTING.

BY W. GREEN.*

Your Secretary (Mr. Payne) has invited me to come here this evening for the purpose of giving you an account of my experiences in Autotype or Carbon printing, and it is with great pleasure that I respond to his request.

I began working the Autotype process rather more than ten years ago, and made considerable use of it for enlargements, always hoping that some day I should be able to print all my work in permanent pigments. I need not weary you by detailing all the trials and disappointments I met with in my studies and experiments, but only wish to say that I have gradually overcome the difficulties which presented themselves, and now use it entirely for my portrait work, to the mutual satisfaction of my patrons and myself. I have not prepared an elaborate lecture on the subject, but my purpose is to lay before you, as clearly as I can, those points in the working of the process which I think likely to prove interesting.

It would be impossible, in the time at my disposal, to mention all the various applications of the process, so I shall confine myself to that which bears on the production of ordinary work, such as cartes, cabinets, &c., and afterwards I will give you a complete demonstration of its practical working, from the preparation of the tissue, to stripping the finished picture in all the various stages of the process; and Mr. Payne has kindly provided for me such appliances as, I think, will enable me to carry out the work with success.

I do not mean to discuss the comparative merits of Autotype and silver printing, but will content myself by recording my own opinion that from a given negative it is possible to produce a print in pigment quite equal to silver, with the additional advantage of permanence in favour of the former.

We have been constantly told that Autotype is much more simple than silver printing; and yet, if you think of all those who bought licences from Mr. Lambert, and had the great advantage of his personal instruction (for, though I never had the opportunitty of seeing him, he was, I believe, one of the ablest workers we ever had among us), you will find that very few indeed succeeded in working the process, and still fewer were sufficiently successful to induce them to continue its practice. I think the cause of failure in many cases has been that they were led to believe that there were fewer difficulties than really exist—in fact, that the possession of the licence was almost enough to constitute them fully-fledged carbon workers; and when the inevitable difficulties cropped up, they had not gone into the work with the requisite determination to overcome them, but blamed the tissue or transfer paper, and gave up the process as too uncertain to be of value.

In theory the process is simplicity itself, and under favourable conditions it is so in practice; but as Mr. Swan can tell you, gelatine is not always of the same quality, and it requires some considerable experience to enable one to understand its varying conditions.

* Read before the Newcastle-on-Tyne and Northern Counties' Photographic Association.

I do not doubt that there are many present who are perfectly familiar with the theory of the process, but I know it has not been studied by photographers nearly so much as it deserves to be; and therefore I must ask the forbearance of those who are well informed while, for the benefit of the uninitiated, we glance for a short time at its growth in the hands of those men whose united ideas and discoveries have enabled us to achieve such satisfactory results as are now possible, as I think this course will make the practical part more easily understood.

I shall, therefore, briefly, only mention what I consider the chief landmarks, and hope so to condense the information on this point as to avoid over-stepping the bounds of your patience.

The term "Autotype" is used to indicate a particular process, by which an artist's work or picture from nature may be reproduced in monochrome, without the intervention of another hand or eye, the only means used being the natural forces of light or actinism, and chemical affinity; the material employed being any of the permanent pigments which are used by artists in oil, water colour, or crayon.

We find that Ponton, Becquerel, Poitevin, Pouncy, Blair, Fargier, &c., each added their quota to the general stock of knowledge upon this subject; but it was not until Mr. Swan had patented his improvements that pigment printing became commercially practical, and even then the nature of the process was such as to require a specially constructed factory and skilled operators to be successful so that it could not be adopted by photographers in general.

The general principles of the process will be best understood if I give a short account of the various attempts by some of those experimenters whose names I have mentioned to produce pigment pictures.

We must premise that the basis of all Autotype printing is the peculiar action which light has upon the bichromates, particularly those of potassium and ammonium when they are exposed to the actinic rays in contact with organic matter.

Mungo Ponton first observed this action when exposing to light, paper which had been immersed in a solution of bichromate mate of potassium. Becquerel showed that sized paper acted much more rapidly under such action than that which was unsized, hence the association of gelatine or gum with the bichromate in such experiments. Poitevin found that if a pigment were mixed with gelatine and bichromate before exposure to light, it was retained, and could not be removed by washing; he therefore availed himself of this property, and so succeeded in producing the first photograph in pigment. Paper coated with a mixture of albumen or gelatine, bichromate, and pigment was exposed to light under a negative; the albumen or gelatine became insoluble where the light had acted, while that unacted upon, retaining its original solubility, was washed away, leaving the pigment fixed in the insoluble gelatine to constitute the picture.

The process at this stage was, however, suitable only for pictures in line or stipple, as, for reasons which will presently appear, half-tone could not be produced. Sutton made several valuable suggestions for the application of Poitevin's patent, and Pouncy, by using gum-arabic instead of albumen, and a porous paper into which he brushed the sensitive pigment compound, produced the first carbon prints in half-tone.

It was the Abbe de Laborde in France, and Barnet and Blair in England, who explained why Poitevin and Pouncy had obtained such imperfect results. They showed that the sensitive compound became insoluble only on a surface exposed to light, and that the part partially acted upon, and constituting the half-tones of the picture, rested upon a substratum of the compound entirely unacted upon, and therefore soluble, and that to retain these half-tones this soluble substratum must be removed from the opposite side.

To effect this, they spread the sensitive compound on glass, or transparent paper, and printed the pictures through the transparent material; after exposure they washed away the soluble compound, leaving the picture attached to the glass or paper.

Fargier next spread the gelatine and pigment on glass, and covered the surface after exposure with collodion; the plate supporting it was then immersed in warm water; when the soluble gelatine was removed, the collodion film floated and acted as a support for the picture, which had then to be caught on a piece of paper.

Mr. Swan greatly improved on this process; he spread the compound on glass previously coated with collodion stripped off the compound film, which he called a "tissue." This he exposed under a negative, and afterwards mounted it upon a support before development, thus avoiding the practical difficulties of Fargier. He showed that the support might be either permanent or temporary: in the former case, the exposed tissue was at once fixed to the paper or card by means of albumen rendered insoluble by alcohol or heat. When the support was intended to be temporary, a thin coating of india-rubber solution was applied to the surface of the exposed tissue, and also to a piece of suitable paper; the two were then brought into contact under heavy pressure. The necessity for having a temporary support to carry the picture during development is very easily explained.

We have now reached a stage in the process where we have a picture by each method developed, but, unfortunately, they are inverted, unless before printing we adopt some means of reversing the negative. Mr. Swan saw that to do this with all negatives, particularly those which were valuable, would be both troublesome and dangerous, and that unless some means could be found to reverse the carbon and gelatine film after development, the process could be of no practical value. He therefore paid little attention to single transfer, but devoted his well-known ability and perseverance to perfecting the second method, since known as double transfer. He corrected the picture which had been developed on the temporary support, by laying it down on a piece of paper intended for its final resting place, which was first coated with gelatine, and treated with alum to render it partially insoluble. When dry, the back of the paper which had formed the temporary support was moistened with benzine, and this dissolved the layer of india-rubber before mentioned, and allowed the picture to be laid bare firmly fixed to the paper. Before completing his patent, Mr. Swan discovered the advantage of spreading the pigmented gelatine in a layer of defined thickness on paper, and modified the composition of the sensitive compound by the addition of sugar, thus giving us the tissue very much in its present condition, except that the bichromate salt is not generally mixed with the pigment and gelatine, but is applied to the tissue in the form of a bath, to render it sensitive as required.

It will be sufficient for our purpose this evening if we now pass on to the double transfer process patented by Mr. J. R. Johnson, of the Autotype Company in 1869, which made Autotype printing thoroughly practicable, and places it now within the reach of those photographers who wish to employ it in place of the silver process, at a comparatively small outlay.

Mr. Johnson found that by laying the exposed tissue down on the temporary support, and thoroughly scraping the air from between with a squeegee, it would adhere by atmospheric pressure alone during development, and that it was only necessary to smear the surface of the support with some fatty substance, which would prevent adhesion, to make the final transfer easy and certain.

Mr. Sawyer has now given us a flexible support which can be used instead of the rigid plate. It is most useful for ordinary printing, and by its use many applications of Autotype are easy, which before were quite impossible.

Correspondence.

ELECTRIC LIGHT PHOTOGRAPHS.

Sir,—I have much pleasure in complying with your request, and send the following particulars relative to the two photographs taken by the electric light. As I have not heard of anything similar being attempted before, I have no doubt they will be interesting to any brother photographers who may choose to call and inspect them, as proving the great power and advantage conferred on photography by the electric light. The subject is a ball in the Victoria Hall, Saltaire, Yorks, under the patronage and presence of the Earl and Countess of Bective, with a distinguished party. As the Countess of Bective has lately taken a great interest in the woollen industries of England (which materially affect this district), the event in question proved to be the prominent one of the season. When invited to try, I had very serious doubts as to whether anything satisfactory could be got, but eventually decided to do so, there being nothing to lose, whilst there was a certainty of gain, if only of experience. Having prepared myself with the most rapid plates I could obtain from Messrs. Wratten and Wainwright, I made some experiments in exposure at a lecture on electricity given by Professor Barrett, of Dublin, the demonstrations being under the control of Mr. Louis Crossley, of Halifax, an able and ardent worker in electricity. The lights at this lecture were not so powerful or steady as those used at the ball, although the same lamps were used, but this may have arisen from not being in perfect working order, owing to the short time at command. The results, however, of my attempts were so satisfactory that I decided at all events to take the ball party. I found that with an exposure of thirty-five seconds a fair negative, of good printing quality, was got, of a rather difficult assembly. The result you have in one of the prints.

At the ball it was a different affair, and it was no easy task to induce an assembly of that kind to remain stationary even for so short a time, and it was only by good fortune and favour that I got a trial. The lights used were on the Brush system (six in number), and each of about 2,000-candle power. The motive power was supplied from the works adjoining. In addition to this, I had all the gas light obtainable with a view of softening the shadows. The illumination from the lamps was very brilliant, there was not the least glare, and, so far as I could observe, no person present complained of the light being trying to the eyes. The electrical demonstration, in fact, was a great success, and gave universal satisfaction. Two exposures were made, twenty-five and thirty seconds, and whilst both are satisfactory, the longest exposed is the best negative. The lens was Ross's rapid symmetrical with open aperture. I should have liked to use as top, but dared not, on account of the lengthened exposure it would entail. The lens was very carefully shaded from the lamps, but, in spite of my care, you will observe a small halo at the bottom of one of the photographs, which I attribute to reflection of one of the lamps through the lens. The plates were developed by the formula sent with them, and came up admirably, without any trouble or forcing whatever.

I also enclose a cabinet photograph of the orchestra, taken by the same light, exposure twenty-five seconds. If they should prove of any interest or use to my co-workers, they will have served the purpose intended in sending them.—I am, sir, yours truly, ALBERT SACHS.

CHLORIDE IN EMULSIONS.

SIR,—In your leading article upon the "Reciprocal Displacement of the Halogens," you say that in the case of small quantities of iodide and chloride being employed when emulsifying in gelatine with bromide in excess, it is doubtful if the finished emulsion contains any chloride or iodide at all. I myself think that there is no doubt about the iodide, as the colour of the film, its long time in fixing, &c., clearly show. But as regards the chloride, it is a different matter. Captain Abney has said (I am told) that in the presence of ammonia the chloride, or at least part of it, will be converted. Whether this be so or not, there are some who, in making their emulsions without ammonia, weigh up their salts in a rather loose manner, and fondly believe they are working a B. I. C. emulsion. I have seen formulæ given which, if made with the same materials I get—not the pure, but ordinary commercial salts from well known houses—would certainly not contain any chloride. I have tested mine, and find, as others have, the working equivalents considerably different from the theoretical. I have made, perhaps, my best B. I. C. emulsion after the following manner. Weigh up—

Ammonium bromide	 120	grains
,, iodide	 8	,,
,, chloride	 20	,,
Potassium bichromate	... 3 or 4	,,
Pure carbolic acid (crystal)	... 15	,,
Hard gelatine	 120	,,
Nelson's No. 1	 120	,,
Silver nitrate	 200	,,
60-grain solution silver nitrate	...	*quant. suff.*

Dissolve the ammonium bromide in 4 oz. water in a bottle, and add the carbolic acid. Soak the hard gelatine in this several hours, add the Nelson's No. 1, and shake it about; when this has swollen, raise the temperature to 130° or 140°, and keep it at this for two or three hours at least. I have kept gelatine at this temperature for over eight hours without any ill effect. I attach some importance to this, as the gelatine, probably from very mixed substances and sources, and of different solubility, is by this means broken up and equalized. I now always use the whole of the gelatine from the first. The silver bromide is formed finer with less care; there are no coarse particles to filter out; and extreme rapidity can be got in a comparatively short time, for any temperature may be used without fear if this quantity of carbolic acid be used.

Reduce the temperature to 100°, and—of course in the dark room—drop in the bichromate of potash, then, little by little at first, the silver nitrate crystals, shaking well all the time. When about half the silver is in and dissolved, drop in the iodide, and shake two or three minutes; the rest of the silver may now be added and shaken till dissolved. Now carefully add a little of the 60-grain silver solution, and after well shaking put a drop on glass and examine the colour by white light; if not coloured, add more silver solution. So soon as it shows the least pink, drop in the ammonium chloride and two drachms of the silver solution; this, with the little free silver already in the emulsion, converts about 5 grains of the chloride, leaving chloride in excess. If you have tested your salts, probably a nearer approach to the weight of silver required may be weighed out at first; the above, however, gives a good margin. There may be nothing new in this, but by this method you know you have got your silver chloride in the finished emulsion.

Touching hyposulphite in the developer, many, it seems, have failed to produce any effect, or at least any beneficial effect, from the use of a small quantity of hyposulphite in the developer, as recommended by Captain Abney; those who use the hyposulphite from the fixing bath being most pleased with it. The kind of plate used has, perhaps, more effect upon the result than some suppose. I should like to point out that I believe the additional detail developed is not due to the hyposulphite *per se*, but, in the case of the bath solution, to the silver it contains being deposited on the film (free silver in the developer, in fact), and in the case of clean hyposulphite—if of any benefit—to its solvent action upon the silver bromide, which is then reduced. I see no reason why, if the developer be well restrained, it should not be used to some extent with pyrogallic. I think it probable that the use of silver in the developer may become a great power in the hands of the photographer. No doubt we have not yet found the best way to use it.—Yours truly, ALFRED J. BROWN.

THE DUNDEE EXHIBITION.

SIR,—A correspondent in your last asks (with apologies for his impertinence for which there was some need) Mr. Robinson and Mr. Jennings what they think of the awards at the Dundee Exhibition, and if they intend to accept the low-class medals awarded to them. Without recognizing your correspondent's right to put such a question in your pages, I may reply that I shall certainly accept the bronze medal, and shall always value it as the greatest curiosity in my collection, of which it will be the sixty-first. The other sixty medals were in every case the highest that my pictures competed for. To receive the lowest award at an obscure exhibition like that at Dundee, for the picture that received the gold medal when competing with all nations at Paris, is an amusing novelty, and shows clearly that there are Scotchmen who have some sense of humour. H. P. ROBINSON.

SIR,—I shall be glad if you can inform me if the judges were empowered to award extra prizes where they considered there was sufficient merit for subjects not specially mentioned in the prize list. I, for one, paid my entrance money on those conditions, and if my photographs have not been judged, I should think the entrance money has been very wrongly obtained.

I notice in the judges' report no mention is made of animal photography, which looks as though they were never judged; but if they have been judged, and the judges considered there was no merit, of course their decision is final. But it is certainly contrary to the decisions of many of the best judges both at home and abroad, whose names I could give if required, also contrary to your own report, which says: "Mr. T. J. Dixon and Mr. Hedges show their familiar but no less wonderful animal studies. Alas! the Dundee programme did not include a medal for photographs of animal life." If this report is correct, I need not say more. David Hedges.

[The Official Programme made no mention of animal studies.—Ed. P.N.]

PORTRAITS IN PAIRS.

Dear Sir,—If you think the following worth inserting, I shall be glad for you to do so, for the benefit of my brother photographers.

It often happens one has in the course of sitters a maternal couple, and they wish to be taken separately, but facing each other. This, when one has only a north light, entails a great deal of unnecessary trouble—*i.e.*, moving backgrounds, accessories, &c.; also camera end for end. Now, Mr. Editor, if your readers will just try my dodge, they will never run away from it.

Now for it, then! Mrs. A. is taken first in the ordinary way. Very good. Mr. A. wishes to face his beloved. Just sit him down in the same chair—in the same position, if you like; focus, &c. Retire to the dark room, put your plate (dry, of course) into the slide; but be sure and put it in the reverse way—*i.e.*, film side up, and back toward the lens. Allow just the thickness of the glass plate in focussing; expose, develop, and you will have as good a picture as the most fastidious can desire.

I enclose you two prints from same negative; one-half of the plate was exposed in the ordinary way; the slide is then taken into the dark room. The plate was turned over and exposed again, with the result shown.—Faithfully yours, Geo. P. Walker.

[This method of obtaining reversed negatives is already in use; but Mr. Walker takes a new view of an old subject.—Ed. P.N.]

DRAINING EMULSION.

Sir,—In the Photographic News for February 17th, 1882, Mr. J. W. Leigh advises Mr. Birrell to drain emulsion by tying it up in a bag and giving it a whirl with the hand. That is very good for a small quantity; but I advise dry-plate makers to use a small centrifugal machine, driven by steam power, or with hand, for the same purpose; a rapid whirl of a quarter of an hour would leave the emulsion almost dry. M. Duggon,

Member of the Royal Society of Photography, of Brussels.

Proceedings of Societies.

Bristol and West of England Amateur Photographic Association.

The monthly meeting was held on Wednesday, 1st inst., Mr. T. Davey in the chair. Preliminaries having been gone through,

The Honorary Secretary handed round samples of gelatine sent by Mr. Heinrichs. He (Mr. H. A. H. Daniel) also had much pleasure in presenting to the Association, Library copies of Ponting's "Photographic Difficulties," and Hunt's "Photography," neither of them recent publications, but both containing much valuable information.

The Chairman then called upon Mr. H. A. H. Daniel, who, in introducing the subject of "Lantern Apparatus," stated that he was not going to read a set paper, but to give a few notes, with experiments. He commenced by describing the mode of fixing Chadwick's gasometer and generator, and everything being ready, a charge in the form of a black cake was put in the retort; the speaker explained that the "cakes" were made by mixing together four parts of chlorate of potash and one part of black oxide of manganese with a few drops of gum, and just sufficient water to cover the mixture to mould easily; he then directed attention to the gasometer, the top of which was rising, the gas being produced very rapidly; he explained the perfectly safe style of the construction of the retort, and the great ease with which a constant supply of oxygen could be kept up during an exhibition, three charges per hour sufficing for a single lantern, the time to recharge the retort being intimated by the top of the gasometer being connected with a small egg-boiler with bell, so that on its descending to a certain point, the bell would ring. Mr. Daniel next exhibited a special kind of carrier he had made, which had a travelling endless leather band in the bottom groove, passing round a roller at each end; this alone, he said, was not new, but the great drawback to the commercially constructed ones was that the band expanded when acted upon by the heat, and would not move the slides along; he had improved upon this, and the one exhibited had a moving roller for increasing the tension, so that it could be always in an efficient state, and the tension taken off when it was not in use. This carrier was also provided with a rolling curtain which was worked by springs, and which, after the assembling of an audience, would roll up as a theatre curtain, and reveal either a crimson proscenium or a landscape, &c.; this was then illustrated, the effect being exceedingly good. The carrier also was registering, that is to say, had various points indicating the correct position of either a Woodbury, Ferrier, or York slide. Mr. Daniel then exhibited a few slides of different makes to show their different qualities, to illustrate silver and collodion slides, some of those made by the Chairman, Rev. H. B. Hare, and commercially by Mr. Harvey Barton, by the carbon process, some by Mr. E. Brightman, also some by the beautiful processes of Mr. Woodbury, and M. Ferrier, of Paris. Mr. Daniel said that oxygen was purified by passing through the water luting of the gasometer.

Mr. E. Brightman stated that he had found mixing a solution of hyposulphite of soda with the purifying water rendered the operation very perfect. He also stated that he had found a solution of cyanide of potassium rubbed over the film remove the stains of silver from a negative which had been printed from without collodionising or varnishing.

Mr. Daniel thought that a yellow colour, such as that in a transparency exhibited, was produced in a negative intensified with mercury, if, prior to so doing, the hyposulphite had not been properly eliminated.

After some further discussion, votes of thanks to Mr. Daniel for his experiments and explanations, and to the Chairman for presiding, closed the proceedings.

The ordinary monthly meeting for January was held on Wednesday, the 18th, Mr. T. Davey in the chair.

The minutes of the previous meeting were confirmed, and it having been arranged that the evening should be devoted to lantern matters, the various lanterns were erected, and the slides of different members exhibited.

The Chairman exhibited a small collection of slides from negatives taken during a run through North Wales;

Mr. G. F. Powell a few silver and collodion slides of scenery around Bath; and

Mr. H. A. H. Daniel some by the same process representing 'bits" of the beautiful scenery on the river Froom, near Bristol.

Mr. E. Brightman recommended the carbon process as most suitable for making slides, and producing a very pleasing colour, more like the Woodbury slides, if a warm tint of tissue were used.

Mr. Daniel endorsed the previous speaker's views; but considered many found a difficulty in so doing, nearly all their negatives being of too large a size for printing slides direct. He therefore recommended the course he had adopted, viz., that of buying a quarter-plate pocket camera for specially taking lantern slide negatives; if used with a walking-stick stand, and taken out always when taking a drive or a long walk, it was astonishing how quickly negatives for printing most pleasing slides from would accumulate.

The Chairman stated that in a new room he was fitting up, he had the window arranged for fitting negatives in light-tight, with a long adjustable stage for a dark slide to slide in, so that he could either make lantern slides, or enlarge, the dark-room forming for the time being a camera.

After some further discussion, and a vote of thanks to the Chairman, the meeting adjourned.

Newcastle-on-Tyne and Northern Counties Photographic Association.

The ordinary monthly meeting was held in the College of Physical Science, Newcastle, on Tuesday, Feb. 14th, 1882, at 7.30 p.m., Mr James Downey in the chair. On the minutes of the last meeting being read, Mr. Carver remarked that there appeared to have been an oversight at the last meeting, and he begged to move "that the best thanks of the members be given to the past council for their services during the year," which was seconded by Mr. Robinson, and carried unanimously. Messrs Kimmish, Readhead, H. Sawyer, and L. Sawyer were elected members.

The Secretary read the following letter which he had just received.

Dear Mr. Payne,—Will you have the kindness to express to the meeting the extreme regret I feel at being prevented, by a slight indisposition, from being present to-night? There are several strong reasons why I wished to be present, and would, if it had been possible, done myself that pleasure. I wished to have the opportunity of thanking the members of the Society for the honour they have done me in again electing me President, and I beg you to say so. But the greatest cause of my regret at my enforced absence is that I shall miss the pleasure of witnessing Mr. Green's demonstration of the working of the carbon process. I need not say how much interest I feel in the progress of that process, nor how great a pleasure it would have been to have witnessed Mr. Green's manipulations.—Very truly yours, J. W. Swan.

Mr. W. Green then read a paper on "Experiences in Autotype or Carbon Printing" (see page 91), and afterwards proceeded to give a practical demonstration of the carbon process, both by single and double transfer, commencing with the sensitizing of the tissue, and, going through the details of the process, finally presenting the prints to the audience. Mr. Green was asked many questions, and kindly gave every explanation. The chief items were: That he preferred to use powdered French chalk to the face of the opal plate, instead of the waxing solution. He never found the slightest difficulty when using the French chalk, but frequently had when using the waxing solution. He preferred to pour water over the surface of the carbon tissue, instead of immersing it in the water, as generally recommended. It was most important to allow each piece of the tissue to remain in the sensitizing solution for exactly the same length of time. He generally used a three-minute sand-glass for this purpose.

The Chairman, in moving a vote of thanks to Mr. Green, said the members owed a double debt of gratitude to Mr. Green for the very great care and trouble he had taken, and the very lucid manner in which he had given the demonstration. He spoke of the value of the permanency of carbon prints, and said that every one present must have learned something.

Mr. Mendelssohn seconded the vote of thanks, which was carried with hearty acclamation.

Mr. Green acknowledged the vote in kind terms, and the meeting concluded.

Glasgow Photographic Association.

A meeting of this Association was held in the Religious Institution Rooms on Thursday evening, 16th inst., Mr. John Parker (president) in the chair.

The minutes of last meeting were read and approved of.

The President reported that a dozen members of the Association visited the observatory, and were received with much kindness by Professor Grant, and afterwards shown the photographic and other arrangements of that important institution.

Amongst the questions in the box when opened were:—1. "Is there any varnish that may be used for gelatine plates without collodion, so that the silver will not permeate through?"

Mr. Jas. Annan said that for some time he had been using a varnish composed of three pints collodion and one pint sandarac varnish applied cold, and subsequently warmed.

Mr. Bell said that he thought this was a most important question, for he had been in the habit of collodionizing his plates previous to varnishing; but that after being printed from, minute yellow-coloured spots often made their appearance; he therefore concluded that the joint application of collodion and varnish was not a preventative, and had therefore abandoned the collodion.

Mr. Annan replied that he used his compound varnish to prevent the occurrence of these specks, and found it to answer.

Mr. Gilfillan thought that the specks were due to the hyposulphite used in fixing the negative not being completely eliminated through air-bubbles persistently attaching themselves to the plate.

Mr. Leith said, in his opinion the specks might be due to damp; he had observed the same thing occur in a plate which had got wet through exposure to a shower during the process of printing.

Mr. Dodd suggested that the members who had given their experience should bring plates illustrating the complaint to a future meeting.

2. "Can silver stains on gelatine plates be removed?" The bearing of this on the former question was pointed out by Mr. Dodd, who said the stains could be removed by applying a solution of iodine and potassium iodide, and subsequently a solution of potassium cyanide.

Mr. Urie recommended a solution of citric acid, then hyposulphite.

3. "Is it not possible to organize an Exhibition in Glasgow, similar to that now being held in Dundee?"

Mr. Dodd said that, on the authority of Dr. Nicol, the first essential requisite would be a guarantee fund of £300.

Mr. Thompson moved that a committee be formed to enquire into the matter, and to gain all information possible.

Mr. Mactear, in seconding the motion, recommended that the Committee visit the Dundee Exhibition with that end in view.

Messrs. Goodall and Steven then proceeded to give a demonstration of enlarging on gelatino-bromide-of-silver paper. Mr. Goodall, at the outset, remarked that the paper they were in the habit of making and using required only an exposure of fifteen seconds, the light being a gas jet; but, taking into consideration the adverse circumstances under which they would labour at that time, he had deemed it advisable on that occasion to employ a much slower paper, and mentioned that in his demonstration he would expose for four minutes. The developer employed consisted of potassium oxalate, saturated solution, 6 ounces, ferrous sulphate saturated solution, 1 ounce, and ammonium bromide, 60 grains in 1 ounce of water. Messrs. Steven and Goodall were eminently successful in demonstrating their process of enlarging up to 18 by 20.

Mr. Thompson then read a paper on "The Romance and Reality in Photography" (received too late for insertion this week), and was listened to with much attention.

Mr. James McGhie read some extracts from a letter which he had received from Mr. Moryson, anent his demonstration as follows:—"On the Chairman asking questions, I find that there was a doubt whether the process of intensification would do for an over-exposed plate. If the plate has any gradation of tone in it, however slight, by a judicious use of No. 2 solution the plate can be made to produce pictures equal to a properly-timed plate. Use No. 1 until proper density, No. 2 not more than five seconds; afterwards a plunge for about three minutes in hyposulphite (saturated solution, 1 ounce; water, 1 ounce). No. 2 acts on the high-lights, hyposulphite for clearing the shadows.

A dozen beautiful photographs, presented by Mr. James Annan, were then balloted for amongst the members present, after which the meeting closed with votes of thanks to Messrs. Goodall and Steven for their instructive demonstration, to Mr. Thompson, and the Chairman.

Thursday Evenings for Photographers.

Mr. W. E. Debenham occupied the chair at the meeting held on the 16th inst.

The negatives, and also prints from them, taken by Mr. Darlow's light at the last meeting were exhibited, an interesting discussion taking place. The results of the various experimental exposures seemed to show that very little, if any, advantage is gained by the use of three separate points of light.

Mr. Turnbull, in answer to a question from the box, said that he had suffered very much through the use of the alkaline developer, but could not say whether it was the pyrogallic or bromide which was injurious. He was recovering slowly from an attack which commenced about four years ago by a small irritating spot on the back of the hand; a number of small pustules next appeared, which spread rapidly up the arms to the shoulders; they next appeared in his legs, especially under the bend of the knee.

He had consulted several physicians, among others one in Edinburgh, who made skin diseases his special practice. He knew many others who suffered equally with himself. He had not, since the appearance of the disease, touched the alkaline developer.

Mr. Henderson said that during the late summer he had suffered in much the same manner as described by Mr. Turnbull, and had consulted the same physician, and, in his case, the treatment was successful.

Mr. Coles said there was a skin-disease caused by the use of bromide, called "bromide spots."

Mr. Turnbull thought that some constitutions, as with bichromate of potash, were more susceptible to the poisoning than others.

Mr. Haddon exhibited a silver print, the hyposulphite from which had been eliminated by a very short washing in a few changes of a weak solution of eau de Javelle. This print, with others treated in the same way, and others washed in the ordinary manner, had been sent to a warm, moist climate, the result being that, while there was no perceptible change in those treated with eau de Javelle, the others rapidly faded.

Talk in the Studio.

South London Photographic Society.—The next monthly meeting of this Society will be held on Thursday next, March 2nd, at 8 p.m., in the rooms of the Society of Arts, Adelphi. Mr. E. Dunmore will read a paper on "Common Objects of the Studio," and the judges' awards for last year's artistic competition be announced.

Society of Arts.—We would remind our readers that the Exhibition of Photographic Appliances will close after Saturday next, the 26th.

Photographs of the Ultra-Violet Spectra of Elementary Bodies.—Professor Hartley commences an interesting paper on this subject in the current number of the Journal of the Chemical Society, and when the remaining part is published, we shall lay all essential points before our readers.

Artificial Light for Photography.—A special meeting held on Thursday evening at the rooms of the Society of Arts was well attended, and those present evidently appreciated the excellent points of Mr. Van der Weyde's method of applying the electric light to portraiture. About a dozen plates were exposed, the times ranging from three to six seconds. In every case sufficient, or perhaps more than sufficient, exposure had been given, Mr. Van der Weyde expressing his conviction that two seconds would have been enough in every case. The paper read will be found on page 89. Other artificial lights were also shown and tried, among which may be mentioned Sugg's 200-candle burner; several magnesium lamps, Swan's biaxial electric lamp, and Mr. Bottone's new arrangement as described in our Year-Book; and an interesting discussion took place, in which Mr. Foxlee, Mr. Cobb, Mr. Archer Clarke, Mr. Trueman Wood, and others took part. Most of the above-mentioned gentlemen exposed plates. With reference to the early use of a magneto-electric machine driven by a gas-engine for photographic purposes, Mr. Woodbury reminds us that he had such an arrangement in use for printing relief no less than ten years prior to the date mentioned in Mr. Van der Weyde's paper.

Stealing Negatives.—Joseph Ward, a photographic printer, was charged with stealing nine negative plates, valued at £2, the property of Mr. W. J. Byrne, his employer. Mr. Lay, in opening the case, said Mr. Byrne extremely regretted being compelled to take these proceedings. The prisoner entered his service five years ago, and the prosecutor had reposed the greatest trust in him, but from circumstances which came to his knowledge, his suspicions were aroused, and he discovered that the prisoner, who was receiving £150 per annum, had been systematically robbing him for some time past, and making use of his property to carry on an extensive business on his own account. The prisoner pleaded guilty to taking the negatives, but asserted that the prosecutor allowed him to take the photographs as specimens. A priest from St. Mary Magdalene's, Mortlake, said he had known the prisoner intimately for the past five years, and he had always borne an excellent character. The magistrates sentenced him to three months' imprisonment with hard labour.

Sudden Death of Mr. Stringfellow in a Railway Train.—The *Derbyshire Courier* reports that, on the arrival of the 4.42 train from Sheffield, on the afternoon of Friday last, at Chesterfield Station, it was found that one of the passengers was dead. It appears that when the train was nearing Dronfield, a person in one of the carriages seemed to be taken suddenly ill, and the communication cord was pulled. The train drew up at Dronfield Station, and the passenger died two minutes after the train was brought to a standstill. The body, which was found to be that of Mr. Stringfellow, photographer, of Sheffield, and late of Vicar Lane, Chesterfield, was brought forward to Chesterfield, and conveyed to the Railway Hotel, to await an inquest.

Indignant Mother: "Surely you don't mean this for a likeness of my son? Why, the boy looks like an idiot."—Photographer: "I'm very sorry, but I can't help that, ma'am."—*Every Week*.

To Correspondents.

⁎ Erratum.—Some Calotype prints, exhibited at Dundee by Mrs. Hill and others, were erroneously called collotypes in our last issue.

J. C. H. Balmain.—Algæine paper should be obtainable from any house having relations with Germany. The upper picture is cemented to the glass by the encaustic paste, the lower print is not.

More Light.—The proportion of glass to slates which you propose will be found to answer very well, but it would probably be an advantage to pitch the roof a little higher than it is represented in your diagram.

K. Phillips.—See an article on page 14 of the present volume.

J. B. B.—The whitest parts.

Ghost.—So many causes contribute to such a result, that it would be useless to suggest one or two without knowing how you work. You had better call on one of the makers, and ask him to go through the process with you.

H. F. Gros.—1. The ashes of unfixed prints usually contain not less than half their weight of silver, while in the case of fixed prints the amount of metal is so small as to be unimportant. 2. The crude silver chloride, prepared as you describe, should yield about two-thirds of its weight of silver.

Tiger.—One part of Nelson's opaque gelatine should be dissolved by heat in five parts of water, after which one-third of a part of powdered bichromate of potassium is stirred in. Use like ordinary glue, and it will become insoluble in the course of a week or so, even if light should be excluded.

F. O. D.—No alteration is necessary in this case.

Pyro.—We should advise you to carefully rinse your hands in warm water immediately after.

R. H. McKenzie.—1. Not sufficiently to be of importance. 2. It depends entirely on the tint which is required. 3. Yes, if you wish to obtain uniform results. 4. It often deposits as a dark-coloured precipitate. 5. Add all the materials, and then allow the solution to settle; or you may filter it. 6. Ordinary whiting answers well.

Experimenter.—Try Butler and McCullock, of Covent Garden Market; and Potter, of Farringdon Street.

W. H. Sedgwick.—Perhaps you are not sufficiently careful as regards the light in the dark room; also take care that no extraneous light enters the camera.

B. B.—Shake up some pieces of wet paper in the bottle until the deposit is removed, then dry and burn the paper.

J. Berryman.—Next week.

Light.—1. It is quite possible that your views as to the distance required between the glasses may be more correct than those of the maker of the instrument; but you must remember that he stands rather high as an optician. 2. Probably a clumsy imitation.

M. J. E.—Most ferric salts are reduced to the ferrous state when exposed to light in contact with organic matter, and this circumstance has been made the basis of the process you refer to. Details in the Year-Book.

T. Weston.—If you expect that your progress will be facilitated by trying such a large number of slightly different formulæ, you are much mistaken. Stick to the first on your list, it being as good as any.

F. L.—1. It is not usual to make any charge for hire under the circumstances. 2. Yes, provided the goods are not in any way damaged. 3. Not unless some mutual understanding was arrived at when the transaction took place.

Gelatine.—1. You might adopt the plan of adding citric acid, as recommended by Mr. Cowan. One ounce of pyrogallic acid requires about 60 grains of citric acid. 2. No doubt from the presence of traces of greasy matter on the plates.

Nottingham.—Such apparatus as you describe possesses but little commercial value when secondhand. You might make the things up into lots, and either advertise them in the Photographic News, or send them to Stevens' sale rooms, King Street, Covent Garden, W.C.

THE PHOTOGRAPHIC NEWS.

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CONTENTS.

COATING PAPER WITH PHOTOGRAPHIC PREPARATIONS.

Few operations are of much greater importance in connection with photography than the application of uniform layers of various more or less viscous preparations to the surface of paper, and in illustration of this, we need merely refer to albumenized paper, carbon tissue, the various kinds of transfer paper, and the sensitive sheets used for photo-lithographic purposes.

There is every reason to believe that before long a gelatino-bromide or a gelatino-chloride paper will come into very general use for printing purposes, not only on account of the rapidity and ease with which prints may be obtained, but also on account of the fact that such pictures are likely to be much more permanent than the ordinary prints on albumenized paper. We are aware that many correspondents have experienced much difficulty in covering the paper with satisfactorily uniform layers of the sensitive mixture, and we therefore propose to now consider some of the methods which are in general use for covering paper with thick or viscous preparations, and to detail some experiments which we have made on the best methods of coating paper with a gelatinous emulsion.

One of the oldest and simplest methods of covering paper is by brushing, and this proceeding answers well when a mucilaginous substance of the nature of gum-arabic is to be applied, as the brush lines flow together rapidly; and by exercising a little care a uniform and bright surface can be easily insured. In other cases application with a brush must be followed by a subsequent polishing or burnishing with a long-haired badger-hair softener, this being held so that only the tips of the badger hairs touch the surface to be worked upon. This method of subsequently polishing with a badger brush or softener is of almost universal application in the preparation of enamelled paper and cards, the ordinary enamels consisting of flour paste as a basis; a white or tinted pigment being also present, and ordinarily a small proportion of gelatine or glue. Enamelled papers are extensively used for the reception of the collotypic impression.

The well-known method of floating finds extensive application in the manufacture of abumenised paper and numerous other photographic preparations, and it is an excellent process when a thin coating is required, and the preparation is sufficiently viscous not to run down towards the lower end of the sheets after they are pinned up. It is, however, not very suitable in the case of gelatinous solutions, because these must be used while warm; and as the paper becomes heated through during the time of floating, the tendency of the gelatine to set rapidly is diminished; when, however, the paper is rapidly drawn over the surface of the gelatinous solution, as in the manufacture of carbon tissue, the case is different, as the paper is not sufficiently long in contact with the surface of the warm gelatinous mixture to acquire its full temperature, the consequence being that the film is cooled to an appreciable extent by the paper itself, and it is usually more or less solidly set at a distance of six or eight feet from the coating trough. Makers of carbon tissue recognise the fact that the more quickly the paper is drawn over the surface of the pigmented gelatinous composition, so much thicker is the resulting film, a circumstance which the above-mentioned considerations explain.

For coating paper with gelatine emulsion, there can be no doubt that one of the usual forms of tissue coating machine would be the most suitable appliance; but as the simplest arrangement of this kind is somewhat complex and troublesome to manage, we may describe two methods founded on the same principle, and which we have found to answer very well on a small scale. The emulsion is made rather thicker than is usual in ordinary cases, and is poured out into a porcelain dish to a depth of about two inches. A strip of paper, which is about an inch less in width than the longer dimension of the dish, and about six feet long, is now taken and rolled up as compactly as posible, the smooth side being outwards. The free end is now held while the coil is gently placed on the surface of the emulsion in the dish, after which the end is rapidly and steadily drawn upwards so that the coil unrols on the surface of the emulsion, after which the coated sheet is hung up to dry. Care must be taken that the coil does not come in contact with the sides of the dish during the process of coating, and the speed with which the operation is performed determines, as before intimated, the thickness of the gelatinous layer. A little practice and care suffice to enable one to obtain the most satisfactory results by this mode of proceeding; but if any difficulty is experienced, the paper may be rolled on a tolerably heavy metal roller, and the quantity of emulsion in the dish should be so adjusted as to rise only to a height equal to one-third of the diameter of the roller. In this case the method of working is the same as before, only the roll sinks instead of floating, and the operation of coating must be performed so rapidly as to render it impossible for the emulsion to run to the back of the paper by way of the ends.

Such expedients as coating waxed glass with emulsion, and then stripping the film on paper, are hardly sufficiently rapid and easy for the preparation of a paper to be used for printing or enlargements, but it is quite possible that an adaptation of the "roller" method, largely used in the application of the vulcanising solution to India-rubber fabrics, may be found useful. In this case a small roller rapidly revolves in a trough of the solution, and the fabric is led across the top of this, but in a direction contrary to its movement. This apparatus has long been in use in the rubber factories, and we remember seeing it in action at the Silvertown Works two or three years ago. A special apparatus founded on this principle, and intended to be used in coating plates, has been patented.

A neat way of coating paper, due, we believe, to Mr. Woodbury, consists in placing two sheets back to back, and rapidly drawing them through the preparation; and we have but little doubt that the simple and easily-constructed arrangement of Mr. T. G. Whaite, which we described in our issue of last week, will prove of considerable value in coating sheets of paper with emulsion.

THE TECHNICAL EXHIBITION AT THE SOCIETY OF ARTS.

This exhibition, which was closed on Saturday last, marks an era in photographic history, and as, a few weeks ago, we took a general survey of the arrangements, and noticed the principal exhibits, we may now pass on to the study of several classes of exhibits which deserve a few words.

Pictures, apart from the illustration of processes, were not shown, excepting in three or four instances, as in the case of Mr. Pointer's admirable series of photographs of cats; these deservedly occupying a post of honour in the lecture room.

As illustrative of modes of lighting, posing, and of special methods of working, several pictures may be mentioned. A 15 by 12 portrait of Mrs. Gladstone, and a similar picture of Mr. Gladstone, taken in the open air, possess in a high degree many of the characteristics of studio work. Then, again, we have a photograph of a *basso-relievo* carving in ivory, exhibited by Mr. Woodbury, and the circumstance of its having been lighted from the top causes the photograph to appear cut out or *intaglio* when placed upside down. A girl on a swing, and a boy in the act of leaping over a post, taken by Messrs. Ross and Pringle, in 1864; De Gray's magnificent instantaneous seascapes, taken in 1854; and Mead's "New York Harbour," on a Daguerreotype plate, serve as illustrations of successful instantaneous work in the old time; and Mr. W. E. Debenham exhibits some interesting examples intended to show how far the drop shutter is applicable to portraiture in a well-lighted studio, rapid gelatine plates being used. The platinotype method is illustrated by a complete set of apparatus and materials, together with a series of prints showing the successive advances in the process, and the gradual elimination of silver, gold, and lead. Three good examples of the direct full-sized reproduction of oil paintings are sent by the Berlin Photographic Company, and several exhibits elucidate special modes of colouring both over and under true photographic image.

The applications of photography to meteorological research is well illustrated by work sent from Kew and Meudon; this latter observatory contributing a very fine and sharp enlargement of a solar spot and granulations, together with many other objects of interest, including some collotypic reproductions.

Microscopic photography is well represented, apparatus and examples being shown by Mr. Warnerke and Mr. C. J. Killick, while some of the well-known work of Mr. E. Viles is hung on the staircase. Backgrounds and the general accessories of the studio are not extensively represented; but Messrs. Avery and Co. show specimens of their Empire opaque cloth which is equally servicable on each side, two tints or designs being thus available. A portable background and stand, which packs into a box under eight feet long, and about six inches square, is calculated to be of considerable value to portraitists who have to execute work at a distance, and to amateurs.

Daguerreotype and Talbotype apparatus and work are well illustrated, and an inspection of some of these old appliances reveals the idea of several new specialities which have recently been introduced in connection with the gelatino-bromide process.

Dr. Gladstone contributes a series of photographs intended to show the somewhat abnormal results obtained by photographing fluorescent bodies, his experiments having been described in the Photographic News some ten or twelve years ago; and, no doubt, many of our readers were gratified in seeing Mr. Swan's simplified electric lamp and shunt as especially constructed for photographic use, and described on page 9 of our present volume.

It may be mentioned that almost all the new forms of apparatus which have been recently described in the Photographic News are shown. Our valued contributor, Mr. J. Spiller, shows his dark box or slide as made thirty years ago, and his examples of the first preserved plates possess considerable interest now that the dry plate method has attained such a considerable importance. Photographs of the solar eclipses of 1858 and 1860 are also shown by this gentleman. Mr. Spiller, some time ago, introduced what may be called the carbon process in writing, but the faded condition of the notices of his exhibits shows that he, like many inventors, does not always adopt his own methods. Mr. Spiller's method of producing permanent writing in unalterable carbon consists in writing with very dilute sulphuric acid, to which a little sugar has been added. When writing executed with this mixture is warmed before a fire, the acid becomes concentrated and clears the sugar, depositing carbon in its pores, all trace of free acid being then neutralized by fuming with ammonia. Permanent writing possesses as much importance from an historical point of view as permanent photography, and those interested in the conservation of records would do well to study Mr. Spiller's method.

The scheme of Mr. Trueman Wood has already received the flattery of imitation, as we hear that an extended exhibition of all matters relating to photography is being projected in connection with the Westminster Aquarium.

THE CHEMICAL ACTION OF LIGHT.

BY DR. J. M. EDER.*

Dissociation and Decomposition Caused by Light.—An aqueous solution of hydrogen peroxide decomposes in the sunlight (Downes and Blunt). Chlorine water is decomposed in the light with evolution of oxygen and formation of hydrochloric acid, but in the dark this decomposition will not take place even at a temperature of 100° (Berthollet, Gay-Lussac, and Thénard); it occurs more rapidly under the action of the more refrangible rays (Davy), and under white than under yellow glass (Torsewicz). The decomposition depends on the intensity of the light and on the temperature, but when once set up it continues also in the dark, though less actively (De Saussure and Draper); heat promotes the action, but does not start it. According to Millon, hypochlorous acid is also formed during this decomposition, and it has been proposed to use chlorine water for actinometric purposes. Bromine water behaves in a similar way, though it is not so sensitive to light as chlorine water (Eder). Iodine water undergoes no chemical change (H. W. Vogel), though the alcoholic tincture of iodine is decomposed by light.

Concentrated nitric acid turns red in the light, oxygen being given off, and hyponitric acid formed (Scheele and Berthollet); this takes place most rapidly under white, blue, and violet, but not under red glass (Seebeck). The same change is brought about by raising the temperature (Gay-Lussac and Thénard). Gaseous hydriodic acid kept in absolute darkness, and preserved from contact with the air, undergoes no change, but is decomposed in the sunlight; in this reaction the blue rays have the greatest energy. Aqueous solutions of hydriodic acid, not exposed to the air, can be kept in the sun without decomposing;

* Continued from page 8.

but if the air be admitted they rapidly undergoes oxidation even in the dark (Lemoine). If potassium iodide, cadmium iodide, and lithium iodide, are dissolved in dilute acids and exposed to the light, the iodine will be set free, but in different proportions, depending on the kind of iodide and acid employed; with hydrochloric and sulphuric acid, this photo-chemical reaction is much more energetic than with the organic acids. The decomposition takes place more rapidly under blue than under red glass (Leeds), and advantage has been taken of this phenomenon as the principle for the construction of a photometer. Iodine is separated in the light from a solution of potassium iodide in the presence of oxygen, and carbonic acid or sugar in the solution promotes the reaction; iodide of potassium paper and ozonometer paper behave in the same way. Crystallized iodide of ammonium, exposed to the air, turns yellow, especially in blue or violet light, less rapidly in yellow light (Eder); solid potassium iodide is in the dry state unaltered by the action of light (Vogel).

Hypochlorous acid gas in the sunlight splits up into chlorine and oxygen (Balard); dry gaseous chlorous acid into perchloric acid, chlorine, and oxygen; hypochloric acid behaves in the same way (Millon). Chloride of lime is decomposed in the light more quickly than in the dark, with evolution of oxygen (Döbereiner and Schweinsberg). Phosphuretted hydrogen is decomposed in the sun with separation of phosphorus (A. Vogel), and loses its power of spontaneous inflammability as the liquid hydride contained in it is decomposed (Thénard). Sulphide of phosphorus becomes cloudy in the sunlight (Böttger). Bisulphide of carbon turns a dark colour when exposed to the sun, and a brown precipitate is thrown down.

The chromates by themselves resist any influence of light, but in the presence of organic bodies the light produces rapid reduction. This is especially the case with the bichromates of potassium and ammonium on paper (Ponton, 1839), linen, &c., and in the case of the same salts mixed with gelatine, albumen, gum-arabic, dextrin, cane-sugar, grape-sugar, glycerine, casein, alcohol, &c. Such mixtures turn brown when exposed to the light, chromic oxide (E. Kopp) and finally pure chromium tri-oxide (Eder) being formed; and they are more sensitive to light in the dry than in the wet state. Fox Talbot discovered that a mixture of glue with a chromate not only changes colour owing to the action of light, but that it also loses its solubility in hot water, and its property of swelling up in cold water; gum and albumen became insoluble in cold water, and sugar less soluble (Poitevin). A mixture of glycerine and potassium bichromate turns green and thickens (Schnauss), while gum, dextrin, and sugar become less hygroscopic. Gelatine with potassium chromate is from twenty to fifty times less sensitive than with the bichromate, but ammonium chromate is equally sensitive as ammonium bichromate: free chromic acid renders glue insoluble even in the dark. Chromated gelatine which has been rendered insoluble by the action of light consists of a combination of chromic oxide with unaltered gelatine, and some admixture of formic acid; gum, after being exposed to the light, forms arabate, or more probably metarabate, of chromium (Eder).

The vanadates of the alkaline metals, when in contact with organic substances and exposed to the light, turn green or blue, and if the substance be gelatine, it also becomes insoluble in water. According to Phipson molybdic acid dissolved in dilute sulphuric acid turns blue in the sunlight, but recovers its colour in the dark; but Eder maintains that this change only takes place in the presence of organic substances.

Ferric chloride in contact with organic substances, and exposed to the light, is reduced to ferrous chloride; this occurs with the alcoholic or etheric solution of salt, and more especially under white and blue glass. On paper, or mixed with tartaric acid, glycerine, alloxantin, or oxalic acid, the salt behaves in the same way; Eder has shown that while the reduction of a solution of ferric chloride mixed with oxalic acid is $=100$, that of one with citric acid is $= 19$, and with tartaric acid $= 25$. Mixtures of gelatine, ferric chloride, and tartaric acid are insoluble in the dark, and only became soluble by exposure to the light. Ferric oxalate dissolved in water, and acted on by light, is at once converted into ferrous oxalate and carbonic acid (Döbereiner, Suckow, and Reynolds), and in producing this change the indigo blue rays of the spectrum are most active. The ferri-potassic, ferri-sodic, and ferri-ammonic oxalates undergo change under the influence of light, both in the solid state and in aqueous solution (Bussy); if the air is excluded in this reaction, ferro-potassic oxalate and carbonic acid are formed; if the air is admitted, also basic ferric oxalate (Eder and Valenta). Herschel and Draper found that ferri-citrate and its double salts are very sensitive to light, and Herschel and Schoras have found the same with the tartrate; the blue and violet rays act most energetically with these salts of iron. Sulphocyanide of iron, either in an aqueous, an alcoholic, or an etheric solution, pales under the influence of the green-blue rays, but regains its red colour in the dark (Grotthus).

(To be continued.)

JOTTINGS.

BY MAJOR J. WATERHOUSE, B.S.C.
Assistant Surveyor-General of India.

Use of Celluloid.—It struck me some time ago that if flat sheets of transparent celluloid could be obtained, they would form an admirable basis for collotype printing, combining, as they would, the respective advantages of glass and metal, transparency, admitting of sunning at the back, and non-liability to fracture. It seemed probable, too, that the opaque variety of this subtance, known as xylonite, might be a good substitute for lithographic stone or zinc plates for printing from, as its surface can either be highly polished, or grained. Having ascertained that celluloid was manufactured by the British Xylonite Company, I visited their works at Homerton. I found that the only description ordinarily available was the opaque white xylonite, in sheets of various thicknesses, and chiefly used by the Company for making combs. This would be a most useful material for carbon transfer work and other photographic purposes; but in large pieces it is almost impossible to get it perfectly flat and free from an obstinate tendency to buckle, a defect which would render it useless for lithographic or zincographic printing. Mr. Merrian, the manager, showed me, however, a small printing block made of the xylonite, and also an etching, which could be printed in the copper plate press. The transparent kind is not often made; but Mr. Merrian kindly looked up two small samples for me. These were, however, so very distorted and uneven that it was useless to try them for collotype. Their strong yellow colour was against their employment in photographic work as a support for negatives, and this is a serious objection, for however colourless the plates might be at first, they would be sure to turn yellow in course of time, as stripped collodion negatives do. Notwithstanding these defects, if the manufacture of celluloid could be so improved as to admit of perfectly flat sheets being produced, there is no doubt that it would be of the greatest value to photographers all round.

Spontaneous Ignition of Papyroxyline.—Photographic pyroxyline is usually considered non-explosive, and, as such, stored in a dry state without any special precautions. Two cases of spontaneous ignition which have recently come under my notice show the danger of this practice. A small quantity of papyroxyline was put away dry in a wooden cupboard, and had been left there for about a month. One morning, on a holiday, a servant going to clean the room found the cupboard smouldering. On opening it the papyroxyline was found to have ignited spontaneously. The ignition does not seem to have been attended with any violent explosion, because the doors of the cupboard were not forced open. A body of flame sufficiently intense to fuse the edges of some pewter plates lying on the top shelf had forced its way upwards, and set fire to some paper labels on the top of the cupboard. There were a lot of chemicals and apparatus inside the cupboard, but, luckily, no damage was done to them, beyond every article being coated over with a resinous-looking substance having a strong empyreumatic smell. The second case happened with the same papyroxyline. A jar containing about a pound of it had been made over to the photographers for adding to the collodion. When given over it was in a moist state, but was allowed to get dry; after some holidays this also was found in the cupboard burnt out. It seems to have burnt itself away quite quietly, a large quantity of charred residue being left in the jar, and did no other damage. By a most lucky chance, little actual damage was done on either of these occasions; but the possibilities are serious to think of with ether and other inflammable chemicals in the neighbourhood. These cases show that pyroxyline should be kept in a moist state, and never be left carelessly about when dry. In the latter condition it is exceedingly liable to decompose and spoil, even though it may not become dangerous. Well moistened with distilled water, it will keep in good order for a long time, and can be dried again with very little trouble.

Removing Mercury Stains from Glass.—After glass plates have been used once or twice with the usual map-copying intensifier of bichloride of mercury and hydrosulphate of ammonia, the surface becomes badly stained, and it is difficult to get clear negatives. In working with the Eder and Toth's lead intensifier some time ago, we found that it was also useful for removing these stains from the old glasses. In noticing this method on a former occasion, the soaking of the glasses in the solution was recommended. It is now found better to allow the salts to dry on. The solution used is:—

Ferricyanide of potassium ...	10 parts
Nitrate of lead	7 ,,
Water	200 ,,

This is applied to the glasses on both sides with a sponge, allowed to dry on, and left for at least a week. When required for use, the powdery coating is removed by rubbing the surface well with a damp cloth. The glass is then well washed and drained for use in the ordinary way.

Engravers' Tracings on Copper.—The following simple method of obtaining designs on copper may be of use to engravers for making traces of intricate drawings, &c., on their copper plates. The copper plate ready for engraving, having been coated with the usual sensitive solution of bitumen, is exposed to light under the drawing to be copied, and developed with turpentine in the usual way. When fully developed, the lines of the drawing will be seen in bare metal on the asphalt ground. If, now, a tuft of cotton be wetted with a little platinum solution and rubbed over the plate, the lines will turn black. The asphalt ground being removed with benzole, the drawing will be seen in a clear, fine, black colour on the bright copper ground. Other metallic solutions may be used, but the deep black of the platinum is perhaps the best, and the copper plate is not perceptibly etched by it. The method is only suitable for drawings in line. The same principle may be applied to the ornamentation of metal and glass for decorative and other useful purposes. For bitumen work I have found Husnik's solution of purified bitumen answer very well. It is sold ready prepared, and only requires dilution with turpentine or benzole.

A PARIS PHOTOGRAPHIC LAWSUIT.

Our Paris correspondent writes:—

About two years ago Mademoiselle Sarah Bernhardt conceived the strange idea of having her portrait taken, lying at full-length in a coffin edged with white silk. Monsieur Mélandri, a Paris photographer, was charged with the execution of this duty, which was all the easier from the fact that the model simulated very successfully the immobility of death. The *cliché* was without reproach, and Mlle. Bernhardt was fairly enchanted with its success.

"Now, I will make a bargain with you," said the artiste; "promise me not to dispose of a copy till after my death."

"After your death!" exclaimed the photographer.

"Oh! that will be sooner than you think for; I engage to die within a twelve-month—"

"You are joking—"

"No, it is a presentiment I have, and presentiments never fail me. Moreover, if in a year's time I am still in this world, I authorize you to print as many copies as you like, and sell them at any price you please."

The photographer consented to the strange compact, and for the space of a year not a single print went out of his studio. But Mlle. Sarah Bernhardt had no intention of carrying out her promise; she remained as lively as ever. Tired of waiting, Monsieur Mélandri wrote to the celebrated actress that she had not carried out her contract.

"A little patience, please," was her reply; "as soon as I have carried out my engagements in America I will certainly attend to your little matter."

Another year passed, but without result. Monsieur Mélandri wrote again to Mlle. Sarah Bernhardt, telling her that since she had failed to keep her promise, he was no longer obliged to abide by his, and that he should put the coffin portraits in circulation at once. Mlle. Bernhardt hastily telegraphed that she had promised to create three new rôles in Paris, and that when she had done this, no obstacle in the world should prevent her executing her terrible promise. This does not seem to have suited Monsieur Mélandri, for he has now brought an action before the *Tribunal de Commerce*.

Such is the history of the latest eccentricity of the famous Ex-Sociétaire of the *Comédie Française*.

By-the-Bye.

WHAT PHOTOGRAPHY DOES FOR SCIENCE.

Fifteen years ago it would not have been difficult to enumerate within the space of this article the chief duties photography discharged in connection with science. She was a species of upper-servant then, performing valuable services enough, but rather of a light order. To-day she is a maid-of-all-work, put upon, on every occasion, to discharge all sorts of functions, whether menial or high-class. Unlike her domestic sister, she is always to be trusted, and hence the most responsible, as well as the most servile offices, are relegated to her domain. Nor is it only, as in former days, a few of the sciences that employ photography; men conducting researches of vastly different character unite in their desire to work photography; and among astronomers, meteorologists, surgeons, physicians, geologists, chemists, physicists, and botanists, the camera is regarded as one of the most useful of investigating apparatus.

Photography helps science in two ways: it is employed in the high office of investigation, and in the subservient one of simple record. The best illustration we have of its use as a mere recorder is that to which it is put at the Kew and other observatories. Day and night, unceasingly, photography watches the fluctuations of the barometer, the rising and falling of the thermometer, and the delicate pulsations of the swinging magnet which tell of the sudden bursts of magnetism that vivify the earth at intervals. All the changes, whether they be weak or strong, that take place among the observing instruments, are written down accurately by photography, hour after hour, and thus a most trustworthy record is secured for after-comparison and study. Not only are the labours of assistants thus spared, but, what is of far more moment, the records obtained are infallible, and beyond the reach of human error. The daily pictures taken of the sun at Kew and Meudon (we mean, of course, when the orb is visible), are other instances of the value of photographic records, of which we could multiply instances without number.

It is, however, when photography is used as a means of investigation that more interest attaches to the subject, and within the past two years especially there have been some wonderful discoveries made through the medium of our art.

To commence with surgery—for, as Pope very truly says: "The proper study of mankind is man"—we may mention the important research of Dr. Koch, now of Berlin, which formed the subject of one of our earlier "At Homes." Dr. Koch was on the look-out for bacteria, those tiny organisms which invariably attend decomposition (if they do not represent decomposition itself) in animal tissue, for, although the presence of these noisome animalculæ in diseased flesh was pretty well established, no one had been able to point them out with even the most powerful microscope. Dr. Koch, in the course of his researches, bethought himself of photography, and he was delighted to find that the camera showed to the world something which had previously been invisible. He found not only bacteria present in animal tissue, but he found, too, by taking pictures of the tiny organisms, that their shape and form varied with the nature of the disease by which the animal tissue had been attacked. Thus he discovered that the tiny bacteria responsible for gangrene, the deadly disease before which all hope for the patient begins to fade, were shaped like tiny currants or grapes hanging clustered upon fine cobwebs, while tissue cut from an animal suffering from relapsing fever showed, when photographed, the presence of thin hair-like organisms. As these organisms were not visible under the microscope, to photography alone is due their discovery.

This amply suffices to show the value of the camera as an investigating apparatus in medicine. Another instance, almost as interesting, is the research on the action of the pulse and heart by Dr. Ozanam, Dr. Lucs, &c. Dr. Ozanam, it may be remembered, established dicrotism, or double beat of the pulse, by photography; while Dr. Diamond, Dr. Wright, and others, have also proved over and over again how valuable photography is in studying mankind in health and disease.

Coming next to the science of chemistry, a recent example may be quoted to show how photography can help the investigator here; we refer to its aid in the analysis of iron and steel. Messrs. Parry and Tucker maintain that theoretically, at any rate, a well-focussed photographed spectrum of any iron or steel is an unerring index to its composition, and although in practice this is not absolutely true, still the lines in the photograph tell us more than we could otherwise divine. The question whether two steels are of the same quality can be settled in half-an-hour by photographing the spectrum of each side by side on the same plate, supposing the two metals to be homogeneous. "There is something so absolutely certain in a photographed spectrum," says Mr. Parry, "that it is most desirable to establish photography as the basis of all spectroscopic work."

And this brings us to the important use made of photography by the physicist, the astronomer, and the meteorologist. By merely photographing the spectrum, as Draper, Abney, Vogel, Waterhouse, and many others have shown, there is much to be learnt both at the red end of the spectrum and at the violet end. In the case of the latter, indeed, it is simply impossible to study the phenomena without the assistance of a camera. Dr. Huggins' pictures of the stars—or, rather, of the spectra of the stars—may be cited as a wonderful investigation only rendered possible by intelligent photography. M. Janssen's pictures of the sun's orb, again, in which he has been able to secure half-tone for the first time, therefore giving us an insight of the sun's mass—of the limb we had already learnt much through the camera—may be quoted as a further example of astronomic investigation by skilful photography, to say nothing of the many camera pictures taken during eclipses, which have made us familiar with solar phenomena whose presence was not dreamt of twenty years ago. Another no less remarkable lesson is afforded by a comparison of photographs of the sun with the photographic records kept of magnetic disturbance. It may seem strange at first sight that any such comparison could furnish data of importance, and yet the most specious results have been deduced therefrom. The recurring presence of sun spots, as shown by the solar pictures, answers to the recurrence of magnetic disturbances, as shown by the photo-magnetic records, and hence a relation one to another is here established which cannot be gainsaid. Mr. Warren de la Rue's moons, which were afterwards eclipsed by Mr. Rutherfurd's stupendous pictures of the same orb, are further proofs of the value of photo-astronomical observations. In short, in the realms of physics, astronomy, and meteorology, the aid of the camera has now become indispensable.

In conclusion, we may cite also the study of anthropology and geology by means of the camera as interesting examples of scientific photography. The clever plan of measuring skull sections recently adopted is singularly useful. A black scale with white marks is set up against black velvet and photographed, but instead of developing the plate, this is used in the camera a second time, to depict a skull; the latter is put in the plane previously occupied by the scale, so that no fresh focussing is necessary. The plate, after the double exposure, then shows the skull with the scale running through it. A series of pictures taken in this way are said to furnish most important information either for study or instruction. In respect to geology, one of Mr. Whymper's Chimborazo pictures furnished an excellent illustration of the aid photography may lend to the subject, for it demonstrated the thickness of the ice crust deposited at a specific altitude. The height of certain objects in the vicinity permitted a comparison of the crust, which, as the picture clearly showed, was of very uniform thickness.

We repeat, however, it is in the more delicate applications of photography to science that most interest attaches, where the results are due almost as much to the skilled worker as to the art itself; and it is well for those interested in photography to look back occasionally upon the difficulties surmounted and the discoveries made, which, but for the existence of our art-science, would have still remained stumbling blocks in the path of progress.

The "At Home" next week will be "Messrs. J. Valentine and Sons at Dundee."

PHOTOGRAPHY IN AND OUT OF THE STUDIO.

The Regulation of Exposure—The Exhibition of Specimens—Photographing Mr. Gladstone—A Question of Procedure.

The Regulation of Exposure.—Instantaneous shutters are now so numerous that there is scarcely need to ask inventors to set their wits to work to devise another. So far as quickness of exposure is concerned, there is no lack of shutters which provide this quality to perfection. In one respect, however, all shutters are deficient, and that is in regard to some means of ascertaining the exact time of exposure. We hear of exposures varying from one second to the hundredth part of a second or even less, but in most cases these durations are not the result of exact calculation, but are mere guess-work, and consequently misleading. To remove this uncertainty an apparatus has been devised by a Col. Sebert, and described by him to the Paris Société d'Encouragement. The apparatus is contained in a small box which can be easily adapted to any camera. There are two shields, one above the other, controlled by springs which tend to lower one and raise the other. A chronometric counter is in the front part of the box, and presents its disc below the objective. The act of bringing the index to the time of exposure required, applies two catches, one of which holds the first shield raised and closes the camera, and the other holds the second shield down, but ready to rise at the right moment after the first has gone down. The index of the counter is liberated by an ordinary pneumatic attachment. As the index moves round the disc, it at once liberates the upper shield without shock, so opening the camera, and when it reaches zero, it liberates the other shield, which closes the camera. It is said that with this apparatus the time of exposure can be regulated to a fraction of the hundredth of a second. A diagram lately was given in *La Nature.*

The Exhibition of Specimens.—Not the least important branch of a photographic business is the exhibition of specimens; but we fancy that, as a rule, photographers do not pay the attention to it which its importance demands. We refer more particularly to the frequent change of specimens. Railway stations are as good places for exhibiting as can well be found, for rarely do passengers who have to wait a few minutes on a platform fail to stop in front of a frame of photographs, glad of the chance of seeing something in the way of a relief from glaring and monotonous advertisements. But when you are a regular traveller, and see the same photographs in the same frame day after day, week after week, and month after month, you grow to loathe the sight of the faces which are presented eternally to your view. We can call to mind, in a certain suburban railway station which it is our lot to travel from three or four times a week, a case of photographs which we once looked upon with interest, but which we now hurry by as soon as possible. It contains at least a dozen pictures, some very good, the centre one being a cabinet sized portrait of a child. Photographically speaking, nothing can be said about the portrait. But the child, by no means pretty itself, has such a scared expression about the eyes, and has its mouth pursed up in so nervous a fashion, evidently showing that it was in a state of mortal terror when its photograph was taken, that to be obliged to look at it day by day is nothing short of an infliction. And the worst of it is, that when you hate a thing it is pretty sure to fascinate you. We are certain that the public who use this station would be deeply grateful for the removal of the objectionable picture, and for some slight change in the others, yet it never occurs to the photographer to do either. And what is true of this railway station is true of a dozen others, and also of the specimens exhibited at the majority of photographers' residences. Variation is the exception, and staleness the rule. The mistake generally made is the exhibition of too many specimens. To arrange a dozen cartes so that one harmonious whole shall be presented is no easy matter, and everyone who has tried it is familiar with the difficulty of getting a dozen silver prints of exactly the same tone, of well-balanced subjects, and where the faces shall be pleasant to look upon. A single inartistic picture is sufficient to spoil the effect. Therefore we would say, be content with a smaller number, and, what is more important, change them frequently. In the pride of obtaining a faultless negative, photographers often overlook the subject photographed, and will exhibit a positively ugly face, simply because the negative happens to be a good one. This we hold to be a total blunder. If it be true that a thing of beauty is a joy for ever, it is equally true that a thing of ugliness is an eternal torment. We therefore reiterate the advice: exhibit only pleasant pictures, few in number, and change as often as possible.

Photographing Mr. Gladstone.—Mr. Gladstone is not like the late Lord Beaconsfield; he has no objection to being photographed. How many times the Premier has had his portrait taken it is impossible to tell, but he must run Her Majesty pretty hard in the matter of photographs, which is saying a good deal. It must not, however, be supposed that Mr. Gladstone delights in dawdling away his time in a photographic studio. For instance, in reply to an application from Mr. Walker, of Regent Street, lately, he said he would call on a particular day and give the artist fifteen minutes. Accordingly, he was punctual to the minute, and, with his watch on the table, posed for the stipulated quarter of an hour. It goes without saying that Mr. Walker was as "spry" as the circumstances would permit, and as he took fifteen separate negatives he cannot be charged with having lost any time. We assume that gelatine plates were used. With collodion the task would have been impossible. More advantages in the use of rapid dry plates—economy of the time of a great statesman, and convenience and profit to the photographer. One of these photographs, it may be mentioned, is said to be exceedingly good, and has been engraved for Harper's Magazine.

A Question of Procedure.—It would be interesting to know what power the general body of the Photographic Society have apart from the Council. Is the Council in the position of a managing committee, whose decisions must be ratified by the body of members, or is the Council all supreme, and able to veto any resolution adopted or decided upon at a general meeting? There is not the slightest antagonism, that we are aware of, between the members and the Council, and therefore the question can be discussed dispassionately; but from a little incident which occurred at the last meeting, it would seem as if there was some doubt on the point, and it would be as well if the exact relations were better known than they are. In the discussion which followed Mr. Warnerke's remarks on the necessity for a standard of rapidity for lenses and for uniformity in apparatus, Mr. Warnerke himself asked whether some notice might not be inserted in the Journal inviting the opinions of the members. "Certainly not," replied the President; "the matter must come before the Council." Mr. Warnerke said no more, nor did any other member take up the question. But supposing the reverse had been the case, and some obstinate gentleman (and there are many such in the world) had pressed the point to a division, and a resolution had been passed approving Mr. Warnerke's suggestion, what would have happened? To this we can only reply in the words of a Speaker in the House of Commons, who, when asked what would follow the solemn formula of "naming names," said despairingly, "Heaven only knows, for I don't."

NOTE ON PITS IN GELATINE.

BY ALF. J. BROWN.*

All who have made gelatine dry plates have noticed that when the emulsion has set—really, as it is setting—depressions are formed, which have come to be called pits. It is common, almost universal, to ascribe these pits to grease in the gelatine; why, I don't know, as I have never heard any reason given.

I say grease has nothing to do with them, as I shall endeavour to show. I made up 3 ounces of a 20-grain solution of Henderson's gelatine; a plate was coated with it and marked No. 1. It is not so clear as it should be, because it was not filtered. I then added to the solution a drop—more than a minim—of flask oil, and coated No. 2. No. 3 had two drops of oil, No. 4 had four, No. 5 ten, and No. 6 sixteen drops, the solution the while of course getting less as the plates were coated, but not very much. It was well shaken after each addition. There was no increase in pitting, but as they dried the gelatine appears to have squeezed the oil out, for it is principally upon the surface, and may be smeared or rubbed off. Under the microscope, when these globules are rubbed away, are left little beds where they have rested, some smaller globules being still in the film. I next made two ounces of a 20-grain solution of Nelson's No. 1, and coated a plate No. 7; twelve drops of oil were then added. This gelatine seemed to take more kindly to the oil, and really formed an emulsion. The acid in Henderson's would perhaps account for any difference. No. 9 was then coated. No. 12 is the same solution after being kept one-and-a-half hours at a temperature of 130°; they look the same to me. You will see that the last two are like ground glass, but the oil is still principally upon the

* Read before the Thursday Evenings for Photographers.

surface, and may be rubbed away. The oil caused no extra pitting, and nothing which could be mistaken for it. I then took a little old emulsion which had been knocking about for tw o or three months, filtered it, and coated a couple of plates, Nos. 13 and 14. They pitted a great deal. I then added oil to it, shook it up well, filtered it again, and coated 15 and 16. There is nearly a drop of oil in each of those quarter plates. There was absolutely no sign of a single pit. I don't advise you to add grease to your emulsions to get an even film, but I intend myself to make an emulsion containing neats-foot oil, to see how it affects the development. You shall know the result.

Now, if it is not grease, what is it? I have examined quite a number of plates and spots with the microscope, the dull spots in the dried film, which Mr. Denbenham has aptly termed freckles, showing where was a pit when wet. Particles of dust will cause them, or the slightest filament cast from the clothes of the worker, but these you will find in the centre of the spot. They appear to exercise a repellent action upon the gelatine; this action, indeed, forms the basis of, I think it is Major Waterhouse's invention of getting "grain" by the use of sand or fine powder. But dust is not the cause of the large majority of pits. It is too common in everyday practice to take for granted that gelatine is a homogeneous mass. Nothing is farther from the truth; the many and varied sources from which the raw material is obtained will expel that idea if you only give the matter a little thought. More than this, if the skin, gut, hoof, or bone, &c., were taken from one animal only, it would not then be alike in all its particles. The work of decay and reparation which is ever going on makes this impossible, the newly formed being more tender than the mature. I say it is these harder particles of gelatine that underlie and cause the pits; they contract sooner than the bulk of the mixture, are really set sooner, and expel part of their moisture, which is taken up by the surrounding more fluid film.

Damp a plate that is freckled with a soft brush and water, the surrounding parts will rise much quicker and higher than the spots. Why? Because they can't, at a low temperature, absorb enough water to do so. Coat your plates at a low temperature, and the pits are gone, or may be nearly so. Why? Because these particles are already contracted and will dry, level with the mass; at least, this is my experience. This is why, I think, that 15 and 16 lost their pits, the second shaking and filtering having reduced the temperature very much.

Moral:—Raise your gelatine to a high temperature, break it up as much as possible, and coat at as low temperature as you can.

You may dispute my theory—I may be wrong—but I think I have shown at least, that pits do *not* arise from grease.

INTENSIFICATION OF GELATINE NEGATIVES OR POSITIVES WITH SILVER.

BY H. HOULGRAVE.*

TOWARDS the close of the past year, I was asked by a friend to make him a series of lantern transparencies from a number of photographs and engravings with which he provided me. As I have for a long time past worked exclusively with gelatine plates, I had no choice of a process by which to do them. With me it was a case of either gelatine or nothing. Unfortunately, in my hands at least, gelatine transparencies are rarely entirely satisfactory. The faults I have to find with them are that they are apt to be too thin and of bad colour. If an attempt be made to overcome these objectionable qualities by pushing the development, the lights of the picture are almost sure to suffer, and if recourse be had to silver intensification (at least, by any of the published methods) matters are often rendered worse rather than better, owing to the difficulty there is of avoiding staining or veiling, more or less, what ought to be the clear portions of the picture.

As I had plenty of time allowed me for the work, I tried a number of experiments in order to find out, if possible, some means of overcoming the above-mentioned difficulties; and I have at last hit upon a method of working which, though differing only very slightly from the usual plan of proceeding, yields me results incomparably better than any I have hitherto been able to obtain.

The following are the baths and solutions which I use:—

1.—*Iodine Solution.*

Iodide of potassium	2 drachms
Iodine	1 drachm
Water	3 ounces

* A communication to the Liverpool Amateur Photographic Association.

2.

Nitrate of silver	20 grains
Distilled water...	1 ounce

3.—*Iodine Bath.*

Alum	2 ounces
Hydrochloric acid	2 drachms
Iodine solution	1 drachm

Dissolve the alum in hot water, and then add the acid and the iodine solution.

4.—*Iron Bath.*

Sulphate of iron	2 drachms
Citric acid	2 ,,
Glacial acetic acid	1 drachm
Alcohol...	1 ounce
Water	9 ounces

Dissolve the iron and the citric acid in hot water, and then add the alcohol and acetic acid.

As this bath improves very much with age, it will be found a good plan to mix two bottles of it, one of which must be used as the stock bottle and kept constantly filled from the other, and when this second bottle is empty, a fresh supply must be made.

The iodine bath undoubtedly deteriorates with use, and must consequently be renewed from time to time. Having prepared the above solutions, the following is the way in which they are to be applied. But first let me say that the intensification may be proceeded with whilst the picture is still wet, either before or after fixing, or after it has been allowed to become dry, and each of these methods has its own peculiar advantages. Should the plates be rather too thin and transparent, it will be better to intensify before fixing, because density can be more easily obtained at this time; but with thick, opaque films, such as are now generally used, the operation is best performed after fixing, because the effect can then be so much better seen and judged. Should, however, the plate be at all inclined to frill, it will then be necessary to defer the intensification till after it has become dry, because when once it is dry, all danger from frilling will cease.

And now let me suppose that it is desired to intensify a picture after fixing, as this is the case that will most generally occur. The following is the plan of procedure:—After removing the plate from the hyposulphite bath, wash it thoroughly for four or five minutes in several changes of water; then, having poured a portion of the iodine bath into a flat dish, plunge the plate into it. Rock the dish gently for about half-a-minute, after which remove the plate to a dish of water, wash for about a minute in three changes of water, and it will now be ready for the iron bath.

In all the printed instructions for applying this which I have seen, one or other of two methods is invariably prescribed. The first is to pour a little of the iron solution into a flat dish, add a few drops of a solution of nitrate of silver, and then plunge in the plate. This having been done, observe what takes place. Unless the dish be chemically clean—a not too easy state of things to bring about—the silver will expend its energies in blackening it, and will finally convert the solution into a muddy mess, which, if the operator be not very careful, will cause a deposit to settle on the film, and ruin the negative. The other plan is this:—Having attached the plate to a pneumatic holder, pour the solution on and off from a developing cup until the required density is obtained. This may appear a delightfully simple operation in theory, but in practice it is quite the reverse, because a gelatine film is so repellent that it is almost impossible to get an aqueous solution to lie nicely upon it. Fortunately, both these difficulties may be entirely avoided in the following way:—Pour a portion of the iron solution into a flat dish, and in this immerse the plate. Next pour into a developing cup a little of the same solution, and from ten to twenty drops of the nitrate of silver solution; for a 5 by 4 plate two drachms will be sufficient. Now take the plate out of the dish, and, holding it either by one corner with the fingers, or on a pneumatic holder, immediately pour over it the contents of the cup. The solution will flow up to the extreme edges of the plate, which may now be kept evenly covered without the slightest difficulty.

Should the picture only require a little additional density, this will be quickly obtained; but if, on the contrary, it be much too thin, it will gain strength very slowly, and the operator will require to use all his patience and a liberal allowance of silver as well, to obtain what he seeks, and possibly be obliged to resort to mercury to finish with. But, even in this case, the previous treatment with silver will not have been wasted, as it will furnish a foundation for the mercury to build upon, and it will now be easy to gain an amount of density which the mercury alone would not have given. Should the intensifier become turbid in the course of the operation it must be immediately rejected, and the plate flushed with a small quantity of the iron solution, but on no account with water. The intensification may then be continued with a fresh portion of the iron and silver solutions. As soon as the operation is completed the plate must be washed until the water will lie smoothly upon it, and then be plunged a second time in the hyposulphite bath, in which it should be allowed to remain for about a minute, after which it may removed to a dish of water and washed in the usual way.

Before closing these remarks I feel as if a word of apology were due from me for having occupied the time of the meeting with a matter which most of you may consider trivial and, possibly, not new. My excuse is that I certainly had no intention to have done so, and I should have remained quietly in the dark had not our indefatigable Hon. Secretary most unexpectedly unearthed me and dragged me into light.

Notes.

The Duke of Edinburgh officially opened the Electrical Exhibition at the Crystal Palace on Saturday, but many of the exhibits are still conspicuous by their absence

The Post Office and the War Office contribute a most interesting show, the latter displaying examples of the applications of electricity to warfare. Unfortunately, these examples do not include the one of all others most likely to interest photographers, that of copying plans and maps by the electric light in the field. Our readers are well aware that one of the principal duties of military photographers accompanying an army corps is to reproduce, by the aid of the camera, any plans or reconnaissance sketches made by staff officers; and that this work may proceed as quickly as possible, the photographers are put in a position to go on with their labours at night by using the electric light. They are not only able to take a negative, but also to produce prints, either for collotype printing or photo-lithography, and thus hundreds of *fac simile* copies of any important sketch are forthcoming the very morning after it has been placed in the hands of the army photographers.

It is pleasant to find the Photographic Society once more in a solvent and flourishing condition, with a few hundreds in the bank. But it has taken many years to rise from its insolvency, the turn of the tide dating from 1870, when most of its Council became life members, and in this way raised the necessary funds to enable it to clear off its obligations.

Mr. Francis Bedford prefers to extract the silver from old hyposulphite baths by means of liver of sulphur, while Messrs. Valentine and Sons precipitate the precious metal with zinc plates. In a laboratory experiment, we found the former method to be the most exhaustive, the proportions recovered by sulphur and zinc being as five to four. On the other hand, in favour of zinc, there is the circumstance that the smell is not so objectionable, while the silver is not recovered in the form of sulphide, but in a metallic condition. The experiences of these gentlemen should, in any case, cause all photographers to exhaust their waste hyposulphite solutions in one way or the other.

The first number of another German photographic journal appeared last month, the *Photographischen Rundschau*; it is the organ of the Schleswig-Holstein Society.

On the other hand, we are sorry to hear that the *Zeitschrift für Praktische Photographie*, a journal published in Munich, has ceased to appear. It was issued by the Munich Photographic Society.

Another item of news from Germany is scarcely so important. An International Photographic Association is announced as having been founded at Guben by Herrn. Groll and Pfeiffer, under the grandiloquent name of the "Victoria" Society. If only there had been one other founder, we should have had an instance of history repeating itself in connection with the three tailors of Tooley Street. Guben, we believe, is in Prussia, but we are not quite sure.

The Alexandra Palace authorities wish to secure some instantaneous pictures of the multitude that usually honours that place of entertainment with their company on Easter Monday. An announcement elsewhere shows that medals and money prizes are offered for the best negatives taken on that occasion; but photographers should note that they part with "all copyrights" when they part with their negatives.

We stated the other day that the Empress of Germany was one of the few in this world who strenuously object to being photographed. She has but once been pourtrayed in the camera, and that was only at the earnest solicitation of the Queen; but the Empress of Austria, it seems, has never been photographed at all.

In the *Graphic* last week was a fine group picture of the Empress of Austria surrounded by ladies of the Court, and hers was the only portrait not taken from a photograph. The other high-born dames of Austro-Hungary were depicted from photographs taken in the Adèle Studio at Vienna, and Herr Koller's studio at Pesth, both of which establishments have recently been the subject of an "At Home" in these columns.

It is sometimes handy to know how to revive a piece of apparatus that has been French-polished. Here is a mixture which must be applied with plenty of elbow grease;—

Pale linseed oil	2 pints
Strong distilled vinegar	½ pint
Spirits of turpentine	¼ ,,
Hydrochloric acid	1 ounce

Chemistry is a wonderful science, but there are some problems it cannot solve, and to tell the difference between cane-sugar and beet sugar is one of them. Nevertheless, there is a marked difference, and one easily perceived, if not by man, by the moth; for entomologists find that to attract these at night by "sugaring" tree trunks with beet-sugar is well nigh impossible, and only when cane-sugar is used does the device succeed.

The finest portrait in Mr. Abel Lewis' collection, which took the gold medal at Dundee, is that of a lady leaning against the trunk of a tree. An upright tree stem of this nature is one of the most simple, useful, and, for out-door costumes, most appropriate accessories the photographer can have. With gelatine plates, a model requires hardly any other support. Mr. Mendelssohn, of Newcastle, has a fir trunk in his studio, but the silver-birch, an ivy-grown oak, or the stem of an ash, would be quite as suitable.

Herr Klic, of Vienna, has been successful in selling his very perfect photo-engraving process in France, Prussia, and Bavaria. MM. Goupil et Cie. have acquired the right of working the process in France, and the other two purchasers are the Berlin Photographic Company, and Herr Bruckmann, of Munich. Neither in Great Britain nor America has any one yet come forward to treat for the sole right, although Herr Klic has received several applications for licences.

The president of the Chemical Society, and president of the Institute of Chemistry, are to hold a "reception" at the Crystal Palace on the 22nd inst.

The gathering takes place in connection with the International Electric Exhibition, which sanguine people hope to see complete by Midsummer. No less than one thousand gentlemen are expected, the hosts on the occasion being Professor Roscoe, F.R.S., and Professor Abel, C.B., F.R.S.

Our readers will remember the account we gave in April last in these columns of Professor H. Dufour's chemical actinometer. In pursuing the investigation, he has made an observation of some importance. In a word, he is in a fair way to discover a photometer that will speak, or, at any rate, emit sounds. It is well known that a mixture of chlorine and hydrogen gases diluted with air or oxygen combines slowly in light. Without air the mixture is exploded by exposure to white light, the chemical rays being most efficient. M. Dufour has examined the behaviour of this mixture as to its power of yielding radiophonic and photophonic sounds when illuminated by intermittent beams of different kinds, as in the researches of Graham Bell and Tainter. He finds that the loudest sounds occur when violet and ultra-violet rays are employed, no sound whatever being produced by red rays. It will interest photographers, therefore, to know that it is only actinic rays that speak.

At the Photographic Club, the conversation recently turned on the subject of alum and chrome alum employed both for "tanning" gelatine plates and carbon tissue, the opinion being generally in favour of the latter. There is no doubt that chrome alum does not possess the same tendency to "crystallize out," which is so frequently remarked when ordinary alum is used, causing the surface treated to be covered with white powder when dry. Moreover, chrome alum is a more trustworthy substance than that sold as common alum.

The Meteorological Society have been mulcted by Government of the price of the "Saladin" balloon, which was lost together with Mr. Powell, M.P. Those who desire in future to make experiments in balloons, whether in connection with meteorology, photography, or other purposes, are not likely to take passage in a Government equipage in these circumstances.

M. Léon Vidal sends us his new volume, *Cours de Reproductions Industrielles*. It is a most interesting work, containing, as it does, not only a description of the graphic and photo-graphic arts, but also examples printed by their means. Photo-lithography, photo-gravure, Woodbury-type and its recent improvements, collotype, &c., &c., are all described in detail; but perhaps the most remarkable feature is the illustrations anent photography in colours. M. Vidal gives examples of the Ducos du Hauron process and of his own, not only exhibiting finished prints in colours, but also printings of the different tints, which, when superposed, make up the photograph in colours. We heartily congratulate our Paris correspondent on his most useful and attractive work.

It is difficult to understand for the moment how photography can assist memory, but the present generation affords a trite illustration that it does so. A man of eight-and-twenty or thirty, who possesses portraits of himself in childhood, has a much keener recollection of himself, his habits, and his surroundings, in those days, than the man or woman who was never photographed early in life. The child's dress in the picture has no doubt much to do with this greenness of memory, but it is the circumstance of his being able to look back at the portrait again and again, as time goes on, the picture forming a landmark always fresh and familiar, that makes it so valuable a line with the past.

Another value—for it is a valuable quality—of old portraits is that the "young people" enjoy the opportunity on seeing their parents and elders when they too were young "The old frump," or "antiquated baboon," as vain youth sometimes stigmatizes old age, the youngster finds as sprightly and good-looking as himself in the portraits take long ago, and he wisely puts a bridle on his tongue hence forth; while our elders, again, are reminded by their youthful pictures that they, too, were young once, and are so disposed to be less harsh towards youth in consequence.

Some people have an idea about making their family albums as smart as they can. The old yellow portraits are weeded, and bright and elegant ones substituted. Portraits highly burnished, and with plenty of magnificent furniture, are slipped in, and those with antiquated balustrades and stony columns are slipped out. Never do this; it is a woeful mistake. Commence a new album, if you like, but let the old portraits be; and, when you have kept them for years and years, you will find your reward in a book whose every page has upon it a sweet remembrance or a touch of pathos.

TWELVE ELEMENTARY LESSONS IN DRY-PLATE PHOTOGRAPHY.

No. 1.—Selection of Apparatus.

The first thing that the photographic beginner has to do, after he has made up his mind that he going to take up the fascinating art-science, is to determine what size of "plate" he will work—that is to say, how large his pictures are to be. As a matter of course, he should begin work upon the smallest plates which he can buy, as the first few results are sure to be far from perfect, and the cheaper the plates spoiled the better. This does not, however, bind him to the smallest size. All photographic cameras are made so that several different sized plates will fit into them, and after the first difficulties are over, the tyro is sure to aspire to the production of something larger than the well-known "card" or carte-de-visite.

In considering size of plate to be worked, it must be borne in mind that the larger the plate the greater the weight to be carried into the field, the greater the difficulty of manipulation, and the heavier the expense at every turn. This being the case, we would suggest to our friends as a good size that known as "half plate"; this is a plate measuring $6\frac{1}{2}$ inches by $4\frac{3}{4}$ inches. This allows of pictures being taken of the popular cabinet size, and the apparatus necessary can very easily be manipulated in the field. A somewhat larger size can easily be carried by an active man; but we should recommend that, at any rate, nothing greater than "whole plate," or $8\frac{1}{2}$ inches by $6\frac{1}{2}$ inches, should be attempted. The smallest size of plate offered for sale is the "quarter plate," measursng $4\frac{1}{4}$ inches by $3\frac{1}{4}$ inches, and, as we have said, the beginner should confine himself to this size till he has become somewhat familiar with the different operations involved in the taking of a negative.

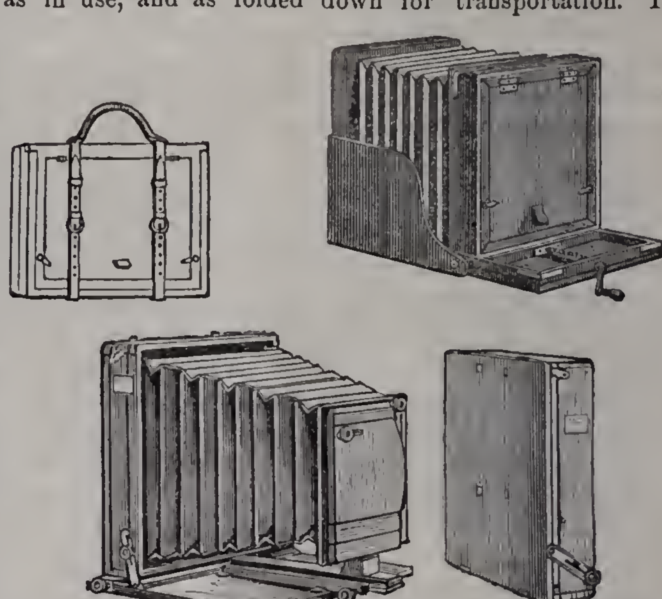
Having decided the size, the next thing to consider is in what manner to purchase the apparatus; and here we must say emphatically that the only way in which to be sure of getting reliable photographic requisites is to go to a first-rate dealer, and to purchase them new from him. There is a general idea in the mind of the non-photographic public, probably gained from seeing numbers of old cameras and lenses exposed for sale in pawn shops and such like, that great bargains are to be made in second-hand photographic apparatus, and that the beginner may "pick up" what he wants very cheaply by a little looking about. There can be no greater mistake. The experienced photographer *may* occasionally pick up an article very cheap; but the man without technical knowledge will be sure, if he attempts to do the like, to find on his hands goods which will be useless to him when he has somewhat advanced in his art.

Having thus advised our reader where to purchase his apparatus, there still remains the question, "How? Is it advisable to go in for a complete set, or to buy each article separately?" The beginner will be best advised in this matter by the state of his funds. The "sets" made up by most of the chief photographic dealers are most excellent and complete; but the sum charged for them is greater than many are willing to lay out at once. These may buy at first only those articles which are absolutely necessary to begin with, and may add to their store from time to time, as they think fit. We give a list of the articles most necessary for working quarter plates, and afterwards shall say a word on such of them as seem to us to call for special description:—

A camera.
A lens.
A tripod stand.
Three flat dishes or trays of porcelain or other material.
A graduated measure, holding $\frac{1}{4}$-ounce.
A graduated measure holding 4 ounces.
A dozen gelatine quarter plates.
A dark-room lamp.

A photographic camera is, as probably everyone knows, a sort of box, at one end of which is held the sensitive plate, and at the other end of which is held the "lens"—which latter throws an inverted image of any object in front of it on to the plate—and that there is a means of adjusting the distance between the lens and the plate, or of "focussing" the camera. Every camera has, besides this, a piece of ground glass, which can be put in the exact place to be afterwards occupied by the plate, and upon which the image can be seen so as to facilitate focussing. It is also fitted with a "dark-slide." This is a sort of case in which a sensitive plate may be fixed. After this camera has been focussed, the dark-slide is placed in the position before occupied by the ground glass, which latter is removable. The "shutter" or sliding door of the dark-slide is then removed, and, on taking the cap off the lens, the image falls on the plate. As many dark-slides as are desired may accompany a camera, and thus a number of plates may be carried into the field. Slides are also constructed to hold two plates each, and are called "double dark-slides." These are by far the best and most convenient to use for dry plates. Three slides are a common number to accompany a camera. This enables half a-dozen plates to be carried out. Each dark-slide should be fitted with a set of "carriers." These enable plates smaller than the largest size for which it is constructed to be placed in it.

All modern cameras for use in the field are made so that they can fold up into small compass for ease in carrying, and have "bellows bodies," that is to say, can be drawn out and in like a concertina. We illustrate two of the best modern forms of camera, showing in each the camera as in use, and as folded down for transportation. In



purchasing a camera, the photographer should get one which will open to a considerable distance—if possible, as much as twice the length of the largest size plate which it will work. In some part of his career the amateur is sure to aspire to the taking of portraits. His attempts in this direction are almost certain to be failures, and to cause great pain to his friends, but nothing is surer than that the portraiture fit will attack him. When it comes to this, he will find a camera which opens to a considerable length a great advantage.

There are various adjustments attached to modern cameras which, although of little use in the hands of the beginner, will be found of great convenience to him when he is more advanced. These are chiefly a vertical and horizontal adjustment of the front on to which the lens is screwed, and what is called a "swing back." This latter provides a means of varying to a certain extent the angle between the sensitive plate and the axis of the lens. A leather case into which the camera and the dark slides can fit, should be provided. The lens is the next most important piece of apparatus, even if it is not the most important of all. As we intend to devote a special chapter to lenses, we shall not go much into the question just now, but shall merely advise that what is known as a "single achromatic" lens of such a length of focus as to enable the largest plate which the camera will hold to be covered should be purchased. The lens should be bought direct from some reputed maker. The particular form of lens known as the "wide angle landscape" lens is the best.

The tripod stand calls for little special remark. Its general form is known to all. In those of modern construction each leg folds into two, so as to make the whole more portable. The only requirements of the camera stand are that it should be light, should be easy to fit up and take down, and should be quite rigid when fixed up.

The flat dishes or trays—or, as they are sometimes called, flat baths—are for use in the operation of developing, fixing, &c., to be described in a future chapter. Such dishes, made of so-called porcelain, can be had for a few pence each, and we should recommend that such be purchased for quarter-plate work. When the photographer advances to larger sizes, he may indulge in the more expensive and more convenient dishes made of ebonite and other light material.

The dry plates can be bought from any photographic dealer. They are extensively advertised in the NEWS; but we cannot take upon ourselves to recommend one make in preference to another. We have found all excellent, the cheap as well as the more expensive.

The dark-room lamp will be described when we come to the chapter on the "dark-room."

INTERNATIONAL PHOTOGRAPHIC COMPETITION.

THE Council of the Edinburgh Photographic Society invites photographers throughout the world to take part in a photographic competition for the most suitable pictures for presentation prints to members of the Society.

The following prizes are offered:—

1st. The handsome Gold Medal of the Society.					
2nd Silver Medal from same die, and			£5	0	0
3rd.	Do	do	3	0	0
4th. Bronze do		do	2	0	0
5th.	Do	do	1	0	0

The Council wish to restrict competitors as little as possible, but suggest that the size of print should be not less than $8\frac{1}{2}$ by $6\frac{1}{2}$ inches, nor larger than 16 by 12 inches. The subject is left entirely open, but it is essential that competitors comply with the following conditions, which will be strictly enforced:—

1. The negatives must be suitable for producing not less than 500 prints by a permanent process at a cheap rate, and lent to the Society for this purpose.
2. Competitors, if required, must forward negatives for inspection prior to the award.
3. Prize prints to be the property of the Society, and the negatives to remain in the custody of its curator until after the required prints are issued to the members.
4. Pictures to be unframed, and, if mounted, must be on cardboard only.
5. No lettering, whereby the competitor can be identified, will be permitted upon the picture or mount, beyond a simple sign, number, or motto, each picture to be accompanied with a sealed envelope bearing this mark outside, and within the name and address of competitor.
6. Competitors to forward their pictures, carriage paid, not later than 30th September, 1882, adressed to the curator, Mr. J. M. Turnbull, 19, St. David Street, Edinburgh.

It is proposed to hold a public exhibition of the pictures sent for competition.

The Council will take the utmost care of all works submitted, but they will not hold themselves under any responsibility.

Unsuccessful pictures will be returned, if desired, at the competitor's expense.

NOTE.—Competitors may supply permanent proofs from their negatives, and enclose in the sealed envelope an estimate for producing 500 similar prints, but this matter will be considered entirely apart from the award.

FRENCH CORRESPONDENCE.

DARK RED NEGATIVES FOR THE BITUMEN PROCESS—IMPROVEMENT IN THE METHOD OF TRANSFORMING NEGATIVES INTO POSITIVES—A SOLVENT OF SILVER CHROMATE—NEW PHOTOGRAPHIC WORKS.

Dark Red Negatives for the Bitumen Process.—When negatives are taken from line drawings, for the purpose of engraving chemically, it is necessary to have a ground of perfect opacity. This result can be obtained by means of the following formula, which gives a red ground, and one completely impermeable to light. In the first place, a rather weak negative must be taken; it may even be a little grey in the ground. This is then fixed, and washed in plenty of water, and then plunged in the following bath:—

Water	... 1,700 grammes
Red prussiate of potash ...	... 65 ,,
Pure nitrate of lead ...	... 100 ,,

It is then again thoroughly washed, and, afterwards, an 8 per cent. solution of yellow chromate of potash, mixed with one-third of ordinary ammonia, is flowed over it. After this it is very carefully washed a third time. This method of intensifying is very well adapted for plates of plans and maps, and for the reproduction of any kind of line drawing.

Improvement in the Method of Transforming Negatives into Positives.—Captain Biny has improved his process for directly transforming a negative into a positive. He develops with a solution of lactate of iron, and then he exposes to the light, at the same time keeping up the action of the developer. After this he washes the plate, and plunges it into a weak solution of bichromate of potash, the manipulation being subsequently continued as previously described. Lactate of iron seems to produce excellent results as a developer of gelatino-bromide plates. It is dissolved in hot water up to the saturation point, and then allowed to cool. When it is used, two parts of the oxalate are mixed with one of the lactate, and the mixture is filtered. The image comes out beautifully with this developer.

A Solvent of Silver Chromate.—Another method recommended by Captain Biny depends on a mixture which he has discovered for dissolving silver chromate. This mixture consists of:—

Water	... 100 parts
Nitric acid	... 5 ,,
Alcohol	... 15 ,,

Alcohol in the presence of nitric acid and of an insoluble chromate seems to cause the formation of acetate of chromium and of malate of ammonium, which, if they are not soluble in, are at least carried off by water, and are thus rendered incapable of injuring, during the subsequent development, the image formed of salts of silver. A gelatino-bromide, therefore, which contains chromate of silver will give up its chromium to the alcohol and the nitric acid, so that by this means it will become neutral. From the peculiar action of this mixture, Captain Biny thinks that a method may be deduced of distinguishing directly whether a gelatino-bromide contains an excess of nitrate of silver. Such a bichromatised gelatino-bromide, after being dried, and the whole of its surface exposed to the light, will, when dipped into a solution of oxalate of iron, become completelely blackened. On the other hand, a gelatino-bromide which has been perfectly bichromatized, but is absolutely neutral, will, after exposure, not be blackened by the oxalate of iron.

New Photographic Works.—Two special works have just been published. The first; "L'Aide Mémoire de la Photographie pour 1882," by M. Fabre, a photographic annual in which there is always given a clear résumé of the progress effected during the past year. The second is, "Le Cours de Reproductions Industrielles," an account of the principal graphic processes of reproduction. Being myself the author of this work, I can do no more than mention its publication, and will only add that it contains the courses of lectures which I have delivered every year at the "Ecole Nationale des Arts Décoratifs."

LEON VIDAL.

ON PLATINOTYPE PRINTING.

BY W. COBB.

WHAT! another short paper on gelatine plates? Oh! please, Mr. Editor, don't be too exacting. It strikes me that fiddling so long upon one string, however harmonious at first, may become like "sweet bells jangling out of tune and harsh." Besides, having had so much to do with gelatine emulsions, I am beginning to think seriously that, as like begets like, my brain has acquired the faculty of setting like such emulson, and so refuse to flow with the necessary ideas. Recognising this as a possible fact, I think it is high time to strike another chord, and if I can succeed in making it reverberate to some good purpose, I shall feel inclined to dance with joy to music of my own making. Gelatine emulsions and plates have had a very large share of attention given to them for a long time past—doubtless deservedly so, considering the very important part which they now play in our system. But there is another element in the photographic economy, which, recognising its bearing upon our future prospects, is, in my humble opinion, of sufficient importance to warrant us in giving to it a greater amount of attention than we have ever yet done: I refer to our method of printing. There is quite as much necessity for a revolution there, as ever existed in the negative department. Is not that a positive fact? There may be—indeed, I will admit that there is—a great charm and richness about a well-toned silver print; and so there is about the rich autumnal tints of nature, or the silver gray of the luxuriant appendages which man is sometimes vain enough to pride himself so much upon; but I must confess that all these have more or less a depressing influence upon my mind, for—

"Tho' rich and charming in their way,
They bear the impress of decay."

Regarding all this as inevitable, there is yet no reason whatever why we should not put a check upon it when we can—in fact, as a rule, we do. Then let us set to work and secure more permanent prints from our negatives, especially as existing means for doing so are now so ample and easy. I think it is a great pity that the public do not more frequently—

Ring in our hearing the doleful cry—
These shadows how fleeting—how soon they fly!
They pleasantly greet us, then bid us good-bye.
Our turn will come next: we'll stop the supply.

Ah! that would do it! If they only laid a finger upon our bread and butter we should see the necessity for immediate action, and treat them more fairly in this matter. I am very pleased to find that there is a growing feeling on the part of the public generally in favour of platinotype printing, and it seems to me that if there could be more concerted action amongst photographers it might be made a popular method of perpetuating our productions. It is something new to them, and there is always a charm in novelty, apart even from its intrinsic value. It is worthy of note that the Platinotype Company have very recently adopted a much more reasonable policy than formerly characterised their proceedings, and, if I mistake not, this will prove a benefit alike to themselves, to photographers, and the public. I would very strongly urge upon the members of our fraternity, who have not already done so, the desirability of giving this process a fair trial, and introducing it to their customers. The working details are very simple and interesting, and the proofs themselves are stated upon highest authority to be unquestionably permanent. The only difficulty I have found in working this method is, that of keeping the paper absolutely dry, which, in order to secure the best possible results, is of vital importance. In support of this fact allow me to state that only a short time since, I had occasion to make a large print from a very intense negative. After taking, as I thought, all necessary precautions against the influence of damp, I placed the printing frame containing the negative and paper in the open air to print. Result No. 1 was a poor, weak, muddy-looking proof. Knowing the paper to have been in perfect working order only a day or two before, and the atmosphere being as free from humidity as could reasonably be expected at this season of the year, I was puzzled, and made a second attempt under similar circumstances, but with a similar result. I then took the printing frame, negative, and pads, and thoroughly warmed them before the fire, and tried a third time, making the exposure in an apartment heated with hot air. The result proved all I could wish. Here, then, was a case where, if the conditions of success had not been in a measure understood, the process itself might have been put down as the delinquent. There is every reason to suppose that many of the failures which have arisen in working this beautiful process are directly traceable to the same cause.

I would just add that, as a medium for working upon, the paper as prepared lends itself most admirably to all the requirements of the artist, whether it be for colour or black and white.

ROMANCE AND REALITY IN PHOTOGRAPHY.

BY C. S. THOMPSON.*

THE subject I have chosen for my paper this evening necessarily gives it a somewhat miscellaneous character. That photography has its romantic side few will deny, but that romance is of such an erratic order that it is hard to say when or where it may be found. There may be romance in the subject—a subject teeming with the pure and lovely freshness of youthful vigour; but, at the same time, it may defy all the skill of the magician of the camera to reproduce the same upon his plate. On the other hand, the subject may be real and ordinary when as such the photographer wishes to secure it, but that tantalising spirit creeps in where least expected.

Perhaps the foregoing may be explained more clearly if we ask again the oft-repeated question—"Can photography be classed amongst the fine arts?" Painting and photography are undoubtedly sisters, but the similarity in their disposition and temperament is still an open question. One man may be able to take a good photograph, and another may be able to produce a correct drawing of a table or chair; but not one or the other of these could from their works be ranked as an artist, and, therefore, not one or the other would be able to infuse the slightest trace of romance or sentiment into his works. For my own part, I believe that unless a man be somewhat of an artist, he will be nothing more than a mechanical photographer.

There is one great distinction between art and photography, forming a barrier that is often overlooked. To the painter a certain amount of licence is always granted. His conception of a picture bears the stamp of his own personality. The treatment and touch of his work give him the opportunity of throwing life and spirit into a subject which may perhaps lack both. The photographer's case is different. He has to deal with things provided already, and, not having the same power to modify them, it is only by judicious selection, aided by a mind carefully trained in the study of lights and shadows, that he will be able to cause any of his own individuality to enter into his works.

The early photographs, on the whole, bear little artistic merit with them, especially in portraiture. Who was to blame for this? I know not; but my impression is that on it being discovered that a correct delineation of any object could be produced in a photograph, then that very fidelity became its own drawback. The general public also contributed—and do so now to a great extent—to destroy all romance in portraiture. The average sitter would not be satisfied with a picture that did not reproduce all his pet peculiarities. He wants everything to come out well. Perhaps he has had his hair cut and carefully oiled for the occasion, his handkerchief neatly folded square and emerging from his pocket to be in keeping with a gorgeous array of shirt

* Read before the Glasgow Photographic Association.

front, and his coat left unbuttoned so that his watch guard may be visible to his admiring friends. These are only a few of the traits of the "every-day young man" who does his best to bring photography down to a very low level.

But, unfortunately, the blame does not rest with his class alone. People in good positions, well educated, and, who, therefore, should know better, are almost as bad. As a rule they don't appreciate artistic portraits, and most likely will refuse to take them if they are offered. Of course if a person sits for his portrait, he should get a portrait and nothing else. I don't mean to say that the figure should be subservient to the accessories in the composition of the picture—far from it; otherwise beautiful pictures are often spoilt from this cause alone.

Why furnish a picture with articles that have no connection with the figure or the pose? But, apart from the furnishing of a picture, there is generally something about the arrangement of the figure that proclaims aloud the fact—"I am having my likeness taken!" This may in a measure be accounted for by the sitter having for some time previously been studiously experimenting to discover what style or attitude will suit him best, and having selected one, he desires the photographer to take him so. The most probable result of this will be the total loss of all the characteristics of the man. It is a most difficult thing to persuade people to allow their portraits to represent them in their everyday life; but this is, I am afraid, an evil for which the photographer has no remedy.

However, the same excuse cannot be made for pictures of actors or actresses taken in costume. For instance; an actor represents a certain character in a certain piece. Now there are few, if any, plays upon the stage that are not full of attitudes and situations incidental to the piece, and characteristic of the character; but often when the photograph is produced it is as much like one character as another. Why, then, throw all individuality on one side and give us nothing but a portrait of a person in some fancy dress?

It is here that the forethought and conception of the photographer are required to get life and animation into his work, so that it may tell its own tale. It is here, also, that the artistic training of the operator will tell him what is required, and combining this with his technical knowledge, he will be able to produce results which are faithful portraits, when, at the same time, the crudeness of stern reality is toned down by a touch of romance or idealism.

In some cases, though where feeling plays the most important part in a subject, the camera fails utterly. I may mention, in illustration of this, a deathbed scene—a single figure, encircled by sorrow-stricken relatives. What are the feelings such a scene as this would stir up in our breasts? And what feeling would we have on viewing a photograph of the same? Some people might approve of it, but others (and I think they would be in the majority) would say it was a desecration of the most solemn page in the history of life. Where is the romance in the photograph of a battle-field? What becomes of—

"All quality,
"Pride, pomp, and circumstance of glorious war?"

You may find them on the easel, but not in the camera. Therefore, as far as certain subjects are concerned, photography cannot (at least at present) raise itself up to the level of her sister of the brush. Many, I have no doubt, will be ready to contradict this assertion of mine; nevertheless, I believe it is true.

But if photography be denied certain most important facilities, such as I have just mentioned, she has others which in some measure help to compensate for these deficiences. In quiet, sunny, rural scenes; a mirrored lake, surrounded by hills, in all the luxuriant vesture of glorious summer; a yacht, with a cloud of snow-white canvas raised to catch the first passing breeze; or some wild glen or rugged mountain side only partially revealed between the driving clouds of mist. In such scenes as these (and there are many like them) the camera has equally as much, if not more, power than the brush. Take, for instance, some of the beautiful landscapes and studies now before the public. They are full of artistic feeling, and appeal more directly to our minds, because they faithfully represent scenes in our everyday life.

In using the word "romance," I am not sure if it fully express that feeling of mind and conception which is necessary. Some people may use other words that appear to them more applicable; but it matters little what word is used, for it will all result in an attempt to define that almost mysterious connection between mind and matter. I feel that what I have said this evening falls far short of what it was my wish to say, could I but frame the thoughts that are in my mind.

The two sides of the subject are so much alike, and yet so very dissimilar, that to draw inferences from one without touching upon the other is a most difficult and perplexing task; but it is a subject that demands the attention of every photographer, no matter if he be professional or amateur, or his work landscape or portrait. There is too much of the cut-and-dry style at present in vogue, which should be done away with as soon as possible. And now that we have rapidity of gelatine plates, and lenses of great "depth of focus," we have a far better chance of producing pictures that will compare more favourably with the work of the painter than in the early days of photography.

I may mention, in conclusion, a very curious case that has of late occupied the attention of judges in the law courts of Brussels, and which bears directly upon the subject of this paper. A Belgian artist, M. Van Beers by name, has recently painted a picture entitled, *Le Syrene*, or *Le Premier Pas*, which, on being exhibited, called forth the censure of the critics, one of whom boldly declared that the artist used photography as the foundation or base of his pictures. M. Van Beers very naturally resented such an an assertion, and forthwith entered an action against his accusers. On the case being decided there was little favour for the artist in the finding of the judges, who gave it as their opinion that M. Solvay (the newspaper critic) had not overstepped the bounds, and that his statement was quite justifiable. This verdict does not, however, settle the question that will have most interest with artists generally. Whatever may be the case, this painting has certainly a very photographic appearance about it. If it be not a coloured photograph, then M. Van Beers has in his treatment and drawing managed to get that very fault into his work which is the greatest drawback in ours, namely, too much reality and too little romance.

Photographers as well as painters should, if they have any artistic knowledge at all, be able to see more in a subject than there really appears to be on the surface, and they should not have it said of them, as was said of a certain man, that—

"A primrose by a river's brim
A yellow primrose was to him,
And it was nothing more."

Now, gentlemen, here is an engraving from the picture in question, so you may judge for yourselves how much the photographer has assisted the artist in the production of *Le Syrene*.

Correspondence.

A PHOTOGRAPHIC SOCIETY FOR THE NORTH OF LONDON.

Dear Sir,—Judging from the reports which appear periodically in the News, I almost envy those of my brethren who are privileged to attend the very interesting and instructive meetings of the different societies of which they are members. I take this occasion of asking whether in the North of London (where a society once existed) there is not sufficient material to form a society? There are the adjacent districts N.W. and N.E., containing several photographic establishments. Perhaps there are others, who have felt the same want as myself, anxious to come forward in the matter.—Yours very truly,

North London.

SULPHITE OF SODA DEVELOPER.

Sir,—I have been surprised that so little notice has apparently been taken of Mr. Berkeley's sulphite of soda developer. I tried it some time ago, and, since doing so, have abandoned all others for it. I am sure it will prove a boon to those who, like myself, have always preferred pyrogallic to ferrous oxalate, and I am writing in the hope that others will be induced to give it a trial.

The quality of a plate developed by pyrogallic and sulphite of soda is very closely akin to that of one developed by ferrous oxalate. There is none of that yellowness caused by plain pyrogallic. The colour is such as to produce excellent transparencies for the lantern, and even prints upon opal glass. The printing qualities, too, of the negative are much superior to those produced by plain pyrogallic. I find also that it is far easier to obtain the requisite density with the sulphite than with other developers.

A picture on a properly exposed plate usually, with me, begins to appear in about half a minute, and the development is generally complete in from four to five minutes, thus allowing ample time to make any modification the development may indicate.

I may add that I use $1\frac{1}{2}$ grains pyrogallic, and 6 grains sulphite of soda (neutralized) in every ounce of developer, to this I add from $\frac{1}{2}$ grain to 2 grains ammonium bromide, and from 2 grains to 3 grains ammonia according to the requirements of the plate.—Yours truly,

Vero C. Driffield.

EMULSION MAKING.

Sir,—In your leader (page 73) you say that it is doubtful if the finished emulsion contains any chloride or iodide at all. If you look by daylight at cloths that have been in contact with an emulsion containing an iodide, you will observe that they are of a deeper yellow than when only bromide is used, and, if there is any chloride in the emulsion, it soon gets of a purple colour, proving the presence of chloride, as neither bromide nor iodide gives this colour; and if a plate covered with an emulsion containing chloride is put behind a negative in a printing-frame, a picture will make its appearance in a few minutes, and this picture remains even after all the bromide and iodide is dissolved in the hyposulphite bath. It is a noteworthy fact that the chloride is far more sensitive than when in combination with albumen, and, although the image is faint, no doubt its vigour would increase in proportion to its increase in the emulsion.

I may add that the emulsion I use contains only 10 grains of chloride and 120 grains of bromide. Any one can be satisfied of the truth of what I state by an experiment.—Yours respectfully,

William Birrell.

THE DUNDEE EXHIBITION.

Sir,—Your correspondent, "Due South," is dissatisfied with the awards of the Dundee jury, but you declare your conviction as to the integrity of the judges—a most proper view. There can be no doubt this medal-giving business causes great heart-burnings and jealousies to spring up, and when a man once obtains a medal he appears to expect the highest awards at every exhibition to which he may contribute for the term of his natural life. I should say Messrs. Robinson and Jennings would consider it a great impertinence to be asked such a question as "Due South" suggests; both these gentlemen have more medals than they can comfortably stow away, and would certainly not object to a few going to the "second and third-rate men." Indeed, Mr. Robinson's window gives one more the impression of an engraver's than of a photographer's, such is the plentitude of the numismatic display.—I am, sir, yours obediently,

Southron.

ERUPTIONS CAUSED BY THE ALKALINE DEVELOPER.

Sir,—In your report of the Thursday evening meetings in last week's News, there is a statement by Messrs. Henderson and Turnbull, regarding the ill effects of the alkaline pyrogallic developer on the system; and as I am at the present time suffering from the same symptoms as there described, I can fully corroborate their statements. I have worked gelatine plates for the last three years, and have always used the alkaline developer. In June last the first spot appeared under the joint of my left knee, first being very small, but gradually spreading in a circle to the size of a shilling, itching a great deal at times, and when rubbed, watery matter exuding; the next one appeared on my left hand, between the knuckles, which I thought at first was a heat bump, and knowing that ammonia allayed the irritation, I applied some; but as the place gradually grew bigger, I tried numerous remedies, none of which did any good, and it was not until I went for my holidays that there was any improvement, when the place on my leg got quite well, and the one on my hand nearly so; but I had not been back to business more than two or three days when my hand was quite as bad again, and just about Christmas another appeared on the back of my right hand, which is still very bad. It was not until about three weeks ago that I began to suspect the real cause, as I then noticed that if I did not develop any plates for a few days the places would be decidedly better, but directly I did so they were worse again. I think this a matter that deserves investigation in the interest of the profession, and hope you will take the matter up in your valuable journal. For my own part, I am trying the ferrous oxalate, and mean to try and banish altogether the alkaline pyrogallic.—I am, yours, &c.,

Frank H. Berry.

ELEMENTARY LESSONS IN PHOTOGRAPHY.

Sir,—The writer of this is quite overjoyed to read that elementary lessons are to appear in the Photographic News. Having some leisure, he would like to occupy it by photograppic amateuring. Sensible of slowness of comprehension, and being somewhat dull of understanding, he ventures to beseech that the lessons which are about to be given may be carefully adapted to the very meanest capacity for receiving instruction, through their author being mindful to point out every inch of the ground he traverses. For the sake of the densely stupid, let him not, in desiring to avoid becoming too voluminous, err in the opposite direction, and be at all chary of furnishing the very fullest painstaking explanations on all points whatsoever.

The undermentioned will owe him much gratitude, if he will kindly condescend to describe with the utmost minuteness and distinctness of language each single separate step, *seriatim*, of not simply what is to be done, but exactly how it is to be done, and in what order and manner, stating all the little (apparently) insignificant minutiæ of manipulation and arrangement which are essential to success, and which those who know how to practise them find so valuable in yielding perfect results.

It is exceedingly difficult for an instructor who can do anything skilfully, to analyze what he does, take it to pieces, and show how perfection is gradually arrived at. The method has become so much a matter of course to himself, that it seems to him as if the same degree of knowledge and power he possesses must come to others by the light of nature, and not through his brain being taught to work, and his habits being trained and formed. A teacher commonly assumes that his pupils have far greater intuition than they really possess. But how likely it is that even highly-intelligent persons may easily overlook what is obvious, appears from the story of Sir Isaac Newton not seeing that there need not be two holes in his door for his dog and his cat.—Faithfully yours,

Chesterfield Junior.

Proceedings of Societies.

Thursday Evenings for Photographers.

At the meeting held on the 23rd ult., Mr. J. A. Harrison occupied the chair.

Mr. A. J. Brown read a paper entitled, "Notes on Pits in Gelatine" (see page 102), and a discussion followed.

Mr. Henderson said that pitting had been attributed to the admixture of two gelatines of different setting powers, but he was of opinion that it was partly due to the presence of carbonic acid gas; he had found that an emulsion giving pits when freshly made, if kept for twenty-four hours in a liquid state did not then give pits.

Mr. W. E. Debenham thought Mr. Brown's experiments were very interesting and useful. In his experience, thinking grease might be the cause, he had washed the sheets of gelatine with ether, and this not having the desired effect, he had dissolved it and agitated with ether, but all without success, thus showing that grease was not the culprit.

Mr. Mackie suggested that it would be interesting if the experiments were repeated, using a solid fat such as suet. He showed several negatives having iridescent stains on them, more especially near the edges and in the shadows; this he found could be cured by immersing the plate in a solution of pure cyanide of potassium.

Mr. Debenham attributed the stain to gas fumes in the air.

Mr. Brown thought it was a deposit of metallic silver caused by contact with the air.

Mr. Reimann had, when developing a negative, observed a stain very similar to that shown by Mr. Mackie, but found that he could rub it away with his hand.

Mr. Haddon said that when chloride of calcium was used in drying-cupboards, if placed in an ordinary beaker, after a time it becomes inert by being covered with moisture, and he showed a modified arrangement he had devised to overcome this difficulty; this consisted of a perforated inverted cone fixed in a saucer-like trough so that the moisture drawn from the air by the calcium percolated through the holes in the cone into the trough beneath.

Mr. Ashman had noticed that if a negative was brought into the sunlight after being fixed, and previous to washing off the hyposulphite, it becomes much-reduced in density.

Mr. Debenham had noticed the same effect if the plate was slightly washed first.

Mr. Henderson thought it was not so much caused by the sun as by the action of the air in the presence of hyposulphite, and instanced the fact that if a plate is removed from the hyposulphite, and left without washing, in a very short time it will be dissolved away; whereas if a negative is left for some days in the hyposulphite solution it will not be much reduced.

A question from the box was read, viz., "Is there any means of toning a silver print with gold after it is fixed?"

Mr. Henderson suggested the old hyposulphite and gold formula.

Mr. Debenham said that Mr. England's pictures of the 1851 Exhibition were all toned by being placed in a solution of hyposulphite till yellow, and then removed to another of hyposulphite and gold 1 to 6.

Mr. Henderson had also adopted this method in consequence of noticing that the prints did not commence to tone till the chloride had been removed.

Liverpool Amateur Photographic Association.

The monthly meeting of this Association was held on Thursday evening, the 23rd ult., at the Free Library and Museum, Mr. E. Roberts (President) in the chair.

The minutes of the preceding meeting having been read and confirmed,

The Chairman announced that a picture of Meyringen, by Mr. W. England, had been selected by the Council for enlargement as the presentation print for 1881. He (the Chairman) then read the following rules which had been drawn up by the Council for the regulation of the annual competition :—

1. That pictures for competition be sent in not later than 6.30 p.m. on the day of the meeting of the Association in November, addressed to the Honorary Secretary, Liverpool Amateur Photographic Association, Free Public Library, Liverpool.

2. That each picture shall bear a private mark or motto only, and be accompanied by an envelope bearing a similar mark or motto outside, and contain within the proper name and address of the competitor.

3. That the subjects for the annual competition be chosen by the Council, and announced to each member on the circular summoning the November meeting.

4. That certificates of honour and prizes be awarded by three judges, to be selected by the Council.

5. That each picture be mounted on a separate mount.

6. That only one picture by the same member be submitted for competition in each subject.

7. That the competing pictures must have been taken during the year preceding the adjudgment of the certificate or prize, and that the development, printing, and toning must have been the *bona fide* work of the competitor.

8. That a certificate of honour be given annually to the producer of the best picture illustrative of each subject.

9. That a prize be given annually to the producer of the best series of competitive pictures.

10. That a prize be given for the best picture of the year, not necessarily a competitive subject.

11. That a prize be given annually to the producer of the best picture, on any subject, on plates or films entirely prepared by the competitor.

12. That all exhibits become the property of the Association.

The following had been selected by the Council as the subjects for 1882:—Landscape, with Distance; Country Lane; Waterfall; Flowers, Fruit, or Ferns; Relics of the Past; Instantaneous; Human Figure Study; Winter.

The Secretary read portions of a letter from Mr. J. H. T. Ellerbeck, announcing that he proposed to be "at home" on each alternate Tuesday evening from 7 to 9 p.m., at his address, No. 7, The Elms, Peel Street, the Dingle. These "at homes" are "open to all or any members who wish for information, or a quiet chat on matters photographic."

The Chairman referred in complimentary terms to Mr. Ellerbeck's most kind offer, and, on behalf of the Society, accepted it very gratefully. He thought that it could not but be of the greatest assistance to the members, and especially to those who had newly joined the Society, to receive the benefit of Mr. Ellerbeck's experience and advice.

The Hon. Secretary read a paper, by Mr. H. Houlgrave, "On the Intensification of Gelatine Negatives or Positives with Silver" (see page 103). The paper was illustrated by a number of negatives and positives, intensified by Mr. Houlgrave's process. These were greatly admired by all, as among the most perfect and beautiful specimens of photographic work which had ever been exhibited.

A unanimous vote of thanks was accorded to Mr. Houlgrave for his most useful and interesting paper.

Mr. A. Pumphrey, of Birmingham, then gave a detailed account of the modes of exposing, developing, and drying his new films. The filmograph, with its appurtenances, was exhibited and explained in every particular, and Mr. Pumphrey answered fully numerous inquiries put to him by the members present.

A vote of thanks to Mr. Pumphrey was proposed by the Chairman and seconded by Mr. W. H. Kirkby, and was carried by acclamation.

Mr. Knott then gave a lantern exhibition with the lime light, the slides having been supplied by himself, the Rev. A. T. Scott, Mr. Boothroyd, the Hon. Secretary, and others.

A vote of thanks having been accorded to Mr. Knott, the meeting, which was largely attended, adjourned till the last Thursday in March.

Talk in the Studio.

Leeds.—A meeting of the amateur and professional photographers in the Leeds district will, we are informed, be held at the Mechanics' Institute on Thursday, March 9th, at 8 o'clock, to receive the report of the committee, and make arrangements for the organization of the proposed photographic society.

A New Drama.—The *Daily News* says: "Mr. Baden Pritchard has dramatised his novel entitled 'Dangerfield.' The variety of character and the intrinsic interest of the story would seem to fit it well for the stage; and it is to be hoped that the author will, in spite of the defective state of our copyright laws, be permitted to enjoy the fruits of his own invention. 'Dangerfield' is a comedy-drama in three acts."

Metallic Designs on Glass obtained by the Aid of Photography.—An ingenious method of obtaining mirror-like designs on glass has been devised by Leclerc. The glass, having been silvered by the chemical process, is coated with a thin and uniform layer of sensitive bitumen, and this is exposed under a transparency, the next step being to wash away the unaltered bitumen with oil of turpentine, so as to leave the bituminous design on the silvered glass. The application of moderately strong nitric acid removes the silver, excepting where it has been protected by the bitumen, so that the metallic design shows like a mirror from the reverse side of the glass. The plate may be backed by paint or any other suitable material.

Mr. Sala on Art.—In distributing the prizes at the West London School of Art, Mr. Sala said that within the last thirty years there had occurred five distinct boons for which lovers of art ought to be grateful. The first and second were the purchase by the Government of the Elgin marbles and the series of international exhibitions which followed the Great World's Fair of 1851. For the third boon they had to thank two very different and conflicting influences, the great fire which destroyed the Houses of Parliament, and the remarkable religious revival then called Puseyism, and later Ritualism, which was awakened by the "Tracts for the Times." The burning of the Houses of Parliament led to a Royal Commission for the encouragement of the fine arts, and to the adoption of the Gothic style by Sir Charles Barry, aided by that wonderful draughtsman the elder Pugin, which not only necessitated the application of a good architectural style, but brought in the decorator, the maker of stained glass, the modeller, the carver, and the manufactures of encaustic tiles and brass work. The religious revival led to the cultivation of mediæval art, to a kind of pictorial Puseyism, encouraging at least in one direction the art of illumination which had been dead for centuries. The last boons, he said, were the spread of Japanese art in this country, and of photography. He could not help recognising the numerous lessons they owed to the Japanese, beautiful symmetry and design, and true sympathy and brilliancy of colour. As to photography, the mighty artists scorned it; yet it enabled them to contemplate exact representations of the great works of ancient art, the originals of which were only to be seen at Rome, Pisa, and other places on the Continent.

Photometrical Standards.—Last week Professor Dixon read an interesting paper on this subject before the Chemical Section of the Society of Arts. After alluding to the (apparently) insurmountable difficulties in fairly estimating light, owing to its composite nature, the various standards and methods of photometrical working were described, and, in most cases, experimentally illustrated, it being demonstrated that such methods were but ill adapted for comparing lights of differing qualities, as, for example, candle light and the arc electric light. A demonstration of Arago's polarization method of determining the equality of two lights excited considerable interest. The rays from two sources were decomposed by passage through prisms of Iceland spar, and the ordinary ray from one source was made to fall on the same spot as the extraordinary ray from the other source, three luminous images being thus obtained. When both sources were adjusted to equality, no polarization existed in the case of the light resulting from the superposition of the two equally polarized rays; the observation being made with a selenite or quartz plate, while the two remaining light spots were, of course, completely polarized.

Death of Professor Marreco.—It is our melancholy duty to record the death of Professor Marreco, which took place last night at his residence, Westmorland Road, Newcastle. The learned professor had been ailing for some time. Last summer he felt far from well, and in writing to Principal Aldis, with whom his relations were of the most affectionate character, he said a holiday would be absolutely necessary. From some cause or other this holiday was not taken. The Professor worked on until the close of the year, but from that date his strong life-energies began to droop, and he has at length succumbed to his malady. A. Friere Marreco, M.A., F.C.S., was born at North Shields. His father was a Portuguese merchant, his mother, Miss L. Harrison, was daughter of Mr. John F. Harrison, originally of Somerset House, a family ably represented in Newcastle by the eminent engineer of the name. At a comparatively early period the exigencies of commerce took Mr. Marreco's father back to his native country, and thus it was that in Lisbon the departed Professor laid the foundation of that extensive knowledge of chemistry by which he was distinguished. Although his connection with England was temporarily broken, while he was yet a youth he returned to Northumberland, and perfected his chemical knowledge amidst its manufactures. From 1859 until 1867 he performed the chief portion of the duties of reader in chemistry in Durham University, acting generally during that time as the deputy of Dr. Richardson. Ultimately he succeeded to the office of lecturer, and in due course became demonstrator in the Medical School in connection with the University. Professor Marreco was one of the original members of the Newcastle Photographic Society, and was also a member of its council.—*Newcastle Chronicle*, February 28th.

To Correspondents.

David Hedges.—You desire an answer, not from the Editor of the News, but from one of the Dundee judges; unfortunately, the latter is not in a position to reply, much as he might wish to do so.

W. H. Cheesmann.—Neither the exhausted alkaline pyr gallic developer, nor the iron oxalate solution, contains any silver or other substance worth saving. If you were working on a very large scale it might pay you to wash off the films from spoiled plates and to extract the silver.

F. Stanley.—The starch is free from hyposulphite, and we would recommend you to use plain collodion in preference to iodised. Such an experiment as the following would be sufficiently conclusive for founding a claim upon. Cut a print into three parts, one of which should be unmounted, the second mounted on a reliable sample of card, and the third on the doubtful sample, then keep all three in a damp cellar. It is, we believe, an established matter of law, that when a material is sold for a specific purpose, there is an implied guarantee as to its suitability for such use.

W. B.—There can be but little doubt that in the town which you mention there will be abundant facilities for disposing of good views of the neighbourhood. Situated as you are, it would probably answer your purpose to employ some photo-mechanical process, as Collotype or Woodburytype. We shall have pleasure in giving you any information in our power.

W. W.—The second formula (B) is to be preferred, and the use of hot water should be avoided.

H. A.—The value of negatives is so variable and so much influenced by special circumstances as to make it difficult to estimate. If the views you enclose have no special interest attached to them, and are merely to be regarded as photographic scraps, it is probable that you will not obtain more than 20s. each.

J. T. C.—Mere exposure to the air would not cause the blacking you refer to, and we are at a loss to account for the phenomenon. You might cut two small strips from the border, and try the effect of hyposulphite of soda on one, and of weak cyanide on the other. If you succeed in restoring the print, you had better secure as perfect a copy as practicable.

J. Berryman.—Of course we cannot say with certainty what is the cause of the defects which appear on developing your plates, but we have found a similar coloured fog to arise from either one of the following causes: 1. The use of dirty or porous vessels capable of contaminating the emulsion with decomposed remains of previous batches. 2. Partially decomposed or unsuitable gelatine. The "opaque gelatine" sold in packets by the grocers is often unsuitable and causes red fog; but we have always found the selected or "X opaque" gelatine sold by Messrs. Nelson and Co. to be satisfactory. 3. The use of imperfectly purified ammonia. The *liquor ammoniæ* sold as made from volcanic ammonia is generally pure. 4. Fumes of putrescent matter in the preparation or drying rooms.

F. Cowley.—1. Very good results have been obtained by the process you refer to, and you will find particulars in back numbers of the News. 2. The use of pink or white albumenized paper is a matter of taste; but you will find that comparatively few high-class photographers use pink paper except in rare cases. 3. Occasionally, but not often. *Second letter*. 1. We have no doubt that Mr. Henderson would send you a copy if you were to write to him. 2. Yes. The process is very easy, and plain directions will be found in previous volumes of the News or the Year-Books, and also in Captain Abney's Instructions. 3. About three-sixteenths of an inch is a convenient thickness. 4. It is a kind of mineral pitch which is found in many parts of the world. You can obtain it from Hopkin and Williams, of Cross Street, Hatton Garden, E.C. No definite formula can be given, as samples vary very much as regards solubility. 5. They will be printed in the Journal of the Society of Arts during the summer, and probably be reprinted in the Photographic News. Thank you for your kind wishes and suggestions, and rest assured that no number of questions will weary us as long as they arise from a sincere desire for information.

Thomas.—We should prefer No. 1.

G. M.—Considering everything, you would probably find the second most suitable for your purpose.

J. R. X.—We would advise you not to use acetate of lead at all, as it is practically impossible to prevent the formation of traces of the insoluble sulphate or the carbonate, and these easily become blackened by traces of sulphur compounds.

Bradford Experimenter.—It is a colourless and invisible gas, but when it comes in contact with the air it absorbs oxygen, and red fumes of the mixed tri-oxide and the tetra-oxide are formed.

T. Braid.—The single thickness of yellow-glass, like sample, will serve very well, provided you take great care not to expose your plates unnecessarily to the light.

K. L. Johnson.—The operation requires some care and experience, but by observing the precautions given in the paper referred to, and avoiding dampness during the process of laying the film, you ought to succeed.

THE PHOTOGRAPHIC NEWS.

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CONTENTS.

ABSORPTION OF LIGHT IN THE ATMOSPHERE.

The blue colour of the atmosphere on a cloudless day has, like very many of the other familiar phenomena which nature presents to us, been for a long time the subject of scientific investigation by physicists, and the enigma of meteorologists; and many speculations have been advanced respecting the cause, not only of the blueness of the sky, but also of the bluish haze which appears to veil dark shadows and distant objects.

Originally it was supposed that this tint was caused by the presence of exceedingly minute particles floating in the upper atmosphere, rendering it turbid, and reflecting chiefly the rays of smallest wave-length, owing to their very minute size. Nor is this theory without foundation, for many similar phenomena are known to be produced by matter in a finely-divided state. Professor Tyndall has performed many experiments, showing the action of vapours on light; and, by passing a beam of light through tubes containing air mixed with various organic vapours, he was able to produce artificial blue clouds. As the result of his experiments, he concluded that the blue colour of the sky was due to the existence in the higher regions of the atmosphere of excessively fine particles of water or of some other substance, so finely divided, indeed, that their wave-lengths form but a small fraction of the length of a wave of violet light. This theory is strengthened also by the fact that both the light emitted from his artificial blue cloud, as well as that from a blue sky, is polarised in a direction at right angles to the axis of the rays.

More recent researches, however, have thrown additional light upon this subject, and have led to the idea that the cause of the blueness of the atmosphere is to be found in the absorptive power of ozone. Nor can we deny the fact that it is extremely difficult to believe that the extraordinary transparency of the distance, on many occasions when the sky is bluest, could exist when the air is filled with innumerable particles of solid matter, however small they might be; for in that case we should expect increase of blueness to be accompanied by greater haziness of the atmosphere.

At no very remote period it was doubted whether ozone existed in the atmosphere at all; for, unfortunately, the tests for its presence are ambiguous unless applied with the greatest care. But, although our knowledge of its actual amount and variation is still far from being perfect, recent researches prove conclusively not only that ozone is present in the atmosphere, but also that it plays a very important part in the absorption of solar rays.

It is found that a column of air a square centimetre in section acquires a full sky-blue tint from the presence of only 2·5 milligrammes of ozone, and a very considerable quantity of air assumes a blue colour even when not mor than about $\frac{1}{700000}$ of its volume of ozone is present. Now this amount has been determined by Houzeau to be present under ordinary circumstances in the atmosphere. Hence it is extremely possible that ozone may be the cause of the blueness of the sky.

It has been shown by Hartley, who recently contributed to our columns the account of some interesting photo-spectroscopic observations, that if the absorptive power of gases and vapours causes this colour in the atmosphere, the other constituents of the air cannot play any important part in the phenomenon; for ammonia, water-vapour, and carbonic acid are all perfectly diactinic, even in considerable quantities. The only other substance capable of absorption of solar rays would be the oxides of nitrogen; but Hartley shows conclusively that it is impossible for these substances to have much effect in this respect; for if present, these substances would probably exist in the atmosphere as nitrate and nitrite of ammonium, which in minute quantities he found to be quite diactinic. Even if present in a free state in sufficient quantities to absorb the visible rays, the sky would not be blue at all; for photographs of the spectrum transmitted by the oxides of nitrogen show that these gases absorb just those rays which ozone transmits.

Now it is without doubt that the solar spectrum, as transmitted by ordinary air, is limited by the absorptive power of some constituent of the atmosphere, nor is this constituent invariably present in the same proportions; for Cornu has shown that the limit of the spectrum varies considerably with different meteorological conditions, the actinic rays being transmitted in greatest quantity at noon and at high elevations.

These facts, coupled with the extraordinary power which ozone possesses of absorbing the ultra-violet rays, seem to prove beyond doubt that Hartley's views are correct, and that the ozone present in the atmosphere causes the limitation of the solar spectrum.

Thus the amount of ozone present in the air acquires a peculiar interest to photographers, by directly influencing the actinism of the sun's rays. Unfortunately, however, it is extremely difficult to determine with accuracy the variations which it undergoes. In the opinion of some chemists the proportion of ozone in the air is constant; but the experiments of Houzeau and Reiset seem to prove that it increases in quantity at high elevations and with the prevalence of S.W. winds. Nor is it probable that its amount depends entirely upon the electrical conditions of the atmosphere, for it is produced in considerable quantities during the evaporation of water, and is probably derived from this source rather than from aerial discharges of electricity. Its absence from the air above great towns is explained by the fact that it is reduced by organic matter and sulphurous acid to the state of ordinary oxygen: but probably the ozone in the higher regions of the atmosphere would remain unaffected.

At a recent Thursday evening meeting the question was discussed, whether fog in the atmosphere cuts off the actinic rays of light in the same proportion as it does the luminous rays. The opinion was, that on account of the absorption of actinic rays by the yellow colours of the fog, the more refrangible rays were cut off in even larger proportion than the luminous rays. It is well known that smoke and volatile hydrocarbons are quite capable of extraordinary actinic absorption. In the opinion of Professor Hartley the presence of dust, such as carbon or finely-divided opaque matter, has no other effect than to intercept the light and to weaken the whole spectrum; but the presence of even a minute quantity of benzene or napthalene is to cut completely out a portion of the spectrum, so that no increase in the length of exposure would supply the missing rays.

It is gratifying to learn, however, that in most cases absorption does not increase in proportion to the quantity of the absorbing body present, but that generally a maximum effect is produced, beyond which any additional increase is without any appreciable effect. But it is without doubt that very large numbers of the imperfections in negatives produced by errors of exposure, on days when the conditions of light were apparently well understood, have their origin in atmospheric absorption of actinic rays. In all cases photographers should guard themselves against the fallacy that a clear sky is necessarily accompanied by the maximum actinism of light.

ELECTRIC LIGHT IN THE DEVELOPING ROOM.

A leader which appeared in the Photographic News, during July last, served to call prominent attention to the necessity for making some provision for ensuring a proper change of air in the dark-room; and in illustration of this point we referred to some calculations which we had made with regard to the amount of oxygen consumed by an ordinary gas jet, or by a paraffin lamp of similar illuminating power. Such a flame was found to consume an amount of oxygen corresponding to complete removal from no less than 40 cubic feet of air per hour; such a consumption of the vital element being approximately equal to the amount of oxygen absorbed in the lungs of an average man during two hours. Thus the lamp would possess a vitiating power corresponding to that of two men; but in making a comparison one must not lose sight of the fact that the lamp is likely to burn in the dark room for a longer time than that during which it is actually tenanted by the photographer or his assistants. Another point that must be remembered in connection with the lamp is the fact that unless the air-way through it is sufficiently large to insure the most perfect combustion, we have not only carbon dioxide formed—this in itself acting as a narcotic poison—but also carbon monoxide, this latter possessing, even when present in a minute quantity, a direct physico-chemical poisonous action on the blood. There can be but little doubt that many of the cases of injury to health (which have been attributed to fumes of ammonia or to pyrogallic acid) ought really to be laid at the door of carbon monoxide. It should be remembered that carbon monoxide is invariably formed when a e rbonaceous fuel burns with an insufficient supply of air, and in taking precautions to prevent the escape of light through the air-ways of the lamp, the photographer is making arrangements by which this singularly poisonous gas is generated to a dangerous extent.

When we were making experiments on the use of the Swan incandescent light for portraiture, we tested the value of the lamp in question for illuminating our dark room, the bulb being placed in a vase of ruby glass and covered over at the top. The result was most satisfactory, and our only regret was the impracticability—at any rate in our own case—of always having at hand a source of sufficient electric energy to keep the carbon thread at the required temperature. Since then we obtained some very small incandescent lamps in which a platinum wire replaces the carbon thread of Swan; and as these lamps—which are made by Messrs. Becker and Co., of Maiden Lane—can be worked by three or even two cells of a bichromate battery, we immediately proceeded to experiment on their suitability for dark-room illumination. In the first place, one was carefully painted over with a suitable red varnish, and suspended in a convenient position by two thin insulated wires, a small piece of tin-foil serving as a reflector and eye-shade. A button for making and breaking contact was fitted to the edge of the table, and three pint cells of Bunsen's battery were charged, and placed in a convenient position out of doors. This arrangement was found to possess most important additional advantages over ordinary lamps, as a touch on the button serves to re-light or to extinguish it, and the light can pass directly downwards without obstruction. As the lamp is no larger than a small walnut, and it hangs quite freely from the flexible conductors, it can be slung up on a hook against the wall, or suspended directly over the developing-dish, as may be required. The three cells of Bunsen's battery served us off and on for more than a fortnight, although, at one time, the acids were somewhat weakened by rain falling into them. An experiment was next made with a hand Gramme-machine as a source of electricity; but the first few turns caused the platinum wire to fuse, the current being too powerful. When, however, another lamp was set up, and the machine was turned slowly, the result was most satisfactory, the power required to drive the machine being quite trifling. We should suggest that a very small Gramme-machine, mounted on a sewing-machine treadle-stand, would be about the most convenient arrangement, and a little extra would gearing enable the machine to be actuated by either foot or by hand, the odd boy of the establishment supplying the motive power.

Others can now adapt and vary our idea of the application of the incandescent lamp to dark-room use, by making the lamp of ruby glass, or its immersion in a red liquid; and possibly a thermo-electric battery might with advantage supply the small amount of electricity required.

THE LATE M. POITEVIN.

This distinguished chemist has just died at Conflans, in France, whither he retired some time ago, after many years of arduous work in connection with photographic investigation. His labours were chiefly confined to the elaboration of permanent printing processes, and to him we owe in a very great measure the success that has attended carbon printing and the production of photographs in greasy ink.

As far back as 1855, M. Poitevin recognized the property possessed by gelatinous, gummy, and other similar bodies, when impregnated with a solution of bichromate of potash, and exposed to light, of taking up and retaining a greasy ink, and succeeded in applying the discovery to the perfection of a photo-lithographic process.

By covering a lithographic stone, grained in a suitable manner, with a coating of gum or albumen, mixed with a solution of bichromate of potash, and allowing the same to dry, a sensitive film was obtained, on which a picture was produced by means of a negative. Prints were then obtained by the ordinary lithographic process, the ink adhering to those parts only which had been rendered insoluble by the action of light. On the publication of his process, M. Poitevin pointed out that the employment of the bichromate compound might serve for the production of metallic plates in *relief* or in *intaglio*, applicable for use in the arts of engraving and typography, as a film of the material in question, after exposure to light under a negative, was found to resist the action of water in those parts which had been modified by the light; whereas the unaltered portions became swollen when moistened, thus forming a perfect design in *relief*, from which a cast could be prepared.

M. Poitevin, as a pioneer in the matter of photo-lithography and collotype printing, received the Duc de Luynes' prize—or, rather, the greater portion of it—in 1867. The total amount offered was 10,000 francs, and of this, something more than 8,000 was awarded to M. Poitevin, who was considered to have most nearly solved the problem for which the prize was instituted—the production of permanent photographs.

M. Poitevin, notwithstanding his success as a photographic experimentalist, was far from being a successful man. At the time he received the Luynes prize, he was obliged to support his family by accepting the humble situation of chemist in the small town of Ahun, in the department of the Creuze. Fortune smiled on him somewhat afterwards, but he never was in affluent circumstances. He was the most modest of men, albeit in later years a little soured by reason that so little pecuniary benefit had come to him. We believe he only took out one patent, which was sold to MM. Tessié de Mothay and Maréchal for £400, and upon which may be said to be founded collotype printing.

To those who were intimate with him, he was a warm and sympathising friend; but to the outside world his demeanour appeared grave and retiring. He had not occupied himself with photographic research for some time, his last contribution being a printing process combining the use of iron and silver salts, and which will be found published in our columns in January, 1880.

Although he had been suffering for some time, his death (which occurred on the 4th inst.) was so sudden that a scheme projected by M. Léon Vidal and others to invest the funeral with a semi-official character by inviting delegates from the various photographic societies, unhappily fell to the ground. M. Poitevin was 63 years of age.

At Home.

MESSRS. JAMES VALENTINE AND SONS AT DUNDEE.

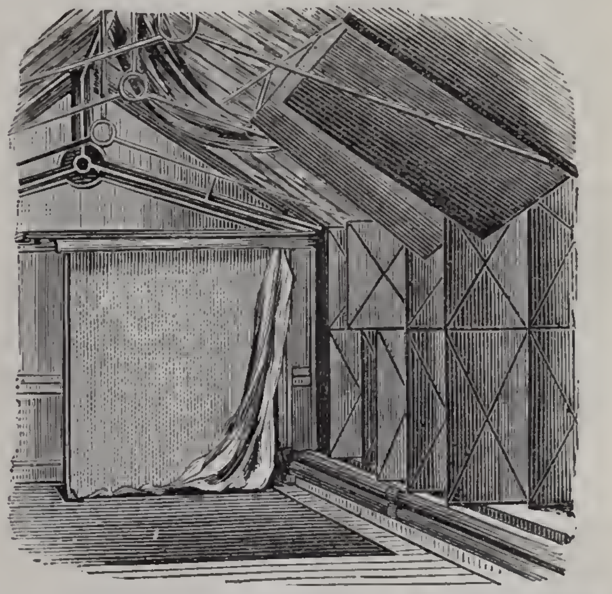
The largest photographic establishment in Scotland, and one of the largest in the world—that of Messrs. James Valentine and Sons—takes very high rank indeed. Mr. James Valentine himself died two years ago, just as he had completed the re-organization of the vast undertaking which bears his name; but his sons (Mr. W. D. Valentine and Mr. George Valentine) have shown themselves in every way equal to the task of carrying out their father's designs. As many as forty employés are to be found in the establishment of Messrs. Valentine, and it says something for their administrative ability that this number of hands is engaged all the year round. The work is so well regulated that, both summer and winter, there is plenty to do, in one department or the other.

Perhaps the best idea of the extent of work done is to be gathered from the fact that 3,000 prints a day is not an unusual number to produce, while upon the printing-tables may be found, at any rate in dull weather, as many as 700 frames. The principal work is the production of views of Scotland, Mr. W. D. Valentine being responsible for the negatives, which, as our readers know, include the most delightful scenes that have ever been taken of that delightful country. Every phase of Scottish scenery is here. A cluster of dark granite boulders, strewn with brown seaweed, and beaten by angry waves, whose white foam is tritely characteristic of their spent wrath; a placid loch, with stately craft floating calmly on its surface; a solitary lighthouse of silver grey, rising from a clump of black rocks, and surrounded by turbulent waves flecked with white—a very painting; lichen-grown crags, sweet forest glades, delicate fern gardens, bowery foliage—in a word, nature in every shape and mood is here represented.

The Messrs. Valentine also enjoy high reputation as portraitists, and it is, indeed, into the portion of the establishment devoted to portraiture that we are first led. A hall tastefully furnished leads to the reception-room, whence again a corridor takes us through the dressing-rooms to the studio. We may mention here that it is in the reception-room that the only open fire in the whole establishment is found, for, following the example of Mr. Marshal Wane, of Edinburgh, Messrs. Valentine employ hot-water piping throughout. They make use of Keate's boiler and coil, which is found to be exceedingly economical, for upwards of forty rooms are heated by its means, at an expenditure of between six and seven shillings a week. Gas cinders only are required for consumption, perhaps the most economical fuel one can use.

The studio itself, which is forty-six feet long, was most agreeably warmed (and this, too, albeit our visit was in February). Studios are apt to strike chilly in our experience, and if a sitter has to divest him or herself of any garments, a cold glass-room is not only unpleasant, but adds to the difficulties of the photographer. In Dundee, no doubt, cold is a greater enemy than in most towns; but still, the example of Messrs. Valentine is one well worth following. Moreover, the system of heating obviates many winter difficulties. "The snow never lies on the roof here," says Mr. W. D. Valentine, "for there is always warmth sufficient to melt it as it falls."

Curtains are almost unknown in Messrs. Valentine's glass room. Side light, and light from the roof is tempered by means of upright zinc shutters on hinges. The height of the lower range of shutters is 3 feet 6 inches, and of the upper one 2 feet 6 inches, their breadth being about 20 inches, the same as the sash. They are painted on the inside (that next the glass) of a pure white, and when opened more or less, reflect light upon the model at the end of the studio. Our sketch will give some idea of their construction.



Not only the end of the studio, but also the angle farthest from the glass, is fitted up as a background. The angle, indeed, forms a rustic arbour, tastefully arranged with fragments of cork bark, ivy, &c., so that with but little trouble it is constituted an apt and unconventional background for groups, &c. A change from the ordinary flat background is at times very welcome, and by simply turning the camera, this is here secured.

We pass through the retouching room, noting on our way two little points. The one is a plan of concentrating light upon negative or print; the ordinary plan, which we have already pointed out, is to have a spherical decanter of water near at hand, which condenses the light upon any spot on which you desire to work; but Messrs. Valentine employ, instead of water, a weak solution of sulphate of copper, the greenish hue of the latter being less trying to the eyes. "It is what jewellers always use," explains Mr. Valentine. The other point is that of employing a developed gelatine plate instead of pure glass to support the negative during retouching; the brown tint of the former is also preferred, as being less injurious to the eyes.

There are no doors to the darkrooms. Mr. Valentine holds them to be not only unnecessary, but positively harmful. They give rise to dust, and they are always in the way. They are, too, easily done without. The passage leading to the dark-rooms is only lighted from the top, the panes of the skylight being reddened. In these conditions of lighting from above, all that is necessary is to place inside the entrance of the dark-room a broad barrier, or partition, round which you must walk to get into the room. In one of his dark-rooms, by-the-way, Mr. Valentine showed us a huge pane of ruby glass, which, after but two years' exposure to light, had lost more than half its original colour. Photographers, therefore, will do well to look after their windows occasionally; fortunately, most of them begin by working in a light that is far more subdued than is actually necessary.

But we must pass on. We go downstairs to the printing department. This occupies the whole of the basement, the principal portion being a long room, in which there are no less than twelve tables ranged side by side, each measuring about 9 by 2 feet. It is the biggest printing room we have ever seen. At each of the tables stands a girl with printing frames, and her duty is simply to open each frame, withdraw the print, provide a fresh piece of paper, and then to push the frame through an open window to the printer. For, opposite each table, there is a window of this kind, opening directly into the yard, so that all the girl need do is to carry her freshly-filled frames to the side, and the printer, by putting his hands through, reaches them without difficulty. In the same way, the frames are afterwards returned. In all photographic establishments, the difficulty is with new hands; but the Messrs. Valentine, by thus subdividing the work, get over it very well; that is to say, those inside the printing room need have very little experience compared with those occupied with the actual printing, who number among them the most skilled employés of the establishment.

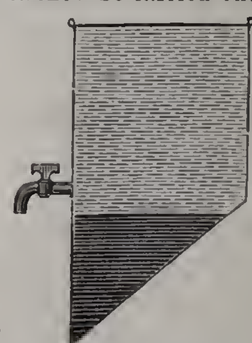
The printing is done in the open air or under shaded glass, according to the season of the year. Many of the pictures require skies printing in, and this of course necessitates double work. Mr. W. D. Valentine arranges with the head printer what sky negative shall be employed for a particular picture, and then the printing frame containing this, instead of being returned to one of the ordinary changing tables, is taken to a separate department, where the sky negative is adjusted and a suitable mask fitted.

The sensitizing of the paper takes place in a compartment at the end of the printing room. Three baths are employed, large enough to take a whole sheet, each bath provided at the end with a glass bar or rod, over which the sheet is dragged after being lifted from the liquid. There is no draining of the sheet; the glass rod has removed the spare liquid from the surface, and immediately afterwards the paper is pressed between blotting-paper. It is half dry by this time, and requires to be hung but a very short time to be completely desiccated. Nevertheless, Messrs. Valentine contemplate drying still more quickly by means of hot water boxes, over which the paper will be stretched on net-work. The regulation time of floating the paper is two minutes; the strength of the baths, fifty-five grains of silver nitrate to one ounce of water.

It is one man's duty to fold the sheets of sensitized paper and to cut them, a knife fixed hinge-wise to a board serving to do this very rapidly. "By this means, our prints have always clean-cut edges, a matter of much importance when it comes to toning and washing," says Mr. Valentine.

We have not time to speak of the negative rooms—all negatives in use being racked, while reserve and stock plates are packed in paper—but must pass on to the washing room. Here, raised in the centre of the long apartment, are a number of baths; there is, in fact, a double row of seven, so that two sets of assistants, facing each other, can work at the same time. The prints are first put into No. 1 bath, rinsed, and then placed in No. 2, whence they are conveyed to No. 3, and so on until they get to No. 7. Above the baths are hanging india-rubber tubes, which supply both warm and cold water; and each bath is supplied with an outlet that empties it rapidly. The water from the first four baths runs off into a residue tank in the yard, but the other washings are thrown away. Each print is taken separately in hand, and handed from one assistant to another. After toning and fixing, a washing even more thorough ensues, for after rinsing all night in tanks, in which each print is nipped separately between laths to prevent conglomeration, the prints are put one by one on a glass plate, and subjected to the action of falling water, both warm and cold.

Messrs. Valentine have given the question of residues careful study. The tanks are placed in the open yard, in the full glare of daylight, for they find that the deposition of the chloride takes place much more rapidly out-of-doors, than in. In summer the deposition is very rapid, while in winter it is comparatively slow; but still there is no danger of losing suspended particles by drawing off liquid that has stood twenty-four hours in their tanks. Moreover, with the washing arrangement we have just described, the assistant cannot throw away valuable washings, but the liquids must of necessity run into the tanks. The bottom of these is wedge-shaped, so that when emptied of liquid the residue cannot be carried off.



Section of Residue Tank.

The old hyposulphite baths used for fixing prints are collected in a separate tank. The most economical plan is to treat them with so-called liver of sulphur, and thus extract the precious metal in the form of sulphide. But, practically, Messrs. Valentine find it best to throw down the silver in the metallic form by means of zinc. Fragments of old zinc will do—sheeting, water-spouts, &c.—and from these the black deposit is brushed from time to time, and collected. "The silver collected from our hyposulphite washings fetched thirty pounds last year," said Mr. Valentine, in reply to our question as to whether it paid.

We are next led into the mounting room. The mountant employed is gelatine soaked in water, and then dissolved in hot spirit. But they are very particular about the brushes employed, since most of these leave "brush-markings." A brush two inches broad, of red sable, is the only instrument permitted in the establishment, and the price of these, we were told, was no less than fourteen shillings. The tables here are all covered with linoleum, not only to protect them from wet, but also because the soft character of this material is not likely to injure any albums or finely-bound books that come into the place.

Our allotted space is full, and yet we feel we have done but scanty justice to this magnificent establishment. Still one thing more we must mention—the burnishing by steam, which is a sight of itself. We believe Messrs. Valentine is the only firm in the world in which steam power is employed for the purpose, the apparatus having been specially designed by Mr. J. C. Cox, the president of the Dundee Photographic Society. The to-and-fro movement of the burnished plate under the roller, due to a very clever reversing action, is exceedingly smooth and regular, the rate at which the burnishing goes on being 350 pictures in the hour.

The "By-the-Bye" next week will be "Photography in its capacity of Clerk and Draughtsman"; the following "At Home" will be "Herr Obernetter in Munich."

A FEW COMMON OBJECTS OF THE STUDIO.

BY EDWARD DUNMORE.*

I WILL this evening devote a little time to a chat about what may be termed some of the common objects of a photographer's work-room. For that purpose I will get you to imagine an apartment where are the objects to which I shall allude, and enter it with me.

The first common object that strikes the eye, in more than one sense, upon entering, is dust. Dust varies as greatly in its composition as in its effects; it is, in fact, unattached matter, wandering about, seeking a lodgment, which, when effected, at once changes its designation from dust, and becomes dirt, and dirt, we are told with truth, is matter in the wrong place, and, being so, is the cause of much anxiety and annoyance to the photographer. When working out of doors in hot dry weather, especially where the soil is in great part composed of chalk or limestone, the dust penetrates every chink and cranny of tent and camera, getting on to the films and into the baths. If the wind happens to be gusty, so much the worse. The manipulation of coating the plate with collodion and getting a spotless film is an extremely difficult matter. By the time the day's work is over, the nitrate bath will badly require filtering, and the apparatus generally will be in a dirty condition. The evil results will, however, be but small—a few unimportant specks on the negatives, perhaps none. The reason for this immunity is, that the dust, though plentiful, was almost inert, being in a great measure composed of powdered flint aud chalk, or limestone, with comparatively little organic matter; and if the precaution is taken of sensitizing the plate with the film side down, little harm accrues.

In speaking of wet plate work out of doors, I may, perhaps, be considered by some, in these days of rapid dry plates, to be talking of an exploded process, but there's life in the old bath yet; and there are qualities in the negatives made by it of some subjects that gelatine plates cannot touch, let alone the permanency, which in the gelatine process has not yet been sufficiently tested, and of late a new trouble has been talked of—spots that appear after the negatives have been used some little time, and go on increasing until the negative is spoiled. The reason given for them is dust on the film when collodionizing or varnishing. These specks of dust being of a repellent nature, the collodion or varnish does not make a perfectly homogeneous coating, but leaves small holes, through which the silver from the paper penetrates and does the mischief, especially when the printing is carried on out of doors in damp weather. I have examined these spots with the microscope, and they present the appearance of an opaque nucleus with concentric rings of different degrees of opacity. I am not, however, prepared to say that this is the true solution of the difficulty; there are certain peculiarities in the case, that make one hesitate to endorse this idea in its entirety as the true and only explanation of the fault; at present, however, it is the most feasible theory advanced for the occurrence of a very serious drawback.

Dust in the studio is in a great measure dependent upon the carefulness, or rather carelessness, of those engaged therein, and may consist of powered hyposulphite of soda, pyrogallol, silver nitrate, ferric sulphate, &c., &c., mixed with organic and inorganic matter in uncertain proportions. It may, in fact, and does, consist of particles of any solid substance that has been used or handled in or about the premises. Solutions of solid substances being spilled about is a prolific source of chemical dust; the solvent evaporates, and the solid matter is left to be ground and powdered by passing footsteps, and wafted into the air, in which it remains suspended, to be finally deposited on any surface that may present itself, slowly or rapidly, according to its specific gravity or the fineness of its particles, the characteristics of this dust of course being governed by the preponderance of that chemical that has been most liberally wasted. Bearing in mind the energetic nature of this chemical dust, care ought to be exercised that our daily occupations are conducted with as little "flustering" as possible. I think this word conveys the idea as well as any I could use, that no unnecessary currents of air should be caused by violent or rapid movements calculated to disturb objectionable dust that may have accumulated unnoticed. These violent movements in some measure account for the fact that some operators are so much more troubled with faults on their negatives than others, when working with the same chemicals under apparently similar conditions. A continual source of supply of chemical dust is from the boarded floors of rooms where chemicals are stored or used. The boards in course of time become impregnated with substances that get spilled or dropped upon them; the friction of the feet is sufficient to loosen or grind off some of this mischievous matter, which currents of air impartially distribute. As a precautionary measure, the floor of the laboratory or operating chamber should be kept slightly damp during working hours, and dust prevented from accumulating as much as possible; when it does, remove it in a sensible manner, not merely whisking it off one thing to settle on another—doors and windows carefully closed the while—but where slightly damp cloths are admissible, use them; and when not, open the window and carefully remove it with a dry duster, getting as much as possible out of the premises. There seems to be, judging by ordinary observation, comparatively few people who know how to dust; if they know, they seldom put the knowledge into practice. Watch the generality of employés who have to sweep a room out—the dust raised is something alarming; the prevailing idea seems to be that all that is necessary is to raise the dust; where it goes to is no matter. Ofttimes business commences before the dust has time to settle, and if it happens to be a busy day with a warm dry atmosphere, the number of negatives slightly defective from dust specks are numerous. The special and particular cleanness of gelatine dry plate films is in a measure owing, I believe, to the special care bestowed in avoiding dust during the process of manufacture; afterwards dust is certainly of less importance.

I have here a small quantity of dust gathered from unconsidered places, ledges, tops of doors, corners of rooms, &c., &c., in fact, anywhere where it had been accumulating for some little time, and it consists, no doubt, of an immense variety of substances—organic, inorganic, and chemical—with in all probability some slight amount of metallic particles. I now sensitize a small piece of albumenized paper with a solution of silver nitrate, and, before it dries, sprinkle a little of this dust upon it; the result is, as might be expected, spots and stains wherever the dust adheres, and chemical action is set up. Of course this is an exaggerated case, but when we substitute the infinitely more sensitive surface of our negatives, what surprise can be felt at their being rendered useless for picture making, if dust has access to them? Or would it not be surprising if the nitrate bath did not get out of order when such deleterious matter is introduced? Dust is perhaps one of the most insidious and troublesome things with which photographers have to deal, and, consequently, no pains ought to be considered too great to avoid its interference with our especially delicate and complicated chemical processes. So much, then, for dust, a subject, by-the-bye, upon which I might enlarge very considerably, but the time at my disposal will not permit it. The next common object to which we will turn our attention is silver nitrate. All photographers are acquainted with this metallic salt in some form or another, and there is scarcely a photographic business carried on without its aid, so although common, it is very important. It is an easily-manufactured simple salt obtained by dissolving silver in dilute nitric acid, and crystallizing as we usually see it; in flat, tabular crystals of unequal size. At one time there were many complaints of the impurity of this salt, and acidity was frequently laid to its charge. For my own part, I have not had under my observation an acid sample of nitrate for many years. When purchased of respectable refiners, its purity can generally be relied on. Acidity is a fault that might suggest itself on account of the method of its manufacture, it being

* Read before the South London Photographic Society.

crystallized from an acid liquid, and merely dried, the salt being anhydrous, heat will drive off any acid that may cling to it, and the result is a neutral salt. Recrystallization from its solution in distilled water will undoubtedly remove any acid that is left from imperfect drying in the first instance, and remove any dirt or accidental impurity that might be contained in the first crystallization. For very delicate experiments it is, perhaps, as well to use recrystallized salt, although for ordinary purposes the first crop of crystals is sufficiently pure. That impure nitrate is sometimes offered for sale, there is no doubt, and the impurity may be either accidental or intentional. With regard to intentional impurity—or, I should, perhaps, say, adulteration—as far as my experience goes, it is of rare occurrence; and, as a rule, the purchaser gets his money's worth for his money. The moral obliquity sometimes charged to chemists and refiners is, I think, unfair so far as supplying adulterated silver nitrate goes. I have a sample here of a sophisticated nitrate, the adulterant used being potassium nitrate, which it contains to the tune of about 25 per cent. If the sample of silver nitrate is, either from its appearance or behaviour, suspected of impurity intentionally added, it is one of the most easy matters in the world to ascertain the fact by quantitive analysis.

Take (say) ten grains of the suspected salt, and dissolve it in half an ounce of distilled water, then from a dropping tube add very carefully as much solution of a soluble chloride (the strength of the solution so calculated that half a drachm precipitates a grain of silver) as is needed to precipitate all the silver; the amount of chloride solution then being read off, the exact amount of silver is at once ascertained, and the exact weight of the adulterant used. Impure nitrate of silver, not intentionally sophisticated, is sometimes obtained when the source from where the metal is derived contains much sulphur—say from photographic residues that have been precipitated by means of sulphuret of potassium. It is extremely difficult to thoroughly get rid of the sulphur from the metal and nitrate made from it, as it is apt to be contaminated in a degree sufficient to interfere with the proper working of the nitrate bath. Sulphur is the source of many photographic troubles. It has been shown by Mr. Spiller that sulphates may exist in the nitrate bath owing to the pyroxyline from which the collodion was made being insufficiently washed, and then it is a source of pinholes. This is the effect of the silver nitrate when it contains sulphur in combination—pinholes, and generally unsatisfactory films. Testing silver solution for purity is a laboratory experiment, and requires close watching, but the behaviour of this salt when treated with ammonia is more easily shown. We often now have, in making our gelatine emulsions, to form an ammonia nitrate solution by adding strong liquor ammonia to a solution of silver nitrate, until the precipitate, which is voluminous and of a dark brown colour, is redissolved. Thus you will observe the instant the ammonia is added, the precipitate forms; but should it happen that a *trace* of nitrate of ammonia is contained in the liquor ammonia, although no perceptible difference is formed in the result, the difference in its apparent action is most remarkable, and may cause some perplexity. I will now add a trace of nitric acid diluted to the ammonia; no perceptible difference is made; it smells equally pungent, and remains equally colourless and clear; there is, of course, a small portion of nitrate of ammonia formed, which remains in solution, and this slight addition has the curious effect of preventing any precipitate being formed when it is added to the silver nitrate solution. You will observe the mixed solution remains apparently unchanged; no precipitate whatever forms; but the chemical action takes place all the same, and the nitrate is converted into the ammonia nitrate. This may be ascertained by the sense of smell, for until all the nitrate is changed, the added ammonia loses its pungency; but as soon as this is effected, the fumes of the ammonia remain, on account of no further combination taking place. The result is practically the same as when the precipitate was formed. In one instance the eye was the guide as to the right quantity of ammonia, and the other, the nose. If, however, too great an excess of the ammonia has been added, it may be easily remedied by heating the solution a short time, which will drain off the excess of ammonia. There is, however, a danger that fulminate of silver may be formed by a great excess of ammonia, so it should be carefully added. This experiment shows what very slight causes may affect delicate processes, and lead to confusion unless understood; *e.g.*, a glass measure that has been used for measuring nitric acid, and not thoroughly cleansed before using for the purpose to which I have just alluded, might produce this peculiar effect, and puzzle the operator considerably.

The next common object is a glass measure. It is as well to verify the graduations on glass measures before taking them into regular use, for they are frequently inaccurate. This may be easily done by placing the vessel in a scale and weighing in definite quantities of distilled water, observing if they agree with the graduations. In choice of them, select those that are made of thin, clean glass, rather tall and with heavy feet, as being more easy to use, and less liable to get knocked over. A thin glass cylindrical measure is somewhat inconvenient to use for small quantities; those tapering to an obtuse point outside are infinitely more usable, a correct quantity being much more rapidly measured—the liability to error increasing in proportion to the area of the surface of the fluid in the measure.

The next matter to which I shall call your attention can scarcely, perhaps, be called a common object, it being invisible. Its effects are, however, calculated to produce many uncommon objects, and challenge very particular notice—I allude to gases and deleterious fumes and vapours, of which, perhaps, those containing sulphur are the most objectionable. Ammoniacal fumes are by some considered very prejudicial in their effects upon wet collodion plates. In making this remark, I must say that from my own experience my plates have not to my knowledge suffered any deterioration in working from this cause. But a well-known skilful photographer told me he once had a commission to photograph some buildings in course of demolition located near to some slaughter-houses, from which ammoniacal fumes emanated, which were so pungent as not only to be very offensive, but by the time he had taken two or three plates, his bath became unworkable, and from stains and markings on the films he had to discontinue. Each day he found it the same, and had to go supplied with a new bath, morning after morning, whilst the job was in hand. Whether this upset of the bath proceeded from ammonia or from other gases, engendered by decomposing animal matter, I cannot say. This gentlemen, at any rate, attributed the difficulty to ammonia. That sulphur in any of its combinations in a gaseous form is very prejudicial to our work, none can doubt—sulphuretted hydrogen at once reducing a solution of salts of silver. If wet and newly-sensitized albumen paper is hung up to dry in an apartment to which dangerous fumes have access, there is little doubt but that the paper will be partially spoiled—its whites degraded, and the toning interfered with. A similar effect is produced if a trace of hyposulphite gets into the water in which the prints are washed previous to toning; a yellowish metallic appearance covering the whole surface is soon apparent. Precisely the same chemical effect takes place if sensitized paper is fingered with fingers contaminated with hyposulphite, only in this case the marks are definite and local, and much more intense. An escape of ordinary illuminating gas in the laboratory or sensitizing room is undoubtedly prejudicial to the work. It affects the nitrate bath by causing a scum to accumulate on the surface, which is somewhat troublesome to remove, and gives rise to markings on wet collodion films; also staining dry emulsion ones. Sulphur in any of its combinations is to be guarded against as being most insidious and destructive—an agent, even if very diluted, having the power of thoroughly decomposing and rendering powdery the leather bindings of books or leather in any form. Subjected to its influence for a moderately long time suggests at once a danger to gelatine negatives that may be stored in a place to which it has access, the insoluble gelatine of the films being somewhat analogous to leather, and is affected by the same agencies.

The use of coke as a fuel is another source of danger, unless the fumes are perfectly carried away, for it must be borne in mind that the changes caused are not, save in particular instances, immediate or easily detected. A special instance to which I have already alluded is newly sensitized paper. I have here a piece of that substance, and whilst it is yet wet with the silver solution I will submit it to the action of a gas containing sulphur. The results are immediately visible; of course this is applying the objectionable fumes in a concentrated form; if diluted, the effect would be the same, only a longer time would be necessary to produce so decided effect. A general yellowing of the paper scarcely, or perhaps not at all, noticeable in the light in which paper is generally prepared, is produced, but quite sufficient to impair the quality and colour of the finished proof. Obnoxious vapours may exist in an apartment of which we may be quite unaware until some substance for which they have a special affinity is introduced. Then chemical action is at once set up, and their existence clearly demonstrated. As a rule, these obnoxious gases and vapours are in so dilute a state that some time has to elapse before their presence is manifested. It is well known that a person entering a room direct from the fresh air will detect an odour of which the occupants are quite unconscious.

In some few instances ocular proof may be obtained of the existence of a gas, but, as a rule, delicate chemical tests have to be resorted to, to determine it—with some, the humidity of the atmosphere, which is condensed by the gas as a white vapour, and becomes visible; with others, a combination may take place, and a solid may be found in a fine state of division; for example, we will suppose hydrochloric acid exists in the room in an invisible state, the introduction of ammoniacal gas will at once show it by the formation of hydrochlorade of ammonium. I will pour a few drops of liquid ammonia on to this piece of paper; the atmosphere surrounding it remains perfectly clear and transparent; but when the vapour of hydrochloric acid is allowed to escape and mix with the ammonia vapour already existing, dense white fumes are the result, the vapours in this case neutralizing each other, and forming a definite salt.

Drains are always a source of danger, not only to the householder on the score health and comfort, but to the photographer on account of his occupations; so great care should be taken that they are properly ventilated and trapped.

In conclusion, I can only recommend careful supervision over all sources from which deleterious vapours or gases may proceed from drains which perhaps are most important to bottles accidentally left uncorked or carelessly stoppered. I have in this paper alluded but to a few of the common objects of interest to photographers, and the few experiments I have made are of a nature permitting of easy observation, and not requiring that patience and careful attention that are characteristic of the majority of chemical reactions daily brought under our notice, and which are entirely unsuitable for illustrating a paper of this kind, although they may be infinitely more important. It may be borne in mind that although the experiments I have shown exhibit concentrated violent action, the same alterations take place in our every-day work, but in a much slower manner, necessary time being allowed for the action of, as I may term it, the diluted forces—time being a most important factor in most of the processes with which we have to deal.

I trust I have not trespassed too long upon your patience by this somewhat dry paper, which, as the title indicated, has treated of a few common objects, such being, by their very nature, removed from the realms of that novelty which in the present day is so attractive that papers deficient in this element are looked upon as inflictions to be tolerated, but disliked. I however, bearing in mind the difficulties of securing papers for our meetings, trust the want of novelty will be forgiven, and be my apology for reading one that treats of no new processes, nor demonstrates any new invention.

Notes.

A photographic journal in Spanish has appeared, the *Boletin Fotografico*; it is published not in Spain, but in Havannah.

Mr. J. W. Swan lectures to-night at the Royal Institution on "Electric Lighting by Incandescence." The Swan Light Company make the welcome announcement that henceforth the price of their lamps will be but five shillings each.

At a meeting of the Solar Club on Monday last, Mr. W. Ackland and Mr. W. B. Bolton were elected members.

On Monday, Mr. Muybridge, of San Francisco, will be present at the Royal Institution to exhibit and explain his well-known photographs of galloping horses and other animals in motion. The lecture will be at 5 p.m., instead of the usual hour of nine, tickets being obtainable through members of the Institution, as in the case of the ordinary Friday evening lectures.

We regret to announce the death of M. Poitevin, which took place on the 4th inst., at his residence in Conflans. M. Poitevin was sixty-three years of age.

M. Poitevin was certainly the most noted of our living photo-chemists, not only in France, but in the whole world; and although for the past ten years he took no active part in photographic investigations, the work he had done was of such paramount importance that it never faded from the mind. The value of Mungo Ponton's discovery as to the use of the bichromates in photography was at once appreciated by Poitevin, and his investigation into the behaviour of these substances in connection with gelatine paved the way both to carbon printing and collotype printing. In connection with permanent printing processes, indeed, the name of Poitevin must always be highly honoured.

A monster album! His Royal Highness the Prince of Wales has requested the portrait of every member of the Savage Club for his album of literary and dramatic celebrities, the size chosen being the cabinet picture. It looks as if the Prince were in league with the photographers.

M. Van Beers, the Belgian painter, having lost his lawsuit, about which we have heard so much of late, will lodge an appeal before the Brussels Tribunal.

The lawsuit, our readers may remember. was brought by the painter against a critic who accused Van Beers of employing photography as a basis for his paintings. Although the critic was unable to show that "The Syren"—the picture immediately criticised—was in any way due to the camera, it seems he brought evidence to prove that M. Van Beers sometimes did employ a photograph whereon to apply his pigments, notably in a picture representing two donkeys and their driver. It was not an action to decide whether a painter is or is not justified in employing photography, but whether the critic in this instance had spoken maliciously of the painter. The Tribunal seems to have decided there was no malice.

Speaking of the Van Beers case, Mr. Woodbury, who is just now in Brussels, says:—"A new style of photography has sprung up since the the trial, which one might call Van Beers-type. The portrait, with a white or plain background, is printed in carbon, and transferred to a ground covered with tints, as in the many colour systems that have from time to time appeared (patented or not). The picture is then given to an artist who paints in a suitable background in oil. The effect is very good though one would imagine that the vigorous touches of the artist on the background would kill the more delicate tints as seen through the carbon print. Still, such is not the case, the results being very effective."

Mr. Woodbury further says :—"M. Geruzet, who, by-the-bye does nothing but carbon, has shown me some charming pictures produced in this way, and I can recommend the idea to our own photographers in search of a novelty. A Woodbury print would answer as well, if not better, but would not be suitable for single copies."

Mr. Bedford's plan of sensitizing albumenized paper should be noted, for it is one of the most trustworthy that can be employed, especially when the sensitized paper is to be kept for some days before use. He floats the paper first of all upon a 60-grain silver bath, perfectly neutral, then a second time upon a bath containing 30 grains of silver and 30 grains of citric acid to 1 ounce of water, the paper being drawn over a glass rod in the end, and dried. The longer it is floated the better the paper keeps, and any slight discolouration that may arise after ten days or a fortnight disappears in the fixing bath.

The suggestion of Mr. Warnerke to tightly roll up sheets of sensitized paper one within the other, if desired to keep it long, is also a practical hint to be noted. The outer sheets may get discoloured in time, but these protect the rest from the noxious influence of the atmosphere more effectually than ordinary wrapping paper. Mr. Warnerke speaks of having kept sensitized paper good in this way for a space of two years.

Gustave Doré is going to try his hand as a sculptor, the attempt being to produce a bronze statue of Alexandre Dumas. A numerous series of photographs has already been collected by the eminent painter, who has never concealed his ideas of the value of photography as the handmaiden of art. Doré was a frequent visitor to Rejlander's studio, and that artist's portrait of the French master is probably the best ever taken. Gustave Doré's model will be cast in wax, by the so-called *cire perdue* process; that is to say, the metal will destroy the mould in the process of casting, and nothing will then remain behind but the bronze statue.

The photograper and the sculptor seem intimately connected. A series of profile pictures, giving the salient lines of a model, are invaluable to the sculptor, and upon photographs of this kind was based, our readers may remember, the process of photo-sculpture which the late M. Claudet brought before the public. Since the photographer has to study modelling and lighting after the manner of a sculptor, art-training in a sculptor's studio would doubtless form the best education for a photographer. M. Adam-Salomon's success as a photographer was due simply and solely to his art-training and experience as a sculptor.

M. Guérain, the photographer to the Paris Observatory, proceeds to Egypt in May next, to take photographic observations of the solar eclipse. For some years past the existence of certain intra-Mercurial planets has been mooted in France, and the evidence of photography is now to be invoked to assist in setting the point at rest.

Mr. Aitken has been studying the blue colour so characteristic of the Mediterranean and the Lake of Geneva, and his conclusions are embodied in a paper presented last month to the Royal Society. Mr. Aitken begins by saying that two solutions have been offered of this puzzling problem—the one explained the colour as due to reflection of small suspended particles which did not reflect the lower rays of the spectrum, and the other that the colour was the result of the absorbent action of the water itself upon the white light, before and after reflection of these particles. The latter theory Mr. Aitken holds to be the true one. The smaller the number of white-reflecting particles, the darker or greener the water appears to be, Mr. Aitken having been successful in turning the still green water of Lake Como into a bright blue by scattering finely-divided chalk in the middle of the lake.

The Paris photographers—or, rather, that goodly number of them who belong to the Photographic Syndicate—have made it their custom lately to hold an annual dinner in the French metropolis. The festive gathering for this year has been announced for the 14th inst. When will their English confrères, we wonder, follow so excellent an example?

We shall shortly print some notes by Herr Fritz Luckhardt, of Vienna, on the subject of constructing glass roofs, a matter to which that gentleman has recently given some attention.

Photography is said to interfere with the sale of autographs. Letters, manuscripts, and signatures, however well authenticated, do not realise the high prices at sales they used to do five years ago. We can hardly understand this, as an original sign manual must always possess intrinsic value. The fact that the great men or great women have pressed the sheet with their hands, and their living energy has traced the letters before you, must always remain a consideration, since it is a distinct link between their lives and the present moment. Photography cannot rob a document of its personal character.

At the same time, it must be conceded that the camera, by creating a fac-simile of any characteristic writing, becomes an important factor in a consideration of the kind. Instead, however, of reducing the marketable value of a rare manuscript or autograph, it should be the means of enhancing it. The owner is in a position to sell the original as before, and also authentic photographs of it.

And here is a hint that some of the "Society journals," at a loss for a novelty, may like to have. Why not publish every week an example of the writing of our famous literary men, past and present? A chapter from *David Copperfield*, in the author's own hand, and with all his original corrections; half-a-dozen verses of Byron, photographed from the original manuscript; some of Oliver Goldsmith's *Vicar of Wakefield*, or *Deserted Village*, if the manuscript is still extant; a leading article in Mr. G. A. Sala's neat handwriting, as it is sent in to press—all these (to quote a few instances out of many hundreds) would be of interest to the public; while their faithful reproduction by photo-lithography entails no trouble whatever.

Mr. Alexander Ayton, of Londonderry, sends us two prints, treated in the same fashion as blotting paper which is to be converted into vegetable parchment; that is to say, they have been immersed in diluted sulphuric acid. In the one case, the matt appearance produced is permitted to remain, and in the other, a brilliant surface is imparted by enamelling with varnish. The effect of both pictures is decidedly pleasing.

TWELVE ELEMENTARY LESSONS IN DRY-PLATE PHOTOGRAPHY.

No. 2.—CHEMICALS.

AFTER the photographer has provided himself with the necessary appraatus and plates, his first consideration must be the purchase of the chemicals which he will require to convert his plates into negatives. We give a list of those which he will need, stating after each about the quantity which we think it desirable that he should possess himself of at first. Afterwards we give a few words describing the general properties of each substance, but not entering into the chemical composition. Each chemical, whether liquid or solid, should be kept in a bottle which should have the name distinctly labelled on it, if possible in print.

We ought to have enumerated in our last lesson, amongst the necessary apparatus, a small balance such as apothecaries use for weighing out medicines. This should be provided with the usual set of "apothecaries weights." The chemicals required are as follows:—

Pyrogallic acid	1 ounce
Ammonia of specific gravity ·880 ...	3 or 4 ounces
Bromide of ammonia	1 ounce
Sulphite of soda	4 ounces
Neutral oxalate of potash ...	½ pound
Sulphate of iron	½ pound
Citric acid	1 ounce
Hyposulphite of soda	1 pound
Alum	½ pound
Methylated spirit	½ pint
Negative varnish	A few ounces
Bi-chloride of mercury	½ ounce

A couple of books of test papers, one of blue litmus and one of red litmus.

Pyrogallic acid is a white, feathery, and extremely light body. It is exceedingly soluble in water. It is a powerful absorber of oxygen, especially when alkaline. When a solution of it has absorbed oxygen, it turns brown.

The ammonia used in photography is the strongest solution of ammonia which it is possible to make in water at atmospheric pressure. It is the well known hartshorn. It is a perfectly transparent and colourless fluid. It is powerfully alkaline. When the stock has been purchased, it is advisable to pour it at once into a bottle holding exactly double the amount of the ammonia, and to fill up the bottle with water. If this is not done, the stopper of the smaller bottle may be blown out by the pressure of the liberated ammonia gas when the weather is warm. This will destroy the whole, as, on exposure to air, the liquor ammonia rapidly becomes weaker from the ammonia gas escaping.

Bromide of ammonia is usually found as a white powder, looking very much like ordinary table salt. It is very readily soluble in water.

Sulphite of soda is a white crystalline body. It is readily soluble in water.

Neutral oxalate of potash is a white crystalline body. It is readily soluble in water. It ought to have neither an acid nor an alkaline reaction; but often that sold as neutral is somewhat alkaline.

Sulphate of iron or "copperas" is a greenish crystalline body. It is very soluble in water, but requires considerable time. Its solution decomposes very readily if it be at all exposed to the air, on account of its absorbing oxygen; after this it is useless for photographic purposes. It should therefore be kept—after it is dissolved in water—in a closely stoppered bottle.

Citric acid is met with either as clear colourless crystals, or as a powder. It is soluble in water.

Hyposulphite of soda is a clear colourless crystalline body, and is somewhat deliquescent—that is, if left exposed to the air it becomes damp. It is readily soluble in water.

The alum used may be the ordinary alum sold by grocers, and may be either a potash or a soda alum. As it is intended to be dissolved in water, it should be bought in the form of a powder. It does not dissolve in very large quantities in cold water, and dissolves somewhat slowly.

Methylated spirit calls for no particular notice, as it is well-known to all. That sold as "finish" is not suitable for photographic purposes.

Bi-chloride of mercury is a whitish crystalline substance. It is sparingly soluble in water, and is strongly poisonous. It is commonly known as corrosive sublimate.

Negative varnish in appearance is very like the ordinary spirit varnish used for varnishing wood, but differs from it in the resins used to manufacture it. It can be bought from any photographic dealer. That sold as "dry plate negative varnish" is the most suitable.

The test papers are for discovering whether a liquid such as a solution of any salt is neutral, acid, or alkaline. To use them, proceed as follows. Suppose you have a solution of whose condition as regards acidity or alkalinity you are ignorant. Dip a small piece of the blue litmus paper into the solution. If the paper changes its colour to red at once, or after a short time, the solution is acid; if no change in its colour takes place, the solution is either neutral or alkaline. In this latter case, dip a piece of the red litmus paper into it; you will now know its exact condition. If the red litmus becomes blue, the solution is alkaline; if no change takes place, it is acid.

We have now enumerated and shortly described the necessary chemicals, and shall give instructions for mixing one or two of what are called "stock solutions." These are solutions which may be kept for some time, and which the photographer should always have by him. The ones we now describe are those to be used in the first lesson in development, which will appear shortly.

No. 1 bottle to be labelled "Solution of Oxalate of Potash" in large letters, so that it may be read in a very dull light. Place the whole half pound of neutral oxalate of potash in a bottle capable of holding from ten to twelve ounces. Fill up the bottle with warm water, place in the cork, and shake. A part, but not the whole, of the white crystals, will dissolve. The liquid will be what is called a "saturated solution"—that is, the water will have taken up as much of the salt as it is capable of doing. When any of the solution is used, the bottle should be again filled up with water, and this may be done repeatedly till all the crystals are dissolved, when more oxalate of potash must be purchased. This solution must be tested in the manner described above to discover whether or not it is alkaline. If it is, enough citric acid must be added to make it neutral or very slightly acid.

No. 2 to be labelled "Sulphate of Iron Solution." Place about a half of the sulphate of iron in a half-pint bottle, and proceed exactly as with the last stock solution. It is very necessary in this case to keep the bottle always full of solution, and well corked, as the oxygen of the air, if it come in contact with the liquid, very rapidly spoils it.

The solution should be of a bright green colour. If it get red, it is useless.

No. 3. *Ammonia-Bromide Solution. One per cent.*—Weigh out twenty grains of ammonia bromide. Place in a four-ounce bottle, and make up to four ounces with water. The percentage is not exactly correct, but is quite near enough for the purpose.

No. 4. *Alum Solution.*—Place three or four ounces of the alum in a pint bottle. Fill up with warm water. The whole of the alum will probably dissolve, but some of it will be thrown down again as crystals when the solution becomes cold. As long as these last, more water may be added from time to time, as the solution is used. When they are all dissolved, alum must be added.

No. 5. *Fixing Solution.*—Place five ounces of hyposulphite of soda or "hypo" in a pint bottle, fill up with warm water, and shake till all is dissolved.

Common tap water may be used for all these solutions, which, stated briefly, are as follows:—

No. 1. Saturated solution of oxalate of potash.
No. 2. Saturated solution of sulphate of iron.
No. 3. Ten per cent. solution of bromide of ammonia.
No. 4. Saturated solution of alum.
No. 5. Twenty-five per cent. solution of "hypo."

ON THE RAPIDITY OF PHOTOGRAPHIC LENSES.

BY LEON WARNERKE.*

For some years past I have endeavoured to arrive at greater precision in the use of the various influences and adjuncts we have to deal with in photography; such was my attempt when I measured the intensity of light by my actinometer, and the sensitiveness of plates by my sensitometer. But we have still another adjunct playing a very important part in all photographic manipulations; that is, the rapidity of photographic lenses.

The thorough knowledge of every element and apparatus employed tends to secure certainty in manipulation and excellence of ultimate results; but of the failures occasioned by imperfect knowledge of the tools used, none is more common than that produced by ignorance of the rapidity of lenses.

The object of my communication this evening is to examine the question mentioned, and to demonstrate the utility, nay, necessity, of some definite unit to permit us to measure the rapidity of lenses. We must congratulate ourselves that, although the photographic art has not reached its maturity, the manufacture of lenses has attained to such perfection as to leave very little to be desired. We have lenses constructed with special objects dictated by the requirements of the art. There are more than a dozen different classes of lenses in use at present: every class has special qualities, special advantages, and weak points; these are described in treatises, in descriptive catalogues, or learned by practice, so that the peculiarity of every class, as regards quality, are sufficiently known.

But when we wish to arrive at a knowledge of rapidity—and this must be done with precision—we find ourselves in a great difficulty. In the first instance, the rapidity of every individual lens, in a certain class, varies: there are diaphragms to each lens, which influence the rapidity; and we look in vain for any information as to the value of that influence. We find consecutive numbers stamped on each diaphragm, in some lenses having only an approximate relation, but none whatever in others.

Before I proceed any further, I wish to define what constitutes the rapidity of a lens. This rapidity depends partly on the colour of the glass, the number of glasses in the combination, the number of reflecting surfaces; these we shal not take into consideration, but depend mainly on the aperture of the lens, and its focal length.

It is evident that, other things being equal, the intensity of light in the image depends first on the quantity of light admitted, and, secondly, on the area over which it is distributed. It varies, therefore, directly as the aperture, and inversely as the size of the picture.

But the size of the picture given by a lens varies directly as the square of its equivalent focal length; and the area of the aperture, or diaphragm, varies as the square of its diameter. Therefore, the time of exposure varies directly as the square of the equivalent focal length, and inversly as the square of the stop.

Let us have—

f, as the equivalent focus of a lens;
a, its aperture;
f', focus of another lens;
a', its aperture.

Let us suppose that—

$$\frac{f}{a} = 4 \text{ and } \frac{f'}{a'} = 8$$

The time of exposure will be $4^2 = 16$ sec. for the first lens, and $8^2 = 64$ sec. for the second. Therefore, the first lens is four times more rapid than the second.

Now, all this useful information is not to be found except by calculation and troublesome measurement, which will not be undertaken by one person out of ten; but without it the photographic lens remains a *terra incognita*.

I consider that a correct calculation of the rapidity of the lens is as necessary an appendix as the brass mount, the diaphragms, or the cap, and that it must be attached permanently to the lens. The best plan would be by means of engraving on the brass tube or on the diaphragms.

Moreover, this rapidity must be expressed in some absolute unit alike for all lenses.

The choice of this unit is a matter of considerable importance, and, therefore, it must be discussed and decided by persons more competent than myself. The urgent necessity of the adoption of some system to express the rapidity of lenses is sufficiently demonstrated by numerous proposals to adopt various units, and by many articles in the photographic journals. This subject is, therefore, worthy the consideration of this Society; and a committee, if nominated by the Council, would not have a more important and useful work to accomplish than to decide what unit to adopt, and what measures to take, in order to secure the general adoption of a system for future lenses, as well as for application to those already existing.

For my personal use I adopted a certain unit, and have tested its utility during the last eight years. I can, therefore, confidently recommend it as the first suggestion for future deliberations. The following is a short description of it.

In the first instance, accurate measurements of the equivalent focus and aperture must be secured. I use two methods to find the equivalent focus; the first (which is absolutely accurate) consists in obtaining, in a copying-camera, the image of a geometrical figure the same size on the ground glass as the original. The distance between the original and ground glass divided by four represents the exact equivalent focus.

The second method is an approximate one. I take for this purpose a point anywhere on the mount of the lens, and, obtaining an image of the sun, with the front lens facing the sun, I note the distance from the chosen point to the screen on which the image is produced. I then repeat this experiment, only turning the lens so that the back lens is facing the sun, and again measure the distance from the chosen point to the screen. The mean between these two distances is the approximate equivalent focus.

For the measurement of the working aperture of a double-combination lens, I do not know any better system than that proposed by Mr. Dallmeyer. The camera is directed towards the horizon, and a distant object is focussed. The focussing screen is then replaced by a cardboard with a small round hole pierced in the centre. A candle in the dark-room is put as close as possible to the hole. The beam of rays passing through the diaphragm will produce on the front lens a luminous circle, the diameter of which is the required working aperture of the lens.

Having now these data, in a very few minutes I am enabled to make all the calculations as above described. But now I come to the important point. As a unit in which to express the rapidity of the lens, or, what is equivalent, the time of exposure, I adopted the lens having $\frac{f}{a} = 2$, or having an aperture equal to one-half of the focal length. Or, in other words, admitting that such a lens requires an exposure of one second, all the other lenses and diaphragms are calculated by comparison with this particular lens.

A lens of this description does exist; it is the quickest lens made; but the point whether such a lens exists or not is of no importance.

* Read before the Photographic Society of Great Britain.

As you can observe by the data given below, the time of exposure, calculated on this basis, is as nearly as posible that required by the ordinary wet process in an average light; this was one point which decided me to adopt it. The wet process was not condemued at the time when I adopted this unit; but even now, when the era of gelatine is in full swing, I do not think any advantage is to be gained by adopting a larger unit: a fractional number for quick lenses is very inconvenient. It is for this reason that I oppose the unit already proposed by other investigators, as it drives us into extremely large numbers.

To complete the description of the modes of calculation, I take one of my lenses—the patent stereoscopic by Dallmeyer.*

Equivalent focus, $f = 0{\cdot}13$.

Largest aperture, $a = 0{\cdot}0296$.

$$\frac{f}{a} = \frac{0{\cdot}13}{0{\cdot}0296} = 4{\cdot}4. \qquad \frac{f'}{a'} \text{ for unit lens} = 2.$$

Dividing $(4{\cdot}4)^2$ by 2^2 I found number 5, which is the absolute rapidity for this lens and aperture. All other diaphragms of the same lens are expressed as follows† :—

Number of Diaphragm.	Diameter of Aperture.	$\frac{f'}{a'}$	Absolute Rapidity.
1	0·0296	4·4	5
2	0 0253	5·1	7
3	0·0207	6·2	10
4	0·0182	7·1	13
5	0 0148	9·1	21
6	0·0109	12	36
7	0 0074	17·6	77

The focal length and the numbers of absolute rapidity are engraved on the lens mount, or on every respective diaphragm. A single glance at such a lens conveys at once a full idea as to the photographic value of the lens, and, coupled with a knowledge of the rapidity of the plate, enables the operator to fix his exposure without failure. From the acquaintauce I have made with a great many lenses found either in my own or my friends' possession, I found that the rapidity must be calculated for every lens separately, aud caunot be applied even with tolerable accuracy to a whole class of lenses. To illustrate this, I give here data calculated for several lenses of different focal lengths, but belouging to the same class, viz., portable symmetrical:—

Approximate Focus.	5-in.	6-in.	7-in.	8-in.	8¼-in.	9-in.	10-in.	13-in.
Diaphms. 1	64	79	100	100	78	81	69	101
2	81	90	169	162	100	110	112	154
3	169	160	222	268	191	210	198	306
4	462	281	340	529	196	552	354	...
5	1056	924	930	819	300	1560	1008	...

Here is another table for several lenses of the rapid rectilinear class :—

Approximate Focus.	6⅜-in.	6¼-in.	8¼-in.	10½-in.	12¼-in.
Diaphragms. 1	18	16	20	17	14
2	22	25	30	29	22
3	28	30	36	36	28
4	53	64	72	72	...
5	100	121	143	150	121
6	257	267	289	324	240

I conclude these remarks with reiterating my proposition; viz., consideriug that only a complete knowledge of the lens is arrived at when its rapidity is known, I express the desire that a unit for the measuring of this rapidity may be adopted, and that the rapidity of every leus and diaphragm may be calculated, and in a prominent manner marked on the lens mounts or on the diaphragms.

This measure will be doubly beneficial if universally adopted; but, in order to ensure that, some great influeuce is necessary, and this can be arrived at by the aid of this Society, through its Council.

Before I leave this room, permit me to express a feeling shared by everybody who uses the camera, either as a hobby or otherwise, of the immeuse annoyance occasioned by an endless variety of the threads, the size of screws, and lens flanges. Every maker makes his own thread distinctly different from the thread of other makers. Let me express a wish that the example of adopting a uniform thread, so successfully carried out by microscope-instrument makers, may be followed by the makers of cameras and leuses; and let us hope that if the nomination of the Committee to consider my first proposal can be realised, the same Committee may try to arrive at this desirable end also.

* All measurements are made in metres.

† Absolute rapidity is expressed in round numbers

ENAMELLING, AND A RECENT DISCOVERY FOR FIXING SILVER PRINTS.

BY ALEXANDER AYTON.*

Gentlemen,—As I announced at last meeting, I shall have somethiug to say to-night on the finishing and enamelliug of photographs; but in addition to this, I now propose giviug you some other experiences, and as the subject of dry plates is eugrossing so much iuterest at present, a few remarks in connection with them may uot be out of place.

I had my first experience with dry plates about twenty-five years ago. They were, I believe, those called collodio-albumen, and hearing a great deal of their efficiency I obtained a supply of them. Receiving an order, shortly after, to photograph some very interesting limestone caves, I started one bright summer morning in high spirits at the prospect of a successful day's work without the paraphernalia of the wet process. Arriving at the place, I exposed a good many plates, varyiug the exposures from thirty minutes to an hour, and in the interim, amused myself by searchiug for ferns. Returuing home in the evening, I began the development, which was contiuued till far iu the morning, hoping against hope for something to appear, but all that became visible was a piece of white rock or a peep of sky. Thoroughly disgusted, I had nothing more to do with dry plates till the advent of the gelatine process, and, thanks to the disinterestedness of such men as Dr. Maddox, Mr. Charles Bennett, Mr. R. Kennett, &c., we now enjoy the benefits of it, untrammelled by patent rights or any other hindrance to its practice.

My first plates were made by Messrs. Wratten and Wainwright, and I had considerable success, especially with pictures of children. By-and-bye the rejected plates began to accumulate to such an extent that the question arose: What is to be done with them? and after a good deal of consideration I determined to make my own emulsion and re-coat them. This was more easily resolved upon than accomplished, but after many discouragements I made a beginning, and so I then considered that half the battle was won.

When I began, it was the very hot summer of 1880, and the first difficulty I encountered was with the gelatine not setting, it being Nelson's No. 1 or 2, so that the first two or three batches of seven ounces each were complete failures. I theu discarded the washing process, and after boiling, precipitated the emulsion with alcohol, using, instead of Nelson's gelatine, Swinburne's patent isinglass. I was then able to use my own plates, and since theu have bought none. Increasing my batches to twenty ounces, I coutinued in this way till I had filled all the jars and bottles in the house with waste alcohol, and began to wonder if I could not manage to do without "the liquor." By this time the weather had become colder, and I then had no difficulty with the boiling and washing process, and this I have continued to use ever since.

I have latterly adopted a somewhat different method of emulsifying from any I have seen published, which I shall endeavour to describe, and to put the matter, as it were, in a nutshell. I prepare the material for tweuty ounces by the alkaline process (that is, with ammonia nitrate of silver), and twenty ounces by the acid method, boiling for ten or twelve minutes; neither of these emulsions, so treated, would separately yield a rapid plate, but by mixing both together with the excess of gelatine, allowing it at night to set, and afterwards washing thoroughly, I obtain an emulsion of the very highest sensibility aud certainty. I have used with very great success the formula of Dr. Eder, and latterly that of Mr. Bolton, containing iodide aud chloride; plates by this method are well adapted for making transparencies, the deposit of silver being very fiue. I have also made several batches, using ammouium bromide for the alkaline method, and potassium bromide for boiling; by mixing both together with the full quautity of gelatine, I obtain what I think the best results. Examples of work done on these plates I shall show you by-and-bye in connection with another matter.

In reference to the place where I carry on my operations, I appropriated a room about niue feet square, and employed a joiner to put up a wooden partition, with a door and window, dividing the room into two unequal parts, the larger being six feet by niue, called the dark-room; in the window I have two thicknesses of ruby glass, and upon the door a spring lock, which cannot be opened from the outside but with the key.

Before the ruby glass in the outer room I have a gas jet to illuminate the dark-room. This can be raised or lowered at will by a tap inside, so that while there are a number of plates

* Read before the Edinburgh Photographic Society.

setting upon the glass slab, I can lower the gas and retire, all the light being excluded from the outer room. In front of the window I have a wooden sink about three incees deep, with a water tap, and near it a Bunsen's burner with a saucepan. Across one end of the room there is a glass slab for receiving the plates after being coated, and at the opposite end I have my drying boxes. The first one I constructed was on the plan of that recommended by Mr. England; but owing to the size of mine, I had two iron tubes with gas jets inside of one as in his box. However, this arrangement was not satisfactory, as the plates nearest the tubes became over-heated and in some instances melted. I then had another box made to fit on the top of this one, and by putting two zinc pipes outside the previous iron ones, allowed them to pass outside the top of the second box, and by drilling numerous holes, connected the two. The upper one has become all that could be desired; the heat from the tubes being more genial, and the plates, having the benefit of the hot air from the lower box, dry more evenly, and are less liable to frill. Carrying out this idea, I mean to have another box constructed below, simply for heating the air to supply the two above.

In reference to frilling, I see that tannic acid is recommended to prevent this; but with alkaline pyrogallic, the cure is worse than the disease, as you will see by the plate I now show. It is stained a reddish yellow in the shadows. Microscopists use a solution of tannin with ammonia to stain tissues, and I presume that this compound is formed in the gelatine film by much the same means, but, fortunately, with ferrous oxalate, the plates develop out quite clear.

Hoping that these few hints may be found useful, I now pass to the process of enamelling.

My first ideas of enamelling were obtained from photographs of H.R.H. the Princess of Wales, done in Copenhagen, and sold in this country at the time of her marriage, in March 1863. I thought that, when it was possible to transfer one of the old positive films to patent leather or black paper, I could transfer a film of plain collodion to paper; and in putting this into practice, I coated a piece of patent plate glass with collodion, and, with a weak solution of gelatine, floated the print upon it, and when dry, repeated the same operation with the card mount. This method I see described in the present Year-Book, and, if carefully performed, it is tolerably successful; but I soon discarded it for one I accidentally discovered, and which I have practised less or more since that time. In looking among some old negatives, I observed one with a mask which had been gummed on to the varnish, and had become partly detached; on raising it up I discovered that the paper was beautifully enamelled with the collodion and varnish of the negative.

I was not long in acting upon this suggestion, and, without going into all the details of the experiments I made, I may say that the method I now use is this. Cleaning the plates in the usual way, and finishing with wash leather, no talc or French chalk being used, they are coated with plain collodion about the consistency of that for negatives, and put upon a rack till dry, when they are varnished with a white lac varnish. I prepare a stock of these plates, and so have them always ready for use. Another method, and one which I think the best for larger sizes, is to prepare the glass with French chalk, coat with a thick collodion, and afterwards coat with gelatine as you would an emulsion plate, and allow to dry. Plates coated at night are usually dry next morning. This process has been published many times before. The first to publish it was Herr Liesegang, in the Photographic News, Sept., 1860, also by J. Beattie and others in 1863.

The prints, we shall now suppose, have been washing all night, and are tolerably free from soda; but we know to a certainty that, even with enamelling, some of them, at least, will not last. I now propose, in a great measure, to obviate this by the following treatment:—After drying I immerse them one at a time, with a glass rod, in a solution of 2 volumes of sulphuric acid to 1 of water, or I think it is safer to dilute the acid one-half with water; this changes the tone from the usual brown to black. They are then returned to the washing trough, and thoroughly washed, adding a few drops of ammonia to the last water, which, to a great extent, restores the former brown. The black tone they assume in the acid may be occasioned by sulphur toning, and, if so, it seems to be removed by the action of the ammonia. I have also tried the immersing of them in a weak solution of caustic potash, which effectually removes all trace of the previous black tone; but I find that with some albumenized papers it turns them yellow. I may say that of the papers I have tried, that called "double coagulated" seems to be the best. In looking at these prints, it is very apparent that the whites have become more pearly and the shadows more velvety, and, if finished plain, present a matt surface not unlike a platinotype thus removing the (so-called) vulgar glare of silver prints upon albumenized paper. Those I now show you will illustrate this, particularly the views by Mr. Valentine.

The action of the acid upon the size of the paper is to convert it into a jelly, which is washed out, the paper appearing, when wet, like blotting-paper, and, when dry, like parchment.

By thus changing the paper we get rid of any remains of soda, and between the delicate silver composing the image we interpose, as it were, an impervious medium, thus saving it from any deleterious matter that may be in the mount.

As you will see, the silver forming the image has not been acted upon in any way injuriously.

The prints so treated, and which are to be finished with a matt surface, having been cut to the proper size before toning, are now placed one over the other, and mounted while wet with gelatine (starch paste is no use), and if desired can be burnished in the usual way, the same as the one I now show. "Carte" sized prints for enamelling I coat on the back with gelatine, and pin up till dry, when they are cut to the size and mounted upon a thin Bristol board, by damping the card and passing through a lithographic machine. They are now ready for having the spots touched up and any defects rectified with Indian ink, or, if any are to be coloured, they are now in a fit state for this operation; the colours used are the ordinary water-colours, but without gum or any other medium. When this is done, they are coated with thin collodion, and the next operation is to soften with hot water, and float with a weak solution of gelatine on to the varnished plate, which sets immediately. They are then put up in an airy place till the next morning, when they are dry, and may be stripped off the glass.

Prints of a larger size cannot be so treated. In taking them out of the water, they are laid face upwards on a piece of glass, and raising the edge, a line of gum is put all round to keep them down. The defects are then made good, or, if desired, they may be coloured and afterwards coated with collodion; this done, they are squeegeed with hot water on the plate previously prepared with gelatine, and after being allowed to set for some time, the mount is floated on in the usual way with gelatine, or, if preferred, they may be stripped off the glass in the thin state, and mounted with the machine by simply damping the card, enough gelatine being left on the back to make it adhere; the effect is much the same as if printed on double albumenized paper.

Another method which I have lately tried is this. After the prints are touched up or coloured, they are floated upon the enamel glasses in the way previously described; they are then impregnated with Canada balsam, thus rendering them perfectly impervious to moisture. They have now become semi-transparent, and the next operation is to coat the back with collodion and varnish mixed, which, when dry, gives a beautiful white coating of cotton. This method of depositing cotton I discovered years ago, in my early experiments with enamelling. I see Mr. Woodbury draws attention to it in the present Year-Book. It only now remains to give a back upon this, and, when dry, to strip off the glass. Or, instead of coating with collodion and varnish, I have roughly coloured a print previously treated with the sulphuric acid, and floated it with gelatine on to the semi-transparent one already on the glass; this has the effect of giving greater depth to the colouring. They may also be treated with wax instead of Canada balsam; but in the use of either of these the tone of the picture is very much reduced. I think I obtain a much better effect by rubbing the paper from the back of the print with sandpaper, till it is quite thin and nearly transparent. I show you a specimen done in this way, and you will observe how translucent it has become. Another method is to coat a piece of plain paper with a film of gelatine, which, when dry, is again coated with a film of albumen, with the proper chlorides. We have now albumenized paper on a substratum of gelatine, which is sensitized, printed, and toned in the usual way, when it is squeegeed upon the enamel glass, then immersed in hot water, and the paper backing removed; it is then treated with bichromate of potash and exposed to light, which, as you know, renders the gelatine insoluble. It only now remains to float a card upon the back of this and allow it to dry, when we have an albumen print resting upon an insoluble film of gelatine, and with a film of gelatine and collodion on the face. The specimen I show you is very rough, but it will serve to show the practicability of the process; and when I tell you that the gelatine was spread upon the paper with my finger, and the albumen afterwards by the same means, you will understand the cause of the heights and hollows. Perhaps some of our manufacturers of albumenized papers, on reading this, may be induced to manufacture a few sheets for experiment. I hope by some of these methods to secure permanency, and thus remove a stigma which has long disgraced our art; or, if the source of fading is in the albumen itself, I am afraid we must fall back upon the carbon process, or upon the lately-suggested gelatine-chloride process.

I should now like to draw attention to a few useful applications of the same principle. As you are aware, for some of the mechanical printing processes a reversed negative is required, and having an order a short time ago for negatives for that purpose, they were done by the wet process, varnished as usual with negative varnish, and then coated with a film of gelatine. One of these I have brought to show you how beautifully it leaves the glass.

The next application is one which I think might become very useful. Taking a positive on glass in the usual way, it is varnished, and a piece of chocolate-coloured paper is floated on to it with gelatine, and when dry may be stripped off and mounted in the way previously described. This is a far more artistic production than the new species of positives on tin.

The last application has reference to collodion transfers. They are taken in the usual way and varnished, after which a piece of rough crayon paper is applied with a squeegee and gelatine, and when dry are stripped off and mounted. A specimen done in this way I now show you.

I have been led thus extensively to go into the subject through a visit we have lately had from a gentleman professing to teach enamelling, and claiming besides to make his prints absolutely permanent. This permanency he professes to obtain by saturating the prints with wax, as you can see from the print I now show, done by one of his licensees. There is nothing very new or extraordinary in this; we know that the late Adam-Salomon did this with his prints many years ago, and made no secret of it, and we are now asked to buy this process, and only find out when too late that we knew all about it years ago. Our dealers ought to be very careful who they introduce to their clients.

While upon this subject I cannot refrain from expressing my dislike to secret processes, whether genuine or otherwise; it has not been by secrecy that photography has progressed so far, nor will the process-monger add much to its progress in the future.

Lately we have had a startling advertisement, "The Missing Link;" this was announced as an intensifier of wonderful efficiency; and when it comes to hand what do you think it contains? No. 1 solution is an iodide of mercury, and No. 2 is cyanide of silver, both of which were recommended by Monckhoven. These two solutions are to be had in nearly every studio, and can be prepared at less than 1s. each; they are now vended under the garb of secrecy at 10s. 6d., and when the carriage is added they cost 12s. This has also been extensively puffed up and sold by those who ought to know better. I shall leave the further elucidation of this subject to Mr. Tunny.

By these remarks I endeavour to repay in some measure the many useful hints I have received from this and kindred associations.

Correspondence.

DECOMPOSITION OF PYROXILINE.

Dear Sir,—Major Waterhouse mentions in your last issue two cases of spontaneous ignition of papyroxyline. This statement is so contrary to my experience with this substance that it would greatly interest me to hear from Major Waterhouse which formula he uses.

It is now nearly twenty years that I first made papyroxyline, and use it in great quantities, and I have never had an opportunity of stating either spontaneous ignition, nor even deterioration in keeping it even in a dry state in tin cases. The process I use for making it is very simple. I mix equal measures of sulphuric acid and nitric acid, and after the mixture has cooled I fill the vessel with thin paper, of which I enclose a sample. I leave the paper in the acids for about five hours, when I take a small piece out of it; this I wash in water, and after drying put it into a mixture of equal parts of ether and alcohol. If it dissolves quickly, I take the whole lot out and wash it; if it does not dissolve, I leave it a few more hours and try again. Papyroxyline prepared in this way (*i.e.*, in cold acids) gives as much intensity as cotton prepared in hot acids. Dr. Dawson, who tried it, says, "This is the first experience I have ever had of the capability of collodion made from any kind of pyroxyline extracted from cold acids to yield intense negatives. But might there not be more contained in Dr. Liesegang's practical experience than is 'dreamt of in our philosophy?'"

The above given formula I recommend to the attention of photographers in places where they may have difficulties to buy collodion or pyroxyline.—Yours faithfully,

Dr. Liesegang.

DRYING CUPBOARDS.

Sir,—It seems to me that Mr. England's drying cupboard is still the best form that has been published, and photographers therefore owe that gentleman a debt of gratitude. Is the cupboard to be purchased, may I ask, ready made? Of course, I know very well that any carpenter I applied to would at once express himself willing and anxious to construct one, and no doubt there is little difficulty in doing so; but I do not want to give a carpenter a job: I want a drying cupboard. Can you tell me of anybody who has already constructed a trustworthy drying cupboard after Mr. England's design?—Faithfully yours,

Gelatino Amateur.

[We dare say Mr. England will give our correspondent the desired information.—Ed. P.N.]

MISSING LINKS.

Sir,—There has been more than a hubbub north of the Tweed, in consequence of some recent sensational announcements. One gentleman says he has found the "missing link" with regard to the intensification of negatives. Another gentleman, from the other side of the Atlantic, says he has discovered another missing link, namely, giving absolute permanency to photographs. A gentleman resident in the Northern Capital announces at the Photographic Society's meeting that he has discovered the American gentleman's mode of securing permanency, viz., by subjecting the prints to diluted sulphuric acid. I hope your readers will be on their guard not to risk putting a print they may attach any value to into such a mixture, as rapid deterioration would ensue upon such treatment.

With regard to the American discovery, it is nothing more nor less than one of the old methods of rendering the prints transparent, and painting them on the back. This, as your readers are aware, has been once or twice patented in England. Some have proposed oil, some wax, some varnish, and some paraffin. The latter is always to be preferred. The method of the new discoverer is either wax or paraffin, either of which will give great transparency to the print. The secret of applying the colour to the back and front of the print has been so often described that it is surprising to think how many take the last announcement as new. Let your readers post themselves up in the back numbers of your valuable paper, and they will have the advantage of knowing at once what is new what is true, and what is false.

H. B.

THE DUNDEE EXHIBITION.

Sir,—As you were one of the judges, and do not feel in a position to answer my question, perhaps the Secretary will do so. I simply want to know if the judges were empowered to award extra prizes for merit, for subjects not mentioned in their prize list. I shall then be satisfied. And they surely cannot object to give me an answer if things have been carried on in a straightforward manner, as I was induced by the committee to compete under the above conditions.

David Hedges.

Proceedings of Societies.

South London Photographic Society.

The ordinary monthly meeting of this Society was held on Thursday, March 2nd, at 8 p.m., in the rooms of the Society of Arts, Adelphi, Rev. F. F. Statham (President) in the chair.

The minutes of the preceding meeting having been read and confirmed, Mr. Alexander Mackie was duly elected a member.

The Chairman, in alluding to the Artistic Competition, said the judges—Messrs. Vicat Cole, E. Warren, and S. P. Jackson—had made the awards for last year, Mr. E. Dunmore being the recipient of the medal, and Mr. T. B. Blow of the diploma. The Committee had been considering the matter, and had come to the conclusion that this year four subjects only would be given out, two for figure and two for landscape. The titles would be announced at the next meeting, and competing pictures would have to be sent in before the opening of the Exhibition in Pall Mall, due notice of which would be given. The Chairman also said that the secrecy clause would be done away with. The Chairman said he had been asked to call attention to a lecture to be given by Mr. W. K. Burton, on March 9th, at the Society of Arts, on "Practical Hints on the Manufacture of Gelatine Emulsion and Emulsion Plates." Tickets, no doubt, could be had of Mr. Wood.

Mr. E. Dunmore then read a paper on "Common Objects of the Studio," and demonstrated various points described in his paper.

The Chairman, in the course of some remarks, alluded to dust as being, in some cases, an important factor in diseases; the thorough cleansing of vessels was, he said, an important item, as shown by the failure of one of Mr. Dunmore's demonstrations, through not having time to properly wash out the vessel. The Chairman alluded to sulphide of hydrogen as playing an important part in a household, and said many unpleasantnesses were caused, both photographically and otherwise, by not thoroughly washing down drains.

Mr. Bolas said the moral of Mr. Dunmore's paper was, "Down with the dust!" and he had often heard the same cry from the Treasury Bench, Mr. Bridge often crying, "Down with the dust!"

Mr. Cole said many failures were caused, perhaps not so much by wilful adulteration, as by insufficient attention in storing chemicals.

Mr. Brooks said nitrate of silver was adulterated with baryta, mostly in small crystals, causing black spots to appear in emulsion plates when dry.

Mr. Foxlee said that impurities often arise from weighing different chemicals in the same scales without thoroughly cleansing them first.

The Chairman called attention to the fact that Mr. Dunmore's remarks alluded not so much to adulteration as failures from accidental vapours and other matters.

Mr. Cobb said that in his early days, great care in respect to dust was insisted upon; but in his experience of work at the Woolwich Academy, the cadets certainly made the dust fly about by the pranks they played, yet he had seen some of the cleanest and most perfect negatives turned out.

Mr. Nesbitt observed that it seemed as if those who took the most pains to free their dark rooms from dust got the dirtiest results. Perhaps this was owing to the fact that the dust was always in a state of agitation.

Mr. Edwards agreed with Mr. Nesbitt, and thought it was best to let sleeping dogs lie.

Mr. Foxlee said the best means of removing dust was by a damp wash-leather.

The Chairman remarked that Professor Tyndall had proved that light was caused by reflection from particles of matter floating about, so perhaps it was as well all dust could not be removed, or we should have possibly no light.

After some few further remarks had been made, a vote of thanks was passed to Mr. Dunmore for his paper.

Mr. A. Cowan passed round a little wire tray for holding gelatine plates during development, to avoid putting the fingers into the pyrogallic, as doing so caused, in many cases, bad sores. It consisted merely of a piece of flat tin on which the plate rested, and, at each side, a circular piece of wire, placed perpendicularly to the surface on which the plate rests, these acting as handles to raise the apparatus.

Mr. B. J. Edwards passed round some transparencies made upon gelatino-chloride plates.

Mr. Nesbitt asked if the sensitiveness was as great as with ordinary gelatine emulsion.

Mr. Edwards said the chloride emulsion was much slower, but could be developed as rapidly as nitrate; and also it could be developed in a much more brilliant light, and, therefore, more comfortably. Mr. Edwards then promised to read a paper at the April meeting, on "Gelatino-chloride Pictures by Development;" he also said he would develop various pictures, and explain the process.

The meeting then adjourned.

Edinburgh Photographic Society.

The fifth ordinary meeting of this Society was held in 5, St. Andrew Square, on the evening of Wednesday, the 1st inst., when the President occupied the chair. The minutes of the previous meeting having been approved of, the following gentlemen were unanimously elected ordinary members of the Society:—Messrs. A. A. Campbell Swinton, Joseph Lennie, W. Jamieson, David Gordon, John C. Rodgers, James Fairbairn, and Wm. Ireland.

The Secretary then read the rules and recommendations drawn up by a sub-committee and adopted by the Council, in reference to the presentation print competition (see page 107, in our last).

Mr. Alex. Ayton read a paper entitled "Some Photographic Experiences, including Enamelling and a Recent Discovery for the Fixing of Silver Prints" (see page 123).

The President heartily congratulated the members present on the mass of valuable information they had just received from Mr. Ayton, and proposed a cordial vote of thanks to him.

Mr. Tunny, in seconding the motion, said he had great pleasure in expressing his appreciation of the paper. He was sure that many present would be initiated into mysteries of which they were quite ignorant until that evening. He felt that all interested in photography would be indebted to Mr. Ayton for several of the ideas which were certainly original, and of very great value; he reciprocated the sentiments anent the process-monger, and especially the one particularly alluded to. Vote of thanks accorded by acclamation.

Mr. G. G. Mitchell was grateful to Mr. Ayton for the mass of information he had brought before the Society. He was specially struck with the simplicity of the mode for transferring films of collodion. He noticed that a question was asked as to the best way to reverse the gelatine film. He found that by putting the negative aside immediately it was removed from the hyposulphite bath, until all the superfluous moisture had drained off and evaporated, the film acquired a toughness which allowed it to be pulled off the glass without injury if reasonable care were employed. He had repeatedly employed the method, and invariably with success. The chief thing to avoid was the folding or creasing of the film while floating in the water, or before it was finally placed on its permanent support, any fold or crease being indicated by a perceptible line when the negative was dry.

Mr. J. M. Turnbull was much obliged to Mr. Ayton for his important contribution, and for the very thorough way in which he had entered into the various details. They were of so much value because they were the outcome of the accumulated experiences of many years, and he deemed it a very generous thing in him to have given so full an exposition of his peculiar mode of enamelling, in which process it was well known Mr. Ayton was *facile princeps*.

Mr. W. T. Bashford said he had taken advantage of the hint thrown out by Mr. Ayton at last meeting, and had made a few experiments in the direction indicated. With the sample of paper he had employed he could not succeed in parchmentizing the prints without at the same time so materially injuring the photographs as practically to make the method valueless; at the same time he considered that if any benefit accrued from a bath of sulphuric acid, a much weaker solution would suffice than is necessary to parchmentize the paper. He, as well as others, was much impressed with Mr. Ayton's announcement; but on calmly thinking over the matter, he felt that, so far as shown, he could not accept the assertion that silver prints treated with sulphuric acid were rendered permanent. Of course time might prove the claim correct, but it must be remembered the acid introduces that arch-enemy of permanency, sulphur, in a very active state, into intimate contact with the atoms of silver composing the print. That sulphur in this stage does react on the silver is evident by the marked change of tone due to sulphurization; that sulphur does not of necessity cause fading is proved by the historic fact that many old sulphur-toned prints are among the most permanent in existence; yet it must be acknowledged that the presence of sulphur tends to instability. If the print is not perfectly freed from hyposulphite prior to the sulphuric acid bath, what takes place? The acid decomposes the salt, sulphurous acid is liberated, and sulphur is precipitated. If we take a quantity of water containing hyposulphite and add a few drops of H_2SO_4, we shall notice by the smell that sulphurous acid is disengaged, and we shall see by the opalescent cloud that sulphur is liberated, and in time falls as a precipitate. It is an analogous action that takes place when a silver print containing traces of hyposulphite is subjected to H_2SO_4; the sulphurous acid would be removed by washing in water; not so, however, the atoms of insoluble sulphur that are entangled in the pores of the paper and albumen; these remain in intimate contact with the atoms of silver forming the print, so that there may be a reasonable fear that it is not more stable than prior to the acid bath. Mr. Ayton had given a most beautiful, simple, and original method of enamelling, and had also brought prominently forward several other methods of isolating the silver print, but the speaker feared that a coating of collodion, gelatine, wax, or varnish in any of their varieties, singly or collectively, would not certainly ensure its permanency if the print were originally of an unstable character. During the past few weeks a person had claimed to make photographs permanent by saturating them with a wax, and one of his dupes finds that before a month is out the print done as a sample by the process-monger himself shows unmistakable signs of fading.

Mr. J. G. Tunny intimated that two bottles had been placed in his hands for the purpose of ascertaining the active photographic ingredients they contained. He said: "These solutions are sent out, I understand, for strengthening or giving density to negatives. No. 1 is an old friend—or, rather, I should say, an old enemy—under a new name. It is a mercuric iodide in an excess of potassic iodide. I shall put a little of the solution into this test-tube. I add a few drops of the bi-chloride of mercury, and now you see the bright scarlet colour of iodide of mercury. In this other test-tube I shall put a little of the No. 1 solution, and now add a few drops of nitrate of silver; there you see the yellow precipitate of iodide of silver. This, then, is the active principle of the bottle No. 1. No. 2 bottle contains cyanide of silver. In order to prove so, I shall place in this tube a small quantity of it. A drop or two of muriatic acid added instantly forms a white curdy precipitate of chloride of silver. In this other tube I shall add to the No. 2 solution a few drops of nitrate of silver; this, you will see, instantly forms a heavy precipitate of the cyanuret of silver. This is exactly the solution that Monckhoven, more than two years ago, gave to the public for the intensifying of negatives. Those who wish to make these solutions for themselves will find the following formulæ answer admirably:—No. 1. Bichloride of mercury 20 grains, iodide of potassium 60 grains; grind up these in a mortar with a few drops of water, put into a 20-ounce bottle, and fill up with water. No. 2. 30 grains of nitrate of silver dissolved in 2 ounces of water, 60 grains cyanide of potassium in two ounces of water; when dissolved add the two together, filter into a 20-ounce bottle, and fill up with water. But, for my own working, I prefer bromide of potassium instead of the iodide that is used in No. 1 solution, using 30 grains of the bromide instead of 60 grains of the iodide. Gentlemen, in conclusion, the note of warning cannot be too often or too loudly sounded. Beware of using mercury in any form for the strengthening of negatives; many valuable ones have been lost by it. It is a powerful and valuable agent if unalterable permanency could only be obtained. Recently I have subjected all intensified negatives by it to a bath of saturated sulphate of iron. So far as these have been tested there seems to be no change after an exposure of some weeks to the little sun that has been available recently.

A vote of thanks proposed by Mr. Dobbie was heartily accorded to Mr. Tunny for his interesting demonstration.

The meeting, which was unusually large, terminated at a late hour without overtaking all the items on the billet.

Glasgow Photographic Association.

A meeting of this Association was held in the Religious Institution Rooms on Thursday evening, 2nd inst., at 8 o'clock, Mr. John Parker (President) in the chair.

The minutes of last meeting were read and approved.

Mr. David Service was elected a member.

The question-box was opened in the usual course, but nothing of importance resulted from its contents.

Mr. Lusk showed some negatives illustrating a question which was discussed at last meeting, anent certain yellow spots which frequently make their appearance on gelatine plates that have been printed from.

Mr. Robertson exhibited a drop-shutter that had been made by Dr. Paterson twenty years ago, and which proved that the principle of some of the modern shutters is not novel.

Mr. James Paton then gave a lantern demonstration of "Three Days on Loch Lomond with the Camera, and Specimens of Instantaneous Photography," which was much appreciated by the members and friends present.

Photographers' Benevolent Association.

The Board of Management held its monthly meeting at 181, Aldersgate Street, on Wednesday, the 1st inst.

The minutes of the preceding meeting having been read and confirmed, the following gentlemen were duly elected as members of the Association:—Messrs. A. J. Brown, C. R. Brown, H. Garlick, J. Smith, and H. N. P. Warren.

The other business having been disposed of, the meeting adjourned until April 5th, at 8 p.m.

The balance-sheet, with reports for the past year, is now ready, and will be forwarded upon receipt of application to the Secretary.

Thursday Evenings for Photographers.

At the meeting held on the 2nd inst., Mr. A. Mackie occupied the chair.

The subject of blood poisoning by the use of the alkaline developer was again discussed, and Mr. Henderson read a letter from a country photographer from which the following is an extract:—"The statements of yourself and Mr. Turnbull have taken me by surprise, and enlightened me about myself. I am in a dreadful state, seemingly from the same cause. I have six great sores now on the right knee, and two on the left, besides about twenty others; the doctor has been, as he said, quite unable to account for them. I cannot sit for them on my buttocks and thighs, and scarce do any work. If you will write me I shall feel greatly obliged, as I have not been able to get any cure."

Mr. A. J. Brown said that since last meeting he had been experimenting by rubbing the skin of the arm near the bend of the elbow with the various solutions. Four days' rubbing with a strong solution of bromide caused no apparent effect, the mixed developer only gave a slight stain, but a solution of pyrogallic had caused a very red mark, which he said itched very badly, and pustules were now appearing.

Mr. W. M. Ashman said he had found a beneficial result by using a nitrate of mercury ointment.

Mr. A. Cowan spoke of a gentleman whose fingers had been so badly poisoned as to disable him for over six weeks, and he exhibited a plate-holder he had devised to place in the developing tray and obviate the necessity of touching the solution with the fingers; it consisted of a thin frame of tin, having wires at the sides to raise it by; the plate being placed in this holder could be carried through all the stages of developing, &c., without being touched by the hands.

The Chairman announced that Messrs. Avery and Co. had presented the meeting with a "Patent Empire Cloth Background" and fittings; for which the thanks of the meeting were tendered.

Mr. Henderson exhibited a negative very much under-exposed, which showed a great deal of green fog; this negative was backed up with black varnish and copied, the copy being a transparency, and showing much more pluck and detail than could possibly have otherwise been obtained from such an imperfect negative.

The Chairman passed round two plates prepared with "Kennett's Pellicle" in 1873; these being interesting as showing how great a density was obtainable with so thin an emulsion.

Mr. Cowan showed three prints of a group taken by electric light at the Society of Arts, the previous Thursday.

Mr. Brown showed a print from a negative of a pantomine scene, taken during the performance, with an exposure of about four minutes; he also exhibited an actinometer, constructed after Messrs. Mucklow and Spurge's plan, from pill boxes and perforated zinc.

In reply to the following question from the box, "Is not the use of soap in burnishing prints very likely to hasten their fading?"

Mr. Henderson said he thought it had a deleterious effect and had long since abandoned its use in favour of a preparation of beeswax and parraffin dissolved by heat, and a small quantity of spike oil of lavender, then adding alcohol.

Mr. REIMANN asked if there was any method of reducing a negative intensified with mercury and ammonia.

Mr. COWAN recommended "Ozone Bleach."

DUNDEE AND EAST OF SCOTLAND PHOTOGRAPHIC ASSOCIATION.

THE sixth ordinary meeting of this Association for the session was held in Lamb's Hotel, on Thursday, March 2nd, Mr. JAMES C. COX (President) in the chair. The Vice-president, together with the other office-bearers, mustered in full strength, and numerous other members testified their interest in the proceedings.

The HON. SECRETARY (Mr. C. Johnson) read the minutes of the previous meeting, which were duly confirmed.

Messrs. Birnie and A. C. Milne were then admitted members of the Association.

Mr. JOHN ROBERTSON (Vice-president) afterwards read a paper entitled, "Dark-Slides *v.* Changing-Box." Mr. Robertsou brought a good deal of experience and useful details into his paper, the whole bearing generally in favour of dark-slides. An animated discussion followed, in which the terse, sharp questions and answers showed the keen interest taken in the subject. On the motion of the President, a vote of thanks was awarded to Mr. Robertson for his contributiou to the Society's records.

The next business on the programme was the nomination of office-bearers for the ensuing year, when it was unanimously and cordially resolved that Mr. James C. Cox be again invited to accept the office of President. The request was accompanied by a well-earned tribute to Mr. Cox for the courtesy, talent, and zeal he had shown since the formation of the Society. The Vice-presidents, Treasurer, Secretary, and Council were duly nominated for election at the next general meeting in April.

It was most generally remarked that the Exhibition continued to be a success, and that the officers immediately conuected with it deserved the highest praise for their efforts.

The usual vote of thanks to the Chairmau closed an animated meeting.

HALIFAX PHOTOGRAPHIC CLUB.

THE monthly meeting was held March 6th, at the *Courier* office, Mr. W. C. WILLIAMS (vice-president) in the chair.

The SECRETARY (Mr. E. Gledhill) read the minutes of the last meeting, which were confirmed.

Mr. WHITELEY then exhibited several very good negatives and prints from them. He had prepared the plates from some emulsion made from a sample of gelatine seut to the Club by Mr. Heinrich. He said he had some difficulty in squeezing the emulsion through the meshes on account of its being so strong.

Mr. W. C. WILLIAMS then offered some remarks on Captain Abney's enlarging method on paper.

Mr. MYOTT exhibited a half-plate camera lens and stand, bellows body, and very portable, with one double dark slide specially made for dry plates by Mr. J. Lancaster. Mr. Williams also spoke of a plan he had adopted for preserving emulsion for future use, which he thought would keep it for several weeks. He placed the emulsion in a canister, and heated it to drive out the air, and then sealed up the aperture.

For the next monthly meeting Mr. Williams promised a paper on "Photo-Eulargement," and its illustration with practical experiments.

Talk in the Studio.

PHOTOGRAPHIC SOCIETY OF GREAT BRITAIN.—The next meeting of this Society will be held in the Gallery, 5A, Pall Mall East, on Tuesday, March 14th, at 8 o'clock, when the following papers will be read. "Relation of the Human Eye to the Photographic Camera," by William Peek; aud upon "A New Method for Obtaining Clearness and Intensity in Gelatine Negatives," by William Willis.

THE ROYAL BRIDE AND BRIDEGROOM.—We hear that Mr. J. Thomson, of Buckingham Palace Road, was honoured with sittings by their Highnesses the Princess Helen, of Waldeck, and the Prince of Waldeck, prior to their departure; as also by his Royal Highness the Duke of Albany.

JUMBO.—Our issue this week would not be complete without some allusion to Jumbo; so we are very glad to acknowledge from Messrs. Briggs and Son, of St. John's Wood, two capital likenesses of the elephant and his castle of children, as he appeared, we are assured, "two days after his attempted removal for America."

INSTANTANEOUS PHOTOGRAPHY.—A case interesting to Manchester photographers was decided by the Attorney-General on Saturday afternoon. The late Michael Noton, who was a member of the Manchester Photographic Society, in the year 1879 communicated to the Society his invention of an instantaneous shutter. Mr. Noton died in 1880, and subsequently, in June, 1881, Mr. Sands, of the firm of Hunter and Sands, of London, applied for letters patent for the shutter. The issue of the fiat for the sealing was opposed by the surviving brother of the inventor, on the ground that the late Mr. Noton had freely given his invention to the public, as was his custom in respect of his many ingenious appliances. The opponent was represented by Mr. Edward K. Dutton, of Manchester; and the applicant for letters patent by Mr. T. Aston, Q.C. It was acknowledged that the applicant had added a ratchet wheel with a detent and a scale to the instrument. The Attorney-General decided that the claims under the patent to be granted must be cut down so as to cover only the additions to the instrument made by the applicant, and that the title must be amended.

To Correspondents.

W. PARRY.—There is so much competition in that particular line just now, that an excellent article can be obtained from any dealer in photographic apparatus; and it would be impossible for us to particularise unless informed as to whether you wish to burn candle, gas, or oil. Also see our leader in present issue.

T. L. M. C.—It is intended that the paper negative should be waxed in the ordinary way.

T. B.—Why not send it to us for publication?

W. G. H.—Probably the most convenient method will be to develop carbon prints on waxed and collodionised glass, and then to squeegee down over the print a wet sheet of gelatine loaded with a white pigment, as oxide of zinc or sulphate of barium. When dry the sheet of gelatine will readily separate, bearing with it the print.

J. C.—One part of ammonia citrate of iron and one part of ferricyanide of potassium should be dissolved in six of water, and paper is saturated with it. Exposure should be about as for a silver print, and mere washing for fixing.

CARBON.—1. A moderate fee would be required in most cases. 2. From two to three guineas.

LEO.—There can be no doubt that the gelatine putrefied, and that minute bubbles of gas were formed.

GRIT.—1. An increased proportion of gelatine should be used during the boiling. 2. We think not, but you might print the number with a set of India-rubber stamps. 3. The proceeding would hardly pay unless in the case of very large cards. 4. Probably not worth more than old paper price.

Z. X. Y.—1. Fasten up some large sheets of white material behind the window, and at an angle of 45°, so as to obtain an uniform reflection from the sky. This having been done, paste one or two thicknesses of tissue paper outside the window over the white and blue parts. 2. A gelatine plate, certainly, but coat the reverse side with Brunswick black in order to prevent halation.

SUBSCRIBER (Merton).—It is merely a makeshift expedient, and will in all probability lead to future trouble and annoyance.

SHIRE-HALL.—It is probable that the addition which you refer to will not make any difference either for better or for worse; but the fact of using the solution after prolonged exposure to the air will certainly make a very considerable difference, and must lead to certain failure.

F. O. T.—If the circumstances are exactly as you describe them, you would no doubt be quite justified in refusing to give up the pictures.

T. RICHARDS.—1. The oxide of zinc merely serves to give the film a moderate degree of opacity. 2. Two drachms of glycerine is quite enough in such a case. 3. Yes. 4. Dissolve it in a few drops of water before adding it to the gelatinous mixture. 5. Not less than 130° F. 6. Only by carefully straining through muslin.

B. ANDREWS.—Although it is much better done at the time, there is no reason why you should give up the task. A preliminary soaking in dilute acetic acid will serve to remove all traces of lime, and then you can proceed as before.

ST. ALBANS.—1. It merely consists of carbonate of lime in a finely divided state. 2. About eight grains to each ounce. 3. Rather less time than an ordinary silver print. 4. No.

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CONTENTS.

MR. MUYBRIDGE AT THE ROYAL INSTITUTION.

Before a distinguished audience, which included H.R.H. the Prince of Wales, the Princess of Wales, and the three young Princesses, the Duke of Edinburgh—a distinguished photographer, it may be remembered—the Poet Laureate, the President of the Royal Society, and most of the managing body of the Royal Institution, Mr. Muybridge, of San Francisco, gave, on Monday, his first public demonstration in this country. Mr. Muybridge might well be proud of the reception accorded him, for it would have been difficult to add to the *éclat* of such first appearance, and throughout his lecture he was welcomed by a warmth that was as hearty as it was spontaneous.

Mr. Muybridge wisely left his wonderful pictures to speak for him, instead of making the occasion the subject of a long oration. He showed his photographs one after another on the screen by the aid of an electric lantern, and modestly explained them in clear but plain language. In this way the demonstration was at once rendered entertaining as well as interesting.

Mr. Muybridge first explained his plan of securing such rapid pictures of animals in motion. He showed a representation of his "studio" to begin with; it was like that portion of a race-course to be found opposite the grand stand. This latter building was, in effect, a camera stand, and a very grand one, into the bargain, for it contained twenty-four cameras in a row, the lenses a foot apart, all looking on to the course. As the animal passed, these cameras, with their instantaneous shutters, were fired off one after another by electricity. Thin linen threads, breast high, and a foot apart, were stretched across the course, and as the animal broke these threads, they, being connected, each of them, with a camera, brought about the exposure. The instantaneous shutter in each case simply consisted of two little planks, one to move upwards, and the other to move downwards, in front of the lens by rubber springs; the tension of these latter is very great—equal to 100 lb., Mr. Muybridge said—and the exposure was calculated to be not more than $\frac{1}{5000}$ of a second. Whether this calculation is correct or no, certain it is that the spokes of a trotting carriage shown were very sharp, and there was hardly a movement visible in any of the animal pictures.

We may mention here that all his photographs were taken on wet plates, for they were secured four years ago. Iron was employed in their development, and no additional care or particular method was had recourse to.

Mr Muybridge, by way of comparison, first threw on the screen a series of artist's sketches of the horse in motion, some of them old-world designs of the Egyptians and Greeks, some very modern, including the principal animal from Rosa Bonheur's well-known "Horse Fair." In no single instance had he been able to discover a correct drawing of the horse in motion, and, to prove his statement, he then threw on the screen several series of pictures representing the different positions taken up by a horse as he walks, trots, ambles, canters, or gallops. One thing was very plain from Mr. Muybridge's pictures, namely, that when a horse has two of his feet suspended between two supporting feet, the suspended feet are *invariably* lateral; that is to say, both suspended feet are on the same side of the animal. This, no painter—ancient or modern—had ever discovered. Then the amble was found to be different from the canter, and the canter very different again from the gallop; although most people imagined that, to perform all these, the horse used his legs in the same fashion. Mr. Muybridge was at some difficulty to describe the amble, and it seemed at one time as if it would be necessary to call upon Mr. Tennyson to give a definition of it in his well-known lines: "Property, property, property!" but he succeeded subsequently in defining the step very satisfactorily afterwards by means of his pictures.

After Mr. Muybridge had shown his audience the quaint and (apparently) impossible positions that the horse assumes in his different gaits, he then most ingeniously combined the pictures on the screen, showing them one after another so rapidly, that the audience had before them the galloping horse, the trotting horse, &c. Nay, Mr. Muybridge, by means of his zoepracticoscope, showed the horse taking a hurdle—how it lifted itself for the spring, and how it lightly dropped upon its feet again. This pleasing display was the essence of life and reality. A new world of sights and wonders was, indeed, opened by photography, which was not less astounding because it was truth itself.

After these life-like pictures, it needed not Mr. Muybridge's dictum that to use a mild term it was "absurd" to see a galloping horse depicted with all four feet off the ground, a simple impossibility. And if this held good of one horse, what must be said of ten horses, thus painted, as was the case in Frith's "Derby Day," which Mr. Muybridge projected on the screen by way of comparison, and which the clever photographer described as a miracle.

Mr. Muybridge modestly calls his series of animals in motion—they include horse, dog, deer, bull, pig, &c.—simply preliminary results. They contain little or no half-tone, and are only proof of what may be done. What he desires now to secure, if he only receives sufficient encouragement, is a series of photographic "pictures," and these, with the experience he has now acquired, and with the gelatine process to help him, should be well within his reach. We only trust this encouragement will be forthcoming, and that Mr. Muybridge will be tempted to carry on the difficult work he has commenced with such genuine success.

THE RETURN OF SPRING.

The numerous bright gleams of sunshine which have flashed out from time to time during the past fortnight or ten days will probably act as an incentive to many amateur and professional photographers to make preparations for out-door work, and doubtless many who have only practised the wet process will adopt the gelatino-bromide method at this juncture. Old apparatus will now be overhauled or altered, while new will be purchased; and many amateurs are, doubtless, busy in carrying out plans for new dark-rooms or modified apparatus. As the gelatino-bromide process now is one of the chief methods of making negatives—if, indeed, it is not actually the most important—the dark-room of the past requires considerable modification. The old-fashioned cupboard, only just large enough to stand in, and provided with extemporised yellow blinds, will no longer serve, either as regards the safety of the light, or the space available for work; and those collodion workers who intend to adopt the gelatino-bromide method during the approaching season will do well to thoroughly refit, and, where possible, enlarge, their laboratories; while those who have already practised with gelatine emulsion should carefully test and thoroughly examine all windows, as a medium which has proved sufficiently non-actinic during the dull months may not be safe in the face of the powerful light of spring and the early part of summer.

Our readers will bear in mind that the entry of extraneous light into the dark-room is by no means easy to detect, unless the observer acclimatises his eyes by remaining in the dark for a considerable time; and a mirror should be used in examining those parts of the room which can only be looked at from remote corners—often, indeed, the very corners which are selected as being suitable places for laying plates aside during a few minutes.

Slides and cameras which have been placed aside during the winter will require special examination, as glued joints will often open, and the leather may be cracked, separated from the woodwork, or rendered defective by the attacks of insects. In connection with this matter, we may mention that the woodwork of cameras and slides is often so thin as to form a very imperfect protective against the direct rays of the sun, or even the long-continued action of ordinary daylight.

The question of lenses naturally occurs in conjunction with our present notes concerning the recommencement of out-door work with the camera, and we may remind those who have so loudly predicted that the portrait lens will soon become a thing of the past, that the objective in question is still prized by those who wish to practically realize the full value of the gelatino-bromide plates for instantaneous work, and, although an objective of the rectilinear or symmetrical class is certainly superior when it can be used, there are many cases in which a judicious photographer will arm himself with a portrait combination, even for outdoor work.

A SIMPLE PNEUMATIC FILTER FOR GELATINE EMULSION.

The following method of filtering emulsion is as simple as it is satisfactory. It is the result of a number of experiments in search of a thoroughly efficient filter, and has been in use for about three years. The articles used in the construction of the filter are a gallipot, and a piece of chamois-leather about four times the diameter of the mouth of the pot. The leather should be well dressed, and, as nearly as possible, of uniform thickness. It should be thoroughly washed in soda and water, and all trace of soda afterwards removed by repeated changes of water. The final rinsing should be effected in distilled water, after which the skin, while wet, is laid over the mouth of the pot, so as to form a hollow receptacle for the fluid emulsion.

When the emulsion to be filtered is poured into the hollow, the skin should be gathered up in the operator's hands, and pulled tight over the mouth of the pot. By this means the air in the pot becomes partially exhausted, and the emulsion is forced through the pores of the skin, leaving the grit and refuse behind.

This simple pneumatic filter may be improved by fixing the leather into a wooden ring large enough to enable the operator to increase the pressure used in stretching the membrane over the mouth of the pot. In our practice, however, the simple sheet of leather has been used, owing to the facility it affords for washing.

It should be borne in mind, in using a filter of this sort, that the leather, after each operation, should be washed in the dark-room, and preserved in a jar of distilled water. Should the washing be conducted in daylight, some of the particles of silver bromide remaining in the skin will be affected by the light, and passed through into the next batch of emulsion, greatly to the detriment of the resulting plates.

This filter may be employed for a great variety of purposes, as, for example, in straining soups and jellies, as well as for manifold operations in the laboratory. We have great pleasure in placing it at the disposal of our readers.

PROOFS AND RE-SITTINGS.

Opinions are divided on the subject of sending out proofs to sitters. There is only one class of photographers, we believe, to whom the difficulty never occurs—those, namely, who bargain to supply a single picture for a stated sum. Thus Mr. John Fergus, of Largs, for example, supplies one cabinet portrait for a guinea, and then charges half-a-crown a-piece for every succeeding copy; while Herr Koller, the leading Pesth photographer, to take an example from the South, gives a single promenade portrait for eight florins, and charges a florin and a-half apiece for copies. But this arrangement is only applied, we believe, to larger portraits, so that even these gentlemen have the proof problem to solve in the matter of carte pictures.

Some of our English photographers forward untoned and unmounted prints to their customers, and so, do not provide these latter with a picture gratis, nor give themselves a great deal of trouble in case the portrait fails to please. Others, on the contrary, make it a practice to take as much trouble over retouching and finishing a proof copy, as over the supply.

Again, there are those who charge for the proof, and those who do not; those who require the first impression to be returned, and those who are indifferent on the subject. To stamp in red ink the words "proof copy" is a plan occasionally adopted to prevent a sitter who only wants one copy getting it for nothing.

As we have said, it is a subject on which many opinions exist, and for that reason we have asked some of our friends to express their ideas on the subject. This is what they say:—

One whose name is a household word among British photographers writes:—

I send out my specimens as good and complete as I can make them. Customers do not understand photographic technicalities, and will give a better order from a perfected specimen than from an untouched, untoned, or unmounted print. I not only retake, if a customer wishes it—first destroying the prints already taken—but I will not allow a customer to give an order if I find that he does not quite like the proofs. I insist on having all the proofs returned, but if any are kept, full price is charged for them. Sometimes when I have sent half-a-dozen proofs to a sitter he will give his order from one of them, and will try to buy the others at a greatly reduced price. "They are of no use to you," is his argument; but I never relent. Full price or destruction is my invariable rule.

A firm of "Photographers to the Queen" says:—

For over twenty years we have always supplied finished proofs of the number of positions ordered, and they have been counted in the number given for the price paid at time of sitting. If the proofs are not liked, another sitting is given free of charge.

A voice from Baker Street says:—

Our practice has always been, and I think it is the wisest with our connection, to submit at least two properly finished proofs for each sitting, whether carte-de-visite, cabinet, or larger sizes. A client then knows exactly what will be received in execution of an order, and I should expect endless little troubles to arise from submitting untouched proofs. We invariably obtain our fees at the time of sitting, and do our best to please our clients, but never give more than one re-sitting; if dissatisfaction still exists, we make an extra charge of 10s. 6d. for the third sitting, but such a necessity seldom happens. The following is a small paper which we send with all proofs:—"Messrs. Pyro and Hypo have the pleasure to enclose proof prints from the negatives recently taken, and will be obliged by their being returned as early as convenient, with the number of copies required written on the back of each."

Another voice from Baker Street says:—

I have adopted the only method open to me, viz., supplying perfect proofs in all cases; this being the result of an experience of nearly thirty years. Proofs approved are counted as part of order.

A Bond Street House writes:—

I have always treated proofs as of no value intrinsically; my terms are for the time devoted to the creation of the negative; the mere pieces of paper and cardboard which are called "proofs" are, in my estimation, of no value; I therefore send them liberally, and ask that they may be returned with all directions written on the back; if they are not, I do not charge for them, but send the required number in addition. I have never considered that I have sold carte-de-visite and cabinets at so much per dozen. The value of the work has been in the negative, as in the case of a doctor or barrister, who do not charge for the paper upon which their opinions are registered, but for the opinions themselves. This, I consider, is the proper spirit in which proofs should be viewed.

A "Successful Photographer's" opinion about supplying proofs is the following:—

Proofs should be thoroughly finished, and fewer re-sits will be the result. I make an extra charge of two shillings on the set of cartes, which entitles the customer to re-sit until satisfied. At the same time, I compel the client to return all the unapproved copies, thus preventing the parties from being retaken for the sake of more positions. At a rough calculation I have about one re-sit in a dozen; this makes an average of twenty-four shillings for every re-sit. I send the following with my proofs: "The photograph enclosed herewith is sent for inspection, and, if approved, must be sent back marked with a X. *All other copies that may have been taken must be returned at the same time, or the order cannot be completed*, as only one position will be given. If the portrait is not approved, another sitting will be given, free of charge, any fine forenoon, before 12 o'clock. Should the proof be considered rather dark, or too light, this can be altered without a re-sitting."

Glasgow says:—

When we submit proofs, we expect that they should be paid for. Except in special cases, we do not charge for second sittings; but we think, were the profession to adopt that rule, it would be a good thing to do.

Bristol says:—

I think it very necessary that proofs should be forwarded for approval; but I make it my practice to send *rough and untoned proofs*, enclosing the following intimation:—"Mr. Protosulphate begs to forward *rough and untoned proofs*, which should be kept from a strong light as much as possible, otherwise they will discolour." During my experience (twenty-one years) I have tried all the many ways of sending *finished proofs*, but have come to the conclusion that my present system is the most satisfactory on the whole. Doubtless I have to re-take some negatives that perhaps I should not have to do if finished pictures had been sent, owing to the untoned proofs having to bear the test of comparison with finished prints. On the other hand, my experience has proved to me that the majority of re-takes are by sitters who are *not pleased with their expression, style of garment, badly fitting dress or coat, and, it may be, the position.* If a negative contain any of these shortcomings (which are quite out of the photographer's power to alter), all the time expended on such negatives and prints is lost, however lovely they may be in a technical point of view when finished. With an established photographer, his patrons are aware of the class of work he produces, and if they are satisfied with the expression and position, rely upon his reputation for the finish. "With untoned proofs" you can promise them the following day (should time be of consequence, even the same day); but with finished proofs two or three days must elapse before the sitter know the result. "With rough untoned proofs," should a re-sitting be required, you go about the re-taking with better grace than had you expended considerable time, trouble, and material in producing what the photographer himself considers a thoroughly perfect photograph, but the sitter does not like, on account of expression, &c.

Liverpool says:—

It has always been my practice to supply proofs—finished copies—and I have found that in doing anything that could satisfy my patrons, I could never discover that they considered themselves too well treated. They generally dispose of such proofs as they think best, unless requested very particularly to return them for further purposes of the work to be done, &c. I may here introduce a remark which has probably more meaning than at first sight would appear. I have invariably found that the best and otherwise most artistic productions are seldom, if ever, selected; almost always the worst productions are accepted as the best, and, as a sequence, re-orders follow from the same inferior negative. Any attempt at not supplying proofs would be resisted by the public, and met by the forcible observation "that every one supplies proofs." I need not trouble you with charges, and so on; nearly every photographer has a different scale of prices. I have never altered mine for more than twenty years—in fact, ever since the introduction of the magic carte-de-visite. I am not aware that experience gained, time and money lavishly expended, entitle the public to a lowering of prices. I may be mistaken, and I have probably suffered in consequence, but such is my impression.

A firm in the S. W. district writes:—

We always send out proofs untoned and unmounted, simply trimmed with care. In this way, it is generally possible to forward pictures by the evening post. An unmounted proof, everybody knows, is only a rough picture, and although a finished photograph is on the whole more pleasing, the untoned impression has a softness and charm that are not at all disagreeable. We do not charge for a re-sit, but we should grumble if called upon more than twice to take a sitter to whom we had given our best attention.

A Gold Medallist writes:—

In reference to sending out proofs and giving re-sittings, I think no rule can be laid down to regulate the whole trade; it will always remain a personal matter with the photographer, according to ability, circumstances, &c., upon what principle he conducts his business; there will always be a certain percentage of the public who are attracted, and are continually on the look-out for something cheap. These have to be catered for as well as the other portion who are willing to pay a fair price for a good article. I think for the ordinary small photographs, such as cartes and cabinets, where (as a rule) a number of copies are required, the public have a right to demand proofs before ordering; and if a reasonable charge per dozen is made, the profits will admit of this, and also of occasional re-sittings, should they be required. I must confess that re-sittings, as a rule, are annoying, and sometimes the demands of our patrons in this respect most unreasonable. Still I think we should not grumbe at having to take a few extra negatives. We certainly reap the full benefit from a portrait that gives entire satisfaction; and from an experience of over twenty years I know that very few copies are ordered if the picture is not liked, however good the quality of the work may be. In my own practice I charge the same price for one copy (carte) as for half a dozen; consequently, I never have to take negatives for single copies. If asked the price for a single carte, I say, ten shillings and sixpence, but you can have six copies for the same price, or a similar sum for three cabinets. I experience no difficulty in the matter, but others differently circumstanced might.

Newcastle says:—

The amount of energy daily wasted in the thankless task of finishing a series of portraits for mere approval is beyond estimation. Six, nine, twelve sittings for a few cartes or cabinets, are, I know from daily contact with my customers, quite usual in many establishments. The best of these are submitted, to stand or fall, not on their merits, but oftener on unscrupulous whims, changing fancies, and unjustifiable lack of appreciation. Alas! poor artist, placed in the power of a capricious sitter; his only protection is an appeal to the purse strings—give nine, twelve, a hundred proofs if desired, but let each one be paid for. But far better, sweep away the whole system; it was all very well years ago, when the many vagaries of the art were constantly obtruding, when uncertainty of effect was prevalent; but now, artist and sitter alike are so conversant with the details of form, colour, light, and shade, as to alter the whole face of the matter. There is no occasion for so many trial sittings, one or two, as a rule, being sufficient. As a matter of fact, for some considerable time I have exposed only one negative (with occasional exceptions) on each position ordered; but I don't expose until confident the result will be a success. With experience, one rapid comprehensive glance of the eye immediately preceding exposure will estimate the composition as a whole, and the niceties of detail in posing, lighting, and expression. The sitter, not having had time to be wearied, is thus benefited by the resulting natural portrait, and the photographer, through concentrating his skill on the one production, is also the gainer. No proof need be shown, and an occasional re-sitting, which rarely happens, is charged a sum equivalent to the price of an extra position. Of course, there are instances where several negatives are an advantage, and where proofs are imperative; in such cases a fixed charge is made for each. It is a mistaken and injurious notion to suppose that a high-class establishment must of necessity submit proofs. Quite the contrary is my opinion; for the higher the repute of the artist, the more reliance will the public place in him, and be guided completely, if he will only take the reins.

THE CHEMICAL ACTION OF LIGHT.

BY DR. J. M. EDER.*

The iron salts are used for many purposes in photography. Ferricyanide of potassium is decomposed in the light, and ferrocyanide is formed (Vogel), the violet rays being twice as energetic in producing this phenomenon as the red rays (Chastaing); besides the ferrocyanide, prussic acid and soluble Berlin blue are also formed (Eder). Ferricyanide of potassium on paper is sensitive to light, even in a dry condition (Herschel, Niepce, and Burnett), and the presence of gelatine promotes the reaction (Gintl). Potassium ferricyanide mixed with chloride of iron turns blue on exposure to the light (Herschel). A solution of ferrocyanide of potassium decomposes slowly in the light, turning a darker yellow colour, while potash and prussic acid are separated (Schönbein); on paper it becomes a bluish colour (Herschel). Manganese ferrocyanide also turns blue under the action of light (Arche). From a solution of sodium nitro-prusside a precipitate of Berlin blue is thrown down in quantity proportionate to the intensity of the light to which it is exposed, and this decomposition is quickened by the presence of iron chloride; the latter mixture is decomposed twice as rapidly under blue as it is under yellow or red glass. Prussian blue fades in the light—especially when kept in a vacuum—with the loss of cyanogen or hydrocyanic acid, but in the dark it takes up oxygen again, and recovers its blue colour (Chevreul). According to Schoras the colouring matter is precipitated from a solution of prussian blue on exposure to the light, but this is denied by Böttger.

From a solution of uranium chloride in ether (Gehlen), and from one of uranium nitrate (Becquerel and Chastaing) or of uranium sulphate (Ebelmen) in alcohol, the green oxide of the metal is precipitated by the action of light; the presence of glycerine (Botton), or of tartaric acid (Niepce and Boivin) has a similar effect. Nitrate of uranium on paper is converted into the green oxide in the light (Burnett and Niepce). Many of the organic salts of uranium are rapidly reduced by exposure to the light—for instance, the double oxalate of uranium and ammonium, the acetate, citrate, formate, tartrate, &c., of uranium; in producing this result the blue and violet rays are the most active.

* Continued from page 99.

Cupric chloride dissolved in ether and alcohol is reduced by the action of blue and white light to cuprous chloride. According to Fehling, an alcoholic solution of the alkaline tartrate of copper is also decomposed by light; Fehling's normal solution separates in the sunlight from 30 to 40 times more cuprous oxide than in the dark, and the solution diluted with about six volumes of water, which in the dark is very permanent, is rapidly decomposed in the light (Eder). The double oxalate of sodium and copper blackens in the light (A. Vogel), and in the presence of oxalate of iron metallic copper is separated (Ehrmann).

The brown peroxide of lead, produced by the oxidation of the monoxide under violet glass, loses colour again when exposed to the light under yellow and red glass, and forms minium. Lead iodide in contact with a damp atmosphere gives off iodine under the influence of light, and becomes converted into the oxide and carbonate; a mixture of lead iodide and starch turns blue on exposure to the sunlight (Schönbein, Roussin, and Schmid). If kept for a long time in violet or green bottles, lead iodide undergoes no visible alteration, but if it is then mixed with starch it causes the blue colour to appear much quicker than is the case with the same salt which has been kept in the dark or in red bottles.

Mercury chloride in an aqueous solution is decomposed into mercurous chloride, hydrochloric acid, and oxygen (Boullay and Davy), but the presence of hydrochloric acid or of ammonium chloride prevents this decomposition. Solutions of the same salt in ether or alcohol are decomposed much quicker; mixed with oxalic acid this salt also decomposes (Planché and Becquerel), but in this photo-chemical reaction the formation of mercurous chloride, and the escape of carbonic acid gas owing to the hydrochloric acid being set free, soon decreases (Marchland), while in the presence of ammonium oxalate the action is more equal (Eder). Both these mixtures are used for actinometrical purposes. The addition to a solution of corrosive sublimate of formic, tartaric, succinic, citric, or malic acids, or of cane-sugar or tannin, also promotes the decomposition under the influence of light.

Bromide of mercury behaves similarly to the chloride, and the iodide of the same metal on paper turns brown (Hunt), more especially in the blue rays. Moist mercurous chloride becomes grey in the sunlight. Both the red and the yellow oxides of mercury are darkened on exposure to the light with the loss of oxygen, and they are converted into a mixture of the suboxide and metallic mercury; the violet rays are most active in producing this effect. Moist subiodide of mercury also discolours in the light, and turns almost black, giving off hydriodic acid—especially in blue or violet, also in green light (Chastaing).

Many other compounds of mercury are sensitive to light—the nitrate, carbonate, and chromate, the basic sulphate and sulphite, the hyposulphite and its double salts; many of the double compounds of mercury and ammonium; also the oxalate and suboxalate with their double salts; the tartrate, pyromucate, and benzoate of mercury, all darken when exposed to the light. Iodide of mercury produced by dipping a film of iodised collodion on glass in a bath of mercurous nitrate will receive, after a short exposure, an image, which can be developed by a solution of pyrogallic acid and silver nitrate; bromide of mercury will not act in the same way (Schnauss).

(To be continued.)

By-the-Bye.

PHOTOGRAPHY AS CLERK AND DRAUGTHSMAN.

In employing photography in the capacity of a clerk or draughtsman, there is always one inestimable advantage: you can rely implicitly upon the truth and correctness of the result. And this quality, we believe, is likely to cause photography to be employed in years to come to a very great extent in the bureau of the statesman, the counting-house of the merchant, the office of the lawyer, and the workshop of the engineer. True, we have now-a-days many clever autographic copying processes—the gelatino-glycerine cake is one of the simplest and best—by means of which a writer may take one or more copies of his manuscript; but these, if they render photography unnecessary in certain instances, do not restrict the usefulness of the art in any degree.

One of the first, if not the very first, record we have of photography undertaking the duty of copying clerk is that cited by Professor Alexander Herschel. He has told us how his father, the late Sir John Herschel, made use of photography with iron salts—the blue process—for copying his calculations and intricate tables. These cost so much trouble to produce, and represented such valuable investigations, that he was exceedingly loth to trust them out of his hands. For many reasons it was necessary to prepare a copy or copies of his work, and as he could not rely implicitly on anybody's figures but his own, he himself had the trouble of writing them out. To photography, then, he turned at the first opportunity; he could trust it, obviously, even better than himself to copy the elaborate calculations, and could rest quite sure that not a single error crept into the mass of figures during their reproduction.

The blue process, which gives white figures on a blue ground, is still frequently employed, especially by scientific men who want simply a rough copy of their work; but it naturally has the disadvantage that the ground is not white. Still the paper is so exceedingly easy to prepare, and the process so simple, that it will long command attention where occasionally a valuable MS., an intricate calculation, or an elaborate plan has to be copied. The ink of the original should be as black as possible—Indian ink is best: and for printing, the document is simply placed above the prepared paper, the two being kept flat by means of two plates of glass held together by clips or other simple contrivance. The process is already well known to our readers, but it may well be repeated in Profesfor Herschel's own words:—"The solution for treating the copying paper is as under:—

Citrate of iron (or ammonio citrate)	...	140 grains
Ferricyanide (red prussiate) of potash	...	120 ,,

dissolved together in two fluid ounces of water. The solution can be kept in a glass stoppered bottle, well wrapped up in a dark cloth, or shut up in a dark cupboard, for any length of time. It is applied to the paper by means of a brush, or tuft of cotton wool, and the surface dried in the dark. Two or three minutes' bright sunshine suffices, if the original is on thin, or tracing paper, for printing, and the fixing is done by washing in clear water for a few minutes."

The "Pellet" paper, a patented article, which may be readily purchased in any large town, is better than the above process, for the reason that the copy is in blue upon a white ground. But the manipulations, on the other hand, are a little more elaborate, and the method is more costly. Where much copying is done, the Pellet paper is largely used, as, for instance, in the engineering departments of the Great Eastern and other railways. The use of photography in such connection is very obvious. Here is one example. The Company desire to purchase some engines; to do this as moderately as they can, they put out the work to tender, and supply any firm desirous of contracting with an elaborate plan showing every minute detail. Formerly, tracings were made of the original approved plan, and these were supplied to would-be contractors. Of course tracings are comparatively easy of production, and with a little care there should be no mistakes in copying; but by bringing photography to bear, the expense of copying is reduced as nearly as possible one-hundred fold, while the chance of error disappears altogether.

Among diplomatists and lawyers, photography as an accurate copyist is also beginning to be appreciated, but here it is desirable to have a reproduction in black, and for this reason we think that the process of nigrography, to which attention has recently been called by Captain Pizzighelli, is likely to find favour. The ordinary autographic copying processes to which we have alluded, and which give from one copy to two or three score, handy as they are, do not suffice to satisfy the lawyer and diplomatist's wants. In the first place, the document to be copied may have been written ages ago, or it may happen that it cannot be copied until it is signed, and when this takes place, the writing has lost its virtue to copy in the ordinary way. In these circumstances the photographic art is singularly useful. Copying by hand is out of the question, for even if done correctly, the copy may lose all its value by not being a facsimile. Here is an instance of what we mean. A Russian document was recently submitted privately and confidentially to a foreign minister; it was impossible to leave the pamphlet—for it was of several pages—in his hands for more than a few hours, and yet the minister urgently desired a copy. There were clerks in his office who understood French, German, and Italian thoroughly, but Russian characters were too many for them. In a fortunate moment the chief clerk bethought himself of photography, and suggested it to the principal; the pamphlet was unstitched, spread out upon a drawing board, and within a few hours there lay another similar volume in miniature, upon the minister's desk, produced by means of photography, and fit for translation and perusal at leisure.

Diplomatic enclosures, which are generally confidential, are now frequently repeated by photography, either by the aid of the camera, or by simply printing through, while lawyers also employ the art for making facsimiles of authentic documents. A photographic copy is held in a court of law, now-a-days, to be as good, almost, as the document itself, for a witness can swear to the handwriting and style just as well as if he had the original before him. Any intelligent man, too, can do the work of copying after a little practice, whether it is the blue process, Pellet process, or nigrographic process he makes use of. The last is more elaborate than the blue process, but with a little practice is soon acquired, while it yields most excellent results. Paper thoroughly sized is floated in a darkened room upon a solution of—

Gum-arabic	... ...	25 parts
Water	... ...	100 ,,
Bichromate of potash	.. ...	5 to 7 ,,
Alcohol	... ...	1 part

Or the mixture may be applied with a broad camel's hair brush. Dried, and kept in a cool dark place, it will remain fit for use a long time. It is exposed in the same manner, and for about the same time as in the blue process, and is then put into cold water for twenty minutes to wash out the unchanged bichromated gum. When dry, a dozen or more prints may be taken at a time and treated with the black colour, made up of—

Shellac	... ...	5 parts
Alcohol	... ...	100 ,,
Finely ground lamp black	...	15 ,,

This is applied with a sponge. Afterwards the papers are laid in water acidulated with sulphuric acid (containing 2 or 3 per cent. of acid), when the superfluous black colour is removable by a brush, and the writing or design appears in fine black lines upon white paper.

Another process, which has been recently worked out by Captain Pizzighelli, also yields capital prints. Thirty volumes of a solution of gum-arabic (water five parts, gum one part), are mixed with eight volumes of an aqueous solution of citrate of iron and ammonia (water two parts, double salt one part), and to the mixture is added five volumes of an aqueous solution of perchloride of iron (water two parts, iron one part).

The mixture appears limpid at first, but soon grows thicker, and it should be used quickly after mixing; it is applied to well-sized paper by means of a brush, the paper being dried in the dark.

Any design, drawing, or tracing may be employed as negative, and, after printing a few minutes, the development is proceeded with. A solution of ferro-cyanide of potassium (water five parts, ferro-cyanide one part) is applied with a brush, and the picture appears almost instantly as a dark-blue positive. As soon as every detail has appeared, the print is quickly rinsed, and then put into a dish containing dilute hydrochloric acid (water ten parts, acid one part) when the image becomes clearer and brighter, the ground gets white, and the gum-iron film is removed. After further washing the print is dried.

There can be little doubt that prepared photographic paper will soon be found in every large office where valuable documents abound. The labour saved, as well as the accuracy assured, are already important points, and when to these is added the circumstance that a *facsimile* is the result, firms of many kinds will not be slow to avail themselves of the advantages of photographic copying. With a camera at one's disposal, it is possible, of course, to do yet more, for huge manuscripts may in this way be reduced to small dimensions, while their intrinsic value yet remains. But to use a camera again, more photographic skill is required. Very little knowledge, on the other hand, is required for simple photographic printing of the nature we have mentioned, and with its aid the duties of clerk and draughtsman may often be advantageously discharged.

The next "At Home" will be "Herr Obernetter at Munich"; the following "By-the-Bye" "On Buying and Selling a Business."

PRACTICAL HINTS ON THE MANUFACTURE OF GELATINE EMULSIONS AND PLATES FOR PHOTOGRAPHIC PURPOSES.

BY W. K. BURTON.*

This paper will, I imagine, be read before a mixed audience, some of whom have a complete knowledge of photographic processes, whilst others may not even know the meaning of the word "emulsion." I shall, therefore, try to explain accurately what we mean by the term, and shall then glance rapidly at the history of emulsions generally, so far addressing myself specially to those who have no knowledge of photography. I shall then enter more particularly into the question of the manufacture of a gelatine emulsion, demonstrating the process; and in this part of my paper I shall address more particularly those whom I shall suppose to have at least some photographic knowledge.

In all our modern negative processes, the object which we have in view in preparing a plate is to spread evenly on a surface, usually of glass, one of the silver haloids. Those which are used are the bromide, the chloride, or the iodide. Any one of these can be made by combining nitrate of silver with the corresponding soluble haloid. For example, bromide of silver is formed by combining nitrate of silver with any soluble bromide. As an example, I have here a solution of nitrate of silver in water. I have also a solution of bromide of ammonia in water. I pour the one into the other, and a dense white precipitate is thrown down. This is bromide of silver. Now, in the manufacture of every photographic plate, this process takes place. It may either take place on the surface of the plate, in which case we have what is known as a bath plate; or it may take place before the film is spread over the plate, in which case we have an emulsion plate.

To explain this matter rather more fully, I have here a certain slightly coloured transparent fluid. This is what is called "iodised collodion." It is a soluble iodide, dissolved in collodion. Collodion is a substance which will form a thin film over a glass plate. If, therefore, I pour this iodised collodion over this plate, I shall have a film in which there is the substance necessary to form iodide of silver with nitrate of silver, and you will see, that when I drop this plate into a bath containing nitrate of silver solution, it will lose its transparency and become white and opalescent. In fact, iodide of silver is formed on the surface of the plate, and a "bath plate" has been prepared.

Now this is a very beautiful process, and one which is most pleasing in many ways, but it has its drawbacks. You have seen that, for one thing, some delicate manipulation is required. Not only that, but we are working with two most fickle substances. In practising the wet process, the bath is continually going out of order. If the bath is right, then the collodion is wrong. Then the film itself is of such delicacy that a touch will destroy it; but the great difficulty is, that the plate must be prepared within, say, half-an-hour of the time it is to be used, and when once exposed must be developed within a few minutes, so that the photographer must have the whole paraphernalia necessary to manufacture the plates wherever he means to work them.

Very long ago, it suggested itself to photographers that the two substances, the iodide and the nitrate of silver, might be combined in the collodion before it was poured over the plate, so that the whole process of manufacturing the plate should consist in pouring the collodion over it. I need not enumerate the unsuccessful attempts that were made; suffice it to say that, in 1864, Messrs. Sayce and Bolton succeeded in suspending bromide of silver, in a fine state of division, in collodion, which had afterwards only to be poured over a glass plate. This process I now demonstrate. I pour an alcoholic solution of nitrate of silver into a bromised collodion. You perceive the bromide of silver formed in a fine state of division. All that is necessary is to pour this over the plate, to wash the latter, and an emulsion plate has been prepared, and is ready for the camera. You see that the process is far simpler than the bath process, but the very great advantage of it is that, whereas the bath plate had to be used immediately after preparation, the "collodio-bromide" plate may be kept for a lengthened period, either before or after exposure.

The collodio-bromide plate was about the same in sensitiveness as the wet plate, and for long was the dry plate of the day.

It began, after a time, to suggest itself to the minds of various photographers that, possibly, some other vehicle than collodion might be used to hold the bromide of silver in suspension. In 1871, Dr. Maddox suggested gelatine as a medium, and experimented in it, getting good results. He prepared bromide of silver in a solution of gelatine of such a strength that it was liquid when hot, but in the form of a jelly when cold. He spread it over plates when warm, and allowed it first to set as a jelly, and then to dry.

In 1873, Mr. R. Kennett took out a patent for a "pellicle," which was simply emulsion prepared as by Dr. Maddox, but afterwards dried. It had to be re-dissolved in warm water, when plates could be coated with it.

It was not, however, till 1878—when Mr. C. Bennett published the fact that if a gelatine emulsion be kept warm for a number of days, the sensitiveness increases enormously—that gelatine plates came to the front. Mr. Bennett's experiments demonstrated the fact that in gelatine plates there might be a sensitiveness never before dreamt of by photographers—five times, ten times, or twenty times what they had been used to. It was afterwards shown that if the emulsion be boiled instead of only being kept warm, a very much shorter period of time sufficed to gain the sensitiveness. It was again shown that if the emulsion be kept warm in the presence of ammonia, the process goes on with great rapidity. In 1879 was published a process in which boiling is recommended, but in which it is advised that a very small quantity of the gelatine necessary be introduced before boiling, the rest afterwards. This process is due to Mr. W. B. Bolton. It must be understood that a very considerable quantity of gelatine is required to make a solution which can be spread over glass, and which will "set" as a jelly on the plate: but that a much smaller quantity of gelatine is enough to keep the bromide of silver in suspension while it is being boiled. The advantage to be gained is that only a small proportion of the gelatine goes through the ordeal of boiling, which is one liable to decompose it.

I have not, up till now, touched at all on the subject of washing an emulsion. I have pointed out that by combining bromide of ammonium with nitrate of silver, bromide of silver is formed; but we must recollect, also, that nitrate of ammonium is formed, and that this, if left in the emulsion, would be most hurtful. I here give the equation:—

$$Ag\,NO_3 + NH_4\,Br = A\,gBr + NH_4\,NO_3$$

* Read before the Chemical and Physics Section of the Society of Arts.

Besides the nitrate, there is another consideration. It is quite impossible in practice to weigh out such accurate quantities of each of the two salts that they shall exactly convert each other. We must have a little of one or the other over, or, as it is said, we must have a slight "excess." This might be either nitrate of silver or bromide of potassium; but as an excess of nitrate of silver is found hurtful, the proportion of the two haloids are always so adjusted that there shall be an appreciable excess of soluble bromide, or if the emulsion be one to contain a chloride, of soluble chloride. Now, it is necessary, after emulsification and boiling, to get rid both of this excess of soluble haloid and of the nitrate. This is done by washing, and to the washing process gelatine lends itself admirably. A gelatine solution, in the form of a jelly, is quite insoluble in cold water. All, therefore, that is necessary, is to break up the emulsion when in this form, and to allow it to soak in running water. The nitrate, which is soluble, and the soluble bromide, will each diffuse away.

Now, to pass on to the actual manufacture of an emulsion. The process which has worked best in my hands is the acid boiling process, and this I intend to demonstrate to-night. By working exactly as I am now about to do, I obtain plates of the very highest sensitiveness, and, at the same time, of good quality.

I need scarcely say, that the operations which I now perform in bright gas-light must, when an emulsion for practical use is wanted, be carried out in the deepest ruby light, and very little of that. To begin, then, here is the formula:—

I.

Nitrate of silver	400 grains
Water	8 ounces

II.

Bromide of ammonium...	220 grains
Iodide of ammonium	15 ,,
Chloride of ammonium	15 ,,
Gelatine (Nelson's No. 1)	80 ,,
Water	8 ounces

Hydrobromic acid, enough to make the solution just acid.

III.

Autotype gelatine	450 grains

soaked in water, and afterwards squeezed to get rid of as much of the water as possible.

A few remarks on the formula.

Iodide is recommended by Captain Abney, and I find that it adds greatly to the quality of the plates. Although chloride of ammonium is used in the preparation of this emulsion, it is not intended that there shall be any chloride of silver in the emulsion. The bromide and iodide are just estimated to convert the silver, using Warnerke's practical equivalents. The reason for using the chloride at all is that I believe a greater degree of sensitiveness is gained by boiling in presence of an excess of chloride than with an excess of bromide. I have not myself been able to find that any advantage arises from the presence of chloride of silver in the emulsion.

The amount of gelatine used in emulsification is somewhat greater than is sometimes recommended. I believe the quality of the plate is thereby improved. It may be asked why I do not give a definite quantity of acid; it is because the chemicals themselves are frequently acid. I believe that the success in getting a very sensitive, and, at the same time, clear emulsion, greatly depends on the amount of acidity of the solution. It should be just acid enough to show by litmus paper. If this is the case when the salts are first dissolved, nothing more is wanted. If not, add very dilute hydrobromic acid, till the solution will just turn blue litmus paper red. If it has been neutral at first, about one drop of strong hydrobromic acid will suffice.

I have found the autotype gelatine the best for the bulk, as frilling, in my experience, never occurs with it. It is very hard setting, but, at the same time, does not repel the developer as some gelatines do. Somewhat more than the quantity given may be used, if it be desired.

To emulsify, I pour the solution No. 2 into a glass bottle (when at home I use a hock-bottle); I afterwards add, little by little, the nitrate of silver, both solutions having been raised to a temperature somewhere approaching the boiling point. The whole is then poured into a large beaker or jelly-can; this is covered with a cover consisting of a wooden dish, and placed in a saucepan. The lid of the latter is put on, and the whole is allowed to boil. I coat a plate with the emulsion newly made. It will be seen that, on looking at a light through the plate, the light appears ruby red. The emulsion is said to be "red by transmitted light." As the process goes on, however, the colour changes, and at last it becomes blue. It is difficult to say exactly when the whole of the bromide of silver has been converted into the blue variety, but it may be discovered by gently drying a plate coated with the emulsion. The blue bromide and the red bromide will separate into patches. When all is converted to the blue, the boiling may cease. The time taken in boiling seems to vary considerably with different manipulators; with me it is generally somewhere between one and two hours; but I have frequently boiled for several hours without producing fog, and have, in fact, never reached the fog-line, so long as the emulsion was kept distinctly, but slightly acid. The bulk of the gelatine is then added, and the whole poured out in a flat dish to set.

When it is set quite stiff, it is cut up and placed in the "squeezer." It is pushed through wire gauze into a hair sieve held under water. This cuts it into very small particles, and, if water be allowed to run through the sieve for half-an-hour, the soluble salts will all be washed away.

After this, the sieve is allowed to stand a short time, for some of the water to drain off. The emulsion is then heated, is filtered through two folds of a pocket handkerchief, and is spread on the glass. For this I use a small teapot as a pourer. I used at first to measure the emulsion for each plate, but can now guess the quantity with great accuracy. My teapot holds four ounces, and this will just coat a dozen, or rather eleven, half-plates. I pour the emulsion on the plate while the latter is on the levelling shelf. I then take a glass rod in the finger and thumb of each hand; dip this rod into the pool of emulsion on the plate—the emulsion runs by capillary attraction along the rod to the edges of the plate, but no further. I lift the glass rod about a sixteenth of an inch; the emulsion rises with it. I pass it rapidly first to one end of the plate then to the other, guiding myself by keeping my thumb and finger on the levelling shelf, and the plate is absolutely evenly coated. It is never removed from the levelling shelf till it is set. The plates are slightly warm to begin with. The plates, after they are set, are reared on ends in racks, the design for which I got from Mr. G. F. Williams; they are then placed in the drying box to dry.

Plates prepared as I have described are quite as rapid as the average of the so-called instantaneous plates sold commercially. Captain Abney first pointed out that an emulsion got more rapid by keeping it cold after it was washed. In my experience, this only happens when the emulsion is alkaline, or at least not acid. If to the emulsion, made as described above, about eight drops of strong ammonia be added to the pint, it will be found that after a week's keeping, the plates made from it will be from two to three times quicker than before, and such are quicker than any commercial plates that I have used. This adding of a few drops of ammonia simply to neutralise any acidity which may be in the emulsion must be by no means confused with the process where digestion is carried on in the presence of one to two per cent. of ammonia before washing.

I must say a word on a point that is often discussed; "Is it worth while for an amateur to make his own plates?" I certainly think it is not, if he expects to economise by it. If, however, he is such an enthusiast as to make plates for the pleasure he will derive from working those made by himself, instead of those purchased, then by all means let him make them, but do not let him suppose that everything is to go quite smoothly, and that he is to have no trouble—at least, if he is aiming at rapid plates. It is easy to make a moderately rapid emulsion, and to make a number in succession with uniformity, but it is not so easy to make the plates. It is on the coating and drying of the plates that the difficulty comes. Then, if an exceedingly rapid emulsion is required, the difficulties increase, and, in fact, become very great; the amount of light admissable is so small, that manipulation must be performed more by feeling than by seeing.

We often hear people grumbling at the quality of commercial plates. My own surprise has been at the uniform excellence of the plates issued by all the leading manufacturers. If any amateur reaches the quality and uniformity of any of our first manufacturers, he may be well pleased with himself.

ON THE BEHAVIOUR OF IODIDE OF MERCURY IN CONTACT WITH HYPOSULPHITE OF SODA.

BY DR. J. M. EDER AND G. ULM.*

The solubility of iodide of mercury has been investigated, with the result, that one molecule of the iodide was found to require

* Communicated to the Imperial Academy of Science in Vienna.

for its solution two molecules of hyposulphite of soda. This solution is decomposed either on standing for a long time, or on evaporation in a vacuum, or by warmth, a precipitate being disengaged of a yellowish to cinnabar red colour; this precipitate is composed of variable quantities of sub-iodide of mercury, sulphide of mercury, and free sulphur partly soluble in bisulphide of carbon and partly insoluble. In the presence of an excess of hyposulphite of soda, the precipitate contains no free sulphur. Iodide of potassium and iodide of mercury combined behave in the same way with hyposulphite of soda.

The yellow precipitate, so freely liberated from the solution of iodide of mercury in hyposulphite of soda, is by reason of its containing subiodide of mercury sensitive to light; it becomes black on exposure. Indeed, the solution itself is sensitive, for on exposure to light 1·03 to 1·012 more precipitate is formed than in darkness. The precipitate formed during exposure to light contains appreciably more free sulphur than that obtained in the dark, while the amount of subiodide of mercury and sulphide of mercury remain pretty well the same. Alcohol precipitates from the solution $HgS_2O_3\ (Na_2S_2O_3)_2$ and $HgI_2\ (NaI)_2$ remain in solution.

Metallic silver becomes iodide of silver with simultaneous precipitation of subiodide of mercury.

From these reactions, the authors deduce the conclusion that a double salt $HgI_2(Na_2S_2O_3)$ is formed by the solution of iodide of mercury in hyposulphite of soda, and this is contained in the solution.

Alcohol only exerts a decomposing action, without precipitating the respective component substances.

[The above investigation has a material bearing on the matter of intensifying gelatine plates with mercury.—Ed.]

Notes.

The late M. Poitevin was a Chevalier of the Legion of Honour.

Dr. J. M. Eder was on Tuesday elected an honorary member of the Photographic Society.

"Photography with Emulsions," Captain Abney's new work on the subject, was published on Monday last by Messrs. Piper and Carter.

Mr. T. G. Whaite has devised a simple and very perfect plan of coating paper with gelatine emulsion. We hope to publish particulars of it next week.

Dr. Huggins informs us that he has been successful in photographing the spectrum of the nebula of Orion, and has found therein a new line in the ultra-violet. It is not so long ago that to photograph a star was something wonderful; since then Dr. Huggins has told us how he has been able to photograph the spectrum of a star, that is to say, to secure an impression on a photographic film, not from the full light of a star, but only from such minute portion of it as can pass through a slit $\frac{1}{350}$ of an inch in diameter, the image being distended on the plate to the extent of half-an-inch.

Dr. Huggins has now photographed the spectrum of the nebula of Orion, the small luminous patch which puzzles astronomers to this day. Some nebulæ, like the Milky Way, for instance, are found to consist of tiny stars when looked at through the telescope, but the nebula of Orion baffles the most powerful instrument, and appears to the eye as a luminous cloud. It is of this that Dr. Huggins has now photographed the spectrum, showing a new line in the ultra-violet, a result, the importance of which will be appreciated, since it is the first to teach us something definite about this strange phenomenon. Dr. Huggins communicated his discovery to the Royal Society yesterday evening.

Vienna has followed the example of London, Paris, and St. Petersburgh, and now possesses an electric studio. It was opened by Herrn Stagel and Eckel on the first of this month, being fitted up upon the Van der Weyde system. A Siemen's machine giving a light equal to 5,000 candles is employed, worked by an eight-horse-power engine. A concave mirror reflects the arc light, whose direct rays are screened by means of a little saucer from the sitter; the latter is posed about seven feet from the light.

Levitsky at St. Petersburgh prefers to employ the wet process in his electric studio, and, strange to say, it is used also in Vienna. The exposure given for a carte-de-visite bust portrait is from five to six seconds. In Vienna, the studio is open from dusk to 10 p.m.

Dr. Julius Schnauss, the well-known chemist of Jena University, has just issued a photographic dictionary. It is a most complete work, treating of the chemistry, technics, and optics of the art, and contains 536 pages.

House agents have for a long time past recognized the value of photography, and it may be worth while to note the fact that Her Majesty the Queen made up her mind to take the Châlet des Rosiers, at Mentone, after receiving a fine photograph of the house and grounds.

A committee on lenses has been nominated by the Council of the Photographic Society, at the suggestion of Mr. Warnerke. Its principal aim will be to get opticians to agree upon some system to express the rapidity of various lenses that are made: to establish, in fact, a "unit" of rapidity on which all shall agree. The Committee is composed of Mr. Warnerke, Captain Abney, and Messrs. Darwin, Wortley, England, Dallmeyer, Cowan, Bedford, Davis, Brownrigg, Heaviside, and Stuart.

Major Waterhouse brought before the Photographic Society a new photo-engraving process on Tuesday. A latent image is produced on a bromised copper plate—the sensitiveness of which has of late been overlooked—and development is then brought about by using the ordinary dry-plate developers, either alkaline pyrogallic, or ferrous oxalate. Subsequently the plate is etched. Major Waterhouse, anent the subject of etching liquids, promises to communicate to the News a list of those he has found effective.

The Home Office has ordered the police to secure photographs of "bodies found" in all cases where foul play is suspected, so that not only indentification may follow of the deceased, but, if possible, of the means that led to death. The body of the murdered man found in Finchley Wood has been photographed in accordance with this order. The Paris police have adopted this course for some time, and are provided with a well-fitted movable laboratory, in shape and exterior like our police vans, so that a picture may be taken, when necessary, of the spot where the body is found, ere this is removed.

"I should like to see your boxing pictures," said the Prince of Wales to Mr. Muybridge on Monday at the Royal Institution, when the galloping horse, the running deer, the trotting bull, the halting pig, and the racing dogs had successively crossed the screen in life-like measure. "I shall be very happy to show them, your Royal Highness," responded the clever photographer; and promptly there was thrown upon the screen two athletes, who pounded away at one another right merrily, to the infinite delight of the audience in general and the Prince of Wales in particular.

Mr. Muybridge, in this case, had taken rapid successive pictures of a pair of boxers as they assumed one fighting position after another, and then these photographs were as rapidly thrown on the screen in the same order by means of his zoepractiscope. Thus a boxing-match was reproduced in all its photographic reality. "I don't know that these pictures teach us anything very useful," said Mr. Muybridge, "but they are generally found amusing."

Mr. Muybridge's "Boxing Match" may call to mind the steam engine in motion, of which we ourselves secured a photograph in 1870, when working with Sir Charles Wheatstone. Sir Charles had invented an instrument similar to Mr. Muybridge's zoepractiscope, and asked our aid to furnish the necessary pictures. We produced two series, one of a steam-engine, and another of an infantry soldier going through the bayonet exercise. Our work, however, was very simple compared to Mr. Muybridge's. To secure the steam-engine in motion, we merely had to produce thirteen photographs; the engine was at rest, and we simply turned the fly-wheel one-thirteenth of a revolution between each picture. The result many of our readers may have seen; the engine moved, but rather slowly, as if it were slackening speed.

Captain Abney lectures to-night at the Royal Institution, on "Spectroscopic Work with the Infra-red (Dark) Rays of the Spectrum."

A new edition of the late M. Poitevin's work—"Printing without Silver Salts"—was announced a short time since. Its appearance will not be delayed through the author's death, for M. Léon Vidal, our Paris correspondent, was entrusted with the work of preparing it for the press some months ago. It would have been some satisfaction, however, if the distinguished chemist could have lived to see this new issue of his valuable book. The first edition, we hear, is completely exhausted.

Perhaps the most striking experiment shown by Mr. Swan, last Friday, at the Royal Institution, was that in which he demonstrated how much more economical it was to employ a strong current of electricity than a weak one in his incandescent lamp. Thus he showed how a certain quantity of electricity gave no light at all; how twice the same quantity gave a light equal to two candles; while three times the quantity produced a light equal to thirty-five candles.

As to economy in using the Swan lamp, we may refer once more to our experiments published in November of last year, in which we showed that a low resistance lamp (52 Ohms) gave a much brighter light than one of higher resistance (58 Ohms), the same quantity of electricity being used in both cases. The low resistance lamp marked 23 on our photometer, while the high resistance lamp only marked 20. When a large number of lamps are employed, and the current is a powerful one, this difference may be of little importance; but where single lamps are used—and we soon hope to see them in our dark-rooms—the "resistance" offered by the lamp to the electric current is an element of considerable importance.

There is some prospect of a course of Cantor lectures being delivered at the Society of Arts, upon the manufacture of optical instruments; we hear that a gentleman well known in photographic circles is likely to be the lecturer.

A deputation representing most of our largest towns waited on Earl Spencer, last week, to urge upon the Lord President their right of being permitted to share with London, Edinburgh, and Dublin, the art treasures purchased by the country out of the proceeds of the 1851 Exhibition, and which are to be found, for the most part, at South Kensington. Earl Spencer promised, in reply, to assist with specimens from South Kensington any local exhibition that might be established, and stated that during the past year the item spent in photography for reproducing works of art had been increased by £250. "Photography," said Lord Spencer, "was a most important means of educating art students," and he thought, by still further employing the art, local museums could be furnished with much valuable information.

Applications of photography to science are numerous enough, but painters are prone to deny that it can be applied to the cultivation of the fine arts. But now Mr. Muybridge has exhibited to the Royal Academy, at its own invitation, his photographs of animals in motion, perhaps we may hear it admitted that photgraphy can help the painter as well. At the time the "Roll Call" was exhibited, artists without number fell upon the lady painter because a horse was shown, it was averred, with its legs in an impossible position. Mr. Muybridge's series of horse pictures proved on Tuesday to the Royal Academy and its followers that a moving animal assumes many more positions than were ever dreamt of in their philosophy.

TWELVE ELEMENTARY LESSONS IN DRY-PLATE PHOTOGRAPHY.

No. 3.—The Dark Room.

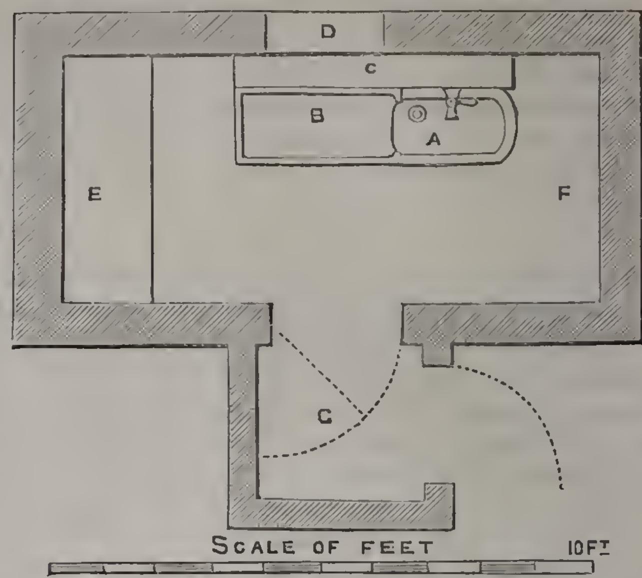
Our young friends will understand that the plates which they are about to work with are of the most "exalted sensitiveness;" that is to say, a very small amount of light allowed to act on them will produce a change which may be made visible. We must explain, however, that it is only certain rays of light which have the power of making the change which we mention. All our readers who have a little knowledge of physical science, know that white light is in reality a combination of light of all the beautiful colours which we see in the rainbow, and that if we pass a ray of white light through a prism, it will be broken up into all these colours. The order of them is—violet, indigo, blue, green, yellow, orange, and red. Those at the beginning of the list are called rays of high refrangibility, those at the end, rays of low refrangibility. Now, it is a curious fact that the photographic change which is worked in a sensitive plate is worked entirely by the rays of high refrangibility, principally by the violet and the blue, which are said to be "actinic;" whilst the red, which is said to be "non-actinic," has no effect at all. Were it not for this peculiar fact, photography would be almost impossible, because we could find no light in which we could manipulate our plates without their being affected and consequently destroyed. As it is, however, we only require to secure some place illuminated by those rays which do not have any photographic action, and we can work quite freely. In other words, we want a room lighted with only red light in which to work.

Photographers give such an apartment the name of "dark-room," although the term is a misnomer. In the dark-room, then, we propose to give what hints we consider necessary for the beginner.

It is scarcely to be expected that the young amateur, taking up the subject of photography for the first time, will have the power of obtaining the exclusive use of a room of considerable size, to convert into a dark-room; but, on the contrary, he will probably have to put up with some temporary arrangement; nor is it at all necessary even when he advances considerably that he should have a permanent dark-room unless he intends to make his own plates. Any room or closet from which all the outer rays of light can be shut off may be converted into a dark-room in which plates may be changed and developed. If a room having a sink and water tap—say the pantry—can be "annexed," the trouble will be greatly reduced; but it is quite possible to make shift with a pail for a sink, and a water jug instead of the tap.

We have said that it is necessary to shut out entirely all outer light. This pre-supposes the use of artificial light for illuminating the apartment with the necessary red or non-actinic light. We consider that until such time as the student sees his way to fitting up a permanent dark-room, he will find it best to work with artificial light. There are lamps constructed especially for the purpose of giving "safe" light sold by all dealers in photographic apparatus. These use either gas, oil, or candles, and all consist of an arrangement whereby the air necessary to support combustion is introduced by passages which will not allow white light to find its way out, the colour of the light being modified by funnels of ruby glass, or shades of ruby paper or cloth. The gas and oil lamps are much to be preferred to the candle arrangements, as with the former it is possible to raise or lower the light at will.

All, then, that the photographer has to do, is to find some small room or closet, which he can make quite dark, in which he can have a plain deal table to work upon, and to purchase a "dark-room lamp" from a photographic apparatus dealer. Our description of dark-rooms would not, however, be complete, unless we say something about the fitting up of a permanent photographic room in which all the operations, including the manufacture of the plates, may be conducted. We give here a sketch of such a room.



D is a window whereby the necessary light is introduced. It should be about two feet long, by one foot six inches high, and should be glazed with one thickness of ruby, and one thickness of orange glass. On the inside there should be a blind of red Turkey cloth, which can be raised and lowered at will. This is to reduce the amount of light when the sun shines direct on the window, or when the process of plate manufacture goes on.

A is a sink made of glazed stoneware. The top edge should be about two feet six inches, or two feet eight inches along the floor.

B is the operating table. It should be covered with sheet lead, should have a very narrow and low ridge round all the sides except that next to the sink, should have a very slight incline in that direction, and should have the sheet lead "dressed" over the edge of the sink, so that all spillings may find their way into it.

C is a narrow shelf about four inches above the level of the table and sink, and extending along the whole length of both of them. On it is placed the lamp when artificial light is used, as when working at night, and the bottles of solutions actually used for development. The lower edge of the window should be an inch or two above this shelf. There should be a shelf about six inches below the operating table, on which the flat developing dishes may be kept.

E is a table on which the levelling slab may be placed when the manufacture of plates is commenced. Above it —or, in fact, along all available space of the walls—shelves may be fixed for carrying bottles, &c.

A space is reserved at F for the drying cupboard, used in manufacturing plates. Above it, and with its lowest edge about three feet higher than the floor, should be fixed an ordinary cupboard, with a door closing light-tight. In this may be placed plates or anything sensitive to light, which would be destroyed if left about, for it must be understood that even light of the deepest ruby red will in time act upon a sensitive plate.

G is an arrangement of double doors, whereby the photographer may go out or in without letting any light enter.

Provision must be made for ventilating the room without letting in light. There should be at least one common gas jet for lighting up the room when no sensitive plates are about, so that solutions, &c., may be mixed with comfort, and there should be provision made for attaching several rubber tubes with the gas pipes for connecting with Bunsen burners, &c.

The photographer will in all probability not *build* a room, but will adapt one already built to his purposes. In this case he will have to exert his ingenuity to allot his space to the best purpose. We have enumerated all the appliances for which room ought to be reserved.

FRENCH CORRESPONDENCE.

Death of Poitevin—M. Braun's Emulsions—Another Shutter—Measuring the Velocity of the Shutter—A New Use of Celluloid—Society for the Defence of Copyright—Warnerke's Sensitometer.

Death of Poitevin.—As was announced in the last number of the Photographic News, Alphonse Poitevin died at Conflaus (Sarthe) at the age of sixty-three years, surrounded by all his family. He leaves a wife and four children, the eldest a son, aged eighteen years, and three daughters, one of twelve years, the second of nine years and a-half, the third of twenty months. He lived at Couflans on a small estate which he had inherited from his father. The rents which he drew therefrom were very small, and scarcely sufficient to maintain and educate his children. This limited income caused him great anxiety, and I have no doubt that to his trouble on this account, added to the wear and tear of his constaut work, was due to some extent the softening of the brain, the first symptoms of which became apparent about two years ago. Those who, like myself, were in constant relatiou with him, could not but perceive the gradual weakening of his mental powers, but we were far from supposing that the catastrophe was so near at hand. To tell the truth, his scientific work, great and brilliant as it was, was accomplished some years ago, and latterly his ideas seemed only to come to him occasionally, and then he was able for a short time to discuss the further researches which it might be possible for him to undertake. More especially the question of printing in salts of iron was an object to which he intended to turn his intention, but the effort was not of long duration; his energy failed him iu consequeuce of the brain disease, and for the same reason he felt it impossible to undertake passing through the press a second edition of his work, "On Photographic Printing without Silver Salts," although the first edition is completely exhausted. I had offered him my assistance in this uudertaking, notwithstanding my numerous other pressing occupations, and I had intended, in concert with him, to complete each of the chapters of the work by an appendix, giving a general account of the practical and industrial applications of those principles which had been discovered and described by Poitevin. The work was in full swing when I was so painfully surprised by the news of the death of my friend—a man with a universal reputation, to whom science is largely indebted, and whose memory will, I trust, be honoured iu a manner worthy of it.* I hope not only that some commemorative monument will be erected to Poitevin, but also that the French Government, and also the lovers of the art for which he has done so much, as well as all those who have benefited by his discoveries, will agree to do something for his family, in order that they may not suffer in a worldly point of view by the loss which they have just undergone. Poitevin has left no fortune, and it will be dreadful to think that his four children will not be assisted by his country, to whom he has been an honour, and by the whole of the photographic profession, which owes him so much. I feel convinced that every one will take a part in fulfilling a duty which we owe to the memory of Alphonse Poitevin.

M. Braun's Emulsions.—The last meeting of the Photographic Society of France was a particularly full one. M. Fernand Braun, photographer of Angoulême, read a paper on his process of preparing gelatino-bromide emulsions. The prints which he exhibited as the results of this process are valuable proofs of its efficacy; they are, in fact, worthy of special notice. Among them he showed some prints from instantaneous negatives, of very large size, and really faultless. A full account of the details which he communicated would greatly exceed the limits of this letter; but I hope to be able to send the complete text of the paper itself to the Editor of the Photographic News, to be published in some future number, if he should think fit. We have by no means heard the last of gelatine emulsions; the question is still in course of settlement, and it is necessary to follow the subject closely, in order to select from all the processes and formulæ those which go to make up a really reliable method.

Another Shutter.—Instantaneous shutters still occupy a great deal of attention. At the meeting above mentioned, one was shown by M. Liskferme consisting of four discs which move simultaneously from the centre to the circumference. This idea is not a new one, and the way in which it is applied may be almost called rudimentary. However, it will probably soon disappear with a heap of other shutters into the arsenal of neglected instruments, whence, perhaps, it may be drawn forth some day by anyone who is looking for a more valuable invention.

Measuring the Velocity of the Shutter.—Colonel Sébert, who is well kuown for his methods of chronometric observation, proposes to verify by a graphic process the duration of the exposure obtained with the shutter of M. Paul Boca. He has endeavoured to prove that the length of the exposure will be really that which is registered beforehand by the needle on the disc of the instrument. The result of his observations, which have been very skilfully arranged, is that, subject to a few minor corrections, the instrument will register perfectly correctly exposures of from $\frac{2}{50}$ second up to $4\frac{1}{2}$ seconds. M. Sébert points out that the instrument is capable of being made to register exposures of hundredths of a second. In the present state of the photographic art these very short exposures are often necessary. This demonstration is without doubt very interesting, but I should like to see brought within reach of the public a more simple method of verifying the rapidity of the shutter. It seems to me that a simple method of realising this idea would be by means of a disc graduated into 100 degrees, over which a needle cau travel iu the space of one second. It will then be only necessary, when trying the shutter, to photograph the needle in movement, and the number of degrees registered on the photograph would indicate the duration of the luminous action. This remains to be seen.

A New Use of Celluloid.—With laudable perseverance M. David is still engaged in the study of the use of celluloid in photography. At the meeting of the Photographic Society he presented some sheets of gelatine, coated by means of a brush with a film produced from the liquid from which celluloid is obtained. By means of this coating the gelatine is rendered impermeable and impervious to the action of water, or of other photographic substances.

Society for the Defence of Copyright.—There has lately been established at Paris, at the instigation of the *Cercle de la Librairie*, a society for maintaining the right of property in literary work abroad. The Photographic Society has already affiliated itself to this newly-established Society, and the *Syndicate de la Photographie* intends also to join.

Warnerke's Sensitometer.—M. Marion, on behalf of Mr. Warnerke, exhibited the sensitometer which has already been so highly spoken of in the English journals. The idea of this instrument is excelleut. A plate of some phosphorescent substance receives the highest possible impression (which is, therefore, a fixed quantity), and it is then allowed to act upon sensitive films whose degree of sensitiveness can be correctly determined by means of this luminous plate. The application of the process is carried out in a frame suitably arranged. Burning magnesium is used to render the phosphorescent substance luminous, but, no doubt, any other source of light capable of producing the maximum vibration of the phosphorescent particles would serve the same purpose, and allow of the same degree of accuracy being arrived at. Leon Vidal.

* The book itself will shortly be published by Gauthier-Villars; it will be illustrated with a portrait of Poitevin printed in phototypie by Berthaud.

RAPIDITY OF LENSES.

BY W. H. WHEELER.

I venture to trouble you with a few remarks on the subject of Mr. Warnerke's paper, printed in your last number, in the hope that they may prove generally interesting.

We shall all agree that a ready and accurate knowledge of the rapidity of our lenses is most desirable. It would be well if every photographer knew by heart the focus and aperture of every combination, and of each individual lens in his possession, that he knew the diameter of every stop, and could at once, after estimating the proper exposure with that which he most frequently uses, calculate that of any other lens and stop that he thinks best for his immediate work. It is not my desire to criticise Mr. Warnerke's plan, but to suggest a few considerations which may help others in doing so.

There is no doubt that the manufacture of lenses has now reached a high excellence, and probably theory has not much more to suggest in the way of practical improvements. I think, nevertheless, that there is still much to be done by the optician. But a more intelligent demand must precede supply, and accurate knowledge of photographic optics must become more general before photographers will adequately appreciate, and intelligently select and use, the instruments with which opticians do or might furnish them.

With one of Mr. Warnerke's suggestions I cordially agree, namely, that on the brass tube of every lens should be engraved the value of its intensity with the full aperture, and on each diaphragm the intensity with that stop. But I venture to think the number engraved should be the denominator (with decimals as required) of a fraction whose numerator is unity, which fraction should thus express the equivalent solar focus of the combination, divided by the diameter of the direct pencil as it passes through the front lens. Much must still be left to individual judgment. That, whereas, with full aperture the intensity of the light degrades from the centre to the edges of the plate, while a stop tends to equalize it; and that the increased conjugate focal length of a combination with a near object reduces the whole intensity; are variations, which, like that of the light and subject, cannot be provided for by any simple general rule. This leads me to a cause of error which Mr. Warnerke has not alluded to. Though the fraction $\frac{\text{aperture front lens}}{\text{equivalent focus of combination}}$ accurately represents the intensity; yet $\frac{\text{aperture stop}}{\text{equivalent focus}}$ is not accurate, at least in any ordinary case, and this may be seen by measuring the largest skeleton stop, which allows full aperture, though its opening is smaller than the diameter of the front lens. For, as a pencil of rays of any diameter has generally a less diameter at the stop—being reduced by convergence—the intensity of the combination must be greater than that fraction, the effective aperture of the stop being practically increased in the ratio which the distance from front lens to stop bears to the whole focal length of that lens by itself, and this often makes a material difference in the calculation for exposure. Now with near objects this focal length is of course the conjugate focus for the distance of the object, and must obviously increase much more rapidly with its proximity than the conjugate focus of the entire combination, thus rendering accurate calculation distinctly troublesome, probably far too much so for practical use. To apply this reasoning to cases of enlargement, where the lens is reversed, the back lens of course becomes the front, and according to the scale of the enlargement, the correction may pass through the zero point, and change its sign. It is enough to point it out as a cause of complication.

In the use of single lenses, generally, an allowance should be made for the saving in absorption of light, and in reflections at the surfaces of the lens being avoided. In measuring the focal length of deep meniscus lenses by a distant object, the distance from lens to plate will be found greater when the convex side is towards the plate, than when turned towards the object. The relation, too, between the focal length and the scale of the image is not invariable, except in combinations perfectly free from distortion. In single lenses it will obviously vary considerably according to the diameter of the lens, the distance of the stop from it, and the place of the stop, whether before or behind the lens, for the two former causes affect the value, and the last changes the sign of the distortion. Now, the distortion of a lens is simply the inequality of the effect of its refraction on the axes of oblique pencils, the whole effect of which refraction goes to alter the scale of the image, and of course the relation which that scale bears to the focal length of the lens. For all these reasons simplicity of method, and accuracy of result, in estimating the intensity of lenses, are not so readily attainable as may at first sight be supposed.

But the importance of an authoritative engraved value for the intensity of a lens with and without the stops supplied is great, because then the reputation of the maker is distinctly pledged to its accuracy, and careful measurement may be relied on. In my experience the smaller stops of even first-class lenses sometimes very inaccurately follow the scale intended by the maker, and accurate measurement is much easier to him than to the photographer.

Allow me, in conclusion, to mention a convenient plan which has for many years made me independent of variety of threads in the screws of the flanges. Each brass flange is attached to a square slab of mahogany, all of uniform size, and each slab slips on or off a fitting on the front of each camera. Thus any lens, large or small, can at once be attached to any camera in my possession.

Correspondence.

THE DUNDEE EXHIBITION.

Sir,—Mr. H. P. Robinson has not been well treated by the people at the "obscure Exhibition" at Dundee. They don't understand the "eternal fitness of things," photographically speaking, as the council of the Parent Society in London understands them. To award Mr. Robinson a poor bronze medal for a picture that takes gold medals at Paris and London is too infamous.

As an old member of the "Parent Society," I am aware that it has been stated pretty often that it is useless for provincial photographers to compete for medals at the exhibition of the Parent Society, as they are usually bespoke—that a certain clique is sure to get the gold and silver medals.

The audacity of the judges at an "obscure Exhibition like that at Dundee," as Mr. Robinson politely calls it, must be something remarkable, and they seem to have forgotten the fact that the editors of both the photographic journals are also members of the council of the "Parent Society," and can lend their valuable aid to remedy the judgments of the "obscure Dundee judges," and to help their brother members of council—Mr. H. P. Robinson and Mr. Payne Jennings—to a proper recognition of their claims to the gold and silver medals at all exhibitions—whether obscure or otherwise.

As an occasional exhibitor at the exhibitions of the Parent Society, at Pall Mall, I would add that I have some experience of the mode of hanging the pictures at the November show, and am aware of the treatment often experienced there by the unprotected provincial photographer by the so-termed "hanging committee."

Trusting to your known impartiality for insertion of this letter, I am, sir, faithfully yours,

Not a Gold Medallist.

[Our correspondent has evidently forgotten for the moment that Mr. Robinson is a "provincial" photographer, and so many would consider Mr. Payne Jennings. It would, we fear, puzzle our correspondent to mention "the clique" by name who have received from the Parent Society "the gold and silver medals," since for years past nothing but bronze awards have been made.—Ed. P.N.]

A DRYING CUPBOARD.

Sir,—I think "Gelatino Amateur" is right when he says that Mr. England's drying-box is the best; but I have made a slight modification, which answers the purpose well. A description may be of use to him and to other amateurs who dabble in photography.

Having a carpenter at work on the premises just at the time I was thinking of manufacturing a drying cupboard, and not being myself very handy with the saw, I got him to put together a cupboard—size about 4 feet high, 3 feet wide, and 1 foot deep, with a well-fitting door, a rabbet being affixed round the inside. A candle introduced, the door shut, and the gas extinguished, soon told me where the light would penetrate. This was soon obviated by pasting brown paper over the places. The door was the worst; but I got over that by fixing some list round the rabbet. I attached four short legs to the bottom, which was raised from the floor about half a foot.

I now bored a number of holes into the bottom, and one large one about four inches in diameter through the top, to which I attached a piece of tin pipe, three inches high, and four inches in diameter, and over this I fitted another pipe or chimney, about three feet high, which could be slid over the short piece. A small gas jet was placed inside the short tube, connected by a rubber tube to a gas bracket.

Now for the bottom. To each side (lengthways) I nailed a strip of wood, and over these a piece of tin-plate, covering the whole area, excepting the ends, through which the air would pass. The object of the tin was that by placing a couple of night-lights underneath, it would get heated, and warm the air which would pass through either end, and the gas jet lighted at the top, a current of warm air would be constantly circulating. For the shelves, I tried wires extending from side to side; but they were too unstable, and after a dozen plates had tumbled from top to bottom, I replaced these wires by strips of wood, which were capable of being taken out, as each end rested on strips attached to either end. This, then, is the unvarnished description of an amateur's drying cupboard, and one that answers in every way; but in this, as in everything else, one must use his ingenuity.

I always burn two night lights of nine hours each underneath, so that, by lighting them at night, they burn till next morning, to be replaced by others.

I always see that the film has well set on the glass slab before transferring the plates to the box, so that there is not so much need to have the shelves perfectly level; but I always make a rule of thoroughly warming the box by placing a lamp inside an hour or so before using.—I am, yours truly, W. H. Plaister.

Dear Sir,—In answer to your correspondent "Gelatino-Amateur," in the last number of the News, I do not know of any firm who manufacture or keep in stock a drying box on the same principle as mine, but if he finds any difficulty in getting one made, on sending me his address I will forward him the name of the carpenter who made mine.—I remain, dear sir, yours faithfully, W. England.

7, St. James's Square, Notting Hill, W.

PROCESS-VENDORS.

Sir,—"Tit for tat" is fair play (at least, so the world says), and as my intensifier has been called in question by a Northerner, I intend to question the same gentleman's "accidentally"-found-out process of varnishing the collodion film before enamelling. In the first place, that the analyist found certain chemicals in my intensifier I will not deny, but I wish it to be known that there are other chemicals in the same; what they are I will keep to myself, although my honesty is involved. As there are some doubts of the stability of mercurial intensifying, I can prove that such doubts, if the chemicals are made up in the manner in which I make them, are without foundation. I will submit a dozen cabinet negatives intensified by myself some six years ago, if desired, for inspection.

Now for the "tit for tat." Let me tell Mr. Northerner that his accidentally-found-out process of varnishing upon the collodion in the process of enamelling has been known to me for upwards of six years, taught me by my respected principal, with whom I served my apprenticeship. This I can substantiate, which is more than Mr. Northerner can when he says that my process of intensifying is the same as "Mouckhoven's."

As to the dislike for "secret process vendors," I would ask the question of the photographic fraternity, "Which of the two men is to be more respected—the process-vendor, or the process-hunter?"—Faithfully yours,

L. A. Moryson.

Proceedings of Societies.

Photographic Society of Great Britain.

The monthly meeting of this Society was held on Tuesday, at 5, Pall Mall East, J. Glaisher, Esq. (president) in the chair.

The President announced that the Council had elected Dr. J. M. Eder to be an honorary member of the Society. Messrs. A. Dismoor and F. Imd were also elected.

Lieut. Darwin (hon. secretary) read a paper by Major Waterhouse on "Photography on Copper." Major Waterhouse's first experiments were made with bitumen. A copy of a print, or the print itself, was laid on the bitumenized copper, and exposed to light, and the image developed by turpentine. This plan answered well, but was only suitable for line reproduction. His next efforts were directed towards obtaining half-tone, and in this he succeeded by employing either a bromised silver or bromised copper surface, and developing by alkaline pyrogallic or ferrous oxalate. The resultant picture, when rubbed, had the effect of a Daguerreotype.

Captain Abney referred to the fact that among the patents of Mr. Fox Talbot was one for a method of obtaining an image in iodide or bromide of copper in the camera, the development being by mercury. In some experiments he (Captain Abney) had made some time ago, he had succeeded in obtaining pictures on copper by using sulphate of copper and sea salt, thus depositing chloride of copper on the plate.

Mr. W. Peek then read a paper on "The Relation of the Human Eye to the Photographic Camera." He said he had taken up the subject in an entirely opposite view from that adopted by a member of the Halifax Club, who last year read a paper endeavouring to prove that this relationship existed. Mr. Peek contended that the eye was only able to focus at one time one point in any plane, but that the rapidity by which the focus was altered, prevented any sensation of blurring. The photographic lens, on the contrary, had an unchangeable focus, and could only represent that which was on one plane. He thought that if the photographer could take pictures in which the whole of the objects were in focus, he would approach much nearer to nature than by producing pictures when the principal object alone was sharp. As an instance of what he meant, he referred to a recent photograph representing Mr. Ruskin leaning against a background of leaves, in which the latter were quite sharp, and yet did not distract the attention from the figure. Mr. Peek also spoke approvingly of Mr. H. P. Robinson's picture, "When the Day's Work is Done," for the same reason.

Col. Wortley protested against the principles laid down by Mr. Peek, that the whole of the objects in a picture should be in the same focus. Such a doctrine was contrary to the principles of art.

Mr. S. Davis said there was an important distinction between the human eye and a photographic lens. In the crystalline lens of the eye there is greater density in the centre than in the margin, and by this means spherical definition is obtained. In photography this can only be accomplished by the use of a combination of lenses.

Mr. Spiller said that in the Photographic News of December 23, 1859, appeared a paper by himself, entitled "The Eye as a Camera-Obscura." The experiments he then undertook with Mr. Dick were to ascertain what was the actinic structure of the eye. It was known that the visual rays passed through the various elements of the eye, but it was not certain that the actinic rays did so. This he, Mr. Spiller, proved by scraping a portion of the back of a bullock's eye uutil only a very thiu film remained, which allowed the rays to pass, and with the collodion and Talbotype processes he was enabled to take pictures, thus showing that the chemical rays did absolutely pass through the eye.

Col. Wortley, adverting to the artistic side of the question, said he was sure Mr. Robinsou would not endorse Mr. Peek's remarks.

Capt. Abney held that from a scientific point of view Mr. Peek was right. You could only see one print when you looked at a landscape in nature, and you could do no more when you looked at a picture. He could see no difference between the two.

Mr. Bird said Mr. Peek's views appeared to be those held by the pre-Raphaelites.

Mr. Peek having replied,

Mr. Willis read a paper entitled "Suggestions for Improving the Clearness and Printing Qualities of Gelatine Negatives." Mr. Willis's method consisted of the application of a ferric oxalate developer until the image was whitened to the back of the plate. The latter was then to be rinsed well, and the ferrous oxalate developer applied, when the image became of a rich brown. He had endeavoured to use potassic chloro-platinite for intensifying, but had not found it answer, owing to the affinity which platinum had for gelatine.

Mr. S. Davis read a Note bearing on the subject, in which he detailed some experiments he had made with phosphate of soda. If the plate, after immersion in a solution of this salt, one ounce to twenty ounces of water, was developed with pyrogallic of double strength, it never fogged. But to prevent staius it was necessary to use fresh hyposulphite for each plate.

Captain Abney said he had lately been experimenting with hypophosphite, and found that it was an admirable preventive of green fog.

Mr. Berkeley said that he had used hypophosphite in combination with the hydrosulphite developer some years ago, but found its action very slow, contrary to Captain Abney's experience. He then used collodion plates.

Captain Abney observed that in combination with the hydrosulphite developer this might be the case, but when used alone he had found the hypophosphite with pyrogallic instead of ammonia remarkably energetic.

Mr. Maxwell Lyte referred to the use of glucic acid as a developer. He thought this substance possessed properties which rendered it worthy of attentiou for photographers. When used in iron it would intensify.

The President then announced that a committee to enquire into the relation of rapidity of lenses, suggested at the last meeting by Mr. Warnerke, had been formed, consisting of the following gentlemen: Messrs. Warnerke, Abney, Darwin, Wortley, England, Dallmeyer, Cowan, Bedford, Davis, Brownrigg, Heaviside, and Stewart.

The meeting then adjourned.

Society of Arts.

On Thursday, the 9th inst., Mr. W. K. Burton read a paper on "The Manufacture of Gelatine Emulsions and Plates for Photographic Purposes" (see page 134), before the Chemical and Physical Section of this Society. Mr. John Spiller occupied the chair, and a large gathering of gentlemen well known in photographic circles were present, several of them joining in the discussion which followed the paper.

Dr. Maddox briefly alluded to the considerable advances which had been made since he originated the process, leaving him far in arrear.

Mr. Kennett referred to the early history of the gelatine process, and said that the heat required for evaporating the emulsion in order to produce a dry pellicle served to exalt the sensitiveness just in the same way as the modern process of digestion.

Mr. England spoke highly of the ammonia process of Dr. Eder; and Mr. Cowan found that this method gives the clearest, quickest, and most certain results, especially when a large excess of bromide is used.

Mr. H. Trueman Wood congratulated Mr. Burton on the thoroughly practical nature of his demonstration, and referred to the present eveuing as forming an appropriate occasion for the discussion of points which Captain Abney could not include in his recent course of Cantor lectures. He had found it advantageous to adopt the plan of dissolving the gelatine in the least possible proportion of water, and diluting the silver as much as practicable. Canvas seemed to him to be the best material for breaking up the emulsion, as one could take a fresh piece for every batch; and as regards preparing one's own plates, he thought the only real gain was the self-satisfaction resulting from such a proceeding.

Mr. Maxwell Lyte referred to the fact that the advance of science depends on photography, and entered into a brief discussion with Mr. Millar Thompson as to the conditions under which one might expect chlorine in silver chloride to become replaced by bromine or iodine.

The discussion was continued by Messrs. Cowan, Monson, Howard, Cobb, Bolas, and others, after which Mr. Burton made a few additional remarks. He had found that the acid digestion process would give plates fully as rapid as any he had tried, some given to him by Mr. A. L. Henderson alone excepted. He strongly objected to the use of canvas for breaking up the emulsion, as it often served to introduce impurities. The plates should not be dried at a higher temperature than 65° F., unless the temperature of the general atmosphere was over this. The effect of the acid during digestion appears to be physical, and, within a wide range, any acid will answer well.

Bristol and West of England Amateur Photographic Association.

The ordinary monthly meeting was held as usual at the Studio, Portland Street, on Wednesday, 1st March, Mr. W. Radcliffe in the chair. The minutes having been confirmed,

Mr. H. A. H. Daniel said that one or two of the officers of the Association found the first Wednesday in the month an awkward day for the meeting, one of the Vice-Presidents, for instance, having, on account of fixed business engagements, to miss four of the meetings during the year. He would, therefore, either give notice to propose at the next meeting a definite resolution altering the day, but would get all the separate opinions on the subject possible in the meantime, and frame the resolution accordingly, so as to meet the convenience of the majority.

The Chairman then exhibited one or two articles of interest. Firstly, the new easily-fitted and perfectly-effective swing-back invented by Mr. Smith, of the Sciopticon Company. He explained that it was simply fitted with a roller and socket joint, tightened by a turn of a screw, all of which revolved in a slot, giving every movement possible to a swiug-back. Secondly, the Chairman exhibited a very ingenious lengthening cone for the camera, also the invention, to a great extent, of Mr. Smith. It was made of a light black opaque material, and had four sides, the two perpendicular ones having inside light wood flaps opening against them, which served to keep the cone extended, and prevent its drooping with the weight of a lens, the whole being exceedingly light, and folding quite flat

Mr. H. A. H. Daniel remarked that both were most useful little pieces of apparatus, the side flaps on the cone being the chief novelty in its construction; the cone would also form, when not in use, a very good view-meter.

The Chairman said that the addition of a few diaphragms would make it perfect for that purpose. He had been attending Captain Abney's lectures, which, he would remark, by the way, had been listened to by overflowing audiences, to whom, by experiments, Captain Abney had brought home facts often before heard of, but seldom thoroughly realised. For instance, most clearly had he demonstrated the benefit to be derived by mixing chlorides with the gelatine emulsion.

Mr. Daniel enquired what chlorides Captain Abney recommended.

The Chairman replied that the ammonium bromide and chloride were used. The lecturer spoke with some stress as to the destructive power free bromide exerted upon the sensitiveness of the plate, and illustrated it by drawing a brush dipped in a solution of bromide across a sensitive surface, thereby producing a perfectly insensitive band.

Mr. E. Brightman said he understood that it also had a definitely destructive effect upon the picture. He also believed that iodide was more sensitive to the violet end than bromide to the red end of the spectrum.

The Chairman considered that it was the iodide which was the most sensitive to the red end of the spectrum. Regarding the subject of luminous tablets for using with sensitometers, this speaker stated that Mr. W. B. Bolton used the following method for making them. He melted solid paraffin in a cup, and added sulphide of calcium thereto, melted and mixed up, pouring it out upon levelled and warmed plates, and keeping warm till it had perfectly settled down, then allowing to cool, and placing another plate of glass at the back for protection.

The proceedings shortly afterwards closed.

The Hon. Secretary announced that at the April meeting the President, Colonel Biggs, would read a paper.

Manchester Photographic Society.

The ordinary monthly meeting of this Society was held at the Mechanics' Institution, on Thursday, March 9th, 1882, Mr. Alfred Brothers, F.R.A.S. (vice-president), in the chair.

The minutes of the previous meeting were read and passed, after which Mr. J. Bolton, of Ashton-under-Lyne, was duly elected a member of the Society.

The Chairman, in the name of the Society, presented to Mr. John Warburton a magnificent album with a suitable inscription, as a slight acknowledgment for services rendered in connection with the late Photographic Exhibition.

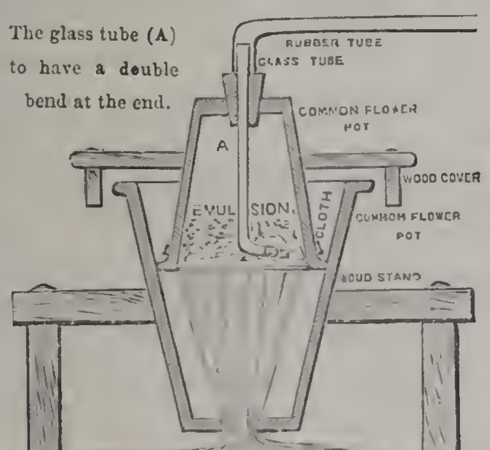
Mr. John Warburton returned thanks in a short and appropriate speech.

Mr. John Kershaw exhibited an ingenious apparatus for facilitating the filtration of gelatine emulsion, consisting of a glass vessel containing the emulsion to be filtered, and at the bottom of which wash-leather was tied, and at the top a pneumatic ball and pipe with valve was attached, acting as a pressure pump; thus by squeezing the ball a pressure is put upon the emulsion, and forced through the wash-leather.

Mr. Atherton said he had used wash-leather for a long time, and had never found any difficulty in filtering through it, and he therefore saw no necessity for the apparatus.

Mr. Bainbridge exhibited a double-cased tin can, the inside of which was filled with hyposulphite of soda, and soldered up. When heated to a certain temperature by placing the apparatus in hot water, the hyposulphite dissolved, and afterwards kept hot for a long time. He used it to keep the gelatine emulsion hot, and he said it was very effectual.

Mr. John Schofield explained a gelatine emulsion washing apparatus he had contrived, and produced a drawing (see figure).



To drain, turn off the water, and disconnect the tube from the tap only.

Mr. J. W. Leigh exhibited a series of about thirty prints from 11 by 9 collodio-albumen negatives, illustrating a walk from Bettws-y-Coed to Ponty Pant. These were very much admired, and proved objects of great interest; and amongst answers to many questions, Mr. Leigh said they were nearly all taken with a Dallmeyer single landscape lens, and that they were the work of more than one trip to Wales.

A vote of thanks was passed to all the members who had brought objects of interest.

A communication from Mr. E. K. Dutton was then read, on a recent legal decision relative to instantaneous shutters.

The formal meeting terminated, a very enjoyable lantern exhibition of members' slides followed.

Mr. Percy Collis showed some excellent portrait transparencies on gelatine plates.

Messrs. Greatorex, Woodward, Wade, Blakeley, Coote, and other members also exhibited.

The members adjourned about ten o'clock, after spending a very interesting evening.

Photographic Society of Ireland.

The annual Lantern Exhibition of this Society was held on Friday, the 10th inst., in the Lecture Theatre, Royal College of Science, Dublin.

This year there was a departure from the usual custom, inasmuch as—with one or two exceptions—no photographs were placed upon the screen which were not the work of members. This fact gave additional interest to members and their friends, which resulted in a large and influential gathering.

Despite the many advantages of gelatine, all the transparencies were upon collodion films. The majority of the pictures were from "Home" subjects, some very fine Continental scenes by Messrs. Thos. Mayne and E. P. Johnson being also exhibited. Mr. Russell's instantaneous views of yachts, taken with the "Gun Camera," were very interesting, as were also Mr. J. L. Robinson's architectural views in Worcester and vicinity. Views taken by the following gentlemen were also shown:—Messrs. Saml. Baker, Alex. Conan, J. R. Fleming, Thos. Mayne, S. W. Nugent, Herbert J. Penrose, Greenwood Pim, Professor J. E. Reynolds, John V. Robinson, John Russell, Joseph H. Woodworth, Chas. W. Watson, and others. Mr. Thos. A Bewley kindly described the pictures, the lantern being managed by Mr. Woodworth and Mr. Watson.

The next meeting of the Society is intended to be held April 14.

Thursday Evenings for Photographers.

At the meeting held on the 9th inst., Mr. C. B. Cutchey occupied the chair.

Mr. Henderson exhibited some prints that had been exposed in his show-case at the door for about three years, unprotected by any sun-shade; they were coated with a preservative solution of one ounce gum-dammar to three pints of benzole, and the only change which had taken place was that they had become of a slightly more purple colour.

Mr. Brown said he found a varnish of Chinese wax and benzine a good preservative from fading.

Mr. Henderson had used wax, but found that it caused the prints to turn slightly yellow. He then passed round some gelatine plates that had been kept about fourteen days in a cupboard with saucer of water, and also others from the same batch that had been kept in a dry atmosphere; those kept in the damp were covered with minute pinholes.

Mr. Brown again exhibited the sensitometer shown by him at the last meeting, in which he had made slight alterations, and he also passed round a plate that had been exposed under it; it was made in duplicate, so that a plate of a known rapidity would be exposed with the one to be tested. He also showed a plate-holder for use in developing; it consisted of four pieces of metal bent at one end for the plate to rest on, and joined together at the top by means of a spiral spring, something after the form of a pair of tongs or tweezers.

In answer to the Chairman, he said that the pain and inflammation of his arm caused by the application of the pyrogallic acid had much increased since last meeting, but he had obtained slight relief by the application of linseed meal.

Mr. Debenham exhibited his actinometer, which was so constructed that twelve two-inch plates could be exposed simultaneously, the medium through which the light was filtered being various thicknesses of the best "Foreign Post," soaked in paraffin; but he said he thought the principle of a number of holes was the better plan. He used the light from three paraffin candles, at three feet distance, giving an exposure of ten seconds and always exposed a standard plate from a batch of known rapidity at the same time as those he was testing.

Mr. Haddon thought that the plates ought not to be all developed for the same time, but allowed to have the full action of the developer, as some samples of gelatine were so much more absorbent than others.

Mr. Cowan showed a chloride plate developed by Captain Abney's "developer," the tone being a rich brown.

Mr. Cobb showed a print from group taken by the electric light at the Society of Arts, without any reflectors, and a stereo lens, with an exposure of about fifty seconds; several prints from negatives taken at the same time by Mr. Trueman Wood were also passed round.

In reply to an inquiry whether he had experimented if it was the air in conjunction with the hyposulphite of soda which had the reducing action on gelatine plates, Mr. Ashman said he thought it was not.

Mr. Coles said he had exposed a plate one half of which was washed, and the other half unwashed, to light and air, and found no difference; he used sulphite in the developer.

Mr. Mackie found no difference in the effect if sulphide was used.

Mr. Haddon thought that the action of light liberated free bromine, which in combination with the hyposulphite acts as a very energetic solvent.

A question from the box was then read, viz., "Is it customary for operators to keep specimens of their work?" The opinion of the meeting seemed to be that decidedly it was neither customary nor right, and several gentlemen stated that they had been victimized by this means.

Mr. Debenham said he would on no account give an operator specimens, but made no objection to lending same.

It was then proposed by Mr. Reiman, seconded by Mr. Henderson, and carried unanimously, that a soiree and ball should be given in aid of the funds of the "Photographers' Benevolent Institution, and a committee was formed to make the necessary arrangements.

Bolton Photographic Society.

The March meeting of this Society was held at the Baths, on Thursday evening, the 2nd inst., Mr. R. Harwood in the chair.

Mr. J. R. Bridson and Mr. Leach were elected members of the Society.

Jarman's electric light—medium size apparatus—was exhibited, and photographs taken by means of it, by Messrs. Parkinson, Dalton, Banks, and Taylor, with more or less success.

The meeting closed with a vote of thanks to Messrs. Cussons, of Southport, who had lent the apparatus for exhibition.

Sheffield Photographic Society.

The usual monthly meeting of this Society was held at Freemason's Hall, on the evening of March 7th. Thomas H. Morton, M.D., presided.

After the minutes had been read and confirmed,

The Chairman said it was his duty—and a painful one for him—to refer to the loss the Society had sustained by the death of its able Treasurer (Mr. John Stringfellow). He had known the deceased intimately several years, and could testify to the interest he took in the Society's proceedings, and in everything connected with photography. He was known to the members as an expert photographer, and a thorough kind-hearted man—one who was always ready to impart the information he possessed. Mr. Stringfellow would be greatly missed by the Society, and also a large circle of friends. He (the President) wished to move that a letter of condolence be sent by the Secretary (Mr. Taylor) to Mrs. Stringfellow. The motion was seconded by Mr. Dakin.

Mr. J. D. Leader, F.S.A., in supporting the same, said he endorsed the Chairman's remarks. He had frequently availed himself of Mr. Stringfellow's kind assistance in photographic matters.

Mr. Rawson and Mr. Given also spoke in high terms of the late treasurer.

Mr. Firth proposed and Mr. Hadfield seconded, that a suitable portrait of the late Mr. Stringfellow be placed in the album.

Mr. Hadfield was unanimously elected treasurer, *pro. tem.*

The subject of Photographic Exhibitions was discussed, and some good suggestions offered by several members. Attention was directed to the summer excursions, and it was agreed that the first outing should be to Haddon Hall, on April 27th.

The meeting shortly after adjourned.

Talk in the Studio.

The Amateur Photographic Field Club.—On Tuesday evening last, a lantern meeting was held by this Society in the large room of the Society of Arts, Mr. J. C. Andrea in the chair. Careful comparisons were made between transparencies made by the wet collodion process, and those by the emulsion methods, and the burden of approval fell upon the results obtained by the wet method, especially in the case of Mr. F. Howard's pictures, which were toned with gold. Next as regards merit came collodion emulsion, while the gelatino-bromide transparencies shown were considered to be by no means satisfactory.

Mechanism of the Eye.—Professor McKendrick, in his sixth lecture at the Royal Institution given on Tuesday, Feb. 21, continued his account of the physiology of vision. He described the structure of the various coats of the eye, and in particular that of the retina. He then contrasted the structure of the complete eye with that of the compound eye, found in many invertebrate animals, showing that there are many points of resemblance between them. He next considered the eye as an optical instrument, and illustrated, both theoretically and experimentally, how the image is formed on the retina, and showed the necessity of accurate focussing on the retina by a demonstration on the screen of the experiment of Scheiner. A description was given of the peculiarities of the normal eye—the near-sighted and the far-sighted—and it was stated that most eyes are more or less liable to certain other defects, such as that due to the curved surfaces of the refractive media being unequal, and thus producing "astigmatism." The Professor described the error in regard to colour termed "chromatic aberration," because the eye is unable to focus equally for the rays of the spectrum, more especially for those at the extreme ends, the violet and the red. After alluding to the entopic phenomena of the eye—the dots, streaks, and curious figures sometimes seen floating in the air—Dr. McKendrick showed how we may be made conscious of phenomena in the retina, and even see the shadows of the retina vessels of our own eyes.

To Correspondents.

*** We cannot undertake to return rejected communications.

H. Howard.—1. The lenses you refer to will gives images of the same size, but differing as regards intensity. 2. Rather smaller. 3. Shorter. 4. Yes.

South Devon.—We believe that it will be obtainable in the course of a few weeks.

Election.—1. and 2. From Messrs. Mawson and Swan, of Newcastle-upon-Tyne.

F. E. P.—You can obtain it to order from any foreign bookseller.

M. W.—The dimensions you propose will answer well, and we should certainly recommend you not to make your studio any smaller. 2. About seven feet. 3. Not quite; say within one foot. 4. Half a dozen should be abundance, and rollers form, perhaps, the most convenient arrangement.

B. S.—Nos. 1 and 4 are so similar in character as to leave but little ground for preferring either. Nos. 2 and 4 will not give quite such perfect definition, but are on the whole better suited for general out-door work.

J. W. Browning.—Write to Mr. J. W. Swan, Newcastle-upon-Tyne.

J. Cowley.—1. It has been sent by post. 2. We think it is eight francs. There is no English translation. 3. About one-third of a candle; but if you put on more battery power, a light of nearly one candle may be obtained. Under these circumstances, the platinum slowly volatilises and obscures the glass. We are told, however, that Mr. Swan intends to manufacture a small carbon lamp which will work with two or three cells. 4. Either.

Nemo.—It is quite possible that your collodion may be at fault; try another sample. If you prepare it yourself, increase the proportion of soluble iodide, leaving the bromide as at present.

Walter F. Cooper.—1. You must be guided by appearances at the time, but in most cases we should say rather under 120° than over. 2. It would somewhat increase sensitiveness in the case of emulsion prepared according to the formula you adopt; but we should expect no mischief to follow. 3. It is probable that you do not take sufficient care to clean your vessels from all traces of previous batches; or perhaps you employ vessels of porous or absorbent earthenware.

Spots.—Defective sizing of the paper.

Nitrate.—1. Your best way will be to line with moderately stout linen, cementing it down and saturating with some bituminous varnish, as Brunswick black. An exposure to the light during several days will serve to make the coating hard and insoluble. 2. It is best to avoid nails or screws altogether, and to put the work together with dowels or tongues of hard wood.

Thomas Timms.—You would not find it by any means easy to obtain a satisfactory picture under the circumstances; but if you attempt it, you had better use a wet plate and old collodion.

In a Fix.—Reduce the proportion of iodizer in the collodion, or increase the strength of your bath solution.

Cadmium.—Reduce to two-thirds of the quantity you are now using.

C. C——n.—Add a trace of nitric acid to the bath, enough to make it slowly redden litmus.

THE PHOTOGRAPHIC NEWS.

Vol. XXVI. No. 1229.—*March* 24, 1882.

CONTENTS.

PHOTOGRAPHIC LENSES.

We are so frequently asked rudimentary questions as to the points which distinguish different kinds of photographic lenses, that we have determined to write a few words and to give diagrams descriptive of the forms most in use.

We do not intend to give our readers in this anything that is new, but simply something which may be useful for them to refer to, and to us to refer our correspondents to.

In the following description we mention the particular uses for which each lens is best adapted. We give a sketch which will show the general appearance of the lens we mention; in the case of each landscape lens, approximately how much slower it is than the ordinary portrait lens; and we give the maximum aperture at which it will work, and also the largest sized plate which it will cover. It is necessary to say a few words on this latter point. We have supposed in each case that the equivalent focal length of the lens in question is 12 inches, and we state the diameter of the largest circle which it will cover. To find whether the lens will cover a certain sized plate, it is only necessary to draw out on a piece of paper a circle of the diameter mentioned, and to try whether the plate can be laid on this circle without any of its corners being outside the circumference. If the focal length of the lens be greater or less, a circle of proportionately greater or less diameter must be drawn. In the diagram, the line-shaded parts represent glass, the black shaded parts brass.

We shall not take into consideration at all the different methods of achromatization. Our readers all know that the object of achromatizing a lens is to make the chemical and visual focus coincide, and that the want of such achromatizing is the last fault which we should expect to find in a modern lens by any maker of name.

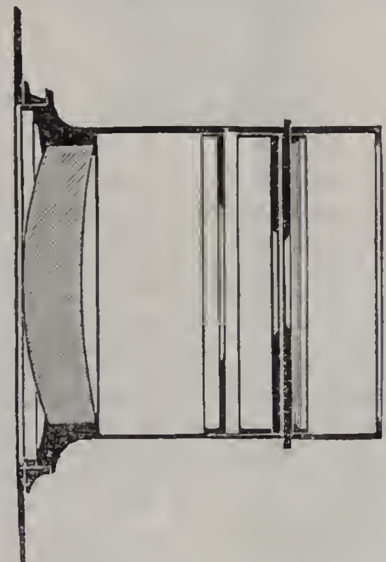
In stating different apertures, we mention them thus:—$\frac{f}{10}$ $\frac{f}{15}$. The lower figure in each case shows how many times the focal length of the lens is longer than the diameter of the largest aperture at which the lens works.

We begin with the

Single Lens.

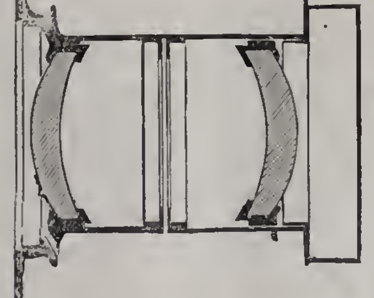
The so-called single lens is an achromatic combination of the meniscus or plano-convex form. The concave or flat side is turned towards the view, and a diaphragm is fixed at some distance in front of it. It is, taken all in all, the most useful of lenses, especially in the modern or "wide-angle" form. It is particularly adapted for general landscape work, as it gives a brilliant and exquisitely-defined image through a considerable angle, and as the illumination is more nearly equal at the centre and at the corners of the plate than with any other form of lens.

It requires to be used with great care for architectural subjects, as if used with a plate subtending any considerable angle, distortion will arise. When used with the largest possible aperture it is fairly rapid. The diameter, if circle



covered with a 12-inch focus lens, is, with the older forms, about 13 inches; with the newer, or "wide angle," about 16 inches. The full aperture is for the older forms about $\frac{f}{20}$, for the newer about $\frac{f}{16}$. The older forms are about 25 times slower than the portrait lens, and the newer about 16 times. Next in order we may take the double combination lens, known as the

Rapid Rectilinear, or Rapid Symmetrical.



This lens consists of the pair of meniscus combinations, each very similar to the "single lens," but of very great focal length compared to its diameter. They are fixed at a considerable distance apart, with the concave sides towards each other. The lens is, as its name indicates, a *rapid* one. It requires an average exposure of about $\frac{1}{4}$ of that required by the last described lens, working full aperture up to about $\frac{f}{9}$. It is thus about five times as slow as a portrait lens. It is admirably adapted for architectural purposes when only a limited angle is required, as it gives no distortion. When used with a large stop or full aperture it is the best form of lens for groups, and is very useful for the so-called instantaneous pictures. It also forms an admirable portrait lens to be used in well-lighted studios with modern dry plates, and especially in the case of large portraits. Its drawback when used with a large aperture is that the illumination of the plate is very unequal.

The diameter of circle covered by a 12-inch focus lens is about 10 inches full aperture, or 15 inches with the smallest stop.

Lenses closely resembling the above are sold under various names, such as "True View," "Euroscope," "Planographic," &c.

The Symmetrical or Wide-Angle Rectilinear.

This lens is somewhat similar in general construction to the last, except that the lenses are placed very close to each other, so that there is only room for the diaphragm between them. They are suitable for architectural work, where it is necessary to include a very wide angle of view. It gives no *actual* distortion, but requires to be used with very great discretion, otherwise a most unpleasant effect is produced, from the fact that the point of view at which the resulting picture is naturally viewed from is further away than the artificial eye of the camera was from the plate in taking the negative. The effect produced is to make the parts of the view which were nearest the camera appear enormously exaggerated; in fact, when stretched to its utmost power, this lens should only be used for very exceptional cases. It makes an excellent lens for general landscape and architectural purposes, when used for plates considerably smaller than the largest size which it will cover.

It is a slow lens working with an aperture, but little over $\frac{f}{15}$, and consequently requiring an exposure even longer than the single lens, or about 20 times as long as the portrait lens. A lens of 12 inches' focus will cover a circle considerably over 20 inches in diameter. The illumination is very equal.

(*To be continued.*)

PHOTOGRAPHIC PAPER WEIGHTS.

During the last six or eight months plain cubes of polished flint glass have been extensively sold as paper weights, and many persons familiar with the difficulty of obtaining a considerable mass of flint glass tolerably free from air-bubbles and from striæ have expressed surprise that such paper weights could be sold at the extremely low prices demanded. Two sizes are in the market, one being about two inches across the face, and the other somewhat more than three inches. The cubes in question are doubtless pressed, or moulded, in the first instance, after which the six faces must be ground and polished. As the sharp edges of the cube are bevelled off, there are no less than eighteen surfaces to be worked true, and polished; and it certainly becomes a matter for wonder that the article in question can be sold for a few pence.

The decoration of the lower surface of a glass paper weight with a photographic picture is by no means new, as we have frequently seen roughly-made and nearly hemispherical glasses ornamented in this way. Such articles have generally a very common and unattractive appearance, owing to the distortion arising from the shape of the glass, and the coarseness of the material. The cubical paper weights now in the market are so well shaped, and made of such excellent glass, that they lend themselves to the production of artistic and highly-satisfactory results. But we consider it better to discard the primitive method of attaching a paper print on the glass, and either to make a collodion or a carbon positive on one face of the cube. As regards the collodion picture, no special precautions are necessary, but, as the ordinary camera and dark-slide are not available, it is best to print on the sensitive collodion film directly from a reversed negative, two thin strips of cardboard being used to prevent actual contact between the wet film and the negative. It will be found convenient to make use of an ordinary gas flame as a source of light, as the approximate parallelism of the rays serves to compensate for the circumstance that the negative and sensitive film were not in thorough contact. Either portraits or views may generally be vignetted with advantage, and an ordinary gold and acetate bath can be used for toning. A mere coating of varnish serves to protect the film, and over the varnish a layer of flake white paint may be applied.

It is, however, easier and more convenient to develop a carbon or autotype print on the cube, and, as the picture is to be viewed through the glass, an ordinary unreversed negative will be required. It is scarcely necessary to say that all the changes of temperature incident to the development of the carbon print must be brought about gradually in order to avoid fracture of the glass. In the case of the carbon picture, the white backing may either consist of flake white paint, or, perhaps, better still, of the phosphorescent paint which has recently been introduced into commerce. The most convenient way of using the paint is to cover the surface of the dry carbon print with the thick portion which settles to the bottom of the bottle of luminous paint, and next to rub down on this a square of glass corresponding with the face of the cube. As soon as the edges are dry, all becomes firmly fixed, and the paper weight is finished. One considerable advantage of the luminous paper weight is the ease with which it can be found in the dark; and as the photographic pictures still remain visible, they may serve as distinctive marks for each particular paper weight. Instead of using the paint, it is sometimes convenient to employ the mixture of phosphorescent sulphide of calcium and paraffin, as used by Mr. Warnerke for making his sensitometer plates; but in this case the cube must be warmed before its application. The sulphide of calcium paint cannot be used over a silver print with advantage, as the metallic image would soon become converted into sulphide.

In order to vary the style of the photographic picture, backings of gold and silver bronze may be adopted, the powders being either mixed with a suitable varnish, or melted with paraffin, as mentioned in the case of the luminous powder.

A REMARKABLE ABNORMAL ACTION OF LIGHT.

A communication singularly interesting to the scientific photographer, as it certainly is to the chemist, was recently made to the Chemical Society of Paris by M. Schützenberger. This chemist has found that certain bodies—to wit, Caucasian petroleum, aniline, and benzole—when they are heated with sodium or copper, and then distilled, possess the singular character, when analyzed, of yielding more than 100 per cent. of constituents; moreover, they maintain the faculty for a long time, if they are kept in the dark.

On the other hand, if a sample of this same petroleum, aniline, or benzole, which has given such a singular result on repeated analysis, is exposed to the action of light for a couple of hours, the normal result on analysis is once more obtained; that is to say, the constituents yielded make up but 100 per cent., as they should. So that it is plain that the action of light has exercised a singular influence upon the bodies in question.

Schützenberger, in explanation of the circumstance, assumes that the composition of water and carbonic acid is not, under all circumstances, that generally supposed. The atomic weights, between certain limits, cannot be fixed, but are oscillatory. If what we term an atom is only the result of an oscillatory motion of the substance, which motion obeys a certain law, then it seems possible that the variation in the atoms of hydro-carbons may be modified by light. Obviously, if light is capable of disturbing our present atomic theory in this way, the disturbance in question will be a most important one for chemists to consider.

At Home.

HERR J. OBERNETTER IN MUNICH.

Whether there is any truth in the proverb that work prospers most upon hallowed ground, we know not; but we can say this much, at any rate, that we did not see better Lichtdruck work during our recent tour in Europe than that met with in Herr Obernetter's establishment. If not situated in the Senefelder Strasse itself, the printing-rooms are within a stone's throw of the thoroughfare named after the discoverer of lithography, and we may surely expect that if photo-lithography, collotype, and arts allied to lithography, are to be found anywhere in perfection, it is near the spot where Senefelder was born.

Be this as it may, Herr Obernetter—who enjoys the reputation of an ardent photo-chemist and experimentalist, not only in Germany, but wherever photography is known—has arrived at a wonderful pitch of excellence in his work. He has no *Schnell-press* on the premises, but only hand-presses; but then his aim is more to do the best work, rather than much of it; that is to say, his principal work lies in the printing of negatives from nature, rather than the printing of negatives of pictures, engravings, &c.; and everybody conversant with mechanical printing knows the former to be the more difficult. Doubtless Herr Obernetter requires a higher price for his work, for, in some cases, it proceeds very slowly indeed.

We need not here recapitulate the processes and formulæ of the Lichtdruck process, which, if not identical, are very similar indeed to those we have already given in our "At Home" at Herr Löwy, in Vienna.* Here, as in that establishment, the main point is the preparation of bichromated gelatine images on the Lichtdruck plates, from which prints are struck off in the press. Herr Obernetter, since he only employs the slower and more careful hand-press, goes to work rather differently in the preparation of his Lichtdruck plates. Instead of the bichromated gelatine being applied to solid plate glass, half an inch thick, only patent plate of ordinary thickness is used. It is more handy of manipulation, and is better adapted to the common printing-frame. Afterwards, when taken to the press, the patent plate is laid upon a bed of plate glass, and in this way receives the necessary support.

Another thing that struck us was that the gelatine images upon the Lichtdruck plates were rather more yellow than those we saw in Vienna. The yellowness, it is true, was a mere tinge, but still those elsewhere were sometimes quite colourless, and this had been pointed out as a sign of perfection. Herr Obernetter's work proves, at any rate, that the yellowish tinge is by no means inseparable from good results.

* See Photographic News for 1881, p. 590.

The laboratory, washing room, drying cupboards, &c., are all on the basement, and here, too, are the reproductions of negatives, made by the graphite process, to the excellence of which Herr Obernetter called attention six or seven years ago, and which then, as now, is one of the most valuable reproducing methods we have. A great many of the clichés Herr Obernetter receives have to be reproduced before they can be transformed into Lichtdruck plates, and he employs either the wet collodion process or the graphite method, according to circumstances. If he desires to make the copy softer than the original, he employs collodion; if he desires to infuse vigour, and make the copy stronger than the original, he uses graphite. The qualities of the gelatino-bromide process, he does not think lend themselves to making reproductions suitable for Lichtdruck.

If a negative is otherwise satisfactory, it usually requires stripping, an operation performed in the simplest manner. The negative is put upon a levelling stand, and fluid gelatine of tolerable consistence poured over it. When dry, a penknife is run round the margin, and the film leaves the glass without any trouble. A stripped film is always preferred for printing the Lichtdruck impression, since, with pressure, there is no difficulty about getting perfect contact; where fine detail exists, this is absolutely necessary. A large series of Lichtdruck plates ready for printing are passed in review, some of them exceedingly delicate. "We are satisfied if we get from 100 to 400 copies from plates like these," says the manager of the laboratory; "as there is no difficulty now in making the plates, we never push the printing too far."

We walk upstairs into the printing room. Here are a dozen presses at work, all of them known by the name of the Star or *Stern-press*. They are small lithographic presses, one man sufficing to work them, who turns a revolving wheel, which reminds one of steering a ship. As we have said, the Lichtdruck plate, gelatine image upwards, is laid upon a sheet of plate glass by way of bed, the film having first been treated with glycerine and water, as we have previously described. The work is very similar to lithography, except that more time and care are spent over it. In the first place, a moist sponge is rubbed over the surface; then comes a soft wash leather roller, whose surface is soft and of the appearance of crêpe, which is rolled over the Lichtdruck plate two or three times to remove surplus moisture. The ink rollers that are now applied are of glue composition, and as the impression requires two inks—it is a Pompeian window—the thick ink is first put on. The roller is not passed once, but half a dozen times at least over the plate, and then another roller charged with thin ink is applied in the same manner. It takes fully five minutes to sponge and roll up the plate, the rolling being done gently, but firmly. A sheet of paper is now laid upon the plate, the tympan lowered, and the scraper adjusted with due pressure; a revolution of the wheel completes the printing, the well-known scraping action of the lithographic press being used in the operation.

A more gentle and time-taking process still is in operation at the next hand-press. Here is a delicate interior (from nature), and the printer, one of the most skilful hands, is paying it great attention. Not only does he spend more time over the sponging and rolling up, but the paper for the print is carefully laid on, tamped with the fingers on the back, and then gently rubbed with the palm of the hand, before the tympan is lowered and pressure applied. Altogether it is a most delicate process, and we question whether a dozen prints per hour are pulled. But they are very fine and perfect pictures that result.

Some of the prints are taken on thick plate paper, and are then ready for binding without further ado; these are usually for book illustrations. Other pictures, that are to pass muster among silver photographs, are, on the other hand, printed upon fine, thin paper, and then varnished and pressed to impart to them a better surface. The varnishing is done by first sizing in a thin solution of gelatine, and then dipping in a solution of shellac in spirit. The "interior" here printing is to be so treated, for it will be critically examined from a photographic point of view. It is an apartment in the *Stadthaus* or town-hall, and the dark oaken wainscoting and furniture necessitated an exposure of eight hours with a gelatine plate; so dark, indeed, was the hall, that it had to be lighted artificially during the operation of focussing.

Another class of work is the printing of little vignetted photographs upon note and letter paper. Everybody is acquainted with the pictorial letter paper, sold at a penny a sheet at all spas and tourist resorts, each sheet having, by way of heading, a coarse engraving of some local spot or building of interest. A German publisher has conceived the idea of printing real photographs, instead of these woodcuts, upon letter paper, and at one of the presses here a collotype printer is printing off such copies at the rate of about sixty an hour. There is likely to be a great demand for letter paper of this kind when once the public learn it is to be purchased, and some of our readers will doubtless do well to give their attention to a branch of photographic industry which is likely to turn out remunerative.

We pass on through the varnishing-room into the photographic studio. As no portraits are taken here, but it serves simply for making reproductions, the only aim has been to make the apartment as light as possible. The photographer attached to the establishment is engaged upon wet-plate work. He does not albumenize before coating with collodion, but prefers well-polished plates, which, he avows, are better produced by rubbing with thin Chinese paper and a little old collodion than in any other way. Chinese paper does not give rise to loose fluff and fibre, like fabric—a point that may well be noted.

Downstairs are the publishing-rooms. "All the works of Albrecht Dürer, and all the known pictures of Rembrandt, are here," says our guide; for one of the first tasks undertaken by Herr Obernetter was the reproduction of these two great masters. Collotype printing has, indeed, made immense strides in Germany, as the vast store-rooms here alone testify. The modern masters are now being attacked by Herr Obernetter, and, in a few years, artists and connoisseurs all the world over will be able to make *fac simile* collections from all the great masters at a most moderate expenditure.

As it is some time since Herr Obernetter's valuable graphite process for the reproduction of negatives was published, we conclude our article with a recapitulation of it as it is published in Germany.

Here are the details. A new, well-polished patent plate is poured over with the undermentioned solution, in the same way exactly as collodion.

Dextrine	62 grains
Ordinary white sugar	77 ,,
Bichromate of ammonia	30·8 ,,
Water...	3·21 ounces
Glycerine	2 to 8 drops

After a complete solution has been made, it is filtered. The preparation will keep good for several days. The plate having been coated, and the superfluous liquid poured off at one corner, it is placed in a horizontal position, and in some place free from dust, to dry, in a temperature of about 40° to 60° Reaumur.

After a period of from five to ten minutes, the solution dries with a mirror-like surface. Whilst still warm, it is put into an ordinary pressure-frame, under the negative, to be reproduced, and exposed to diffused daylight, according to the density of the *cliché*, for a period varying from five to fifteen minutes. If the exposure has been well timed, the picture appears slightly visible upon the film. After the plate has been withdrawn from the printing-frame, it is again put into the drying-oven, where it remains until it has become a little warmer than the atmosphere of the room in which the next operations are carried on. When the plate has reached this temperature, it is carried into an apartment, not too much lighted, upon a sheet of white glazed paper. A fine dusting-brush is dipped in the finest levigated graphite, and this is rubbed carefully over the plate. Breathing upon the plate renders it more capable of attracting the powder. When the desired vigour has been attained, the superfluous powder is dusted off, and the plate is coated with normal collodion. Afterwards the film is cut through at the margins of the plate by means of a sharp knife, and put into water. In a little while—from two to five minutes—the collodion with the image will be detached from the glass; the film is at once turned over in the water, and brought out upon the glass plate. Under a soft jet of water any air-bubbles that may exist between the collodion and the glass are removed, and then the image is poured over with a thin solution of gum-arabic (two grammes of gum dissolved in one hundred grammes of water), and allowed to dry spontaneously in an upright position. After drying, the plate may be varnished in the ordinary way. The addition of glycerine is employed in order to suit the solution to the different conditions of moisture in the atmosphere. Thus in a moist, warm atmosphere in summer, the solution does very well without any glycerine at all; while in winter, on the contrary, in a cold, dry atmosphere, the addition of about 8 drops to 100 grammes of the mixture is necessary.

The "By-the-Bye" next week will be "On Buying and Selling a Business"; the following "At Home" will be "Herr Hof-Photograph Angerer in Vienna."

PHOTOGRAPHY IN AND OUT OF THE STUDIO.

Microscopic Photography — Photography and Dust— Photographic Nomenclature — Photography in America.

Microscopic Photography.—The Corporation of London has lately patronised artists—the time may come when it will patronise photographers. There is, however, little hope under the present *regime* of having anything like the Municipal Laboratory of Chemistry in Paris, where microscopic photography is largely made use of in connection with food analysis. M. Tissandier, in a recent number of *La Nature*, has given details of the method of working, which possesses interesting and novel features. The processes are three in number. The first is the ordinary plan of applying directly a small photographic camera to the eye-piece placed vertically as for direct observation, and need not be minutely described. The second method is due to M. Vogel, and consists in seeking the virtual image situated in the microscope by means of a camera with a short-focus object glass. The image is formed vertically in advance of the eye-piece at about 0·12 m. to 0·18 m., according to the magnifying power of the ocular glass. The photographic object-glass is nearly in contact with the eye-piece of the microscope. The third system requires a special arrangement of the dark room, and its advantage is that it allows of taking the photograph of an object in several planes, and is notably applicable to histological sections, trichinæ, crystals, &c. The microscope is placed horizontally in the middle; to the right is a camera, the object glass of which is connected with that of the microscope by means of a long tube; to the left is fixed the oxyhydric or electric light. This apparatus is based on the principle that luminous pencils with very long conjugate foci become nearly parallel, and that the points situated in planes near the focal plane are reproduced by points hardly larger than those of the focal plane. Gelatine plates are used, and some really remarkable results have been obtained with various articles of food, such as chocolate, flour, pepper, coffee, &c. This application of photography to food analysis opens up a wide field for instruction, and, with photographs to guide him, the amateur microscopist might do good service to his household by experimenting on the various "compounds" which are sold as "genuine."

Photography and Dust.—Let not anybody rashly follow Mr. Dunmore's advice and endeavour to put down the dust by stirring it up. If there is dust in the dark-room, by all means let it be there. Even with a damp cloth it is impossible to avoid raising a commotion which will take half a day more to settle down. Mr. B. J. Edwards hit the right nail on the head when he said, "Let sleeping dogs lie." Gerhard Dow, who had a microscopic eye for detail, and whose pictures are the very perfection of what photographers call "cleanliness," had an intense horror of dust. He never had his studio dusted, but he also never allowed anybody save himself to enter. His movements were, as Mr. Dunmore rightly recommends, leisurely, and he never disturbed the dust. Excess of care in some cases is worse than a deficiency—or, to be more correct, an indifference. We remember once seeing an ardent microscopist spending half-an-hour in getting some microscopic sea shells exactly in position. He scarcely dared breathe during the whole time, and just when he had triumphed, his suppressed breath found its way through his nose, and wafted the shells away, never to be recovered.

Photographic Nomenclature.—Not the least important factor in the progress of a new science is the formation of its nomenclature. New terms have to be invented to suit processes and manipulations; and to discover the origin of technical terms in common use would furnish a subject for curious inquiry. "Switch," "shunt," "brake" are familiar enough now, but must have sounded strangely in the early days of the railway system. The advent of the electric light will probably introduce some names which at first will appear odd. "Ohm" is not yet understood of the multitude, but this is only a question of time. It is very natural that the terms in so novel a science as photography must at first have puzzled the general public, and, no doubt, when nobody knew anything about it, the public gratefully accepted as gospel any crumb of information which experts deign to give. Turning over the files of an old newspaper recently, we came across a droll instance of this. A young Daguerreotypist had to give evidence in an action, and was asked the question, "What is the result of dampness on the Daguerreotype plate?" "It produces phledgeum," he gravely answered; and "phledgeum" appears to have been received by court and jury as a scientific term belonging to the art!

Photography in America.—What would people say if the *Dispatch* or the *Observer* commenced a series of articles on "Amateur Photography?" Yet this is what the *Boston Sunday Budget* has been offering to its readers for some time past as a great attraction. The paper now before us contains the seventh article on the subject, and every number for the last seven weeks has had from two to three columns of instructive matter. Verily more interest must be taken in photography in America than in England. Article No. 7 deals with dry plates and carbon tissue, and we gather from the remarks on the first-named subject that the American manufacturers of gelatine plates are not so careful as their English brethen. The *Boston Budget* says: "The writer has used both Carbutt's and Eastman's, and finds advantages and disadvantages in both. Carbutt's are apt to be uneven in their working, and are often very carelessly cut as to size, so as to exasperate the amateur beyond endurance in his efforts to get them into the holder. Varying thicknesses of glass is also a trial, though it is probably unavoidable. But there is not the shadow of an excuse for cutting the plates inaccurately as to size. This fault belongs quite as much to Eastman's as to Carbutt's. With regard to Eastman's, it may be added that they are apt to have gelatine slopped on the wrong side, a slovenly condition of things that is very annoying when it comes to developing, and as unnecessary as it is annoying; and yet both Carbutt and Eastman make excellent plates, as any will find who will try them. Their worst faults may easily be corrected if the manufacturers will but take a little more pains." These faults, in spite of the hard words which Captain Turton has said of English manufacturers, are rarely found this side of the Atlantic.

Reviews.

PHOTOGRAPHY WITH EMULSIONS; A Treatise on the Theory and Practical Working of the Collodion and Gelatine Emulsion Processes. By Captain W. de W. Abney, R.E., F.R.S. (*London: Piper and Carter.*)

ALTHOUGH many have been anxiously awaiting for some time past this promised volume, Captain Abney cannot be blamed for keeping it back until such time as he judged the gelatine process sufficiently ripe to warrant the issue of a standard text-book; for while Captain Abney's new work teaches of collodion emulsion, and consecrates a large portion of his volume to that important process, it is, naturally, to the more generally employed gelatine method that most readers will turn their attention.

Captain Abney brings down our knowledge of emulsion photography to the latest moment, not only in respect to its preparation in the most sensitive form, but he also explains and sets out very clearly the most recent modifications in development. Dr. Eder's system of employing ammonia in emulsion making is fully described, as are all the more successful formulæ of our English workers, to wit: those of Mr. Burton, Mr. Cowan, Mr. England, Mr. Henderson, and others. An important chapter on "gelatinized paper" supplies some useful information which photographers, whether professional or amateur, are likely to appreciate fully.

Perhaps the scope of Captain Abney's work is best described in his preface, which we have set down for the benefit of our readers. Captain Abney says:—

"It will be seen that collodion emulsions still occupy a prominent place in the scheme of the work, and it may appear as if an apology was required for allowing them to occupy the position they do. The writer believes that they have not seen their best days, and that when the mania for extreme rapidity (which, however desirable for certain purposes, yet is not everything) has subsided, they will still claim a certain number of adherents, to whom the quality of a collodion negative, and the possibility of giving local intensity, is a desideratum. It has been the wish of the writer to render the work useful to beginners, and also to experts. At first sight it might be supposed that an acquaintance with chemistry was necessary to enable the former to use these pages; but it will be found that all the processes are described in a practical way, and involve no chemical knowledge beyond that of English weights and measures."

THE CHEMICAL ACTION OF LIGHT.

BY DR. J. M. EDER.*

ACCORDING to Chevreul, gold oxide, when acted on by light, gives off oxygen even *in vacuo*, and from Rumford's and Juch's experiments, it appears that a solution of gold chloride in ether or in water is rapidly reduced on exposure to the light. Chloride of gold mixed with sugar, gum, or starch, and applied to paper, silk, woollen fabric, or the human skin or ivory, is also reduced under similar circumstances; with oxalic acid or oxalate of ammonia, the reaction is more rapid in the light than in the dark (Pelletier, Herschel and Döbereiner). On paper the protochloride is first produced, the colour becoming lighter, and then the reduction proceeds (in the light, or subsequently

* Continued from page 132.

n the dark) until the metal itself only remains; the maximum effect is produced by the rays of the spectrum between G and H.

Gehlen found that a solution of platinum chloride in ether, as also platinum chloride, or the double chloride of iridium and ammonium, with oxalic acid or tartrate of soda, separate the metal on exposure to the light. A solution of platinum chloride mixed with lime water and exposed to the light grows turbid under the action of the more refrangible rays, a double salt being produced (Herschel). Platinum chloride, mixed either with oxalic or with tartaric acid, and applied to paper, turns lighter in colour in the light, but with potassium ferricyanide it turns blue; both the iodide and the bromide of platinum are sensitive to light.

Silver oxide becomes darker in colour, either in white or in violet light, being decomposed into oxygen and the suboxide; in the presence of organic substances, metallic silver is also produced (Hunt, and H. W. Vogel). Silver nitrate is blackened by light, and, according to Artus, this occurs when the salt is enclosed in sealed glass vessels, but only in the case of the crystallized, not of the fused, salt. Hunt, Weiler, H. W. Vogel, and Scanlan all maintain that pure silver nitrate undergoes no change in the light, but only in the presence of organic matter; on the other hand, a solution of the pure salt in water exposed to the light deposits scales of metallic silver. The first observation of the property of nitrate of silver to darken in the light was that made by J. H. Schulze in the year 1727; his experiment was conducted with the salt rubbed up with chalk. In 1737, Hellot found that the same thing took place with paper dipped in a solution of the salt, and Herschel subsequently proved that the reaction was promoted by the blue rays of the spectrum. Fulham (1794) and Rumford (1798) made the same experiment with silk stuff, Davy and Wedgwood (1802) with leather, Link with the animal epidermis, Fischer with albumen, gelatine, gum, &c.

The chloride of silver also discolours in the light, and more especially under the influence of the dark violet rays; this was discovered by Scheele in 1777, and subsequently corroborated by Davy and Wedgwood. The colour produced is not black, but a brownish violet (H. W. Vogel). This change takes place either in the hot or in the cold, in moist or dry air, as well as in the Torricellian vacuum; it may occur when the salt is in the solid state, either crystallised or fused, at as low a temperature as that of 22° C., but in any case it is promoted by moisture. It will also take place under alcohol, ether, walnut-oil, nitric acid, hydrochloric acid, solutions of the alkaline chlorides, acetic acid, or dilute sulphuric acid; but it is entirely prevented by the presence of mercury perchloride, strong chlorine water, ferric sulphate, or fuming sulphuric acid; it is retarded by ordinary sulphuric acid, fuming nitric acid, or solution of ferrous sulphate. The action of light on silver chloride which has been precipitated by hydrochloric acid from a solution of silver nitrate and still remains under the liquid is not so rapid at a temperature of 100° C. as it is at ordinary temperature. Chloride of silver paper in a perfectly dry state is not so sensitive to light as when moist (Spiller), but differences in the hygrometric condition of the atmosphere, as well as in the temperature, have no visible effect (Bunsen and Roscoe). Chloride of silver paper is more rapidly blackened when an excess of silver nitrate is present (Fox Talbot, Hunt, and H. W. Vogel); the blackening is also promoted when the paper is placed in a solution of chloride of zinc, or of certain alkalies which have the power of binding the chlorine set free (Spiller) in the presence of gelatine, tannin, or morphine (Eder and Pizzighelli), after it has been fumed with ammonia. There appears to be no relation between the active intensity of the light and the blackening it produces in equal times; for instance, in the experiments of Bunsen and Roscoe, five times as great an intensity increased the blackening only 2·3 times. The sensitiveness of chloride of silver paper probably depends on the quantity of the salt taken up by the paper, and not on the nature of the metal originally combined with the halogen, but it is certain that the silver chloride precipitated by different chlorides becomes tinged by the action of light with different shades of colours; precipitated by ammonium chloride, and exposed beneath blue glass, it becomes olive brown; by sodium and barium chloride, purple; by sodium chloride alone, light purple; by calcium chloride, a rich violet; by iron chloride, blue, &c. (Hunt). The presence of organic substances, such as albumen, gelatine, and starch, give the colour of the silver chloride a red tinge (Davanne and Girard). Silver chloride in chlorine water exposed to the light remains white so long as free chlorine is present; but when all the gas is converted into hydrochloric acid, the salt begins to blacken. This discolouration disappears if the salt be kept in a dark place, but again appears when it is exposed to the sunlight. If the silver chloride is hermetically sealed in a glass tube, it turns violet in the sunlight, owing to the separation of chlorine; but, when placed in the dark, it will take up again the gas, and become white (Tommasi). Most of the chemists who have studied this subject agree that the decomposition of silver chloride in the light is a dissociation phenomenon. Chlorine separates either in a gaseous state, or to be dissolved by the liquid which is present, and ultimately to form hydrochloric acid. In this reaction the dry salt loses weight; according to Fischer, the loss amounts to ·2 per cent.; according to A. Vogel, to ·12 per cent. After five days, and under water, only 1 per cent. of the chloride is reduced to subchloride (Carey Lea). The violet product of the reaction is by several per cent. poorer in chlorine than the white chloride (Tommasi and Spiller), and only after exposure for a year and a-half does it correspond to the formula Ag_3Cl_2. It cannot be considered as pure subchloride of silver, although it is generally written Ag_2Cl. It contains no uncombined metal, since nitric acid does not dissolve out any silver. Metallic silver is only found to be present after very long exposure of the chloride, and when silver nitrate is present, since the metal is separated from the latter salt by the secondary action of the alkaline chloride on the subchloride in the presence of organic substances. There are other chemists who, like Bibra, do not regard the coloured chloride of silver as subchloride, as they are not able to observe any loss of weight, nor other reactions, when the compound is obtained from subcitrate of silver. According to Hunt, when silver subchloride is exposed to the light, over water, it takes up part of the oxygen of the air, and, according to Sahler, the dry chloride blackens in pure nitrogen more slowly than in oxygen; whence these two observers regard the product as an oxychloride. The subchloride, after being decomposed by the action of light, on being heated with ammonia or cyanide of potassium, is split up into the chloride and metallic silver; this is the reaction which takes place when photographic images are fixed.

(To be continued.)

GLASS-MOUNTED PICTURES AT EXHIBITIONS.

The Committee of the Dundee Photographic Society's Exhibition having framed their prize list in such a manner as to exclude all glass-mounted prints from competition—except in a special class set apart for such, and, by the way, offered in that class a bronze medal only—it may be well to shortly consider the subject.

It seems difficult to comprehend for what reason an exhibition committee should lay down this apparently extraordinary condition, and the further we look into the matter so much less reason does there appear in so doing, taking it, firstly, in principle, and then, for illustration, considering the case in question.

In the first place, it cannot be said that a really good print is not improved by this mode of mounting, for in that case we should not find so many really artistic amateurs and professionals adopting it. This evidence must, therefore, be taken as amply sufficient for proving that an improvement—and, in our judgment, a very substantial one—*is* effected. Such being the case, we maintain that the objection raised by one or two in our hearing (that this method of mounting is "illegitimate") falls to the ground; for in these days of advancement we suppose few would be found so antiquated in ideas as to hold that any means of improving landscape pictures (with the exception of working upon the print) are illegal. It being a process of much simplicity and devoid of all secrecy, it is alike open to all to adopt it; but, on the other hand, should there be any little skill required in so mounting prints, surely, as in all other processes, those who exhibit the larger amount of such skill deserve any extra benefit which as a consequence may accrue to them. We fail utterly to see in this process any other principle to follow than that the most competent operator should obtain the best result, and, in all fairness, an advantage commensurate therewith.

We do not hesitate to say that any exhibition rules tending to discourage this mode of mounting are not made in the true interests of art; nor, certainly, will they help to elevate photography. There is a distinctly different effect produced by a plain-surfaced print—say in platinotype—to that by an albumenised paper print; the latter has a charm peculiarly its own, and most certainly it appears to us that to preserve its permanency, to give it the delicious softness and transparency which mounting on glass produces, and, still more, to rob it when framed of one of its reflecting surfaces, is at once to improve it as an object of beauty, and elevate it as an artistic production.

As to the effect of the regulation at the Dundee Exhibition, its (fortunately) unusual character and peculiarity caused much misapprehension, resulting in excellent work by Mr. Payne Jennings, Mr. E. Brightman, and others, being out of general competition, the former eminent professional being awarded the only medal in the class for such exhibits, viz., a bronze one.

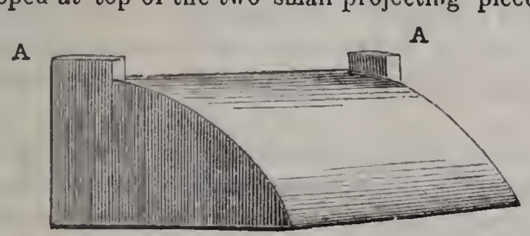
In addition to annoyances such as the above exampled, we fear that many who appreciate the artistic advantages afforded by mounting on glass would refrain from contributing to exhibitions where such restrictions existed, and these alone we would urge as ample reasons for discountenancing any interference of this kind, especially as, so far, we have heard no satisfactory reason for so doing.—*Journal of the Bristol Association.*

COATING PAPER WITH GELATINO-CHLORIDE OR BROMIDE.

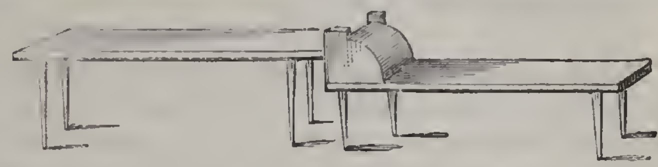
BY T. G. WHAITE.

To successfully cover a large surface of paper with gelatine emulsion in a fluid state will be found by most operators a very difficult proceeding; the irregular expansion and cockling of the paper when the warm emulsion is applied, and the rapid setting in pools and waves, make it almost, if not quite, impossible to obtain a sufficiently level and evenly-coated surface for printing by contact, especially if the smallest piece of the margin should escape coating, which is very likely to be the case, working, as we do, in so dim a light, and with such an obstinate and ill-flowing a medium as gelatine emulsion.

After trying numerous methods with varying success, it occurred to me to try coating the paper with a cold and "set" emulsion; this I find to answer perfectly, leaving nothing to be desired, the apparatus required being exceedingly simple and inexpensive. It consists of a hot water reservoir, as per diagram, made of zinc, It is open at top of the two small projecting pieces A A.



The hot water is poured in at these, and they act as cisterns to ensure the complete filling of reservoir, and, moreover, serve as guides, keeping the paper between them in its passage over the heated surface. The back, ends, and base should be covered with felt. It will then be unnecessary to have any light burning under it, as the once filling with boiling water will be sufficient for three or four hundred feet of paper. At the back and top of this apparatus a levelled bench is placed, say twenty-four inches wide, and the desired length, a little less than half the length of the room, say eight or ten feet, and in front of the reservoir another bench the same length, the upper one for levelling and setting on, the lower one for coating, placed thus—



Suppose the paper used for carbon tissue be selected twenty-two inches wide and cut in eight or ten feet lengths—a convenient size to handle—place one of these on lower bench, and with a stiff hog hair brush about eight inches wide, something like a small whitewash brush, take the cold emulsion either in lumps or after being squeezed through Berlin canvas (I prefer it in lumps), and work it with the brush all over the paper, as a paper-hanger would his paste; it very quickly gives way to a vigorous attack with the brush, and looks very smooth and free from lumps, even at this stage. Now take one end (having previously filled the cistern with boiling water), and steadily drag it from the lower bench to the upper one, between the two uprights A A of hot water cistern: the least contact with the zinc is sufficient to flow it, and it again sets almost as soon as it reaches the levelled bench; it may now be left there until another sheet is covered with the cold emulsion, and then hung up to dry in a cool draught. If it be thought desirable, a second coat can be applied, but this I have not found necessary.

Should a very thick and glossy surface be desired, it may be found necessary to reduce the proportions of gelatine to the chloride or bromide; a much larger proportion of the sensitive salt can then be applied to the paper.

One word of caution: do not let the sheet *remain* still for an instant in contact with the heated surface; a steady drag over is quite sufficient to break down the now well divided up jelly; the least hesitation or prolonged contact will denude it of some portion of the emulsion, and make wavy lines like those we find on ill-prepared albumen paper.

Notes.

Yet another Association of photographers in town. Next Thursday, we see, there is to be a meeting at Ashley's Hotel, when the proposal "by several gentlemen to form a new photographic club" is to be considered. Fortunately, the world is large enough for all.

There is alcohol in all natural waters, is the last sensational announcement in the chemical world. The statement is made by M. Muntz, director of the laboratory of the Institute Agronomique, and he tells us that the proportion of alcohol in the Seine water is exactly one-thousandth, or, in other words, amounts to one pint per thousand pints. The proportion is the same in sea water, and rather more in rain water. M. Muntz concludes from his experiments that alcohol must exist in the atmosphere as well, its presence in air and water being due, he thinks, to the decomposition of organic matter existing on the surface of the globe, in the depth of the sea, &c.

Mr. Muybridge repeated his successful demonstration of animals in motion before the Savage Club on Saturday last, meeting for the first time a full audience of English critics. The clever photographer was loudly applauded, and in the end, the honorary membership of the Club was conferred upon him, an honour all the more gratifying since it comes immediately after the Prince of Wales accepted the same distinction.

Mr. Muybridge took the opportunity to explain that his object in showing his series of photographs of "the attitudes of animals in motion" was to induce further investigations; he offered to place his entire equipment of apparatus and his own experience *gratuitously* at the disposal of any gentleman or Society who might feel disposed to pursue the subject further than he has at present brought it.

Our illustrated journals long ago recognised photography as a material aid to their work, but none of them have gone the length of the *New York Daily Graphic*. The editor of that periodical is "three persons rolled into one," for to the art editor and literary editor has now been added a photographic editor. This is indeed a sign of the times, for while many art establishments have for years past availed themselves of the photographer, there were "none so poor to do him reverence."

An amateur writes, concerning the addition of iodide of silver and chloride of silver to gelatino-bromide emulsion, as follows:—"As a good deal has been said about the difficulty of introducing a small proportion of iodide or chloride of silver into emulsion, I can tell you a very simple way to do it. I only make about eight or twelve ounces of emulsion at a time, and I follow Dr. Eder's excellent plan detailed in the Year-Book; but I find that either a little chloride or iodide—it is immaterial which—certainly does give increased density and clearness to the film."

"It is quite trouble enough, I find, to make one emulsion, and so I get over the difficulty in this way. I coat a couple of 10 by 8 plates with iodised collodion, sensitize in the silver bath, wash the film afterwards in distilled water, and, when well set, scrape off the iodide of silver with a strip of glass. The iodide is put into a small glass vessel, liquefied with as little ether and alcohol as possible, and then gently stirred into the gelatino-bromide emulsion (say 8 ounces). After filtering, for there is a deposit of pyroxyline, the emulsion is fit for coating the plates. When I want to introduce chloride of silver, I chlorise my collodion, first of all, using chloride of sodium for the purpose."

We stated last week that the police, in obedience to a Home Office order to photograph all "bodies found," had secured a picture of the murdered man discovered in Finchley Wood some days ago. This photograph has been the means of identifying the deceased, and also, there is little doubt, of finding the murderer. Serjeant Bridgen, an inspector of common lodging houses, at once named the dead man as soon as copies of the photograph were distributed, and he suggested also the man's companion as the likely murderer. The companion has now been arrested, and it seems more than probable that the police have got hold of the right man.

M. Janssen, the eminent French photo-astronomer, proposes to make use of photography to test the light-giving powers of the heavenly bodies. He says there are three simple duties for the camera to perform in connection with astronomy. Firstly, there is what may be termed descriptive photography, viz., the reproduction of an object or phenomenon, showing its aspect and details. Next, photography of precision, in which the camera is used to obtain images which may serve as the base of particular measurements or calculations. Thirdly, there is photographic photometry, in which we require the sensitive plate to measure the amount of light that strikes it.

This last branch of photography, says M. Janssen, is still to be created. We want photography, in making record of our heavenly bodies, not only to give us an image of a luminous phenomenon, but also to tell us exactly what is the radiating energy of that phenomenon. The importance of the subject is such, that we shall shortly explain to our readers the plan upon which M. Janssen proposes to base his method of photometric photography.

Dr. Heid, of Vienna, who has been engaged in photographing the interior of the Vienna Opera House for illustrating an architectural work, employed electricity as the means of illumination, simply using for his purpose a hundred cells of Bunsen. Albeit the source of light was not strong, and was at a considerable distance from the object, some very satisfactory pictures were secured of auditorium and proscenium with a Steinheil aplanatic lens, and an exposure varying from half-an-hour to an hour.

We generally consider sunlight to be golden, and electric light (not the incandescent lamp) to be of a bluish colour. Dr. Werner Siemens says that the reverse is actually the case. He says it has certainly been proved, by direct comparison of sunlight with electric light, that a white object electrically illuminated appears yellow compared with one illuminated by sunlight, whereas illuminated by gaslight it appears red. Daylight would accordingly appear by night still bluer than the electric light—one proof the more that the eye cannot always be trusted; a photographic film is, indeed, the only impartial observer.

The "reception" of chemists at the Crystal Palace on Wednesday evening was exceedingly successful. The President of the Chemical Society, Professor Roscoe, and the President of the Institute of Chemistry, Professor Abel, discharged conjointly the duty of hosts, and welcomed a gathering that numbered probably fifteen hundred gentlemen or less related to science. The reception was held in the Concert Hall, brilliantly illumined by the Edison lamp, while in the adjoining courts and corridors other glittering systems—the Swan, the Pilsen, the Brush, the Andiè, the Crompton—shone out with all the splendour of rival *débutantes.*

The International Electric Exhibition is indeed beginning to be worthy of its name. The display made by the Post Office is a capital contribution to the history of electricity, and to its usefulness in times of peace, while the adjoining display of torpedoes, electric fuzes, &c., by the War Office, shows the applications made of electricity to warfare. On Wednesday, out of compliment to the Chemical Society, several demonstrations were given by the representatives of various inventors, chiefly with the object of demonstrating the domestic character of electric lighting.

Dr. Robbins, of the Boston Institute of Technology, calls attention to the insufferable pain attendant on contact with the skin of hydrochloric acid. He held the stump of a match which had been saturated with the acid between finger and thumb for half-an-hour, with most dire results. We can quite believe it, for we can remember some years ago visiting a sick photographer who had been making vignette glasses by dissolving off the facing of yellow glass from some plates with hydrochloric acid, and who had burned himself so severely that for some days afterwards he suffered intense pain. A pad at the end of a stick does not afford sufficient protection, for the acid is drawn up by the wood, and thus comes in contact with the fingers. The stick should be jammed into some kind of handle, which facilitates the manipulation of the acid, and effectually protects the hand.

Some discussion took place recently at the Geographical Society as to the existence of a certain snow-clad mountain in Central Africa, known to the natives as the Wamali Peak. Mr. O'Neill, our Consul at Mozambique, who has made a journey of 600 miles through almost unknown country, was reported to have actually sighted the peak, said by the natives to be covered with perpetual snow; but Mr. O'Neill now tells us that, although its position was pointed out to him, he could not distinguish it. The honour of discovering a snow-clad mountain in Mid-Africa is, therefore, left to a future traveller, who would do well to take a camera with him, lest, after so much scepticism has been expressed on the subject, the discovery, when it is made, should fail to find believers.

A little while ago, the directors of prisons insisted on the taking of photographs of the hands as well as the face of the convict; but we did not know that "hand" photographs were becoming fashionable in the drawing-room. Yet *Truth* says:—"The rage for hand albums is increasing. Face photographs are becoming quite uninteresting and old-fashioned as compared with sun-pictures of the hand. There are even enthusiasts who declare that they can discover more numerous indications of character in the shape of the fingers and the lines of the palm, than in the countenance itself. They wax learned over 'musical hands,' sensitive fingers, thieves' thumbs, unemotional joints, and appreciative finger nails."

Our contemporary says, "hand albums" will probably last a season, then be laughed at and soon forgotten. Meanwhile it brings grist to the mills of the photographers, who, thinks *Truth*, of all the business classes, are, next to the butchers and milliners, the most prosperous. We fear both the matter of the hand albums and the prosperity are items of "news" to most of our readers.

We are happy this week in being able to publish Mr. Whaite's excellent plan of coating paper with gelatine emulsion. Some samples he sends us are exceedingly smooth and uniform.

It is likely that a memorial will be erected to the late M. Poitevin at his birthplace. We see that the claim is made on his behalf that he was the inventor of carbon printing and of collotype printing. That he was the originator of all photographic printing processes in fatty ink no one will deny; but in respect to printing with pigments, it ought to content his friends to say that Poitevin had more to do with the creation of the process than anyone else. The reversal of the carbon image prior to development was not discovered until after 1855, when Poitevin published his important paper, and, as everybody knows, the employment of bichromate in photography was suggested by Mungo Ponton as far back as 1839; and these are two important factors in the practical process of carbon printing.

It is not generally known that Lafon de Camarsac, who still enjoys the reputation in Paris of being the best producer of photographic enamels in the French capital, patented, as early as 1855, his method of preparing a film which became more or less hygroscopic after exposure to light. He employed bitumen of Judea for his sensitive surface, which, after exposure to light, permitted a greater or less quantity of particles of pigment to attach themselves. Lafon de Camarsac did not base a carbon printing process on this newly-discovered phonomenon, but employed it in the preparation of photographic enamels.

TWELVE ELEMENTARY LESSONS IN DRY-PLATE PHOTOGRAPHY.

No. 4.—First Lesson on Exposure and Development.

Before giving instructions in the actual manipulation of developing a plate, we must define the terms negative, exposure, and development.

A negative may be said to be a pictorial representation of any object or scene which, on looking through it at a bright light, shows all the shades of nature reversed. Thus, when we look through a negative of a landscape, holding it between us and (say) a gaslight, we see the sky and all objects which are in reality white, represented as black, whilst the darker parts of the landscape are represented by the bare and transparent glass. If the negative be a portrait, we see the face black, looking like a negro's; whilst a black coat looks white, and so on. The negative is produced by the action of light in the camera, the places where the light has acted most strongly being turned black. The time necessary for the light to act on the plate to produce the required effect is called the exposure. Now, we have said that the light acts upon the plate and darkens certain portions of it, but it must be understood that this action is not at first visible. A marvellously short exposure is enough to impress all the details of a landscape on a plate in such a manner that by acting upon the plate with certain chemicals, these details may be made visible. This operation is called development, and consists essentially in the strength of an image so faint as to be invisible to the eye, till it becomes as vigorous as we desire. Anyone, however unconversant with photographic operations, will perceive that when once we have obtained a reversed picture, such as we have described, we have nothing to do but to place this in contact with a sensitive film, and allow light to act through the negative, when we shall have a picture with its shades true to nature. This latter process is performed with sensitive paper, and is termed printing.

Upon correct exposure and development, nine-tenths of the technical success of negative-making depends, and when once the student has thoroughly mastered the relation of the one to the other, half the battle will be over. He cannot do so without practice; but we hope to give him such assistance in explaining the matter as may lead him to the desired end as quickly as possible.

Let the beginner select an object upon which he will make his first attempt. If he can resist the temptation to try a portrait, so much the better. A brightly lighted landscape, with strong contrasts of light and shade, is the best; it need not be picturesque. A suitable view can generally be got out of some window, or a very suitable subject is a bust or statue placed either in a well-lighted room or out of doors. We shall suppose in the present instance that the landscape is selected. The camera should point neither towards nor away from the sun. If the sun shine direct into the lens, the plate will be destroyed; if the sun be directly at the back of the camera, the picture will look "flat." Before beginning operations, we wish to explain what is the meaning of correct exposure. Let the student look attentively at the view which he has selected to make his first attempt upon. He will see that apart from the various colours represented, there is a very great range of light and shade. He knows that this range is brought about by the fact that different objects reflect different amounts of light to his eye. Probably the sky will reflect the most light, and going through the whole range from this he will see that there are a few little bits of the landscape that appear absolutely black. They do reflect some light, but it is so little that by contrast with the brighter objects they appear to reflect none. Now, let our student consider the process which goes on during exposure. He knows that when he has his camera with a dry plate in position, and when he has removed the cap of the lens, a perfect picture of the landscape, with all the shades of light, will be thrown on the sensitive film, and that the light will be acting upon it. Now it is evident the brighter parts of the picture will first take effect, and afterwards the darker, until the exposure has been prolonged to such a period that all the shades of light except those which, as we explained, appear in the landscape absolutely blank, will have impressed themselves. At this point the correct exposure has been given. Had a shorter time been allowed, some of the darker shades, or, as it is technically called, the detail in the shadows, would have failed to impress themselves, and the resulting negative would have been said to be under-exposed. On the other hand, had the exposure been prolonged, the light emanating from the apparently black parts of the landscape would have impressed the plate, which would eventually appear to be darkened all over, and would be said to be fogged from over-exposure. It is said of a correctly-exposed negative, that it has all the detail in the shadows without being fogged.

Now we shall pass on to the practical exposure of a plate, and shall show the student how he can tell, by the behaviour of the plate during development, whether he has hit the much-desired correct exposure, or not.

He will require to light his dark-room lamp, and to get by him the three flat dishes, the two measuring glasses, all the stock solutions which we gave directions for mixing in a former chapter, and his box of dry plates.

Now let him place his camera in position, opposite the view to be photographed; let him remove the cap from the lens, and place his head under the focussing-cloth. Any thick dark cloth or shawl answers the purpose; or a piece of black velvet or macintosh, about two feet square. He should remove the stop from the lens entirely, if it has movable stops, or, if the stops be rotary, should turn them till the largest one is in use. This will make the image on the ground glass very bright, and, by turning the focussing-screw first one way, then the other, he will easily find in what position the image is the sharpest. When he has discovered this, let him place the smallest stop in the lens. We say the smallest stop, not because it is necessarily the best for the picture which he is going to take, but because it will enable him to give a comparatively long exposure.

Having his camera fixed and focused, let him place the cap on the lens once more, and retire to the dark-room with one of his double dark slides for the sensitive plates.

When once here, he must place the dark slide open in front of the lamp. Now, he must lower the light till there s only just enough to enable him to see. He must open his plate box now and take out two plates—two glasses must be placed in the dark slide at once, but one may be a "dummy" if he happen to have but one dry plate; that is, either a clean plate or a spoilt negative. In placing the plates in the slide, let him be very careful that in each case the side of the plate which appears dull, on account of its having the sensitive film on it, is placed towards the outside. Now, having closed his dark slide and wrapped his plates up again, let the photographer return to the camera. He should carry the dark slide under the focusing cloth, for further security against light, and in placing the slide in the camera and during exposure should keep the whole apparatus under the cloth for the same reason. He now removes the focusing screen, and places the dark slide in the position occupied by it, keeping the side marked 1 towards the lens. He now withdraws the sliding door, which is the only thing which intervenes between the lens and the sensitive plate. He takes his watch in his hand, and removes the cap from the lens for (say) five seconds, replaces it, slides in the shutter of the dark slide, and carries the latter off to the dark-room. We have supposed any of the usual view lenses to have been used, the landscape to be brightly lighted, the time of year to be spring or summer, and the time of day morning or noon.

EXPERIENCES WITH COLLODION AND GELATINE OUT OF DOORS.

BY GEORGE BRADFORDE.

While slowly, but surely, drifting away from collodion, and placing our future trust in gelatine, we know that there are many workers who still stand stedfastly by the good old standard, sternly bidding defiance to the intruder; many, again, cast loving eyes upon it, as if loth to leave so old and tried a friend; and very few indeed are the number who have deserted its shelter altogether. There were innumerable difficulties in the studio with collodion, both at its birth and zenith, every worker who has laboured with it these past twenty years can fully testify; but the most annoying disturbances were ever to be found in the field. Here the inconveniences showed their towering heads—first, in the great packing of almost unpackable bottles, funnels, baths, &c.; then the risk of smashing something, and the almost sure certainty of forgetting some little thing of great importance—viz., the tripod screw, a particular flange, or the diaphragms. Why, I have seen a well known landscape photographer in those early days when the more one took to the field with him, he felt the surer of success—I have seen him, I say, dance with fury, and tear his hair out by handfuls with a recklessness that would have delighted the heart of a hair-restorer, all because a dipper had been carefully put in a corner of the dark room, so as to be easily remembered, and as carefully forgotten.

Yes, the nitrate bath, after all, was but a fickle friend, and, like most friends, proved most uncertain when anything particular was required of it. After being at the trouble of doctoring it, making microscopic investigation as to the thorough cleanness of its bath, and coaxing a trial plate from it of great satisfaction; then gently, as if putting a new-born babe to bed, screwing it down, or bottling it up, as the case might be, it was most provoking to find it playing off a number of spiteful and coquettish tricks in the morning. First it might be fogged, when, as most likely, the nitric acid was forgotten; then streaks, which plunging the plate would hardly overcome; then the heat would affect its constitution, and it would refuse to be amiable until cooled down. When this state of affairs was obtained, probably a light breeze might have sprung up, and, bidding defiance to the waving foliage, you try it once more, to find a very decent plate covered with dust, &c.

I need not enumerate the pranks it could play us; everyone knows them pretty well, and knows likewise that to overcome them was, not to lose temper, and tear your clothes, and otherwise behave like a fool, but to patiently discover the cause of the effect, and remove it.

In the field, with collodion, dust and dirty plates and breakages were, in reality, the three principal furies to be battled with. On bright March or April days, the dust was a fearful trouble; whether you pitched your tent among the rocks of an iron-bound coast, or in the depths of a shady wood, the spring wind was certain to send whirls of your torment at precisely the very second you either took the plate from the dark slide or bath, and of a consequence spoil it. The only chance was to extemporize a dark room, but as it often did prove itself to be an out-house for keeping gardener's tools, &c., it was a case of out of the frying-pan into the fire; if a cellar, the humid air affected the plates, if not albumenized, so that it was next to an impossibility to keep the film from slipping off into the bath; a stable is not a bad dark room if well ventilated; if any other outhouse could be obtained, I should prefer it, on account of the ammonia.

Dirty plates, to a certain degree, were the photographer's own fault, the choosing and cleaning of them being generally entrusted to an assistant or a boy. Another great stumbling-block in the path of the out-door worker was false economy—viz., the using of glass that had been used before—glass cleaned by a strong hyposulphite solution, then, to kill the hyposulphite, immersed in nitric acid, finally neutralized by a bath of charcoal; this was a nice plate upon which to secure the "finest results." Was it any wonder that such plates would prove murky, despite the greatest cleanliness in manipulation, or that the bath should get speedily out of order? Then the using of cheap glass. How dear in the end it proves, the thoughtful and calculating may be able to tell! I give it up. As an instance of the existence of this false economic fever, I may mention that, during the past year, in a first-class house, where they pay their operator three guineas per week, and (to express it poetically) situate in the principal street of a certain city that smilingly stands on the sweet-scented banks of the Liffey, cut their glass for out-door as well as studio work from the *waste pieces of common glass* used in picture framing; and with this vile, greasy, putty-smeared, scratched, uneven stuff the operator is expected to turn out first-class work. It is said, "A bad workman ever quarrels with his tools;" but, nevertheless, the best of workmen cannot make a silk purse out of a pig's ear.

By-the-bye, I might have mentioned a very good plan in regard to the possibility of *not* forgetting anything when going on a journey. I mention this simply because collodion has its followers still, and may have young disciples in its ranks who may be amused as well as instructed by my plan—viz., go through the mock operation of taking a negative in the field, and, as you proceed, note down everything you require, then paste a list on the back of your dark-tent. This can apply to gelatine as well; for, in a hurried departure to some outlandish place, "far from the resorts of man," there *might* be a possibility of such an insignificant thing as a wax taper, the dark-lantern, or the still more insignificant matter of a few lucifers, forgotten, and possibly spoil the day's work. At any rate, there is no harm in always having a true—or, should I say, a "correct?—card" before you when going to take the field.

Old King Silver Bath, when he goes in for breakage, strikes his poor servant with awe and horror; if it happens after the day's work is done, and while the porters are dashing the boxes from the van, a profane word or two, and a mental ejaculation of "There goes two pound ten!" may be the philosophic photographer's worst (if you couple a savage desire to witness the owners of certain bags and portmanteaus, which have been liberally drenched by King Silver Bath's blood, as they take out their fresh linen in the morning); but when he slips out of clumsy fingers in a drawing room, while on his way to the lumber room assigned him, or bursts up on the top of a cab, and streams on your head and face, and runs down your back, and calmly settles around the buttons on the new plush-covered seats, it is then—then that you lift up your voice in wild and deep anathema, and feel as if the world was a waste, and that every man's hand was against you, while a certainty settles in your heart that King Silver Bath is neither more or less than Pluto in disguise. One more word upon breakages, and I am done, and a word of caution to the disciples of collodion: never lean your bath against anything during the interim of taking it from its nest in the dark tent and the decanting of it.

By such a little incident a partner and myself were nearly ruined. We had gone to make some 15 by 12 pictures at a Volunteer encampment, and everything went swimmingly until the packing up. In the afternoon there was a grand march round, band playing and everything lively; as a matter of course there were crowds of onlookers, the fair sex, as usual upon such occasions, predominating. *Our* manœuvres were noted as well as those of the gallant Volunteers, and through the whole day we were surrounded by a small group of silent but eager watchers. Thus it happened. We had made our last negative, and Bob had lifted forth the bath with the intention of decanting it, when on the instant up rode an officer to make inquiries respecting our success. Bob leans the bath up against the root of a tree, and goes off to answer; behind the tree stands a lady with white dress, of some expensive stuff, that I forget the name of. Up the little slope rushes a native of the country, grinning like a piece of machinery, and before I could interpose bang! goes his foot on the bath! To my speechless horror the young lady in white was splashed from the waist downwards! On the instant up rushes Bob—collars a cleaning leather, and hurriedly assuring her "that it was merely clean water" proceeded to rub her down, pheezing like an ostler all the time. Then apologising in his best style, he turned to me and abused me for letting the "joskin" escape. To tell the truth, I was so amazed at what Bob termed his presence of mind, that I could think of nothing else. Bob was amazingly pleased with himself all the evening, congratulating himself on his presence of mind: "That dress alone would have taken the profit off the whole job." For my part, I had a presentiment that it might possibly do it yet; and sure as the day of judgment, next morning, a weeping female, accompanied by another bearing a bundle, a fierce-looking sweetheart, and a savage-looking brother, marched into the studio, and threw a bundle of bitter reproaches, abuse, and piebald female attire before us. I say no more. It is the first time I ever went halves in a lady's dress, and judging from experiences undergone since in paying both halves, *that* lady's dress, to use a vulgar but expressive phrase, "must have been a whopper."

Now I will finish up this string of abuse by adding injury to insult; *videlicet*, that of all the thankless, temper-trying, dress-destroying tyrants that humanity ever knew, King Silver Bath and his head minister Collodion, if not the worst, runs a good second. If I had all the wearing apparel they have destroyed for me by occasional splashes, by mysterious dabs and stray sprinklings, by wholesale bursts and leaky dark slides, I faithfully affirm that I could start a big thing in the 'ole clo' line; the only drawback to a speedy sale being a general impression that I must have robbed all the blood-stained victims of the famous and elegant crew that fill Madame Tassaud's Chamber of Horrors.

Now for a sop to Cerberus! As a great panacea I aver that collodion has one great advantage over gelatine in the field—*i.e.*, you know what the results of your labour are on the spot. You develop, fix, and probably varnish your negative on the scene of your work. Your mind is at peace; you can crack your knuckles with satisfaction, and eat your supper with gusto, a degree of excellence not yet attained by gelatine.

In place of the huge unwieldy box, full of smashables, appertaining to collodion, gelatine can walk forth to the field in an easy, upright, gentlemanly sort of manner. In this respect collodion and gelatine resemble the warriors, old and modern: the former went forth to do battle encased in a ton of iron, to wield an axe or level a spear; whilst the latter, trigged out in comfortable—not to say stylish—attire, steps forward with a precise and enjoyable air, and rattles off his so many shots in so many minutes, handling his breech-loader with movements so agile that the eye cannot behold, or reason conceive, how it is done.

With gelatine in the field there is no necessity whatever for an assistant; one can do all the work easily, and with far more satisfactory results. I write from experience, and never, as long as I live, shall I entrust an assistant to change the plates for me, nor shall one go with me, unless it be a boy whose physical and mental calibre will only enable him to fetch and to carry. Last summer, at a very particular engagement where three generations of a family had by arrangement been gathered from all quarters of the globe, I was deputed to make sundry pictures of the different branches, topping off with the living tree, from Alpha to Omega, in one immense group. One day was allowed me, and if I did not meet with success on *that* day, we lost a very remunerative job, inasmuch that certain members of the family had to depart next morning, thus putting it beyond my power to remedy a failure. I had an Irish assistant to attend to the changing of the plates, so as to get the different groups knocked off before the old great grands and the baby great grands should become wearied, and lose patience. I was nervous over the operation, not on account of my own part, but about the Irishman's. He changed them in a Thomas' tent, taking them from the packets, and, after exposure, putting them in rotation in a common negative-box, covered over with folds of yellow cloth. I was drawing a long breath of relief after exposing the last plate (the twenty-fourth, 10 by 8), and went round to the tent where Pat assured me that everything was right. To prove it he threw aside the curtains, and discovered to my startled vision *the box standing open*. The whole were, of course, spoiled, the job lost, and when laying the whole story down in the ear of a sympathetic friend, he, for comfort, coolly asked me, "Why the deuce I did not change them myself?" Experience keeps a dear school, but there is no mistake but that its lessons go home.

Prior to taking an unopened or unusual size of plate to the field with you, it might be as well to fit one into your carrier. An acquaintance lately got an order to execute some 15 by 20, and having great faith in the maker as to the sterling quality of the plates, having used the smaller sizes with great success, he packed them up with confidence. All went well until he drew up the slide, when, flop! the plate fell into the camera. The carrier proved too large, or *vice versa*, and that day's work was lost.

I have seen changing boxes for small sizes of plates, but for large plates, giving ample convenience to the operator, and useful as a receptical for camera, lenses, &c., a Thomas's tent is what I would recommend. This I say to professional photographers intent upon hard work and good results. To the photographer or amateur going upon a pedestrian tour, there are numerous light burden apparatus in the market.

When going out of doors with gelatine, it is as well to be prepared with every requisite should an emergency crop up, as in the case of collodion. Thus I recommend the lantern taper and matches; a piece of ruby glass can easily be fitted over the yellow window of the tent, and the lantern—either inside, or hung outside the window, will greatly facilitate one in changing the plates aright. By no means should a camel-hair brush be forgotten (one as soft as can be obtained), for dust settling on the gelatine film shows as nice a pinhole as a collodion plate. I strongly recommend that two tin boxes, light-tight and padlocked, should be among the necessaries for the field—one containing the plates to be exposed, placed on the right hand; the empty one, to receive the exposed plates, to the left; the operator to lock said boxes whenever done with them, thus putting them beyond the power of accident or some inquisitive bumpkin who may be inspired to take a peep while the operator is busy at the camera. A note-book and pencil are almost indispensable, so as to keep you right with your exposures and developing. The way I do it is quite simple, and proves of singular assistance to me.

When putting a plate in the slide, I take a pin and make a distinct but minute 1 or 5 or 9, as the case may be, in corner. When my exposure is over I enter it in my book thus:—

No. 1. View of house, trees, and distant mountain. Sunshine—flash. Dall., 2nd stop; or

No. 5. Gardener's cottage, hidden in trees. Dull. 4 seconds. Ross, Rec., open A; or

No. 9. Interior of greenhouse. 1 minute ex. Ross wide A.

On proceeding to develop, a reference to the No. and the note-book instantly puts the whole details concerning the picture before me, and gives me confidence how to proceed with development.

Now, having brought everything forward in due order to the scene of operations, the first trouble that gelatine gives the worker is the exposure. Say that he is working with a batch of plates said to be ten times the rapidity of the ordinary collodion. He has a bright, sunny woodland scene, with a gleaming meandering stream in the foreground. For this scene of peace and sunshine he would have given three or four seconds with a wet plate: but how is he going to whip the cap off and on again quick enough? He shakes his head doubtfully, but makes an attempt, returning the cap with such vigour that he nearly brings the camera to the ground. Then a doubt springs up in his mind. Did the camera shake when he removed the cap? This cup is poisoned for the day now; no rest, no peace, no pipe, no supper; his mind is solely and gloomily looking forward to the developing dish in the morning. I merely mention this to show that for miscellaneous work out of doors with gelatine, the good old-fashioned cap will not suffice. It must have its shutter that will give the nearest approach to an instantaneous exposure possible; and for one half second—two or three even—I would advise a Cadett's pneumatic shutter, firmly secured inside the camera. With it there is less risk of shaking the camera while exposing. In long exposures it signifies little what kind of cap may be used.

Apropos! Look well to the firmness of the tripod's legs, and give a sharp look to the thumbscrews before leaving home.

If you have one particular object to take, do not attempt to make a picture of it in a shadow where the sun approaches to within a couple of yards of the object, be it a group, a hearse, or a horse! Such liberties could be taken with collodion, but gelatine will not stand such close quarters. I was forced into trying it on a hunter at a livery stable—that shadow being the only spot at all likely to secure a picture. The sun shone down upon us at right angles, drawing a straight parallel line in front of the wall (against which I placed the beast), leaving a nice diffused light in the shadow of about six feet deep. I expected a failure, but not quite such a kicker as I got. Talk about halation! The half of the plate was halated away. There was the hunter's proud head and his back with the saddle, but his legs, where were they? Tapering away, disappearing gradually until the fetlocks dissolved into a sea of nothingness.

Now, allowing that collodion would have served me the same way, I could have detected it on the spot, and perhaps remedied it. Thus I say, until the worker gains complete confidence in himself—relies entirely on himself, as far as work and changing his plates are concerned—and thoroughly understands the extraordinary power that gelatine plates places in his hands, he will hanker after the slow but sure collodion, and come home from a day's work a miserable, pitiable, wretch.

Gelatine is certain to overthrow collodion in the same fashion as the albumenized paper did the glass picture. I would advise all workers to learn and study as much as they can of it, that is to say, if they do not want to be left far behind the times. To my thinking, for the working photographer, there is far less to overcome in the working of gelatine plates, than there was when collodion first put forth his claim for attention. Thus I say to my brother workers, Esperance and advance! Conquer gelatine as you did old collodion, and then you will return as certain, even more so, of success after a day's labour, as in the "good old days." Remember

> "Ye who toil with a purpose high,
> And fondly the proud result await,
> Murmur not, as the hours go by,
> That the season is long, the harvest late.
> Remember that brotherhood strong and true,
> Builders and Artists and Bards sublime,
> Who lived in the past and worked like you,
> Worked and waited a wearisome time:
> Dark and cheerless, and long their night,
> Yet they patiently toiled at the work begun,
> Till lo! through the clouds, broke that morning light,
> Which shines on the soul when success is won!

PLATINOTYPE.

BY WILLIAM ARMSTRONG.*

I AM not here to-night to compare platinotype with any of the numerous processes at present in vogue, nor to claim for it any special merit, excepting that of extreme simplicity, but merely to give a short sketch of the various stages the process has passed through, since its discovery by Mr. W. Willis, Jun., in 1878, up to the present time, and a practical illustration of its manipulations. I shall leave you to judge for yourselves, from the specimens before you, whether or not it is worthy of your consideration.

The process, as many of you will know, depends, firstly, on the reducing action of light upon persalts of iron. In this case ferric oxalate is employed, which becomes ferrous oxalate; and, secondly, upon the property of a hot solution of this latter salt in potassic oxalate of instantly precipitating platinum, and other of the higher metals, in minute division from their haloid and other salts.

Paper, therefore, coated with ferric oxalate and exposed behind a negative will have produced upon its surface in ferrous oxalate an image corresponding in its gradations to those of the negative. If, then, ferric oxalate be mixed with a salt of platinum, the image will be composed of ferrous oxalate intimately mixed with the platinum salt.

If the paper be now floated, face downwards, on a hot solution of potassic oxalate, the ferrous oxalate is immediately dissolved, and the platinum salt instantly decomposed in its presence—the platinum precipitated in a fine state of division in proportion to the quantity of ferrous oxalate in the image, and consequently, we have platinum black taking the place of the iron salt in the formation of the picture, and embedded in the tissue of the paper. This is the general principle of the reaction; but its details were found to involve serious complications. The image was found to be granular, and only partially adherent to the paper as at first prepared.

To remedy this a primary coating of silver nitrate was given to the paper, which in some way caused the platinum to be deposited in a very minutely-divided state; but this method involved toning with sulpho-cyanide of gold and fixing with hyposulphite, and finally washing—a series of complications as involved as those of ordinary silver printing, and sufficiently serious to condemn its use.

It was next discovered that the admixture of a small quantity of a lead salt with the sensitising solution, and the addition of a platinum salt to the potassic oxalate solution to be used as the developer, greatly enhanced the vigour and half-tone of the image, and left nothing to be done after development except immersion in a dilute solution of oxalic acid to remove the iron salts, and a subsequent washing in two or three changes of water for half-an-hour.

This was a considerable advance in the right direction; but the difficulty in maintaining the developer at a constant strength, the gradual diminution of the platinum salt giving grey and granular images, and the costliness of the platinum solution, precluded its use on anything like a large scale, especially by amateurs. Moreover, the presence of a minute trace of lead salt left in the paper was found in time to destroy the purity of the high-lights, from causes which are obvious.

It was clear, therefore, that unless these objections could be overcome, the process must be abandoned, as presenting disqualifications almost as grave as those imputed to silver printing. Mr. Willis now found that by the addition of more platinum salt to the sensitizing mixture the addition of the platinum solution to the developer could be dispensed with, and that greater variations of tone—ranging from almost a sepia, through a warm engraving black, to a dead cold black—could be produced. The following is a detailed account of the process as we have it at present:—

Paper suitably sized is coated with a solution containing about sixty grains of ferric oxalate, and the same quantity of potassic, chloro-platinite, and exposed under a negative in the ordinary manner, the progress of the printing being determined either by inspection or by an actinometer, after the manner of the autotype process. The latter is the more accurate, but a little experience soon induces the operator to set it aside in favour of the former method, as being less troublesome.

The print is now floated, face downwards, for a few seconds on a solution of oxalate of potass containing 130 grains per ounce, contained in a shallow tray made of iron, enamelled inside, and heated by means of a spirit lamp or gas flame to 170° or 180° F., when the picture at once flashes out in full intensity and detail. It is then immersed, face downwards, in a bath of dilute H Cl, 1 : 80, for ten minutes, removed to another and similar bath, and then washed in two or three changes of water, after which it is ready to be dried and mounted. This last bath of H Cl must show no traces of yellow colour after the removal of the prints; if it do, it must be used as a first bath only, and a freshly-mixed one takes its place.

The developer is returned to the stock bottle, and any waste made up with fresh developer.

* Read before the Newcastle-on-Tyne and Northern Counties' Photographic Association.

The chemical changes during exposure and development are expressed as follows, and for these I am indebted to Mr. H. B. Berkeley, the manager of the Company :—

During exposure :

$$C_6 O_{12} Fe_2 + K_2 PtCl_4 = 2 C_2 O_4 Fe + 2 CO_2 + K_2 PtCl_4$$

On development :

$$6 C_2 O_4 Fe + 3 K_2 PtCl_4 = 2 C_6 O_{12} Fe_2 + Fe_2 Cl_6 + 6 KCl + 3 Pt.$$

The ferric oxalate combines with the potassic oxalate in the developer, and forms a salt which crystallises out of the developing solution on cooling in the form of apple-green crystals, thus :—

$$C_6 O_{12} Fe_2 + 3K_2 CO_2 O_4 = 2 C_6 K_3 Fe'' O_{12}.$$

This has no value.

To ensure success the following simple details must be observed :—The paper, both before and after exposure, must be kept bone dry, or its sensitiveness is impaired, and a grey and granular image is the result. Cylindrical tin cases, having a receptacle at one end for CaCl, are provided by the company for the purpose of storing the paper, which will thus be made to keep almost indefinitely. A sheet of thin india-rubber, known as "insertion," must be interposed between the pad and paper in the printing-frame.

Over-exposure may be corrected by using a cooler developer, and *vice versâ* ; but the use of a too cool developer gives thin, grey images. The best results are obtained from a vigorous, plucky negative, full exposure, and a bath heated to between 170° and 180°.

Printing may be conducted in direct sunlight or in the shade, as is found best suited to the class of negative. The sensitiveness ranges between three and four times that of silver printing. Vignetting, owing to the extreme purity of the white, is a charming study by this process, and, owing to its sensitiveness, enlargements may be done direct by means of the sun or electric light.

The Company claim for their process :—Absolute permanence of the image, as no reagent, excepting boiling *aqua regia* will attack it ; extreme simplicity of the operations, and consequent saving of labour ; great sensitiveness; and beauty and purity of the high-lights of the picture.

ON INSTANTANEOUS SHUTTERS.

BY W. COBB.

It is a well-recognised principle in commercial circles that supply is regulated by demand, and it is curious to note that as soon as a want is created, whether by the surroundings of life or by the exigencies arising out of our advanced state of refinement, human ingenuity taxes itself to its fullest limit in order to meet our requirements. A fair illustration of this may be seen in the neck-and-neck race between rapid dry plates and rapid shutters, rapid exposers, or whatever term we may employ to designate these, at the present time, photographic indispensables. Pneumatics, electricity, and mechanism of the highest order have been brought to bear upon their construction. First in importance for studio work comes that very ingenious instrument known as "Cadett's shutter," which, in my opinion, for portraiture pure and simple, stands unequalled. It has often been urged that it is a mistake to attach this shutter to the lens outside the camera ; with that idea, however, I cannot agree, as I have frequently found, when photographing children, that a preliminary game of peep-bo with the flap has enabled me to arrest the attention, and secure such satisfactory results of the little—well, say darlings—as I could not otherwise have hoped for. It is well to know that it is just as easy to adapt this shutter to the lens inside the camera as it is outside. Effective as this instrument is in its own sphere, something far more rapid in its action is necessary for so-called instantaneous work, such as photographing animals, boating scenes, ships in rapid motion, athletic exercises, &c. For work of this kind I have employed most successfully the shutter known as "Hunter and Sand's."

I will not presume to say that we have reached finality, either in rapid dry plates or rapid exposers ; but I cannot imagine that anything much more effective can be devised for instantaneous work than the shutter just referred to. Its chief point of excellence lies in the fact of its being worked between the lenses, thus giving the additional power of a stop or diaphragm to the lens, opening with the smallest possible aperture, gradually increasing to full aperture, and again closing with the smallest. It may be that the cue for making exposures in this way was taken from a remark made by Mr. Dallmeyer, on the occasion of a discussion upon drop shutters, at a meeting of the Parent Society some two or three years since, when that gentleman remarked that, in his opinion, the proper place for a drop shutter is between the lenses. Be that as it may, I can bear testimony to its value, and that from considerable experience with it, having been able to secure by its aid negatives of objects in rapid motion, possessing all the sharpness and delicacy usually supposed to belong only to those which have received a more lengthened exposure. One other point which should be mentioned is this, that by the adoption of the regulating spring, with which the instrument is now supplied, one is able to vary the exposures from, it is stated, one second to a two-hundredth part of a second. Surely, with such a power in our hands, and the unlimited degree of sensitiveness which is said to be attainable in dry plates, the coming season should show us something even still more wonderful than we have yet beheld!

Correspondence.

PROOFS AND RE-SITTINGS.

Dear Sir,—In reference to the discussion in the News, I may say I send out, and always have done, a finished proof ready for the album or otherwise, and await order. The proof is charged in the dozen ; if it is carte, and no order is given, I charge 6s. ; cabinet, 12s. 6d. If the photograph is not up to standard, I retake without charge ; if good, but expression or dress not liked, a charge of 3s. 6d. for C.D.V., and 5s. for cabinet, is made in addition to the ordinary charge.

I have always found this plan to answer, as, by sending a finished proof, your customers see exactly what they are going to have. You cannot explain to customers who look at a rough proof unmounted, what a finished one will be. You may try to make them understand, but it entails a lot of technical talk, which is best left unsaid. I find all my customers like to see the finished picture. I have often tried rough, unmounted proofs, but it was never satisfactory. So you see, my dear sir, opinions differ. A friend of mine sends out, unmounted, one finished and one unfinished proof, and he says the finished proof is invariably selected ; and he says, too, that his system answers admirably ; but I fail to see his advantage, as he prints two proofs while I print one. But I expect a man's business is just what he likes to make it ; it may be expensive, or the reverse.—I am yours truly, Edinburgh.

Dear Sir,—As it is only advisable to forward reasonably good photographs as proofs, and as the general public are only capable of judging from finished prints, properly retouched and mounted specimens should be sent, the sitters understanding at the time of sitting that all such proofs supplied would be counted as a portion of any amount that they had ordered or would eventually be expected to order. In the case of none of the proofs pleasing (an undesirable state of things), a charge should be made for the proofs supplied, in proportion to the usual terms of the particular photographer.—Faithfully yours, Manchester.

DEVELOPMENT SORES.—LONG EXPOSURES.

Dear Sir,—I see much grumbling about pyrogallic and bromide "sores." Try my "thimble" of gutta-percha, with a quill pen inserted as a finger nail. It is readily put on, it is waterproof, and keeps pyrogallic entirely off the finger when lifting the plate out of developing tray. What more is wanted?

Speaking of rapid exposures with dry plates, I have just exposed one (54-inch plate) with a stop $\frac{3}{8}$ of an inch to large triplet lens; the exposure was four days (and three nights); that is, I left the plate exposing for early and late light. The exposure is just the thing. Each day was a very bright sunny one, not such as you have in London, but really clear fine light for this time of year; the subject required too small a stop to obtain the whole sharp, and this with as rapid an emulsion as I can make. As the Yankees say, "How is this for high?" and where would wet collodion be?—Yours, &c., Thos. G. Whaite.

A WRINKLE.

Sir,—I send a wrinkle that has been of service to me. Any dry plates that have accidentally seen the light, or have been exposed on an object that has moved, &c., &c., can be made into vignetting glasses by the following simple plan:—Take a plate into daylight, and, with a camel's hair brush charged with hyposulphite fixing solution, proceed to work from the centre to any desired form; well wash and develop. Of course, perfect plates can be used, and, in many cases, the vignetting glass can be worked to any special form suitable for a particular negative.—Yours, &c., W. B.

RADIATION OF GELATINE PLATES IN DARKNESS.

Sir,—A curious case came under my notice a few days ago, when, on developing a gelatine negative, I found a distinct image appear of a previously undeveloped plate which had been taken one month before, and which had been in the next groove of one of Hares' changing-boxes to the plate on which its image appeared, showing that gelatine plates have, in some way, the power of radiating their light in perfect darkness. Perhaps some of your other readers have experienced the same thing. I should be glad to hear any remarks on the subject.—Yours faithfully, R. B. White.

[Certain kinds of gelatine are notably phosphorescent, and this circumstance may explain the phenomenon.—Ed. P.N.]

Proceedings of Societies.

Glasgow Photographic Association.

A meeting of this Association was held in the Religious Institution Rooms, on the 16th inst., at 8 o'clock, Mr. Parker in the chair. The minutes of the last meeting were read and approved of. Messrs. E. Beckett and W. Snell Anderson were elected members.

Mr. J. W. Swan gave a lantern demonstration comprising a collection of his most recent micro-photographs; also a series of transparencies, illustrating a town in the Isle of Man, kindly contributed by Mr. Chadwick, of Manchester. Mr. Swan's demonstration gave much gratification to a large gathering of members and friends. The meeting was graced by a goodly member of the fair sex. The Secretary was instructed to convey the thanks of the Association to Mr. Chadwick for his kindness, after which the meeting closed with the usual votes of thanks.

Newcastle-on-Tyne and Northern Counties' Photographic Association.

The ordinary monthly meeting of this Association was held in the College of Physical Science, on Tuesday, the 14th instant, Mr. James Downey in the chair.

The minutes of the last meeting were passed, and the following gentlemen were elected members:—Messrs. J. Pike, M. Auty, A. S. Stevenson, and R. S. Donkin.

The Chairman referred to the loss sustained by the Association through the death of Professor Marreco, who had taken great interest in the proceedings and welfare of the Society. He begged to submit the following resolution:—

"The Council and Members of this Association desire to express to Mrs. Marreco their sincere sympathy with her in the very great loss she has sustained by the death of Professor A. Friere Marreco, late Vice-President of this Association. The valuable assistance which he so willingly rendered to, and the warm interest he took in, the welfare of the Association, contributed to a very great extent to establish the high position it has acquired. It is with the deepest sorrow that we mourn the loss of a gentleman who had won our highest respect and esteem."

(Signed) James Downey, *Chairman.*
March 14th, 1882. J. B. Payne, *Hon. Sec.*.

It was quite unnecessary for him (the Chairman) to speak in its favour. He was sure the loss would be difficult to repair.

Mr. A. L. Stevenson seconded the resolution in feeling terms.

The resolution was carried unanimously, and the Secretary was requested to forward it to Mrs. Marreco.

Mr. E. Sawyer said that the Council recommended that an enlarged photograph of the late Professor Marreco, finished in monochrome, should be obtained and presented to the Institution. He thought it very desirable that this proposition should be carried out.

Mr. P. M. Laws seconded the proposition, and said that Mr. Sawyer had offered to paint the portrait gratuitously.

It was resolved that the portrait should be prepared at the expense of the Association. Also, that Messrs. Sawyer, Laws, and Mendelssohn should be a sub-committee to decide upon the negative, size, and other particulars necessary to the execution of the work.

The Chairman drew attention to the next meeting in April, which, he said, would be an open one. He also mentioned that the Council recommended that a competitive exhibition, confined to the original work of members of the Association only, should be held next November, and that judges should be appointed to select the two most suitable pictures for presentation to the members; each member to receive one copy gratuitously, and to have the right to purchase other copies at cost price. No restriction would be made either as to size, subject, or number to be forwarded. He moved that such an exhibition should be held, and that the Council be empowered to carry out the whole details.

The Hon. Secretary seconded this, and spoke in support of the proposition, requesting that as many members as possible should contribute to the exhibition.

Mr. W. Armstrong then read a paper on "Permanent Printing by the Platinotype Process" (see page 157), and afterwards gave a practical demonstration of the process.

The Platinotype Company very handsomely sent a splendid collection of pictures, which were greatly admired by all present.

The members were greatly interested in the demonstration, and at its close warmly applauded Mr. Armstrong.

The Chairman commended Mr. Armstrong for his clear description and illustrations.

The members gave a very hearty vote of thanks to the lecturer.

The Hon. Secretary next showed and explained a camera, lens, tripod, instantaneous shutter, and dark slides sent down by Mr. G. Smith, of the Sciopticon Company, and also a series of pictures forwarded by the Platinotype Company, all of which were very keenly inspected by the members, and their various points freely discussed. The camera and apparatus were marvellous specimens of ingenuity.

Votes of thanks were passed to the exhibitors and the Chairman, and the meeting was adjourned.

Talk in the Studio.

Photographic Society of Great Britain.—The next Technical Meeting of this Society will take place on Tuesday, March 28th, at 8 o'clock, at the Gallery, 5a, Pall Mall East, when the following questions will be discussed:—"On Protective Coverings for Gelatine Negatives;" "What would be the Influence on the Sensibility of Gelatine Plates on the Addition of Hydrochloric Acid to the extent of Five Minims per Ounce?" "To inquire the Cause of Scum-like Markings on Gelatine Plates, which are Visible before and after Development;" "The Hardening Effect of Time upon Gelatine Plates."

New Studio Accessories.—Messrs R. & H. T. Timperley forward us a catalogue of their "Requisites for the Studio," and a specimen of one of their new balconies.

Mrs. Langtry.—A photograph of Mrs. Langtry is not exactly a novelty; still, the magnificent pictures with which Messrs. Marion and Company have favoured us well deserve a word of comment. They are twelve-inch portraits, the work of Messrs. W. and D. Downey, of Ebury Street, and are mounted tastefully on gold bevelled black cards. Their value in our eyes lies in the fact that it is the woman, rather than the dress, which has received most attention by the artist, who has been successful in securing the lady with an agreeable pose, and under the most pleasing phase of lighting and modelling. Messrs. Marion and Co. tell us these are the only pictures of Mrs. Langtry in "full dress;" but this important fact we are unable to confirm of our own knowledge.

Tracings on Glass for the Lantern.—Several methods of making these have been devised, but, for simplicity and perfection of result, the following method, which was communicated to us by Mr. George Smith, of the Sciopticon Company, appears to be the most satisfactory which we have met with. A piece of very finely-ground glass is rubbed over with a trace of glycerine, in order to make it as transparent as possible. It is now easy to write or draw on the prepared surface with a hard and finely-pointed black-lead pencil, and the glass is so transparent that the finest details of any engraving over which it may be placed can be seen quite distinctly. The drawing having been finished, the plate is washed with water, in order to remove the glycerine, and dried. A thin coating of Canada balsam or of negative varnish now serves to render the slide permanently transparent, and ready for the lantern.

Obituary.—We regret to learn the death of Mr. Wainwright, of the well-known firm of Wratten and Wainwright, at the early age of thirty-three. The funeral took place on Saturday last at Brockley Lane Cemetry.

Influence of the Electric Light on Vegetation.—A plant placed at a distance of 6 feet 6 inches from an electric arc giving a 1,400 candle light, grows about as rapidly as in average daylight, and Dr. Siemens further observes that plants differ from animals by not requiring intervals of rest.

Recent Photographic Spectrum Work.—A series of no less than 22 ultra violet spectra has been issued by the Chemical Society in illustration of Professor Hartley's recent paper on the spectra of the elementary bodies. The prints are by the Woodburytype Company, and are highly satisfactory. Professor Hartley claims to have been the first to apply gelatino-bromide plates to photo-spectral work. Remarkable resemblances may in some cases be traced between the spectra of elements belonging to the same natural group, as in the case of iron, nickel, and cobalt; and no less than 603 lines have been traced in the case of iron, 556 in the case of nickel, and 391 in the case of cobalt. The analogy of magnesium zinc and cadmium is well illustrated, while arsenic, antimony, and bismuth give strikingly corresponding spectra. Those who are not occupied with work of this character can have but a faint notion of the labour involved in satisfactorily purifying the materials, and in other operations. We are pleased to learn that some of Professor Hartley's most important photographic results will shortly be published in a much enlarged form by the Autotype Company.

The Electric Exhibition at the Crystal Palace.—As the Electric Exhibition is now approaching completion, and well worth a visit, we append a list of the principal exhibits, and the localities where they are to be found. Concert Room, Edison; Centre Transept, the Pilsen Lamp and the Crompton Lamp; the Avenue and Opera House, Jablochkoff; Italian, British Electric Light Co.; Renaissance, Andró's; Mediæval and part of Nave adjoining, Electric Light, Power, and Generator Co.; Byzantine, Anglo-American Brush Co.; the North or Tropical End (including lamp of 150,000 candle power) and Alhambra, Anglo-American Brush Co.; Roman, Electric Light, Power, and Generator Co.; Greek, Audré's; Egyptian, British Electric Light Co.; the Entertainment Court (with illustrations of Edison's discoveries, the phonograph, electric pen, electric metre, &c.), Edison; the Avenue next the Chinese Court, Latimer Clarke and Muirhead's Scientific Instruments; Chinese, Crompton; the Avenue between the Chinese Court and Pompeian House, Elmoro's System of Electro-plating, Kelway's Electric Log; the Pompeian House, the Pilsen and Joel Lamps, Rowatt and Fyfe; the Nave and South End, Siemens Brothers and Co., and Siemens Frères; Corridor leading to Brighton Railway and Garden Terrace, Hammond Electric Co. (Limited); Costume, Hammond Electric Co. (Limited); Glass, Gérard; Negretti and Zambra's studio (where portraits are taken by the electric light), Gravier; Furniture, Swan; in the Southern Nave, Strode, Gladstone, and Tribe (chemical and local action, &c.), Swan's Chamber Candles (by Eastern Telegraph Co., Limited), Jablochkoff Candles; the Picture Gallery, Swan; Drawing-room, Boudoir, Smoking-room, Dining-room, and Library, Domestic Lighting Co.; secondary batteries, telephones, bells, &c., &c., &c.; in the Northern Nave, interesting Instruments and Appliances of War Office and Postal Department; West Corridor in rear of Chinese Courts, Ametti's Saw-cutting Machine, Transmission of Energy by Electricity, Rotary Steam Engine, making from 450 to 1,000 revolutions per minute; Gas Engines, Crossley and Co.; Utilization of Water Power for Generating Electricity, Liardet and Donnithorne; Elkington and Co., Electro-plating.

To Correspondents.

*** We cannot undertake to return rejected communications.

C. J. H (Bradford).—Unless some special appliance is employed for agitating the mixture, you will find it inconvenient to work on more than sixty ounces at a time, this being as much as can be thoroughly shaken in a "Winchester" quart bottle, which holds 80 fluid ounces, or 2 quarts.

Lantern.—1. As regards the negatives—old collodion, bright and uniform light, small stop, weak developer, and intensification either with pyrogallic acid and silver, or by the lead method of Eder and Toth. 2. Make your transparencies in the copying camera, and develop with iron. Neither toning nor intensification will be required in the case of letter-press reproductions. It is probable, however, that negatives would be found to suit better than transparencies.

Leo.—Most likely it would cause local fading. 2. In damp weather it is as well to finish the drying before the fire, as a trace of moisture often causes irreparable mischief to the negatives. 3. Trouble may often arise from such a proceeding. 4. Consult our advertisement sheets. 5. Four ounces to each pint of water.

F. K. Barclay.—Nothing is better than a good quality of white paraffin wax. After painting, the prints should be backed up with white enamelled paper.

A Young Printer.—It has been proposed and used for the purpose, but we are inclined to prefer a thorough washing in plain water.

V. L. P.—Water, 1,000 parts; saturated solution of borax, 100 parts; and chloride of gold, 1 part.

George Connor.—From a dealer in lithographic materials you may obtain tolerably thick and uniform sheets of gelatine. Soak one of these in water until it becomes quite flaccid, and lay it on the surface of the negative, this having been previously flooded with water. Next apply a squeegee, so as to force out the superfluous water and bring the gelatinous sheet fairly in contact with the collodion film, after which clamp it round the edges with slips of wood held by American clips. When dry it is easy to detach the whole by raising the edges with a penknife.

E Williams.—The method is an exceedingly useful one, especially in hot weather, and as far as we are aware there is no objection to it except the small additional expense. It is necessary, however, to obtain pure methylated spirit, and not the so called "methylated finish," which contains a small per centage of resinous matter.

A. L. O. E.—It is a collotypic print and you will find abundant directions for this class of work in back volumes of the News. See also the Year-Book for 1881, p. 157.

T. W. Parry.—We will communicate with you by post.

F. H.—Obtain as perfect a transparency as possible, and next soak the plate in water until the film can be removed by a kind of side-shifting action with the fingers; when this has been done you can float it on a fresh plate. The negative will become considerably enlarged during the process, and you will naturally experiment with valueless negatives first.

J. W. W.—It is impossible for us to give you the information, or we should feel much pleasure in doing so.

E. J. B. (Gloucester).—When it appears we will forward you a copy.

D. Newman.—We are informed that a cash equivalent of ten guineas can be had in place of the gold medal; but no arrangement of this kind will be made in respect to the second or third-class awards.

Amperton.—Just like a model chest of drawers constructed of thin sheet metal, each drawer containing some dry chloride of calcium, and the plate is mounted in a frame just over it.

Yorkshire.—As soon as we hear that you are suspected of being the author of the letter in question, we will have great pleasure in giving publicity to your denial.

Thos. Burder.—1. Although the market value is not more than £20 per ton, you could hardly expect to purchase a single ounce for less than twopence. 2. Undoubtedly due to pressure against some hard body.

Nitrate.—Use new glass, and clean it thoroughly with old collodion, and your difficulties will disappear.

THE PHOTOGRAPHIC NEWS.

Vol. XXVI. No. 1230.—*March* 31, 1882.

CONTENTS.

PROTECTIVE COATINGS FOR GELATINE NEGATIVES.

The due protection of a gelatino-bromide neg .tive against the action of the free nitrate of silver contained in printing paper is by no means an easy matter, those who have had occasion to print long numbers from a gelatine negative having generally found that no varnish proposed up to the present time is so satisfactory as could be desired.

The whole question was discussed at a recent technical meeting of the Photographic Society of Great Britain, and almost each person present had something to say on the subject, while several brought forward specimens illustrative of the defective qualities of existing varnishes.

The experiments of Mr. William Bedford possess considerable interest, and he finds that a thick layer of plain collodion, covered by a film of seed-lac varnish, is more satisfactory than other combinations with which he experimented, and a simple coating of seed-lac varnish proved to be singularly bad, the silver rapidly penetrating and forming round spots. A solution of the so-called xylonite or celluloid in alcohol and ether was tried instead of ordinary collodion; but this proceeding did not prove in any sense advantageous, while attempts to attain a greater degree of impermeability by the addition of a solution of mastic in benzole, or of Canada balsam, to the collodion also proved futile. The sub-film of collodion should be thick, say four times as thick as the usual film of a collodion negative, and it is best to level the plates and allow them to set in a horizontal position. Care should be taken not to apply the varnish until the collodion is thoroughly dry, a prolonged warming of the plate being necessary to ensure this.

The old-fashioned amber and chloroform varnish was favourably spoken of by Mr. Spiller and Mr. Maxwell Lyte: the latter gentleman preferring to saturate chloroform with the soluble matter of amber, and then to dilute the liquid with an equal volume of ether. The importance of thoroughly drying the gelatine film before applying any varnish appeared to be thoroughly appreciated, and Mr. Foxlee's method of removing water by soaking the wet negative in methylated alcohol has proved of considerable value when prints have been required in a hurry.

The plan of placing a very thin sheet of gelatine between the negative and the printing paper met with general approval, and we have ourselves found this method to be of great practical value, as when the first sheet of gelatine has become impregnated with silver, it is easy to exchange it for another, and Mr. England mentioned that he occasionally uses thin sheets of talc in a similar way. We have ourselves frequently thus employed a sheet of talc in printing Woodburytype reliefs, as, if the tissue is not absolutely dry, there is a considerable tendency for the sheet of pigmented gelatine to adhere to the negative, especially when a prolonged exposure becomes necessary.

A simple solution of orange shellac in alcohol was preferred by Mr. Mawdsley and Mr. Ayres, the slight colour being of no practical importance, and the advisability of using cold alcohol in preparing such a varnish was insisted on by several gentlemen; while Mr. Berkeley recommended agitation with precipitated chalk, in order to rapidly clarify the solution from the flocculent matter which, under ordinary circumstances, often takes several weeks to subside.

The ordinary white, hard spirit varnish, diluted with twice its volume of methylated alcohol, was recommended by Mr. Sebastian Davis as being a serviceable and economical varnish for general use; but Mr. England referred to the superior qualities of the brown hard varnish, the shellac being considerably deteriorated in the process of bleaching.

Many other suggestions were made at the meeting, and numerous points were discussed in detail, but it was generally acknowledged that no covering at present known will enable a gelatino-bromide negative to withstand free nitrate of silver in the printing paper so satisfactorily as is the case with a well-varnished collodion negative, and under these circumstances we recommend the following as the most satisfactory proceeding when long numbers are required from a valuable gelatino-bromide negative.

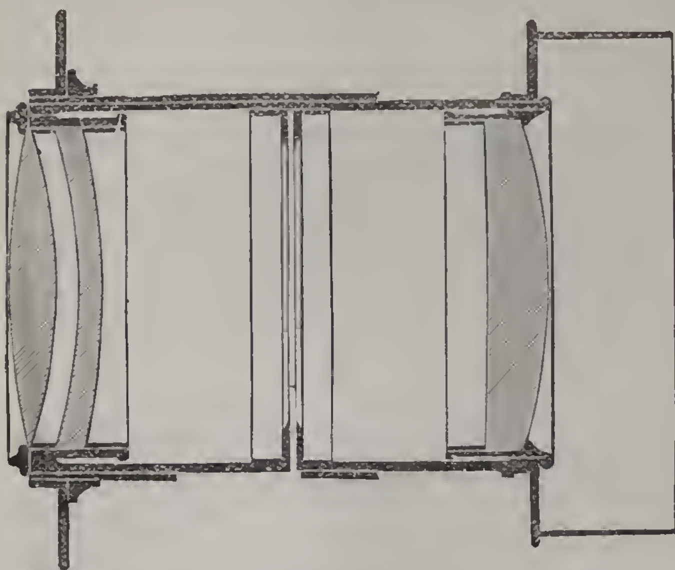
In the first instance, as perfect a transparency as practicable should be made, and before printing a composite film of collodion and insoluble gelatine, made as directed below, should be attached to the negative by strips of gummed paper, this film being changed as often as may be required; but the film we now recommend will last out five or six sheets of the ordinary thin sheet gelatine.

To prepare the composite film, a glass plate is first carefully and rather freely waxed, after which it is collodionised just as if it were about to be used as a support for a carbon picture during development. It is next placed in water at a temperature of about 150° F., and when all traces of alcohol and ether have become removed, it is flooded with a warm solution containing 50 grains of gelatine and half a grain of chrome alum to each ounce. When dry, it is again collodionised, after which it is merely necessary to allow it to dry once more, and to remove the pellicle from the glass by cutting round the edges with a penknife.

PHOTOGRAPHIC LENSES.*

The next lens we come to is more elaborate than any we have yet described;—we mean the

Portrait Lens.



Probably there are few other optical instruments on which so much ingenuity and skill have been spent as upon this lens, and the consequence is that, although it has certain inherent defects, we have in the modern forms a lens which combines extreme rapidity with marvellous definition through a very small angle.

In form it consists of two combinations of lenses, one at a considerable distance from the other. The front combination is very similar to the "single lens," but has the convex side turned towards the view. The back combination is, on the other hand, of peculiar construction, consisting of two lenses having a considerable air space between them. The use of this lens is indicated by its name. It is intended for portraiture pure and simple, and in this it finds its only legitimate use. For landscape work, or even for groups, it is quite unsuitable, as the definition is confined only to a very small circle, whilst the lighting is very unequal, the depth of focus slight, and the field comparatively round. The largest aperture of modern portrait lenses is from $\frac{f}{2\frac{1}{4}}$ to $\frac{f}{4.}$

The largest circle which a 12-inch portrait lens—that is, a lens with a focal length of 12 inches—full aperture will cover is about 8 inches, nor should the attempt be made by excessive stopping down to cover with it a greater size plate than will come within this, as the result will be to produce false perspective, and consequently an unnatural effect in the resulting portrait.

Modifications of the portrait lens are sold under the name of "universal" and "group" lenses. These are simply portrait lenses of very small diameter compared to their focal length, and with the combinations considerably nearer to each other, so that when stopped down with a small stop they can be used for landscape purposes. With large apertures they can be used for groups, and the larger sizes make admirable lenses for portraiture proper with rapid plates. The full aperture is about $\frac{f}{6}$. The largest sized circle covered by a 12-inch focus lens of this type is about 18 inches, full aperture, or with a small stop about 14 inches.

We should have explained that the focal length of a lens is the distance between the point at which the rays forming the image cross, and the plane at which the image is formed; in other words, the distance between the ground glass and the lens when the image is correctly focussed. In the case of a single lens, the measurement is from the lens itself. In the case of a double combination lens it is usually sufficiently exact to measure from the diaphragm. We have frequently given methods whereby it is possible to calculate with great accuracy the point at which the rays cross, if it be thought desirable. It is usual to speak of the "focus of a lens" instead of the "focal length of a lens." This is not strictly accurate, as a *focus* is a point, and has, of course, no length.

Besides the lenses which we have just described, various other forms have been introduced from time to time, but most of them have been superseded by one or other of the former which we have illustrated; we may, however, mention the three following:—"The Doublet" consisted of two combinations of different forms placed at some distance from each other. It has been superseded by the Rapid Symmetrical. The Triplet consisted of three combinations separated from each other, the two outer being of greater diameter than the central one. It has been superseded by the Rapid Rectilinear. The Orthoscope was the first form of landscape lens in which an attempt was made to improve upon the "single lens," so as to reduce distortion, and allow of a larger aperture and a wider angle being used. It consisted of two combinations, the back one much smaller than the front, and of the negative or dispersing form. It has been superseded by the lenses of the rectilinear type.

A lens differing entirely from any of these has been recently introduced by Dr. Steinheil, of Munich. He terms it an "anti-planet." It is composed of two combinations, each having very considerable faults, but in opposite directions, so that the one corrects the other. Two modifications are made, the one suited for landscape, the other for portraiture. We have not yet had an opportunity of practically testing this lens, but our friend Dr. Eder speaks highly of its merits.

* Continued from page 146.

NOTE ON THE CONSTRUCTION OF GLASS ROOFS.

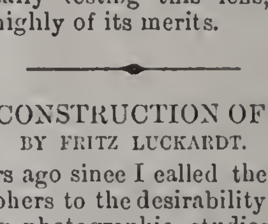
BY FRITZ LUCKARDT.

It is now six years ago since I called the attention of my brother photographers to the desirability of improving the method of glazing photographic studios, and submitted certain points upon which I thought modifications might be made with advantage. Strange to say, most photographers seem perfectly satisfied with things as they are, and new studios are still glazed in the old-fashioned manner. I suppose my friends do not think the construction of the glass roof is a matter that concerns them.

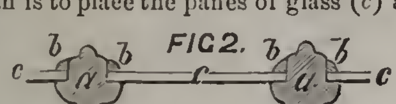
I regret their inaction in the matter very much, as I think things might be changed for the better if a little trouble were taken before the design for the roof is completed. Many studios have been built to my knowledge since I moved in the matter, but all upon the old plan, and they have, to my knowledge, all the old drawbacks. My notions on the subject, which are below, are based upon practical experience.

In the first place, I may mention that it is not only necessary that the glass panes for the roof, Fig. 1, should

FIG. 1.

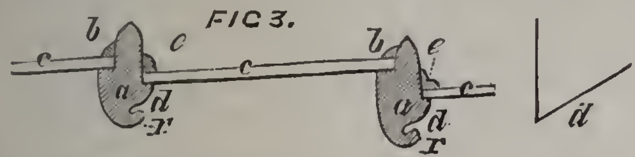


be rhomboid in shape—that is to say, not rectangular—but it is also requisite that they be placed *not horizontally*. Therefore, it is necessary that the iron rods upon which they are made fast should be cast or rolled in such a way that the pane of glass rests a little higher on one side than the other; the drops of moisture or rain will then, as they collect, run down from one edge to the other. At present, the usual plan is to place the panes of glass (c) as in Fig. 2,



in a horizontal position, and the iron rods (a a) also on a level, while the fastenings (b b) are likewise the same one side, as the other.

If, however, as I recommend, the arrangement was that shown in Fig. 3, then the rain drops would be carried off



from one pane to the other by the point d. The rain as it collected would pour from d into the channel r, which might easily be cast upon the iron rods at the time these are made.

I hope that my rough sketches will make my plan understood; it is a little difficult to explain, but simple enough when made clear.

FOG AND LACK OF PRINTING POWER IN GELATINE NEGATIVES.

JUDGING from the flatness and lack of vigour that still obtain in gelatine negatives, and from the fog that frequently mars their printing power, we may safely conclude we have still much to learn and unlearn in their treatment.

The plates in the market are no doubt as diverse in quality as the treatment should be by which these are manipulated. In the main, however, our experience goes to prove that the plates are not so much at fault as the mode in which they are dealt with in exposure and development. The difficulty of timing exposure and of development increases in a ratio corresponding to the increase in sensitiveness of the film. This may be set down as an axiom in photography, and it may be also accepted as a corollary that a delicately sensitive film will not submit to haphazard treatment without showing that the conditions on which success is based have been violated. It is only by most careful and systematic treatment that the finest results can be obtained.

Some operators do not employ weights or measures; they deal in unknown quantities in making up their developers and intensifiers, and wonder why gelatine plates are so much inferior to collodion—why they fog, are feeble, and fail to come up to a high standard. The old wet plates stood dosing and dodging to any extent without much detriment to their quality; not so the dry gelatine. Some approach to scientific accuracy must be observed in its treatment, otherwise nine of the finest plates out of ten will turn out faulty. In fact, they have a dainty appetite, and are easily poisoned. At the same time, success does not invariably crown the efforts of the chemical expert when he has to deal with dry plates. He may overlook some optical phenomena in his studio, lens, or dark-room. Halation, partial or complete fog, may vex his soul at times, and mar his progress. Touching the first of these we have little to say, as it has been treated fully in the pages of this journal.

With a plate properly coated with moderately-opaque emulsion, and exposed under certain conditions, halation would not appear; but if the same plate had been so exposed in a dark interior as to receive the image of a window lit up by direct light, halation might or might not be developed in full force in the negative. It might be brought out in its worse form, so as to cause general fog, by the use of a developer strong in pyrogallic acid and ammonia, and it might, on the other hand, be greatly modified by employing, to start with, a developer weak in pyrogallic and ammonia.

Taking a picture against the light is always apt to cause halation, or halation and fog combined. This may be simply illustrated by attempting to take a landscape and the sun by which it is lighted at the same time. A like result will obtain, in a modified degree, in taking a picture against any bright source of light, unless the lens is protected from the direct rays emanating from the source.

It is thus customary for landscape photographers to employ an artificial shade for the lens, and so to lower it above the lens as to cut off direct rays when the camera is set facing the sun. The shadow of a tree may provide an efficient substitute for the artificial shade.

In studio practice a common cause of fog is to be found, as pointed out in a former article, in reflections from bright surfaces in the lens-settings and tubes. In the best lenses the optician is careful, as far as possible, to remove this cause of failure. The danger of light which has nothing to do with the image-forming rays being transmitted through the lens, is greatly increased when the lens is imperfectly shaded. The lens should be protected on all sides from the excess of extraneous light, so that the actinic image may fall upon the plate in all its purity. Theoretically, every part of the studio, excepting that part occupied by the sitter, should be wrapped in darkness. As for the dark room, it cannot be too dark, in so far as actinic rays of light are concerned.

It is difficult to get a perfectly safe light, and at the same time a light strong enough to work by; still, if we work under something approaching an inert red light, we can always avoid fog from this source. During the early stages of development the tray containing the plate should be kept as much as possible out of the direct red rays, and the plate should never be brought close up to the red glass of lamp of window. It ought also to be remembered that very few gelatine plates can be safely inspected even by the feeblest daylight before fixing. In order to prove this it is only necessary to expose a partially fixed plate to daylight, and return it to the hyposulphite bath. It will be found that the part which contained undissolved silver bromide has contracted a brown stain which completely spoils the negative.

FRENCH CORRESPONDENCE.

CHAMBRE SYNDICALE DE LA PHOTOGRAPHIE—ACTION OF WATER UPON AN AMALGAM OF ZINC COATED WITH BITUMEN—PHOTOGRAPHS OF BIRDS ON THE WING—COLOURED PHOTOGRAPHS ON CHINA.

Banquet of the Chambre Syndicale de la Photographie.—This festive meeting was held on the 14th of March last. The only subject discussed at the meeting to which I need allude was the proposed memorial of Poitevin. M. Lévy, the chairman of the banquet, proposed that a subscription should be raised in favour of the project, and it was decided that the two Societies (the Chambre Syndicale and the Société Francaise) should unite their efforts to make this subscription a success. A considerable sum of money was promised at the dinner itself. It is to be hoped that the list will not be confined to France, but that other countries will also come forward to secure for Poitevin a memorial worthy of his name. No doubt, the original discovery of the action of light on potassium bichromate is due to Mungo Ponton; but to Poitevin belongs the glory of having turned this discovery to practical account. Certainly, the latter never claimed for himself the honour of the discovery itself, for, in his book on "Printing without Silver Salts" (a new edition of which is now in course of publication) he expressly states that Ponton had made use of bichromated paper in 1840, while his own experiments were not made public until 1848. But there is no occasion for any dispute as to the right of priority. Poitevin's share in the working out of the invention is quite large enough to ensure for him a full acknowledgment of his merits.

Action of Water upon an Amalgam of Zinc Coated with Bitumen.—M. Fisch makes a drawing upon a plate of zinc with an ink consisting of finely-divided biniodide of mercury in suspension, thus producing an amalgam, and then coats the plate with a thin layer of bitumen. When this is dry, he lays the plate in water for a couple of hours, and at the end of that time the bitumen can be removed by aid of a brush from all the parts which have been amalgamated. This promises to permit of very interesting applications.

Photographs of Birds on the Wing.—Professor Marey, of the *Collège de France*, writes from Naples to the Academy of Sciences, that he has succeeded in taking the photographs of birds during their flight. He has arranged a kind of gun with a revolving apparatus, something like that which M. Janssen employed for the Transit of Venus. The revolving disc makes one revolution in a second, and in this space of time twelve apertures, each carrying a sensitive plate, pass in front of the lens. By this means a series of twelve successive images is taken, the duration of the exposure for each image being about $\frac{1}{700}$th of a second, or in full sunlight not more than $\frac{1}{1500}$th of an image; in the latter case the motor spring of the disc is at the highest tension. In using the instrument the gun is pointed at the bird just as when shooting it on the wing. Experiments of this kind here indicated, undertaken with a view of analysing the motion of a bird during its flight, are of the highest interest.

Process of Taking Coloured Photographs on China.—Being at present engaged in investigating a means of obtaining coloured photographs on ceramic productions, I have been led to the attempt to get images richer in colouring material. Prints usually obtained by the dusting-on process or by phototypie will not stand a great heat, and can only be produced in the ordinary muffle furnace. The question is whether a means for arriving at a proper density of colouring matter may not be found in the Woodbury process. But, as is well known, gelatine will not burn without contracting; it is, therefore, a substance not adapted to our present purpose. I then thought of making a coloured ink with sugar, which burns up completely in firing; I employed it in solution in water to which potassium bichromate had been added, and found the metallic oxide reduced in the form of an impalpable powder. The thick mucilage is poured on a Woodburytype mould, and compressed with a piece of smooth plate glass; in this state the whole is exposed to the sunlight, which gradually renders the whole of the image insoluble by acting through the thickness of the paper. It is then withdrawn from the mould, and exposed again to the light to increase the insolubility, after which it is soaked in water to remove all the salt of chromium in a free state. This image, taken on a provisional support, and then transferred to the piece of china to be decorated, will resist a great degree of heat. LEON VIDAL.

By-the-Bye.

BUYING AND SELLING BUSINESSES.

ALL things have their palmy days, and photography among the number. Unfortunately, palmy days always carry a discount; they are gone, and never to come. Palminess, like "the good old times," only exist in the past. The palmy days of the drama are gone, and so too are the palmy days of soldiering, sailoring, farming, coaching, hunting, dancing, and the rest. Our modern artists no longer paint like the old masters, and old china is infinitely more valuable than new. The palmy days of chivalry are no more, and to-day, we are assured, is the material common-place age just between the good things that are gone and those yet to come.

Whether all this is true or false, it is very certain that there have been photographic businesses in the past of considerable value. Six thousand pounds is a high price for a "going concern," even in London, and yet this sum was paid not so long ago for a photographic business in the provinces. We know of two gentlemen, at least, who have made upwards of ten thousand pounds out of photography in a single year, in the ordinary way of business, and although it is rather against the theory of "palmy" days, we may adduce our belief to the effect that this sum was exceeded in the case of the lucky man who secured the photographic copyright of "You Dirty Boy," for which he paid one hundred pounds. In the West End there are, of course, businesses to be found at the present day for which six thousand pounds would be refused; but fifteen or twenty years ago, before cartes-de-visite were common, this sum would not have been too much to offer to some of our leading city and provincial firms. Of course, these were less numerous than they are now, and profits fell off rapidly as the ranks of photographers began to fill. A Regent Street firm we wot of, charged a guinea and a-half for six carte portraits in those days, and second-class firms at Notting Hill, Islington, and Clapham would ask three shillings a piece for any extra copies required from a small portrait after the first dozen or half dozen had been paid for.

These prices certainly belonged to the "palmy" days, and are no more likely to return, than we are likely to see salmon again at twopence a pound, or natives at sixpence a dozen. Fortunately, the price of photographs does not depend solely upon quantity; twenty years ago, when photographers, both good and indifferent, were scarce, good and indifferent photographs were alike dear. But good photographers still command good prices, albeit not so high as formerly; and thus it is still possible to sell a photographic business for a tolerable sum. Only, since photography is daily becoming more and more of a fine art, the necessity for a thorough artist as the leading spirit of a firm to keep it going, also becomes imperative. In a word, portrait-photography is a profession, not a business, and you can only sell it in the same way as a doctor or solicitor sells his practice. True, there are certain goods and chattels to be taken into consideration—the photographer's stock of negatives, his deftly-arranged studio, and his apparatus. But the doctor, if he does not purchase glass portraits of his *clientele*, buys the practice books in which their constitutions and ailments are recorded, and he buys, too, as a rule, the surgery to which patients have been wont to come, as well, in all probability, as his predecessor's stock-in-trade of implements and drugs. It behoves him to be as clever as his predecessor, or patients will go elsewhere; and this will happen to the photographer if he does not show himself in every way as skilful as the brother from whom he purchased. People will come to him for prints from negatives that he possesses, and so will patients continue to go to the old surgery for medicines they have formerly been supplied with; but energy and skill are requisite to keep up the business.

In purchasing, then, a photographic business (we are speaking, of course, of a portrait business), we think both buyer and seller should be guided rather by the rules that govern the buying and selling of a doctor's or lawyer's practice, than by the regulations applied to ordinary businesses. A tradesman frequently gets three years' purchase for a well-established business, and, in some businesses, the purchasing value is still higher; but neither doctor nor solicitor can command such high prices. From a year-and-a-half to three years, at the very utmost, is all that a solicitor can ask for his practice, the sum being calculated on nett profits. The purchase money would include "introduction;" that is to say, the selling solicitor would act as partner to the purchaser for a given period.

The doctor does not get quite so much; he never receives a sum equal to three years' purchase; but then, in his case, the amount is calculated on gross takings, and not upon nett profits, as with the solicitor. With an "introduction," a doctor may receive as much as two years' purchase; but more often the sum agreed is only equal to the takings of a year. If a doctor dies before he can sell his practice, the latter is valued at nine months' gross takings, provided, of course, it is a substantial concern, and the purchaser has immediate possession.

In all sales of this kind there are usually exceptional circumstances which influence the bargain one way or another, and, in the case of a photographer, his stock of negatives and his personal qualifications would have to be taken into consideration. Mr. Ackland, of the firm of Messrs. Horne and Thornthwaite (who has, perhaps, had as much experience as any one in such matters), places the value of a photographic business in between the doctor's and solicitor's; but, as in the case of the latter, the purchase is naturally based upon "nett profits." Supposing a photographer's business to be well established (and, of course, the whole basis of the calculation depends upon this), Mr. Ackland thinks that a fair price would be an amount equal to the nett profits during a year-and-a-half to two years. For this sum, the stock of negatives and the books of the concern would be required, and, perhaps, the printing-frames and printing plant, but not lenses, cameras, &c. A separate valuation would be made of these, and also of the fixtures.

We have said that there may be exceptional circumstances, which influence very much the sale of a photographic business. The advent of a photographer of high reputation in the vicinity, or the bestowal of Royal or powerful patronage upon a neighbour, may decrease the value of a business suddenly, just in the same way as that of the more fortunate man is increased. The fortune of war, luckily, has little or no influence in this country; but it is different on the Continent. In the spring of 1870 we visited M. Reutlinger's famed studio on the Boulevard Montmatre. At that time M. Reutlinger was producing a novelty in the form of glazed cabinet portraits with fancy borders, and had, perhaps, the best photographic business in Paris. At the little *comptoir* at the top of the house, a busy clerk sat booking engagements, and all day long a driblet of gold coin fell upon the brass-railed counter. A large number of the callers were English, and loud and pressing were their demands for early sittings. A year later, all was changed. The Franco-German war had come, and M. Reutlinger, as a German settled in France, could expect little quarter. For some years the business at Reutlinger's studio was at a standstill, and it is doubtful whether money enough was taken to pay the rent; but right glad were we to see, when we last year visited the French capital, unmistakable signs of M. Reutlinger's star ascending once more. But the rare combination of skill, energy, and good luck which puts a man before all his fellows is, as everybody knows, scarcely likely to visit an individual twice, and the palmy days of the Reutlinger studio, we fear, are, like all other palmy days, gone for ever.

A business must be well established, we have said, at the time of its sale, or the terms do not hold good. It is not enough that it has existed many years in one spot, and is still doing a respectable business. The takings during the past year may be respectable, but, if they are only half that of the year before, it would not do to make an offer without a searching inquiry into the cause. A fading business is nearly always a bad bargain. In the same way a business that shows steadily-increasing takings is likely to be worth the maximum we have set down for guidance. Again, it should be remembered that no one is in a hurry to get rid of a good thing under ordinary circumstances, and, therefore, unless good and sufficient reasons are forthcoming for the sale, this fact should be taken into consideration in making the valuation. The stock of negatives should always be a valuable item, and if the would-be seller can prove he is making a tolerable income from re-print orders (this is not difficult to show), the fact that the business is well established is pretty well proven.

The "At Home" next week will be "Herr Hof-photograph Angerer in Vienna;" the following "By-the-Bye" will be on "Dark Room Disease."

THE CHEMICAL ACTION OF LIGHT.

BY DR. J. M. EDER.*

Silver bromide behaves in the same way as the chloride under the influence of light—it turns a grey violet colour, and loses bromine. AgCl precipitated from a saturated solution of silver decomposes more quickly in the light than the similarly produced AgBr; on the other hand, AgCl precipitated by a saturated solution of NaCl is decomposed more slowly than AgBr thrown down by a similar solution of NaBr (H. W. Vogel). Silver bromide is more sensitive to colour than the chloride, but does not reproduce the spectrum with its colours. According to Vogel, nitric acid dissolves out no metallic silver from the bromide which has been blackened by the light, but Carey Lea found an appreciable quantity of the metal in the same substance. At all events, the dark colour of the bromide which has been exposed to the light is not removed by nitric acid, whence Eder concludes that sub-bromide is present. Iodide of silver does not present the same re-actions, inasmuch as it is only discoloured (turned a greenish grey colour) by the action of light, when it has been obtained by precipitation from a saturated solution of silver nitrate; but the salt thrown down by a saturated solution of potassium iodide undergoes no alteration at all (Schnauss). The separation of iodine during or after the discolouration of the iodide cannot be detected (H. W. Vogel), not even when the latter is heated (Schultz-Sellack). Acids materially retard the photo-chemical action; nitric acid ($d = 1{\cdot}2$) bleaches the blackened iodide, but without dissolving any metallic silver, while potassium iodide restores the colour. The presence of substances which absorb iodine, nitrate of silver, tannin, arsenite of soda, &c., strongly promotes the decomposition in the light, the sub-iodide being probably formed.

Plates of silver fumed with iodine, bromine, or chlorine will condense the vapour of mercury on those parts of their surface which have been exposed to the light; on this principle the Daguerreotype process is founded. Iodide, bromide, and chloride of silver on paper (Fox Talbot), albumen (Niepce), collodion, &c., on being exposed to the light, become possessed of the property of attracting finely-divided silver in a nascent state, as it is precipitated from nitrate-of-silver solution by means of ferrous sulphate, pyrogallic acid solution, gallic acid, &c., in this way rendering the latent image visible; this is development by attraction, or physical development. Silver bromide, after a short exposure, is rendered capable of being reduced by alkaline pyrogallol, potassium ferrous oxalate, ammoniacal hydrochinone, &c.; this is development by reduction, or chemical development. The development of the latent image is promoted by substances absorbing iodine, bromine, or chlorine, such as tartrate of antimony, sulphite and arsenite of soda, tannin, ferrocyanide of potash, &c., and more especially by silver nitrate—substances which Vogel calls "chemical sensitizers." In the presence of certain dye stuffs, in addition to these chemical sensitizers, the sensitiveness to colour is increased by means of optical absorption. Bromide of silver emulsified in gelatine is particularly sensitive. The chloride also admits of the chemical development; but in this case, weaker reducing agents—such as ammonio-ferrous citrate or neutral pyrogallol—must be employed as

* Continued from page 150.

developers (Eder and Pizzighelli). Both bromide and chloride-of-silver emulsions are rendered more sensitive by half-an-hour's boiling, particularly to the less refrangible rays.

Up to a certain point the capacity of the silver salts to blacken under the developer increases with the length of the exposure, but beyond that point it decreases (the so-called "solarisation"), and this reciprocating process repeats itself several times (Moser and Jansen). This so-called negative action of the luminous rays is more especially manifest towards the red end of the spectrum, owing to the fact that the less refrangible rays interrupt the previous action of the more refrangible rays. According to Abney, solarisation must be considered to be due to oxidation, which, after a long exposure, will make its appearance over the whole spectrum, from the violet to the ultra-red. This phenomenon, as well as the behaviour of the latent image with different chemical agents, point to the presence of infinitesimal quantities of sub-iodide, sub-bromide, or sub-chloride of silver.

Many other of the silver salts, especially those of the organic acids, blacken under the action of light. The carbonate, phosphate, oxalate, tartrate, citrate, and benzoate of silver all behave in this way, and admit of the development of the image with gallic acid and silver nitrate (Hunt), or with alkaline pyrogallol (Carey Lea).

Of the organic substances which undergo decomposition on exposure to the light may be mentioned nitric ether, which turns yellow. The vapour of amyl nitrite forms under the influence of light heavy clouds of amyl nitrate and hyponitric acid, the more refrangible rays being more especially active in producing this effect; according to Tyndall, allyl iodide and isopropyl iodide behave in the same way. Dilute oxalic acid is decomposed with the production of oxygen; its neutral alkaline salts are more permanent, but still not perfectly stable. A solution of oxalic acid will reduce the salts of gold more rapidly after exposure to the light than before.

Graphitic acid turns black in the light, and nitrocumic acid gives a red precipitate; santonin becomes yellow, and the crystals break up with the formation of photo-santonin. Solutions of the quinine salts, as well as dry or moist sulphate of quinine, blacken in the sunlight, particularly under the influence of the radiations which excite fluorescence, sulphate of quinidine being formed. Hœmatoxylin turns red when acted on by light, even in *vacuo*, without alteration of its composition. Paper coated with starch acquires the property of turning a brick-red colour, in a solution of iodide of potassium, after it has been exposed for an hour to the sun. In this reaction the blue and violet rays are most active.

ON ETCHING FLUIDS.

BY MAJOR J. WATERHOUSE, B.S.C.,
Assistant Surveyor General of India.

The following notes on etching fluids for steel, copper, and zinc, gathered from various sources, may be of interest and use now that increased attention is being directed to photographic engraving.

I.—Mordants for Steel.

Nitric acid forms the basis of most fluids for etching steel as well as for other metals. Acetic acid and alcohol are sometimes added, and some formulæ contain nitrate of silver, corrosive sublimate, salts of copper, &c. Iodine is also a most efficient mordant for steel, and Mr. Fox Talbot used the chlorides of iron and platinum for etching his plates through the coating of bichromated gelatine.

Plain Acid Mordant.

1. *Kruger*—First biting—

Muriatic or nitric acid	1 part
Water	8 parts

Stronger.

Acid	1 part
Water	4 parts

Deepest.

Equal parts acid and water.

2. *Fielding.*

Nitric acid	1 drachm
Water	1 pint

3. *Roret*, for delicate work—

Nitrous acid	1 part
Water	4 parts

4. *Kruger.*—Chromic acid diluted according to the effect to be produced. This also serves for zinc, copper, and brass, and bites with great ease and certainty, making a good vertical cut.

5. *Prof. Kick.*—Equal parts muriatic acid and water, with a trace of chloride of antimony. Acetic or pyroligneous acids are sometimes added to the nitric acid, as in following—

6. *Fielding.*

Pyroligneous acid	1 part
Nitric acid	1 ,,
Water	3 to 6 parts

7. *J. Barth.*

Fuming nitric acid	1 part
Acetic acid	5 parts

This bites very vigorously, and for fine work may be diluted with distilled water.

8. *Roret.*

Glacial acetic acid	1 part
Nitric acid	1 ,,
Hot water	6 ,,

9. *Ed. Turrell.*

Glacial acetic acid	4 parts
Absolute alcohol	1 part
Nitric acid, sp. g. 1·28	1 ,,

The acetic acid and alcohol are mixed and allowed to stand for half-an-hour, then the nitric acid is added very gradually. This mordant is applied from 1 to 15 minutes according to the strength desired, and may be strengthened by adding nitric acid.

Etching Solutions with Alcohol.

Alcohol seems to be added with the object of softening the action in the first biting, and of making the mordant bite at once. For etching Niepce de St. Victor's asphaltum plates, M. Lemaitre used for the first biting—

10. Nitric acid at 36°...	1 part
Distilled water	8 parts
Alcohol at 36°	2 ,,

And finished off with nitric acid and water, without alcohol

11. Pure nitric acid	4 parts
Absolute alcohol	1 part

Many formulæ contain nitrate of silver in addition to the alcohol.

12. Nitric acid...	1 part
Alcohol	1 ,,
Water	8 parts

For the first etching, add to this mixture half part of a solution of—

Nitrate of silver	1 part
Water	6 parts

The acid should be changed every ten minutes.

13. (*Kruger*), Glyphogen. (*a*). First etching.

Nitric acid	1 part
Alcohol	5 parts
Water	10 ,,

(*b*). Deep etching.

Nitric acid	4 parts
Alcohol	12 ,,
Nitrate of silver	4 ,,
Water	24 ,,

Or

Nitric acid	6 parts
Spirit at 80°	15 ,,
Nitrate of silver	6 ,,
Water	30 ,,

14.

Alcohol 88° *Tralle*	1,500 ,,
Nitric acid sp. g. 1·22	10 ,,

Mix at 60° F., and, when the mixture is complete, add 1 part of nitrate of silver dissolved in distilled water.

If the varnish be weak, the following is better:—

15.

Alcohol	6 parts
Distilled water	9 ,,
Pure nitric acid	16·6
Nitrate of silver	0·83

The liquid improves by keeping. Before beginning, wash the plate for a few seconds with dilute nitric acid (at 4 per cent.), then apply the above mordaut for about three minutes, and wash off with distilled water containing 6 per cent. of alcohol. Repeat the biting as often as may be necessary, well washing between each operation.

16.

Distilled water	15 parts
Alcohol	2 parts
Nitric acid	1 part
Nitrate of silver	18 grains per litre

Strength may be increased by adding nitric acid or nitrate of silver.

17. *Deleschamps.*—Glyphogen.

Acetate of silver	8 parts
Rectified spirit	500 ,,
Distilled water	500 ,,
Pure nitric acid	260 ,,
Nitric ether	64 ,,
Oxalic acid	4 ,,

This is recommended as being free from the defects of many of the other mordants and giving a clean vertical bite.

Several formulæ contain salts of copper.

18. *Roret.*

Nitric acid	62 parts
Distilled water	125 ,,
Alcohol	187 ,,
Nitrate of copper	8 ,,

19. *Roret.*

Crystallized nitrate of copper	15 grammes
Distilled water	$1\frac{1}{4}$ litre
Nitric acid	a few drops

20. *Roret.*

Bay salt	15 grammes
Alum	60 ,,
Sulphate of copper	60 ,,
Nitrate of copper	16 ,,

Moisten with vinegar.

21. *Roret.*

Oxalic acid	2 grammes
Alum	4 ,,
Sal-ammoniac	4 ,,
Sulphate of copper	60 ,,

Grind up in vinegar mixed with common salt.

22. *Tardieu.*

Distilled vinegar	3 litres
Sal ammonia	184 grammes
Sulphate of copper	125 ,,

Boil up twice.

Corrosive sublimate enters into the composition of the following in Roret's manual.

23.—

Tartaric acid	21 centigrammes
Nitric acid	4 drops
Corrosive sublimate	4 grammes
Water	100 cub. cent.

This is a good mordant for soft steel.

24.—

Corrosive sublimate	8 grammes
Alum	8 to 12 ,,
Distilled water	1 litre

25.—

Spirits of wine	125 grammes
Nitric acid	62 ,,
Water	250 ,,
Corrosive sublimate	0·212 ,,
Hydrochloric acid	8 ,,

26.—

Brandy	150 ,,
Nitric acid	32 ,,
Corrosive sublimate	0·212 ,,

Iodine is recommended as a very efficient mordant for steel, being free from the inconveniences caused by disengagement of gas, as when biting with nitric acid. Messrs. Schwarz and Boehme give the followiug:—

27.

Iodine	2 parts
Iodide of potassium	5 ,,
Water	40 ,,

This may be further diluted up to 40 parts more water for etching the finest lines.

It gives good deep lines, sharp, and with clear edges even, for the finest and closely-ruled lines have no tendency to run one into the other.

28.—(*Cooley.*)

Iodine	1 ounce
Iron filings or wire	½ dram
Water	4 ounces

Keep in a stoppered bottle. Also

29.

Iodine	3 drachms
Iodide of potassium	1 drachm
Spirits of wine	1 ounce
Water	2 ounces

Niepce de St. Victor used for biting his photo-engravings in preference to other mordants, water saturated with iodine at a temperature of 50° to 59° Fahr., so that it has a good yellow colour, but does not reach orange red. It requires renewing after remaining on the plate a quarter of an-hour. This only serves for the first bitings, and the plates must be finished with nitric acid.

Fox Talbot used perchloride of iron and bichloride of potassium for biting his photographic plates through the gelatine. His formulæ for the iron solutions are—

30.

No. 1.—Saturated solution of perchloride

No. 2.—No. 1. solution ... 5 or 6 parts
Water ... 1 part

No. 3.—Equal parts of No. 1 and water.

The perchloride of iron is made by saturating muriatic acid with peroxide of iron as much as it will dissolve with the aid of heat. After straining the solution, to remove impurities, it is evaporated till it is considerably reduced in volume, and is poured off into bottles of convenient capacity. As it cools, it solidifies into a brown semi-crystalline mass. The bottles are then well corked up and kept for use.

The formula for the bichloride of potassium solution was:

31.

Saturated solution of bichloride of platinum	4 parts
Water	1 part

This may be strengthened or weakened as may be found necessary after a few trials.

The following resembles the etching fluid for copper, commonly known as "Dutch Mordant."

32. (*Cooley*).

Hydrochloric acid	5 parts
Water	95 ,,

Mix and add,

Chlorate of potash	1 part
Water	50 parts

33. (*Cooley*).—For electric etching with the battery, a solution of common salt is used.

(*To be continued.*)

Notes.

As many of our readers are anxious to see Mr. Muybridge's "Animals in Motion," we may mention that on Tuesday evening next he will give a demonstration before the Society of Arts, and on Wednesday at South Kensington. To-morrow, he shows the Eton boys what instantaneous photographs are like.

Mr. Muybridge thinks we should hear no more about "dead heats" if a plan he proposed four years ago of recording the winner in a race were adopted. "A thread stretched across the track, connected with an electric shutter in front of a camera, would determine to an absolute certainty which horse was an inch, or less, a-head." Mr. Muybridgs adds tersely: "In an important race, the decision of the camera would be preferred to that of the judges."

The total eclipse of the sun on the 17th of May will form the subject of a Government expedition to Egypt, where the phenomenon can be favourably observed. The camera, as a matter of course, will be made use of on the occasion as the most faithful of all observers, and Captain Abney, with a chosen staff of Sapper-photographers, will in all likelihood take charge of the photographic arrangements. Mr. Norman Lockyer is also to share in the expedition, his duty being confined to observing the eclipse through telescope and spectroscope.

It may be remembered that both Mr. Lockyer and the French photo-astronomer, M. Janssen, received promotion in the ranks of science by their careful observations of an eclipse of the sun some years ago, and more especially of the flaming masses of matter known as protuberances, which are only visible to the naked eye when the black disc of the moon obscures the bright disc of the sun; they are among the most important objects to be noted on the instant of eclipse, and these will be photographed to record measurement, shape, and luminosity. These protruding flames signify that the sun is not simply a heated ball, but is enveloped in ragged tongues of fire, due to the combustion of gaseous matter.

Photography first recorded these tongues of fire rising, so astronomers tell us, from the surface of the sun many hundreds of miles high, in 1860; but it was not until 1870 and 1871 that solar protuberances were depicted with any degree of sharpness and detail. Since then, it has been found possible to photograph the monster flames without waiting for the actual disc of the sun to be shut out from our vision by the moon, Professor Young having secured a picture of a double-headed protuberance in ordinary daylight by employing specially constructed apparatus.

The eclipse pictures taken by Mr. Alfred Brothers, in Sicily, in 1870, are among the best we possess of the phenomenon. His pictures were obtained in the simple fashion of employing an ordinary camera and rectilinear lens of four inches aperture and thirty inch focus. With an instrument of this focal length, his image of the sun was, however, only three-tenths of an inch, and it would be well, therefore, if a photographic lens were employed of still longer focal length, so as to give a much larger picture.

Herr Köhnke, an amateur photographer of Schleswig-Holstein, has prepared a new collodion, which is stated to yield dry plates of considerable sensitiveness. When we have practically tried this preparation, which we hope to do in a few days, we will report the result to our readers.

In a communication recently received from Dr. Eder, that gentleman expresses the great pleasure he feels at the compliment paid him by the Photographic Society in electing him an honorary member. "It is a token that honours me in the highest degree," writes Dr. Eder, "and it will encourage me still further to exert my poor talents towards the advancement of photography."

M. Marcy presented, the other day, to the Royal Academy of Sciences at Paris, some pictures of birds on the wing, secured in a camera with an exposure, it is said, of $\frac{1}{100}$ of a second. Mr. Muybridge's "Animals in Motion" include birds on the wing, and he shows, what we believe has never before been depicted, a bird in the air with its wings below its body.

We have not seen M. Marey's apparatus, but it is cleverly constructed like a rifle, so as to be capable of being raised to the eye to take aim and expose. It is on the principle of M. Janssen's *revolver*, which makes a series of rapid exposures one after the other, and with this Mr. Marey is able to secure the bird in various positions. A chronograph regulates the periods of exposure, which may be as brief as $\frac{1}{1200}$ of a second. M. Marey proposes to combine a series of the photographs thus taken, after the manner of Muybridge, and in this way to analyse a bird's movements and demonstrate it in motion, as the American photographer has done with his galloping horse.

Here is a hint for the Dress Reform Association, who are anxious to introduce "dual garments" for ladies, and other radical changes. The popular prejudice against such novelties is due to a widespread notion that their innovators are all of them the most staid and sedate of their sex; therefore, get some pretty models to wear the new dresses, and then distribute photographs of these broadcast; an outlandish dress combined with a pretty face never appears ugly, but is only piquante and bizarre.

Mr. Swan has not been fortunate in the exhibition of his electric lamp to Royalty. When the Duke of Edinburgh opened the Exhibition at the Crystal Palace, something went wrong with the engine at the very moment when His Royal Highness came to inspect Mr. Swan's invention;

and on Saturday last the lamps, which had been burning brilliantly for many hours, suddenly ceased to glow, and enveloped all in darkness while Mr. Swan was in the act of explaining to the Prince of Wales his new mining lamp. The driving band from the engine had slipped, and as the magneto-electric machine thus ceased to act, the electric current was momentarily cut off. Fortunately, the engineer was at hand, and within the space of a minute the steam gear was in order again, and the Swan lamps were once more aglow. But whether these two little incidents were due to accident or design, is, we believe, still a moot point.

A varnish upon which the finest pencilling is possible is described by M. Crova; it is especially suitable for application to glass, and, therefore, we should think of use to photographers as a retouching medium. It is applied cold, and might be used either on the face or reverse of a negative. This is the formula:—

Ether	500	grammes
Gum sandarac	30	,,
Gum mastic	30	,,

Dissolve, and then add a little benzine, by degrees, until the varnish applied to glass gives the latter the appearance of having a ground surface.

Government has decided upon spending fifteen thousand pounds in observing the next transit of Venus, albeit the results obtained on the last occasion, despite the lavish expenditure, were not so very satisfactory. There will, in all probability, only be one station for British observers (that at Madagascar), of which there is little doubt Mr. E. J. Stone will be nominated chief astronomer.

Photography is not in favour this time, and no photographer is likely to accompany the party. Besides the sum we have mentioned, the Admiralty will be called upon to supply a vessel of war, if not to carry the expedition, to protect it; for Madagascar is reported to be a spot scarcely so quiet as astronomers engaged upon watching an interesting phenomenon would most desire. We have always a squadron in African waters, but this is generally occupied at the Cape and on the West Coast.

A Paris photographer is said to make exposures in his studio of but one-hundredth of a second duration. This, however, would not be quick enough to suit some mercurial temperaments, thinks the *Practical Photographer;* the average boy could change his position three or four times during a sitting.

A recent prosecution of licensed victuallers for adding salt to malt liquors has called attention to the fact that some waters contain naturally a large quantity of sodium chloride. Thus Mr. Bartlett points out that a certain Chelmsford water used for drinking purposes actually contains more than one hundred grains per gallon, while ale and porter, as a rule, have but forty grains, unless brewed from a very salt water. In London, there are few waters containing more than twenty grains. The subject of salt in waters is not uninteresting to the photographer, in certain manipulations especially. In the case of washing prints, for instance, many add further salt to that naturally in the water, Mr. Payne Jennings' advice on the subject being, we remember: "When the prints are taken from the printing frames they should be well washed in three or four changes of water, and lastly in a bath containing a handful of salt."

The use of salt water in this way is a guarantee that no silver nitrate remains upon the prints. But in washing negatives, it behoves one to be careful in the use of water containing much salt. Salt is of a most deliquescent nature, and a film, whether it be collodion or gelatine, washed in water that contains much of it and dried spontaneously, is likely to give trouble. Indeed, it is not so long ago that we saw a series of negatives from Essex hopelessly spoiled, simply because they had been washed in water taken near the seashore, and consequently impregnated with salt. If brackish water is used in photographic manipulations, the negative should in the end be rinsed with, or immersed in, distilled or rain water before drying. As every photographer knows, the way to test water for sodium chloride is to drop into it a little nitrate of silver solution.

Photography, we are glad to hear, is likely to assist in giving some protection against explosions in mines, by recording from time to time the amount of explosive gas there is in a pit, in the same way as it is employed to register meteorological changes. Colliery explosions have been woefully frequent of late, and it is certainly high time better precautions against accidents were taken. The danger arises from coal gas mixing with the air of a mine, making an explosive compound, which ignites with terrible effect.

Two or three per cent. of gas mixed with air gives an explosive mixture, but the most dangerous compound is produced when the proportion reaches about ten per cent. Mr. Liveing has invented a clever little instrument by which the percentage may be read off on a photometric index, and if the working of this instrument were made automatic, there is no reason on earth why photography should not be made use of to take readings, and thus afford a record of the amount of gas in the mine every hour in the twenty-four.

Mr. Liveing's instrument is easily explained. At each end of a little box is a light of equal intensity, so that an index placed in between is equally illuminated. This equal illumination means there is no gas in the mine, but the right hand light grows in intensity as the percentage of gas increases. And for this reason. The lights, right and left, are due to small pieces of platinum wire rendered incandescent by an electric current. The left-hand light never varies, for it is in an air-chamber hermetically sealed; the right-hand incandescent wire, on the other hand, is open to the air, and the more coal gas this contains, the brighter glows the wire. Thus, as we have said, the right-hand light grows in intensity with the percentage of gas, and the light index—the matter having previously been determined by experiment—tells what this percentage is.

It is sometimes useful to know how to clean a plaster cast, for dust and dirt stains are exaggerated rather than decreased in a photographic image. Here, then, is a very simple receipt. Make a thick paste of starch, and apply it with a soft brush over the plaster object; put this in a dry place, and when the starch crust flakes off, it will bring the dirt with it.

In all probability there will be another photographic exhibition in Scotland this year, to be held either in Glasgow or Edinburgh. The expense attendant upon such a gathering is the only serious matter to be considered, for there is not a doubt that a fine collection of works would be forthcoming, whether the gathering took place on the Clyde or in our modern Athens.

The Colour Photographic Company being dissolved, the process of producing photographs in natural colours is spoken of no more in this country. But from Germany and Switzerland we still hear of the method being for sale, the price for a licence being no longer a hundred pounds, but a hundred francs. Some clever examples have recently been forwarded to us, and, if only the process had not been represented under "false colours," applications for it might well have been found. Those who forget the details of the process for the moment, will find them given in our Year-Book; but, briefly put, it consisted in producing a faint photograph upon salted paper, colouring this by hand, then albumenizing the surface, and once more printing it under the negative, this time more vigorously.

Those who are hawking the process abroad just now adopt a very ingenious plan. They produce the photograph after it has been coloured and printed a second time, but before it has been toned and fixed, and in this rough condition they exhort the photographer to do what he will with it. He may put it in his own toning and fixing bath and wash it thoroughly, so as to convince himself that the colouring is inherent to the picture. Finding in his own hands that the pigments do remain "fast," he begins to believe they really have been produced chemically or physically, and not unfrequently becomes a purchaser. Colours superposed by a photographic film in this way may, without doubt, be made to produce some charming effects, but whether it is worth while paying for this well-known fact is another question.

"I see him and her too!" was an excited old lady's remark as she came out of the crowd assembled on Saturday at the Crystal Palace to see the Prince and Princess of Wales pass; "and I'll tell you what is so singular," added the delighted dame, all aglow with enthusiasm, "he is so exactly like his photograph, too!"

TWELVE ELEMENTARY LESSONS IN DRY-PLATE PHOTOGRAPHY.

No. V.—Second Lesson in Development.

In our last lesson we left the photographer at that stage where he had accomplished the exposure of a plate, and was about to commence the development. We should explain that the developer with which he is going to make his first experiment is that known as ferrous oxalate. When he has somewhat advanced, we should recommend him in all cases to use the exact developer recommended in the printed instructions contained in the plate-boxes. This will generally be that known as "alkaline pyrogallic," but the ferrous oxalate has the advantage of such extreme simplicity that it is most suitable for a beginner, and, mixed as we recommend it, is suitable for any commercial gelatine plates of which we have had experience.

The photographer has now, we shall suppose, returned to his dark room. He may lay his dark slide, still wrapped in the cloth, on a shelf, and, turning up the white light, make the following preparations. He lays his three flat dishes in a row along the front edge of the table, the one to the left opposite the red light, the others to the right of this one. We shall call the dishes Nos. 1, 2, and 3, beginning at the left. Into No. 2 he pours two or three ounces of the alum solution; into No. 3 about the same quantity of the "fixing" or "hyposulphite" solution. Now he takes the four-ounce measure, and pours into it exactly two ounces of the potassium oxalate solution. To this he adds half-an-ounce of the sulphate of iron solution. The whole will immediately assume a beautiful ruby red colour; to it he adds about 20 minims of the one per cent. solution of bromide of ammonium. He will now have about 2½ ounces of developer. This is an extravagant amount to use for a quarter-plate, and, if the photographer continues to use ferrous oxalate, he must reduce it to one-half; but at first it is best to use a good dose. Everything is now ready. The white light must be entirely extinguished, and the red light lowered as much as possible, till there is just enough to see by. The plate which has been exposed must be carefully removed from the dark-slide, and laid—film side upwards—in dish No. 1, which is still empty. Now the dish with the plate in it is taken in the right hand, and the measure with the developer in the left. The developer is poured rapidly, but gently, over the plate, the dish being waved or rocked to make the liquid cover any corner which it may incline to avoid, and the whole is placed again in front of the red light. And now (if everything has been rightly done) will commence one of the most wonderful of the phenomena of science or nature which man has been given the power to control—a phenomenon which is always new and always beautiful—the "development of the latent image." Let the beginner watch it closely. The plate had no indication of having been acted upon at all before the developer was poured over it. After, perhaps, ten or twenty seconds there is a slight darkening of some part. When this becomes distinctly visible the light may be somewhat raised, for the plate has become less easily affected by it. It will now probably be seen that the brighter parts of the landscape have become quite visible. In *negative*, be it remembered. The sky will be represented by blackness. Now is the time when we can tell whether or not the exposure has been correct. If it has been, the development will progress with beautiful regularity. The bright parts (or high-lights) appear first; then slowly, but steadily, more and more of the half tones, or less brightly lighted parts, come out; and at last every object and shade except the deepest shadows have their counterpart in the negative. In other words, the plate should be darkened to a greater or less extent in all parts except those few which represent the part of the landscape which appears to the eye quite black, and this should come about in between one and two minutes. If the plates have been under-exposed it will be longer before the high lights appear, and very soon after they do the action will stop, no more detail coming out, but large patches of the plate remaining white as before. If, on the other hand, it has been over-exposed, the high lights will appear a little sooner, and almost immediately afterwards the whole of the plate will be covered with detail, no part remaining white.

The final result of incorrect exposure is, with under-exposure, a hard picture with contrasts over-marked, and with deep heavy shadows in which none of the detail which is visible to the eye is represented; with over-exposure, a flat, uninteresting looking production, showing all the detail which there is in the original, but lacking the bold contrast of light and shade.

We shall suppose the happy medium to have been hit, if not at the first attempt, after a few more plates have been exposed. The development is not of necessity finished when, looking on the surface of the plate, all action seems to have ceased. We have still to wait till the "density" is sufficient.

A little reflection on the principles involved in the process of printing which we briefly described in a former lesson will show that not only is it necessary for the production of a harmonious picture to have all the details which are in the original represented, but in the negative these must be represented by a certain definite amount of opacity, or, as it is usually called, density. It must be understood, then, that as long as the plate lies in the developer, even after looking down upon it, all action seems to have stopped, the density continues to increase, and we may say at once that the most difficult thing of all to judge of in gelatine dry plate work is when the required density is gained. So difficult is this, that even the most experienced photographers may occasionally fail. The reason of this is that the after processes very much modify the apparent density of the negative, and not only that, but in every different make of plate the apparent density is modified to a different degree. We must make it appear far denser than it is eventually to be. It is only by experience that knowledge approaching to exactness can be gained on this point. When we come to the lesson on printing, we shall explain more fully the characteristics of an over dense, and a "thin" or under dense negative. Just now we will merely indicate the manner in which it is usual to judge of the density. The red light must be turned pretty high. The plate must be lifted from the developer and held, with the film side towards the observer, for a second only, close to the light, and between the light and the photographer. He must rapidly judge whether or not the density is correct. We may say roughly that, as a rule, the densest parts should appear almost, if not quite opaque. If they do not, the plate must be returned to the developer.

We shall suppose the correct density to have been gained. The time taken with the developer we have given will probably be from two to five minutes. The developer is now poured back into the measure. If used within an hour or so, one or two more plates may be developed with it. The plate is now thoroughly rinsed under the tap, either held in the hand or left in the flat dish. After this, as much red light may be admitted as is required. Then the plate is laid for five minutes in the alum solution, to harden the gelatine film. It is again thoroughly rinsed, and placed in the fixing solution. It will have been observed that up till this time the plate, looked at from the back, still appeared white. This is because the sensitive salt of silver which was not acted upon by light still remained in the film. On placing the plate in the hyposulphite, this whiteness will gradually vanish. When there is no farther appearance of it from the back, white light may be freely admitted. The plate must still be left a few minutes in the fixing solution, after which it must be most thoroughly washed. It should remain at least half-an-hour either under running water or in frequent changes of clean water. After that, it is reared up on edge to dry, when the negative is complete. Heat must on no account be used in drying.

DIRECT ENLARGEMENTS FROM SMALL NEGATIVES IN CARBON AND SILVER.

BY JOHN HARMER.

The great desirability of being able to obtain an enlargement direct from a small negative, either upon carbon tissue or albumenized paper, induces me to bring to the notice of my brethren an arrangement by which the chief difficulty arising from defects of light can be overcome in an inexpensive way, so that direct enlargements on the substances in question can be made without the sacrifice of too much time or attention. We all know that, hitherto the class of enlarging has been confined to those only who can afford to employ very expensive apparatus, and these appliances, even, are found in practice to be not always equal to supplying sufficient light for all classes of negatives, in consequence of the comparatively small size of the condenser the instruments are furnished with; and, although advances have been made in methods of enlarging by development, yet any photographer who can appreciate the delicacy and beauty of tone of carbon and albumenized paper will scarcely be satisfied with the bulk of the results by other processes. They may answer very well for the cheap and lowest class of club work, but give no pleasure to a photographer or *clientèle* endowed with a little more of the artistic faculty. When many copies of one subject are required, it is undoubtedly better to proceed in the usual way by transparency and enlarged negative. The production, however, of single copies by this somewhat roundabout method introduces a serious item of cost which places such a superior kind of picture beyond the reach of a large class of purchasers who appreciate and desire the better article, but who are not always prepared to pay the greatly advanced price, and consequently prefer to remain unserved. This represents a large monetary loss to the profession. Apart from these considerations, it is tolerably certain that all photographers who care anything about the future reputation of their art, and are not wholly absorbed in getting cash, are agreed that any effort to supersede the fugitive and unlovely productions too often sent out is not energy thrown away.

Some years ago I was employed by a firm who had received a commission to print a series of enlarged transparencies from small and highly non-actinic negatives by a dry plate process, whose chief features consisted in these qualities; one of the conditions of the contract being that they should be very warm in tone, a few stereoscopic transparencies of very rich colour having been left as a criterion as to what was required. In those days the secret of success in this respect consisted in making the positives on collodio-albumen plates by contact or by the wet process in the camera with a well-iodized collodion and a quick exposure. Warm tones from "paving stones" by either of the above methods appeared to be entirely beyond one's power, unless some superior method of illuminating the negative were resorted to. The condensing lens being found wanting, mirrors were suggested, and afterwards successfully used in such a way that if the sunlight reflected from one proved sufficient, their number might be increased to any extent short of fusing the glass upon which the reflections of the series were received. From six to ten of these sufficed for the purpose, and were arranged and used as follows. In the north side of the studio a couple of square feet or so of finely-ground glass was inserted, to which the front of the copying camera holding the negative was directed, with about a yard intervening; and opposite to this, on some rising ground in the garden, were placed the requisite number of plain mirrors rigged up on stands so that a boy could easily keep the beam of sunlight from each upon the glass in front of him, the efficiency of the arrangement being such that no trouble was experienced on the score of exposure, for that was reduced to seconds with the employment of a very small top.

A series of these plane mirrors, each of about a foot square, and mounted by means of a ball-and-socket joint, at a little distance from a slightly concave frame, to admit of adjustment for direction, would, in fact, represent a large flexible concave mirror, having the great advantage for the purpose in view of being composed of facets, each giving its square beam of sunlight. The illumination from the whole is more equally diffused over the square, and quite under command with its power, capable of modification to suit the requirements for thin or dense negatives, as well as their degree of amplification, a slight alteration of the angle of any reflector being sufficient to throw its reflection out or into the focus of the other, a variation not possible with a mirror of continuous curve.

The open space necessary for its employment need not be large, especially in summer time, provided it were not of very great size and power; and as its uses are many—for, besides the special one of enlarging, its concentrated beam directed upon ground glass in front of very dense negatives, in the course of their printing on lightly-salted paper, would tend to soften the print; while, on the other hand, the most could be made of a thin negative in getting a more vigorous transparency in carbon tissue. Therefore, one would feel more justified in incurring the expense of its construction.

The other details connected with the enlarging are as usual, excepting that the easel or frame for carrying the sensitive surface must be fitted with thin plate glass, and means for applying slight pressure to ensure the tissue being kept flat and in place during exposure.

Nothing need be said respecting the requisite time for albumenized paper—that being judged by inspection during printing; but in the case of tissue it is otherwise. Great help, however, can be obtained in practice by noting how many tints the small negative requires in the sun, and then preserving a similar relationship between the number of times a negative is enlarged superficially and the number for reflectors in the "battery." A few trials will give the ratio of the value of the one to the other, and what allowances are to be made for the loss of light by reflection, and in passage through stopped lens and ground glass, the actinometer, of course, being still made use of in the circle of illumination at the edges of the sensitive surface to indicate and register the tints. Vignetting, stopping back any portion, and a great many of the usual dodges resorted to by the successful printer, can be almost as readily performed as when the printing-frame and large negative are employed. The use of an easily-fitting yellow glass cap with the lens will admit of the substitution of an accessory negative for the other, and its adjustment on the sensitive surface, or to a sketched outline of the first negative—if the printing be in carbon—to be effected with little trouble; softening of the edges of any portion or production of atmospheric effect being equally easy.

THE NEGATIVE NITRATE BATH—ITS PREPARATION AND TREATMENT.

When used with the bromo-iodized collodion of the present day, the preparation of the nitrate of silver bath is one of the simplest in practical chemistry, for it merely consists in dissolving pure nitrate of silver in pure water and imparting to it a slightly acid reaction, when, without any other preparation whatever, pictures of the highest class may be taken.

But while the above constitutes a negative bath, there are certain niceties involved in its preparation, which all tend to facilitate the production of, and decrease the chances of failure to do good work. Again, by the very act of using a silver bath it becomes contaminated with foreign matter by which its working becomes impaired; and to render the present article as complete as possible, we shall treat *seriatim* the several components of the bath, together with the disorganizations by which its working becomes affected after having been for any length of time in use.

The water ought to be distilled. In this way only can we be certain that it is free from inorganic bodies. Concerning the elimination of organic compounds by distillation, we prefer not to speak with so much certainty, for while organic bodies ought to be removed by distillation, we know in practice that much of this form of impurity is to be found in distilled water, which is sometimes contaminated from such an apparently simple cause as the steam coming in contact with a joint of one of the boiler fittings in which the surface may have been slightly greasy. Attention is here directed to this because on one occasion a silver bath composed of a very fine sample of nitrate of silver in distilled water gave foggy pictures, which evil was traced to the water.

There is a simple and effective test for the presence of organic matter in water, whether it be common or distilled. Into a clear glass bottle pour the water to be tested, and to this add one or two drops of a solution of permanganate of potash, which solution need not be strong. Instantly the water assumes a delicate and beautiful pink colour, which remains unchanged if the water be pure; but if it contain organic matter the pink colour disappears, the rapidity with which it does so depending upon the amount of organic matter present. Now, while pure distilled water is always to be preferred for making a silver bath, it is not always easy to be obtained. A good substitute is to be found in melted ice or clean rain water which has not been allowed to trickle down the dirty roof of a house or to remain in a water barrel till it has imbibed innumerable kinds of impurity. There are two kinds of inorganic impurities frequently to be met with in common water—chlorides and carbonates. The latter usually assumes the form of lime, which may to a large extent be got rid of by boiling the water, by which the carbonic acid is liberated and the lime precipitated, a fact realised by every good housewife when she looks inside her tea kettle and notices how it is incrusted. When chlorides are present in water the best way is just to allow them to work their own work on the silver after it is added, and a few grains only of which will be lost in the purifying process.

Now, then, having before us two bottles, one containing distilled water of absolute purity, and the other filled with plain water obtained from any source, such as the rain tank, the river, or the lake, but which has been boiled, we shall proceed to make two baths. Notice the points of difference in their behaviour, and see if that from the impure water can be made to rival the excellences of the other.

In each ounce of water dissolve thirty-five grains of nitrate of silver. If the water be pure, the solution will be quite transparent; if it contain chlorides, it will be slightly milky. Now, as a solution of nitrate of silver possesses the property of dissolving a little iodide of silver, and as iodide of silver is formed in the collodion film when a plate is immersed in the bath, it is plain that the first one or two plates immersed would suffer by the solvent action of the bath, to prevent which it is customary to saturate the bath with iodide of silver at the start. This may be done by one or the other of the two following methods. Coat a plate pretty thickly with collodion, and allow it to remain immersed in the bath for about an hour. The iodide at first formed will be eaten out by the liquid. This may be repeated a second time, although it will scarcely be found necessary in practice to do so. Another way is to form iodide of silver by mixing together solutions of nitrate of silver and iodide of potassium in their combining proportions (170) of the former to 166 of the latter, or, for the present purpose, about equal weights of each, when a deposit takes place which, after being washed, is added to the silver bath and shaken well up. The portion that is not dissolved falls to the bottom. As a strong solution of nitrate of silver dissolves more iodide than a weak one, some prefer iodizing the bath when in a concentrated or strong solution, say sixty to eighty grains per ounce, and then, after saturating it, adding water to reduce it to the proper strength, by which addition all excess of iodide is precipitated. Every one to his taste; it is all the same in the end. The object to be attained is the preventing of the bath dissolving the iodide from the plates after the bath is in working order. It is proper to observe here that it is not necessary to iodize a bath in order to obtain a negative, for if a plate be removed before the solvent action commences, a good negative will be obtained; but one does not care to have to stand by a bath while a plate is immersed, and take it out just at the precise time; hence the convenience of the iodizing process.

The addition of one or two drops of nitric acid may now be made, so as to gently redden litmus paper; and, after filtering, the bath is ready for trial, or, we should say, both baths, for we have supposed two to be made, one from pure and the other from impure water.

Now, it is possible that the impurities in the water may be of such a nature as not to interfere in the slightest degree with its producing good negatives, and if this, upon trial, prove to be the case, nothing must be done to it. But if, as may possibly be the case, the shadows are clouded by a foggy haze arising from the organic matter, the following treatment should be resorted to. Add to the bath either a pinch of oxide of silver, or, by preference, a few drops of a weak solution of bi-carbonate of soda, to neutralize the nitric acid that was previously added, and when by this addition the bath assumes a slightly opaline appearance, let it stand exposed to the sun's rays for a few hours. It will at first darken, but, as the organic matter precipitates, the liquid will clear again, after which it is once more acidified, and will be found in splendid working order.

In order to allow the sun to perform (at any stage in the bath's subsequent history) the part of purifier, it is important that the liquid be brought to a state of neutrality or even to alkalinity. To effect this there is nothing more safe or excellent than a weak solution of bicarbonate of soda.

When, in course of long working, something is found to be wrong by the plates being full of pinholes, uneven, streaky, or deficient in sensitiveness, and this hitch is known not to arise from the collodion, give the bath the following course of treatment. If there be pinholes in the pictures, add about a fourth of its bulk of plain water. The probability is that there will be a slight yellow-coloured opalescence produced, caused by the liberation of iodide of silver. Remove this by filtering, and then, but not till then, add crystals of nitrate of silver, to bring up to the original strength of thirty-five grains per ounce. Pinholes are occasioned by the formation of a double salt of silver in the film (the iodo-nitrate), and this double salt is formed only when the silver bath is very fully charged with iodide; hence the value of the removal of a portion. It is also well recognized by many that by a solution of barytes to a bath that gives pinholes, this tendency is removed. In what way it acts upon the iodo-nitrate is not yet well understood. The strength and quantity of the solution to be added must depend upon the aggravated nature of the evil which it is desired to remedy; but a bath will bear a goodly quantity without showing indications of suffering from a surplus.

For remedying fogging, streaks, or stains, first reduce the bath to a state of neutrality by the bi-carbonate of soda, then place in the sun for one or two days, to get rid of the organic matter arising from the ether and alcohol of the collodionized plates. On one occasion, a bath of about a gallon was behaving in a very bad manner. It was neutralized and divided into two portions, one of which was exposed to sunlight for two days, the other having been placed in an earthenware vessel, and subjected to boiling heat for half-an-hour, followed by sunning for two or three hours. Both portions worked equally well after such treatment.

The addition of a few drops of a solution of cyanide of potassium has been known to restore to perfect working order a bath which was believed to be hopelessly bad. In what way the cyanide acts is not well understood; but too many instances of its beneficial action are on record, to permit the fact of its curative functions, under certain conditions, being doubted.

It should be borne in mind that, with the immersion of every plate in the bath, a portion of silver is abstracted, and that a few crystals of the nitrate should be added from time to time to keep the solution up to a proper degree of strength.

But it is possible to produce negatives of a high degree of excellence even from a bath of the worst possible description. In order to understand how this can be so, it is requisite to observe that the function of the bath is of a two-fold nature: it forms the iodide of silver, which is the sensitive material in the collodion film, and it also supplies the free nitrate of silver which is deposited by the iron developer to form the images; and we have found by many trials that the quality of such image is dependent not upon the quality of the nitrate bath by which the plate was made sensitive, but upon that which remains after such sensitizing has been effected. When a photographer has got a large bath which behaves in a reprehensible manner, and which it is not expedient for him to subject to a proper remedial course of treatment, let him use it for sensitising his plates; but let him have a second bath much weaker than the other, and composed of materials in good condition, into which the plate, after being sensitized, is removed and allowed to remain for about half a minute before being exposed. The result shows that the evils that would be attendant upon the preparation of the plate by the first bath exclusively have quite disappeared. It remains for the photographer to make practical application of this fact.

Sometimes, after a long career of useful work, a bath gets into such a chronically bad state as to defy medicine. One who has plenty of time at his command, and is fond of experimenting, may pour the solution into an evaporating dish, expose to heat to drive off the water, and after that fuse so as to get rid of all those impurities that fly before the action of heat. Bad baths may in this way be converted into good ones; but when it is considered that refiners give the full value, either in currency or new crystals, of the silver contained in old baths, quite irrespective of the working condition in which they happen to be, the reader may conclude that there is a stage in the history of a nitrate bath in which it is economy not to waste time over its restoration to primitive excellence.—*The Photographic Times.*

MR. MUYBRIDGE'S PHOTOGRAPHS OF ANIMALS IN MOTION.

The following, from the pen of Mr. W. B. Tegetmeier, appears in the *Field*:—

It may be in the recollection of some of the readers of the *Field*, that in No. 1383, which was published on June 28, 1879, I reproduced eleven instantaneous photographs of a racehorse, which were taken in rapid succession during a single stride of the animal. The very ingenious apparatus by which these photographs were obtained was designed by Mr. Muybridge, of California. In the interval between that date and the present time, Mr. Muybridge has so far improved the arrangements of his cameras, that he has succeeded in taking more than twenty consecutive photographs of a racehorse, from the commencement to the termination of a single stride. This is done by placing a series of cameras twelve inches apart along one side of the track over which the horse passes. As the animal comes in front of each camera he breaks a thread; this releases an electric arrangement by which a narrow opening is rapidly pulled across the lens, which is exposed for an infinitesimally short period of time, each photograph thus obtained showing the exact action and position of the horse when opposite the camera. This ingenious arrangement has been used to obtain photographs of the horse in every pace, namely, the walk, slow and fast trots, canter, and amble, as well as the gallop, and also when in the act of leaping over hurdles.

When seen single, these photographs of many of the paces, more particularly those which are rapid, are strongly opposed to the usual conventional drawings of horses in motion; but when they are placed in an optical instrument, designed by Mr. Muybridge, and by means of an electric light their shadows are thrown in rapid succession on a large screen, the exact natural movements are reproduced in a manner which is truly marvellous; and as the pace may, so to speak, be "slowed" so as to admit of more easy observation, a high degree of interest attaches to the exhibition, inasmuch as every movement of the gallop, walk, or other paces can be traced.

In a similar manner Mr. Muybridge has reproduced the walk trot, and gallop of the ox, the deer, and other animals. The representations of a greyhound in rapid motion are most interesting, as also are the exact reproductions of a professional walker exerting himself to the utmost, and of athletes running, wrestling, leaping, &c.

Mr. Muybridge has given an exhibition of these moving instantaneous pictures before H.R.H. the Prince of Wales, and also before the members of the Royal Academy; but, unfortunately, no arrangement has hitherto been made by which they are accessible to the public at large. In Paris they were viewed with great interest by Professor Marey, the highest living authority on the movements of animals.

These investigations respecting the paces of animals have a practical and artistic bearing of so important a character, that I hope Mr. Muybridge may be induced to carry them out to a further extent in this country. I should much like to see the arrangements for taking these instantaneous photographs erected in England, and feel convinced that much valuable information respecting the paces and action of our horses could be gained by this means, not to speak of the great interest these correct delineations possess when considered from an artistic point of view.

THE PHOTOGRAPHIC SPECTRUM OF THE GREAT NEBULA IN ORION.*

Last evening (March 7) I succeeded in obtaining a photograph of the spectrum of the great nebula in Orion, extending from a little below F to beyond M in the ultra-violet.

The same spectroscope and special arrangements, attached to the 18-inch Cassegrain telescope with metallic speculum belonging to the Royal Society, were employed which have been described in my paper on "The Photographic Spectra of Stars" (*Phil. Trans.*, 1880, p. 672).

The exposure was limited by the coming up of clouds to forty-five minutes. The opening of the slit was made wider than during my work on the stars.

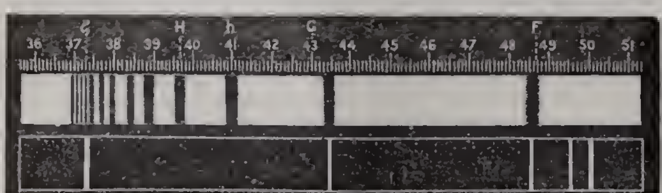
The photographic plate shows a spectrum of bright lines, and also a narrower continuous spectrum which I think must be due to stellar light. The bright stars forming the trapezium in the "fish's mouth" of the nebula were kept close to the side of the slit, so that the light from the adjacent brightest part of the nebula might enter the slit.

Outside this stronger continuous spectrum I suspect an exceedingly faint trace of a continuous spectrum. In the diagram which accompanies this paper the spectrum of bright lines only is shown, which is certainly due to the light of the nebula.

In my papers on the visible spectrum of the nebula in Orion, and other nebulæ (*Phil. Trans.*, 1864, p. 437, and 1868, p. 540; also *Proc.* Roy. Soc., 1865, p. 39, and 1872, p. 380), I found four bright lines. The brightest line, wave-length 5005, is coincident with the less refrangible component of the double line which is strongest in the spectrum of nitrogen. The second line has a wave-length of 4957 on Augstrom's scale. The other two lines are coincident with two lines of hydrogen, $H\beta$ or F, and $H\gamma$ near G.

In the photograph, these lines which had been observed in the visible spectrum are faint, but can be satisfactorily recognised and measured. In addition to these known lines, the photograph shows a relatively strong line in the ultra-violet, which has a wave-length 3730, or nearly so. The wide slit does not permit of quite the same accuracy of determination of position as was possible in the case of the spectra of stars. For the same reason, I cannot be certain whether this new line is really single, or is double or multiple. In the diagram the line is represented broad, to indicate its relative great intensity.

This line appears to correspond to ζ of the typical spectrum of white stars (*Phil. Trans.*, 1880, p. 677). In these stars the line is less strong than the hydrogen line near G; but in the nebula, it is much more intense than $H\gamma$.



In the nebula, the hydrogen lines F and $H\gamma$ are thin and defined, while in the white stars they are broad, and winged at the edges. The typical spectrum has been added, for the sake of comparison, to the diagram.

I cannot say positively that the lines of hydrogen between $H\gamma$ and the line at 3730 are absent. If they exist in the spectrum of the nebula, they must be relatively very feeble. I suspect, indeed, some very faint lines at this part of the spectrum, and possibly beyond λ 3730, but I am not certain of their presence. I hope, by longer exposures and with more sensitive plates, to obtain information on this and other points. It is, perhaps, not too much to hope that the further knowledge of the spectrum of the nebulæ afforded us by photography may lead, by the help of terrestrial experiments, to more definite information as to the state of things existing in those bodies.

* Reprinted, by permission, from *Nature*.

Correspondence.

THE PHOTOGRAPHIC CLUB.

Dear Sir,—An advertisement has appeared in the Photographic News calling photographers together to form a new society under the sham name of a club. The reason given for doing so is, that "the existing Photographic Club does not meet the requirements of the art, more especially in not reporting their proceedings." In this elegant diction is the reason expressed. The fact is, that the Photographic Club has refused to adopt any innovation which would be calculated to interfere with the functions of already existing societies, and wishes to retain the true club element. The proceedings of the Photographic Club are of a social and informal character, incubating, so to speak, material that will eventually produce topics for discussion in the existing channels; and I am induced to say this much, as the character of the advertisement alluded to is, to say the least of it, misleading, and may prejudice those who have meditated joining the Photographic Club.—I am, dear sir, yours truly,

C. Dunmore.

PROOFS AND RE-SITTINGS.

Sir,—As this question is a subject of considerable importance to the profession, it may not be altogether waste time if further thought is devoted to it. Naturally, every one must please himself as to the rule to be adopted, and locality and circumstances very materially alter the practicability of any plan.

My object in writing is more particularly to point out that photographers generally, not being good business men, look at this subject photographically, rather than commercially. I presume that the chief aim and desire of all professional photographers is to make money. Proofs, numerous or limited, finished or untoned, are only a means to serve this end.

Then the question of how the proofs shall be issued, what time and expense may be incurred, must always depend upon the price charged, and not upon an uncertain order that may eventually be obtained from the customer. The deficiency of one sitter might be counterbalanced by the profits on a more reasonable client; but even this is unjust, as every sitter ought to pay a fair percentage upon capital and labour.

My opinion is that 70 per cent. of average photographers have no idea as to what their photographs actually cost, and that by many transactions they really lose money, although they think they are gaining it. A rough estimate of cost of materials, with the crudest notions on the actual cost of skilled labour, is the most they arrive at. I remember one studio particularly, in a good business town, where the cost of labour was so out of proportion to the amount of work issued, that it was a financial impossibility for it to succeed, and yet that business should have been a lucrative one.

Finished proofs and re-sittings helped to make sufficient to keep every one employed, although the labour from *bona fide* sitters (I mean without profitless re-sits), might easily have been performed at much less cost.

Notice what "A Bond Street House," writes, about proofs "of no value intrinsically," although to "send them liberally" means time expended by operator, retoucher, printer, and mounter. Although "A doctor or barrister" does not charge for paper, any one of experience knows that the clerk's or dispenser's time is not forgotten in their fees.

Those firms who always demand one guinea as price of "sitting," can afford finished proofs (although I know a firm of this kind, with eight or ten studios, who always send untoned ones); but, with a medium-class establishment, at 10s. 6d. per dozen C.D.V.'s, for two positions, finished proofs are a serious expense.

If good dry-plate negatives, carefully retouched, with finished proofs, are sent out, and no charge made for re-sittings, I consider the proprietor must lose by every re-sitting, if really artistic work is the rule, and skilled labour employed.

Of course the photographer may reduce his cost of production should he do most of the work himself, and place a low rate of value upon his own time.

Our own arrangement is to send out slightly retouched but untoned and unmounted proofs for selection, with printed instructions for their return, and 2s. 6d. extra is charged should another sitting be desired.

I take the question as a purely commercial one, and if these terms are not attainable, I prefer to be without a profitless customer.

With every reasonable endeavour to keep pace with the times, turn out good work, and give universal satisfaction to clients, I always resist any transaction which does not promise to be fairly remunerative.

In estimating expenses, remember always that as a commercial speculation the proprietor is not necessarily the operator, and skilled labour must thus be added to cost of materials. GERMANICUS.

ADDING IODIDE AND CHLORIDE TO GELATINE EMULSION.

SIR,—I have tried the plan given in the NEWS last week, of adding iodide to the emulsion, and it is certainly a very simple one; in fact, I succeeded at the first attempt. Any one who has a dipping-bath still on the premises (and there are few who have not, I suppose, even among amateurs, like myself) will find the process answer. I put the scrapings from my collodion plate, after dissolving them, into the emulsion, before it had well cooled, and then straightway filtered; so that I do not think that the whole process of emulsion making took me much more than an hour. There is not, I think, any other way of making an iodo-bromide emulsion so quickly. Mind, I do not think that an emulsion with iodide or chloride—the latter, I find, gives most brilliancy and density—is always to be recommended. The little I added did accentuate the shadows most decidedly, as you say; but this is not always wanted. If great softness and detail are required, I think pure bromide is better. I send you some prints, which will make more clear what I say.—Yours faithfully,

J. HARTWIG.

INCANDESCENT LAMPS IN THE DARK ROOM.

DEAR SIR,—I have been making some experiments this week with one of the small incandescent lamps of Swan, for the purpose of illuminating the dark-room. So far as the light is concerned, it has been perfectly successful; the only troublesome thing is the battery power required. I use three of Bunsen's quart batteries; these give a very good and steady light for several hours, but I have not had sufficient experience as yet to determine how long they last without renewing the acids. The zinc plates should be kept well amalgamated, then they are tolerably durable. There can be no question of the very great advantages of having such a light in the dark-room where gelatine plates are prepared and developed. Besides its coolness over gas-light, we have the very great advantage of being able to cover or uncover, with a non-actinic shade, in an instant the light, so we can have at will a white or coloured medium with no trouble. This cannot so easily be effected with gas.

I am sorry I cannot give your readers more practical information, but no doubt, now attention is called to this subject, there are many who have had considerable experience in the use of the various batteries, and can make some useful suggestion. What is wanted is a permanent battery that would not often require renewal. There are, I think, such, but perhaps they are not of sufficient power to give a good light; but for the operating room a powerful light is not required.—I remain, dear sir, yours truly,

W. ENGLAND.

THE PHOTOGRAPHERS' ASSOCIATION OF AMERICA.

DEAR SIR,—At the request of the Executive Committee, and Joshua Smith, Esq., of Chicago, President of the Photographers' Association of America, I desire to extend through your columns a cordial and urgent invitation to the photographers of Great Britain to join us in our next Annual Convention, at Indianapolis, Ind., during the second week of next August.

Though we can scarcely hope for a personal presence we will be highly pleased to receive exhibits of photographic work from all who can find it convenient to send.

We would also like to receive stereopticon slides (portrait studies), or papers on topics interesting to the profession. Our Annual Conventions are largely attended. We have exhibits and exhibitors from every state in the Union, from Mexico, and Canada. Many photographers travel thousands of miles to be there. We can assure you that anything that may be sent to us from England will receive much attention, and greatly add to the interest of the occasion.

We are particularly desirous to see work made from the dry plate. The English dry plate has an enviable reputation, and American photographers would like very much an opportunity to compare them with their own.

We would suggest that for the sake of economy and ease in transportation, photographs may be sent in parcel shape.

The Committee appointed for the purpose will arrange them carefully in specially prepared cases.

The name of the maker of the plates, together with the time of exposure and name of lens, should be enclosed.

Exhibits will be returned, every care being taken to preserve them from injury.

Communications should be addressed to Joshua Smith, Esq., 206, North Clark Street, Chicago, President P. A. A.

Exhibits will be addressed, John Cadwalader, Esq., Indianapolis, Ind., Sec.—Yours truly, A. E. DUMBLE.

Rochester, N. Y.

Proceedings of Societies.

THURSDAY EVENINGS FOR PHOTOGRAPHERS.

AT the meeting held on the 23rd inst., Mr. C. G. COLLINS in the chair,

Mr. A. J. BROWN produced some plates prepared with chloride emulsion, which were from two separate emulsions, one prepared with chloride of sodium, and the other chloride ammonium; they were coated at the same time, exposed the same time, and developed side by side. The sodium image appeared first, but the ammonium plate quickly caught it up; and the results of his experiments were in favour of the ammonium, as being better and more sensitive. The plates were developed with Eder's formula, *i.e.*, ammonia and acetic acid in equal proportions, ½ an ounce, and water 1½ ounces.

Mr. BROWN thought that wood blocks for engraving purposes should not be wetted in any way.

The CHAIRMAN thought that the uranium was the best process for the purpose, and that there should not be a film of any kind, as it would be liable to chip under the graver.

Mr. HENDERSON passed round some specimens of etching of porcelain, which were prepared by depositing platinum on the image, then firing, the platinum acting as a glue, and sinking into the plate. They were then treated with fluoric acid, which dissolved out the image, and left a relief print.

Mr. MACKIE said that, having noticed lately in one of the photographic journals a method of increasing the sensitiveness of gelatine plates by treating with an alcoholic solution of potash, he had experimented, and could detect no difference.

Mr. CUTCHEY said he found the best and most reliable method of intensifying was, after well soaking the plate in water, and flooding it with a sherry-coloured solution of iodine, to again well wash, and treat with Wratten's formula.

Mr. OLDHAM (of Grahamstown, Cape Colony) gave an interesting account of the progress of photography in South Africa, and the difficulties encountered with the gelatine emulsion process, owing to the extreme heat of the climate; they were compelled to import plates from England (the cost of which by the time they arrived was about doubled), and their greatest enemy was frilling.

Mr. Cutchey, the chairman of the committee appointed to arrange for the ball, &c., in aid of the funds of the Photographic Benevolent Association, announced that the entertainment would take place at Seyd's Hotel, Finsbury Square, on Thursday, April 27.

Talk in the Studio.

Photographic Society of Great Britain.—The next ordinary meeting of this Society will take place on Tuesday, April 4th, at 8 p.m., in the Gallery, 5a, Pall Mall East, when a paper, "Some Remarks on the Sensitiveness of Gelatiue Plates," will be read by Captain Abney, R.E., F.R.S.

South London Photographic Society.—The next monthly meetiug of this Society will be held on Thursday next, April 6th, at 8 p.m., in the rooms on the Society of Arts, Adelphi. Mr. B. J. Edwards will read a paper upon "Gelatino-Chloride Pictures by Developmeut." Mr. Edwards will also develop some pictures, aud explain the process. Mr. G. F. Williams will show an Electric Instantaneous Shutter with Pocket Battery.

Mr. Muybridge's Instantaneous Pictures.—It is arranged for Mr. Muybridge to deliver a lecture on his now celebrated results, before the Society of Arts, on Tuesday next, the 4th April, at 8 o'clock p.m.

Electric Light in the Developing Room.—The incandesceut electric lamp for dark room use has already been adopted by several photographers. The best lamp for the purpose at present in the market is uudoubtedly Swan's two-candle carbon lamp. This requires three cells of Bunsen's, or the bichromate battery, aud is about the same size and price as the platinum lamp already alluded to. A photographer of our acquaintauce, to light up his outside show frame, proposes a couple of these miniature electric lamps placed inside. Here, then, is an application of the electric light under circumstances which would render gas quite inadmissable. Mr. Paterson, of 76, Little Britain, has just introduced into the market a portable arrangement, consisting of five cells of bichromate battery, and a five-candle Swan lamp; the whole beiug so compact as to be readily carried from place to place. We shall treat of this subject in detail shortly.

Some Chemical and Physical Effects of Light.—Interesting investigatious have been made by Lemoine, who finds that both sulphur and phosphorus are isomerized, while styrolene is rapidly changed into meta-styrolene. Chloral is polymerized and partially decomposed at the same time; and even acetylene undergoes condensation when long exposed to the action of light; while perfectly pure turpentine and cyanogen are unchaugcd. Gaseous hydriodic acid is decomposed, but its aqueous solution resists the action of light; and the same remark applies to a solution of silver-chloride in ammonia. Most of these chauges are effected to some extent by the red rays, although the violet rays are much more active.

Colours on the Retina.—It is related by MM. Macé de Lepinay and Nicati (*Jour. de Phys.*), that, after a mountaiu excursion, and five hours among snow-fields, one of them found all artificial lights in town—candles and oil lamps—to appear distinctly green, the effect lasting from 7·30 to 11 p.m. This case of temporary daltonism for red is attributed to the fatigue of the retina for red persisting much longer than that for other colours. The authors describe a simple experiment by which this persistence may be verified. Three coloured glasses are taken—red, green, and blue—which, with average illumination, all bring the visual acuteness to about the same value. Having nearly shut the shutters, and placed himself a few yards from a white board with printed letters of different sizes on it, the observer finds that, at the first, he can, with the blue glass, make out pretty distinctly the letters of medium size; whereas, with the red glass, the visual acuteness is so much reduced, that he cannot even distinguish the board. But, if the darkness be continued, he observes that, whereas the visual acuteness does not sensibly iucrease with the blue glass, he is presently able, with the red, to make out, first the board, aud then the largest letters. The visual acuteuess in the latter case increases, at first quickly, then more slowly, for half-an-hour, when it becomes nearly stationary. Green glass gives results intermediate between the others. It is important to remark that, in all cases, even after an hour and a-half, the visual acuteness with the red glass remains considerably less than with the blue.—*Nature.*

To Correspondents.

*** We cannot undertake to return rejected communications.

*** Our publishers desire us to call the notice of advertisers to the fact that, next Friday being Good Friday, the News will be published on Thursday moruing.

*** Erratum.—By a silly printer's error we were made to call "hydrofluoric" acid, hydrochloric acid in one of our "Notes" last week.

W. Richardson.—Return to your old system if you wish to produce the best results; the short cut is useful when quality of work may be sacrificed to convenience.

H. D.—1. Add benzole. 2. If you are really anxious to convert it into something photographic, you might, perhaps make it into a drying cupboard, a plate box, or a retouching desk; but you would probably spend more time than if these articles were commenced from the beginning, and it is quite possible they might not prove so convenient as the usual things.

H. Baker.—Such pictures are ordinarily silver prints, and we cannot give you full directions here for carrying out the process; but you will do well to study "Silver Printing," a new work which has been written on the subject by Captain Abney and Mr. H. P. Robinson.

Leo.—1. No arrangement can be better adapted for the purpose than that which you sketch. Use one of your ordinary cameras fastened up as shown in the diagram. 2. In many cases a portrait combination will answer well, and in others you may employ a symmetrical or rectilinear.

A. Read.—If you want the best results possible, it will be advisable to make enlarged negatives and to print from them. Excellent results may be obtained either with a carbon or a gelatino-bromide transparency.

C. A. M. W.—It is not at all likely that auy mischief will arise from the use of the india-rubber sheet if placed as you propose.

G. B.—1. You will find an article on the subject on page 2 of our present volume. 2. The method you suggest is not practicable.

C. Jackson.—1. Yes. 2. Soak a pound of glue in water until it becomes quite soft, then melt by heat and stir in half an ounce of potassium bichromate. 3. It would not prove very satisfactory.

Alpha.—We could not give you useful information in this column, but we will give a detailed description of tho method of working the process before long.

Alfred Newton.—See the "At Home" in onr issue of last week.

F. C. M.—At No. 3, Cheapside, London.

Swan Light.—13, Mosley Street, Newcastle-on-Tyne.

Dr. Ed. Liesegang.—Thank you for the books, which shall be noticed at the first opportunity.

Toner.—1. The addition of glycerine to the albumen is hardly desirable under the circumstances, but if any is used, the proportion should not exceed 2½ to 3 per cent. 2. Increased brilliancy and depth is the result. 3. A consequence of dampness, the presence of glycerine no doubt rendering the paper more difficult to dry. 4. As far as we remember, it was in the early part of 1862, or the latter portion of the previous year. 5. Such expedients, although recommended on the score of economy, are really expensive, as the quality of the work invariably suffers. 6 The solution of oxide of silver in nitrate of ammonia has been used with the greatest success by one well-known printer whom we could mention. It is prepared by dissolving 3 parts of pure nitrate of ammonium in 10 parts of water, and then adding an excess of freshly-washed and moist oxide of silver, the clear liquid being poured off for use as required. The oxide of silver is best prepared by dissolving one ounce of silver nitrate in 10 ounces of water, and adding caustic potash solution (liquor potassæ) until no further precipitation takes place. Several washings by decantation are required to remove all traces of soluble matter, after which the silver oxide should be collected on a filter and preserved in a moist state. About ten drops of nitric acid may be added to each pint of the sensitizing solution, and the paper only requires to be floated on it for a short period. Fuming is desirable. 7. Rest assured that we never feel annoyed when a correspondent asks numerous questions; and pray do not hesitate to send us the remainder.

T. C. H. (Thames Ditton).—Though not a strictly scientific way of putting the case, it is so common that to use exact and circumstantial language would look almost like pedantry.

Albumen.—Dissolve five grains of citric acid in a drachm of water, and mix this with a pint of your old bath; after which ammonia must be added until the solution is slightly alkaline. Next filter, render the liquid feebly acid with nitric acid, and evaporate until the required strength is reached, or make up the strength with fresh nitrate of silver.

Indignant.—There can be no doubt that a gross fraud has been attempted; but if you do as proposed, you will probably have to answer an indictment or a suit for libel.

THE PHOTOGRAPHIC NEWS.

Vol. XXVI. No. 1231.—*April* 6, 1882.

CONTENTS.

ARRANGEMENTS FOR OUT-DOOR WORK.

The bright spring weather having come upon us rather early this year, very many who intended to have all their landscape apparatus in working trim have doubtless found themselves forstalled by the bright sunshine, and light, rapidly-moving clouds of the spring time. Few will care to work the wet collodion process in the field now-a-days, although it seems but yesterday since we rode out on a tricycle, taking with us a set for whole plates, the tent folding up like a portfolio; and the fixing and intensification being allowed to stand over until our return.

As regards practical convenience, there can be but little doubt that the most convenient method of working is to carry a sufficient number of double dark slides; but the price ordinarily charged for double backs is so high as to frequently prevent the purchase of a sufficient number for a fair day's work. Next in order come changing boxes, complex pieces of cabinet work which appear strikingly easy to use when examined in the shop of the vendor, but he who carries one into the field is fortunate if he escape the combined efforts of damp to swell the wood, grit to prevent the smooth working of the sliding parts, heat to open joints or distort the wood work, and of badly-cut plates to put the whole system out of gear. In addition to these, he is not unlikely to fail unless he guard against the entry of light, by enclosing the box and slide in a dark cloth or bag when he shifts a plate; and this circumstance is calculated to increase the tendency to mistakes as to the order of exposure, especially when the bystanders are keeping up a continual volley of chaff regarding his strange movements.

A simple bag of black cloth provided with a large opening for the slide and plate-box, and two sleeves for the arms, will serve very well, and after a little practice it becomes very easy to change the plates from the slide to the box, and *vice versa*, without any assistance from the sense of seeing. In such a case it is convenient to have a separate box for the exposed plates; and if they are regarded as bearing numbers corresponding to the order in which they are placed, all confusion will be avoided.

When slides are used, it is necessary to take some precaution against double exposures, and we are inclined to consider that the best method is to employ slips of thin gummed paper, about the twentieth of an inch broad at the middle, and spreading out towards each end like the section of an hour glass. One of these is attached to the lower part of each shutter, so as to bond it with the frame of the slide, and when the shutter is withdrawn the narrow strip is ruptured.

An ordinary portable bellows camera is, considering everything, the most convenient. As regards size, little is to be said; this being a matter for the consideration of each individual photographer. We may, however, mention that in the case of a whole-plate camera which we recently had made, it was found of considerable advantage to provide an adapter, by which a set of fourteen quarter-plate double slides could be used with it; and as there were twelve whole-plate slides, a total of fifty-two plates could be carried.

The stand has long been a source of trouble to the out-door photographer, and innumerable devices have been resorted to with a view of concealing the tripod, and make it look like something else. We remember once to have had a very ingeniously-constructed umbrella-stand; but the last occasion when we used it was when a heavy rain-storm broke upon us, and the rustics were surprised to see the owner of a handsome umbrella prefer to carry it in its waterproof case, rather than use it to keep off the drenching rain. The form of tripod which we now prefer is so constructed that the divided legs can be drawn out and clamped at any length, and a good standing can be obtained on a slope or at the edge of a pavement—a position, by-the-bye, which is often best of all for street work.

He who takes only one lens into the field will probably do several times as much successful work as the man who takes the comprehensive series which many consider necessary; and where instantaneous pictures are desired, a portrait lens may do good service. It must not be forgotten that when the front lens of the portrait combination is placed in the position of the back combination, and with the flat or concave side towards the subject, we have an ordinary view lens; the central stops as usually placed being used. It sometimes happens that the camera will not expand sufficiently to admit of this arrangement, and in such a case the best method is to simply remove the back combination, and make use of the front lens and stops as already fixed. In this case, it is well to cover the bright brass screw-thread, left bare by the removal of the back lens, with a strip of black or yellow paper, so as to avoid reflection; and also to take extra care in screening the lens from bright reflections during exposure. Either of the arrangements just proposed will give better results for pure landscape work than can be obtained with the symmetrical or rectilinear, doubtless so much used in the present day; the slight barrel-shaped distortion arising in the first case, and the pincushion distortion which occurs when the single lens is in front of the stop, being of no moment.

The outdoor worker may defy any reasonable amount of wind by suspending a potato-net between the legs of his stand, and loading this with the most weighty stones he can find, especially if he watches for a period of calm. It may be noted that an approaching wind gust may often be detected by noticing the dust cloud which frequently accompanies it, or the bending of the tops of distant trees.

A LANTERN MANUAL.

We have received from Dr. Liesegang, of Dusseldorf, his new hand-book, "Die Projections Kunst," which forms a convenient manual of the magic lantern, and extends to near upon 200 octavo pages, and is, moreover, well illustrated with wood cuts.

The elementary principles of construction are treated of in clear untechnical language, and the various conditions which render special systems of lighting desirable are put forward in such a way as to help a novice in making a suitable selection. A useful comparison of various lights is given, and although a strict and scientific comparison would require minute details as to each light, we reproduce it, as likely to aid our readers in forming a rough estimate.

An ordinary paraffin candle	1
Argand gas-burner	16
Solar lamp	30
Sciopticon lamp...	39
Lime-light—oxygen and alcohol ...	100
do. oxygen and benzole ...	150
do. blow-through jet ...	190
do. mixed gases	427

Most of the usual forms of burner and lantern are figured and described, and detailed directions are given for so managing the lime-light so as to avoid all probability of an accident; and the following particulars regarding the repairing of damaged gas-bags will be read with interest.

One part of fine-cut sheet india-rubber, or of the (so-called) masticated rubber, is soaked in about half its weight of carbon disulphide, until a uniform viscous mass is obtained. For use, this is mixed with a convenient proportion of the following:—One part of similar rubber is heated until it becomes soft and pasty, after which half its weight of powdered resin is incorporated, and about $1\frac{1}{2}$ parts of oil of turpentine are added. The preparation is spread on pieces of india- rubber cloth or leather, and these are used to cover the defective parts; but it is advisable to also smear a little over the corresponding parts of the bag, and the patches should be retained in their places with pressure for some days in order to allow the composition to become thoroughly dry. Bags which are generally leaky, or which allow the gas to slowly diffuse out through the fabric, may be rubbed all over with the above waterproofing composition, and hung up in an inflated condition to dry. In some cases, a coating of glue and glycerine is better, and, to prepare this, the glue is soaked in water and melted in the usual way, after which about one part of glycerine is added for each four parts of glue originally used. The finished bag may be dusted over with powdered French chalk, should it have any tendency to be adhesive on the surface.

The addition of dry common salt to the usual oxygen mixture is recommended, on the authority of Professor Günther, as moderating the violence with which the gas is otherwise given off, and causing the evolution to stop almost as soon as the burner is removed from under the retort.

The following proportions are recommended:—

Chlorate of potassium	10 parts
Dry common salt	5 ,,
Black oxide of manganese	1 part

The photographic methods available for use in making lantern slides are described in tolerable detail, and careful directions are given for painting slides or tinting photographic pictures, while numerous mechanical arrangements for actuating movable slides are described. The latter portion of the book contains directions for performing numerous mechanical, physical, and chemical experiments in such a way that the results may be visible on the screen; and we also notice directions for raising Professor Pepper's once famous ghost.

At Home.

HERR HOF-PHOTOGRAPH VICTOR ANGERER IN VIENNA.

Vienna has long enjoyed a reputation for brightness and gaiety among European capitals. It now bids fair to lead the way by reason of the magnificence of its architecture, the grandeur of its public buildings, and the handsome character of its squares and public gardens. The Ringstrasse, as a thoroughfare, is likely to be unique; the broad belt of fortified wall and glacis, which formerly surrounded the city, has given place to a handsome and airy boulevard, with lofty buildings of white stone, green gardens, and verdant avenues. The fortifications, therefore, if they did not stop the Prussian army twenty years ago, have been useful in peace, if not in war; for, had they not existed, there could have been no open space around the city for the construction of a Ringstrasse, and Vienna would have been the poorer by its finest thoroughfare; while, from a sanitary point of view, it had been bereft of a healthy breathing apparatus. We doubt, indeed, if ever fortifications were put to a better use.

Viennese life has much of the *élan* of Paris life, while being peculiarly its own. The warmer climate permits of more out-door recreation, and consequently café and "Vauxhall life" are found in perfection; music is a part of the existence of a Viennese citizen, and waltzing is not an accomplishment, but a custom. The busy streets have a tinge of Eastern life about them—Turks from Constantinople, Greeks from the Levant, and turbaned Armenian Jews are occasionally met. The Graben, Kohlenmarkt, and Kärntner Strasse are always bustling and lively, the Viennese cab-driver contributing thereto his fair quota (for he usually drives a pair), and, with the loosest of reins, maintains his steeds at a hand gallop through the streets, let them be wide or narrow. The handsome Opera Ring (a bit of the Ringstrasse where the Opera is situated) forms a magnificent promenade, and so does the Volksgarten, which abutts the same circular street a little farther on. Verily, there is but one Kaiserstadt and only one Ringstrasse.

The name of Angerer has long been associated with the Kaiserstadt. It was not Herr Victor Angerer, however, but his brother, who first enjoyed the title of Court-photographer. The present principal is one of the most genial of men—suave, polite, and eminently good-natured. He is a keen sportsman, and a great fisherman, besides being an accomplished photographer. A more unpretending, courteous gentleman, it has not been our lot to meet.

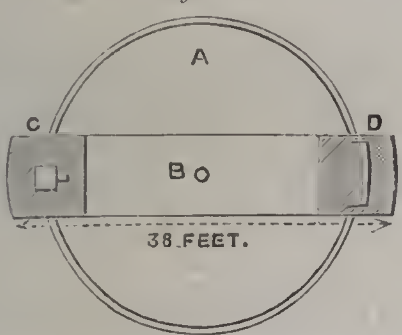
We visited the Angerer studio ten years ago. Then the glass-room was entirely of blue glass—perhaps the only establishment that has ever been glazed throughout in this manner; but, whatever theory may say as to the benefits to be derived from such illumination, in practice, white light has decidedly the advantage; the blue-glass studio of Angerer exists no longer. The present glass-room of the Court-photographer is very spacious and lofty, and, strange to say, it is the only instance we remember of a studio being "downstairs," for thither we are at once invited to meet our host.

But though asked downstairs, we do not leave the waiting room for the moment, and for this reason. A young lady and gentleman have just come from the studio, and are now at the further end of the room in conversation with a clerk who holds a ledger before him in his hands. The gentleman is arrayed in a tie of snowy whiteness, and the young lady, in bridal attire, carries a bouquet. They have been photographed in anticipation of the wedding, and are a little flurried; the lady evidently thinks the man with the book means marrying them out of hand, and perhaps a passing thought that she has been inveigled here for the purpose crosses her mind. In any case, she will have nothing to do with the clerk. The gentleman is equally timid, and objects flatly to give either his name or address, under the impression that he is being taken advantage of. "I have paid, and that's enough," cries the bridegroom. "But, sir, we must have some address to which we can send proofs," urges the book-keeper. The customer begins to see there is some force in this argument; but after a moment's thought he relapses into his fit of obstinacy again. "No, you don't want any address; I will call," and away rush the timid lovers.

The studio where Herr Angerer bids us welcome is said to be the largest in Vienna. It measures fifty-four feet in length, and at its highest is twenty-five feet. A gallery runs along the top of the room, which then slopes gradually down to the glazed side-wall, looking into a cheerful garden. Indian straw-matting is hung about the room, forming alcoves here and there—under the gallery—and altogether the apartment has the appearance of a fine conservatory or palm-house. Blue hangings are to be seen on the glass side, while brown hangings for the most part are on the other. For backgrounds, too, Angerer occasionally employs screens of straw or cane, such as are to be found in drawing-rooms, and in this way he produces portraits that seem to be taken at home. One movable screen we saw was very practicable, as it permitted the lighting up of the lower part of the sitter's garments most effectually. It was simply a stand with two movable surfaces, the top being of light blue, and the bottom of white, as shown in our sketch (fig. 1). Herr Angerer always poses, and indeed is a very hard worker in the studio.

We walk out into the garden. There is here a Swiss châlet or garden-house, with balcony, &c., erected solely for the purpose of taking groups and out-door pictures. It is painted a dark grey, the best colour, Herr Angerer finds, for a photographic background in the open. But what our host desires more particularly to show us is his enlarging apparatus, which is a wonderful structure. Imagine a turn-table, as large as those to be seen on our lines of railway; rails are laid down in a circle, and this big table on wheels then turns on its axis. The diameter of this circular table is no less than 38 feet. At one point, on the circumference, of this table is located the camera, with a recess or alcove built over it, and directly opposite, at the other margin of the table, is another small structure, under which the picture to be copied is placed. Here is a sketch of the whole arrangement (fig. 2). The camera under its alcove can be advanced and retired at will towards the picture. As both the camera and picture are in this way boarded over, no objectionable rays of light can strike either one or the other, while from the fact that the table carrying camera and picture can be turned in any direction, it is possible to choose the very best light for the object. The photographer focuses the picture, and then while still gazing at it on the focusing glass, gives the word to his assistants to revolve the turn-table; when the lighting is at its best, he cries "Halt!" the table is fixed, and the exposure is made. No rays but direct rays fall upon the picture. Certainly the arrangement is very perfect, and it is carried out on a grand scale.

Fig. 1.



A is the turntable, B is the pivot, C is the camera, and D the picture to be copied.

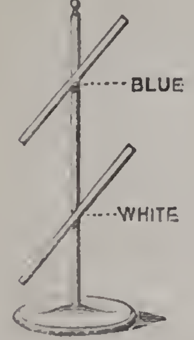


Fig 2.

"I only wish I could print faster," says Herr Angerer, alluding to his large negatives of four and five feet that stand here in their frames in deep shadow. Both silver and carbon printing—the only place in Vienna, where we saw carbon printing—are here in operation; but Herr Angerer cannot get satisfactory results, he says, unless the light is very diffused; and this brings us to the subject of enlargements, which Herr Angerer produces in a different way to that in vogue in this country. Moreover, when we detailed our usual method of making a small transparency in carbon to begin with, he replied that he had tried it repeatedly, but that it did not yield him such perfect results as his own plan. This is, to make from the small negative a large collodion positive, in the first instance, which is done in a dark-room fitted up like a huge camera; from this collodion positive, after careful retouching, is printed in a printing-frame a carbon print, which is developed on a glass plate. This large carbon impression on glass is of course negative, and rarely requires further touching before being employed to produce the finished print. The elaborate retouching is all on the first collodion positive, and not upon the carbon negative, and Herr Angerer believes that when the retouching has been thus translated, the finished effect is better.

Dark rooms and developing rooms open from the studio, which, as we have said, is "downstairs," from the front of the house, although on a level with the back garden. So that the washing rooms and laboratories are half-cellars, exquisitely cool and dark. Herr Angerer employs for his washing, fixing, and toning baths, very large, but very shallow wooden tubs, like low washing tubs, which are, indeed, exceedingly practical.

The "By-the-Bye" next week will be "Disease in the Dark Room;" the following "At Home" will be "The Bruckmann Establishment in Munich."

PHOTOGRAPHING ON COPPER.

BY MAJOR J. WATERHOUSE, B.S.C.,*

Assistant Surveyor-General of India.

It has long been known that copper exposed to the action of bromine, chlorine, and iodine becomes sensitive to light; but, so far as I can ascertain, this fact has never been turned to much practical account, and the only process I know of the kind is the one given in the Photographic News, vol. x, p. 190, as M. Mielcret's, in which a plate of copper is dipped in a bath of sulphate of copper, sea salt, and water, then washed and dried, and exposed to light under a reversed or unreversed negative or positive, as may be desired, for about five or ten minutes, the resulting image being fixed in a solution of hyposulphite of soda containing a little chloride of silver. Very good images may be produced in this way, but I have found the process rather uncertain.

Having lately been asked to produce photographs on copper of some rather intricate drawings of surveying instruments as an aid to the engravers, I tried bitumen with some success, where the drawings were in line alone. The polished copper plate is

* Read before the Photographic Society of Great Britain.

evenly coated with bitumen, and a print of the drawing, or, if suitable, the drawing itself, is laid down upon it and exposed the necessary time to light. On developing with turpentine, a reversed image of the drawing is obtained, showing the lines in bare copper on the bitumen ground. A little solution of platinum may be applied to blacken the lines, and, on removing the bitumen, the drawing shows up in a nice clear black on the bright copper ground.

This method being, however, only suited to line work, the question still remained how half-tones could be got. I then thought of trying the effect of the ordinary dry plate developers on the thin film of bromide of silver, obtained by silvering a copper plate and exposing the silvered surface to the action of bromine. My first trials were made by sensitizing the silvered plate in bromine water, and were tolerably successful. The bromine water was, however, very unpleasant to use, so I tried a five per cent. solution of bromide of copper in water, used in a dipping bath; and this I found answered well, and gave plates of great sensitiveness. Unsilvered copper sensitized in this bath also becomes very sensitive. I have been able to get fairly detailed images in the camera on the silvered plates with about four to six times the exposure of wet collodion; the unsilvered plates require longer. For contact printing under a negative a few seconds' exposure to diffused daylight is ample with either silvered or unsilvered plates, though the former are more sensitive and seem more even in their action. Before exposure to light, the plates are of a dull brownish-grey, darker in the plain plates than in the silvered, which are more yellow. The impressed image is quite invisible with short exposures, and it takes some minutes' exposure in sunshine to bring out a visible image. Both the ordinary alkaline developer, containing pyrogallic acid and ammonia (I used Edwards' formula, with glycerine), and ferrous oxalate, develop the image; but I rather prefer the latter, both for silvered and unsilvered plates. After development, the images developed with ferrous oxalate appear in red on a greenish-yellow ground; those developed with pyrogallic acid are darker and blacker.

For fixing the images on the unsilvered plates, a weak solution of cyanide of potassium seems to be the best. It does not dissolve the yellow ground, but clears it and turns it of a brighter yellow. The resulting images are of a rich brownish-purple, with pale yellowish lights. Hyposulphite of soda also fixes the images; but it dissolves the yellow ground, and unless great care be taken, the image breaks up, especially if developed with pyrogallic. The images fixed with plain hyposulphate or cyanide are powdery, and easily damaged by rubbing. Ammonia also fixes the images, dissolving the yellow ground; but with it also the images have a tendency to break away.

For fixing the images on silvered plates developed with ferrous oxalate, an old hyposulphite solution containing silver seems to answer best; and the resulting pictures, after the powdery deposit has been rubbed off, are very similar to Daguerreotypes, and show a very delicate half tone, particularly in places where a bright blue or purple tarnish comes over the shadows on drying. If the plates could be covered uniformly all over with this tarnish, the images would be very beautiful, and might find application for decorative and ornamental purposes.

I do not consider the process described above at all perfect as a photographic process for general use, and I find it somewhat uncertain and irregular in action; but practically it will answer well for the object I had in view of producing a photographic image in half-tone on copper plates, which can be worked over by an engraver.

The reversed images obtained in the camera would probably be useful for etching from nature, the lights and shadows being also reversed, just as they are on the etched plate.

At any rate, the wet development of these latent images on copper, being, as I believe, new, may be of interest to the Society; and I hope to be able to communicate further improvements.

A silvered plate, exposed under a negative for a few minutes in sunshine, gives a very clear image, either line or half-tone, which may be fixed in the old hyposulphite. If the powdery surface deposit be rubbed off, the resulting images are very much like Daguerreotypes, and are not so strong as those obtained by development, though they are quite clear enough to work upon. For practical purposes this method appears likely to answer better than the developing, being more regular in action.

[In continuation of this subject, we refer our readers to the valuable communication of Major Waterhouse in our columns last week, in which he gives a most complete list of etching fluids suitable for photo-engraving.—Ed. P.N.]

ON THE EFFECT OF THE SPECTRUM ON THE HALOID SALTS OF SILVER, AND ON MIXTURES OF THE SAME.

BY CAPTAIN W. DE W. ABNEY, R.E., F.R.S.*

There have been many investigations as to the sensitiveness to the spectrum of the haloid salts of silver, from the very earliest days of photography; and when the results obtained by the different investigators are compared one with another, there are often very wide discrepancies apparent. It appeared to me that it was desirable, if possible, to examine the subject afresh, and to endeavour to reconcile or to explain, as far as possible, these discrepancies.

The earlier investigators, such as Herschel, Hunt, Draper, and Becquerel, added much to the knowledge of the subject, but their researches were carried on at a time when the modern modifications and more powerful means of development of an image were unknown. Later investigators, including such eminent names as H. W. Vogel and Eder, have availed themselves of the modern appliances, but their results are not always consistent one with another.

In the following researches points are brought out which are, it is believed, new and deserving of attention, not only on account of their applicability to the practical working of photography, but also because they throw a light on molecular physics.

For solar photography it is essential that a knowledge of the relative effect of the various parts of the spectrum should be known, since, if the photo-heliograph be adjusted for one particular part, and the films employed be more sensitive to another part, it is manifest that no great sharpness of image can be obtained. The following researches, it is believed, show what an enormous effect the mixture of haloid salts has in shifting the position of maximum effect, and it may be possible to either alter the achromatism of the objectives employed, or else solely to use the sensitive compound to which the objective is at present adapted.

Apparatus Employed.—The spectroscope employed in these researches was that already described "On the Effect of the Atomic Grouping of Molecules."† Two prisms of medium dense and colourless flint glass were used to obtain the necessary dispersion. They were set to have the angle of minimum deviation near G. The angle of dispersion between A and H was about $6\frac{1}{2}°$, the length of spectrum between these two lines was about $2\frac{1}{4}$ inches, the spectrum in the ultra-violet extending some $1\frac{1}{4}$ inches beyond H, and the infra-red about $\frac{3}{4}$ of an inch beyond A. The whole spectrum as given by the prisms under consideration thus had a length of $4\frac{1}{4}$ inches, a length in which all phenomena could be fully recognised and measured.

Sources of Light.—The sources of light employed were the sun and the crater of the positive pole of the electric light. Images of these sources were thrown on the slit by means of a condensing lens alone in the second case, and by it and a heliostat in the first case.

Vehicles holding the Sensitive Salts.—The sensitive salts were held *in situ*, in paper, in gelatine, and in collodion, in the last vehicle the salts being prepared either as emulsions in fluid collodion, or by the ordinary silver nitrate bath process. In gelatine the salts were all prepared as emulsions; when in paper they were prepared by soaking it in a soluble haloid salt, and floating on solution of silver nitrate. The question of the production of sensitive silver haloid salts on a metallic silver plate I have left to be considered later, since it has no direct bearing on the points I wish to discuss in this communication.

Exposures.—When it was desired to obtain the expression of the action of the spectrum by its direct effect without the intermediary of a developer, the slit of the spectroscope was opened to a width of $\frac{1}{20}$ of an inch, and the exposure prolonged for five to twenty minutes. When the effects had to be shown by development, the slit was closed to $\frac{1}{300}$ of an inch, and exposure given varying between $\frac{1}{4}$ second and one minute or even two minutes. By having a shutter at the slit of the spectroscope it was easy to give two exposures on the same plate or paper, using half the length of the slit for each exposure. This was excessively convenient, since it allowed the different phenomena arising from different methods of exposure to be accurately compared together. The principle on which the exposures were given was as follows. —1st. An exposure was given to the plate, when a pale solution of chromate of potash so dilute as to cut off the spectrum above E was placed in front of the slit. This exposure was in all cases prolonged in order to see if there was any action produced, how-

* Communicated to the Royal Society at the request of the Committee on Solar Physics. † "Phil. Trans." for 1881; Part 3.

ever feeble, by the spectrum remaining unabsorbed. The next exposure was always taken with the slit unshaded, and on the same plate (or paper) as the first exposure. After a certain interval of time had elapsed, the yellow chromate was again placed in front of the slit, and the exposure continued. The reason for adopting this plan was that the effect of diffused white light (diffused from the prisms during unshaded exposure) would thus be differentiated. Thus, supposing it was found that the first exposure caused no sign of a change in the sensitive salt by the exposure to the spectrum unabsorbed by the chromate, but that the unshaded spectrum caused an action on these parts, it would be evident that the action of diffused light had played a part in causing such an action.

When such phenomena resulted, plates or papers were first exposed to the unshaded spectrum through the chromate solution, then withdrawn from the camera and exposed to the diffused light of the laboratory for a fraction of a second, or for eight or ten seconds, according as the experiment was to be conducted by development or by direct printing action, and again inserted in the slide and exposed to the action of the partially absorbed spectrum. If the experiments were rightly conducted, the results of the last two should be confirmatory of the first two exposures. Other plates or papers were then exposed, giving, unshaded, one half of the slit of a short period, and the other half for a period ten to twenty times as long. By this system all the phenomena met with could be differentiated and traced.

Localities of Maximum Action.—I have followed the usual custom of writers on this subject, and shown the top of my curves as the place of maximum action. Although this correctly shows what appears on the photographic plate, yet in all cases it is apt to give a false notion regarding the effect of the spectrum. If we look at the energy of the spectrum in its different localities, we find that it rapidly decreases as it approaches the violet and ultra-violet. If this diminution of energy be taken into account, it will be found that usually the point of maximum effect nearest the violet indicates the region where the absorption of the rays becomes total, and that the shading off towards the ultra-violet is really only due to the diminished energy of that part of the spectrum. In other cases—as, for instance, where there are two maxima—this will not apply to the second maximum.

(To be continued.)

DEVELOPMENT IN CONNECTION WITH DENSITY AND BRILLIANCY.

BY T. SEBASTIAN DAVIS.*

During some researches made at the conclusion of last season in connection with bromo-gelatine plates prone to give thin and somewhat fogged negatives, I experimented with some differently constituted solutions. It occurred to me that the action of a bromide salt, in its capacity as a fog-restrainer, was connected with its power of forming an insoluble salt with any reduced silver. It seemed, therefore, that if a salt having an alkaline reaction could be substituted, and yet capable of forming an insoluble compound with silver, some advantage might be gained. The two most likely ones to fulfil these requirements are the borates and phosphates of soda, the latter of which, upon trial, offered the greater advantage. Ordinary sodic phosphate ($Na_2H\ PO_4 + 12\ H_2O$) added to the pyrogallic developer produced a marked influence in securing increased density and brilliancy. The most favourable manner in which I have since used the salt is by dissolving about one ounce in twenty ounces of water, and covering the plate therewith for a few seconds, and then pouring it off, afterwards proceeding with the development made of twice its ordinary strength. The sodiac phosphate solution is a powerful restrainer, but its use does not necessarily necessitate longer exposure. The first trace of an image appears very tardily, but the development afterwards progresses with great regularity and rapidity. The film remains clear, notwithstanding the discoloration of the alkaline pyrogallic mixture. The developer I usually employ, without the phosphate treatment, is two grains of pyrogallol dissolved in four drachms of water, two minims of ammonia ·880, and half a grain of potassium bromide dissolved in another half-ounce, and the two mixed immediately before being poured over the plates. Each plate should be fixed in a fresh portion of hyposulphite, to avoid stains.

The above method of development will, I think, be found valuable in cases in which brilliancy and intensity in the finished negative would otherwise be deficient.

* Read before the Photographic Society of Great Britain.

THE RELATION OF THE HUMAN EYE TO THE PHOTOGRAPHIC CAMERA.

BY WILLIAM PEEK.*

It has been a frequently discussed subject by the public and the photographic world, that the human eye and the camera stand in a close relationship. Now to examine the correctness of this generally accepted idea ; at the end of last year, a gentleman, in a communication of his to the "Halifax Photographic Club," endeavoured to prove that the camera and the eye are in close relationship ; and as he but expressed the opinion held by the majority, I have taken the liberty of quoting from his paper. The diagram I have brought with me is similar to the one he used to explain his lecture. He here shows the cornea, the crystalline lens, the diaphragm, and a sort of optic nerve ; but he neglects to point out two refracting media, which I shall have occasion to speak of presently. Firstly, he pointed out the iris as a self-adjusting diaphragm, and explained that, directly the vision becomes centred on a landscape, the iris adjusts itself, and all is directly in correct focus ; the forground being nearest the eye, commands the chief focus of vision ; the middle distance, as it recedes, getting out of the range, becomes of necessity less sharply defined, and the extreme distance still less decided in character. Hence the folly of making the lens into a telescope by using too small a stop, so bringing distant objects into the sharp definition which only correctly belongs to the immediate foreground. After some other observations, the gentleman says,—"The lens should contain the same angle, or field of view, as is contained in the eye ; this ranges from fifty to sixty degrees. It is therefore plain that the eye is a long focus lens, of a limited angle of view. Now, in the old single lens we have that which gives an angle of view the nearest approach to that of the eye ; all other angles must, therefore, be impossible ones." Here the author of the paper states that, immedialety the eye is centred on a landscape, all is directly in correct focus. But, in fact, one point only is focussed ; but there is still a consciousness of the form of the objects surrounding this point, and this consciousness is culled from previous experience. The moment the eye has received the idea of the form of the point mentioned, the eye focusses another point, giving only a blurred image of the first point, which the mind fills up with the aid of remembrance ; thus the eye conveys the impressions of the image by a succession of images respectively focussed on a succession of points, all with such rapidity that the impression on the mind is of a complete-focussed general picture, and, of course, the eye receives a clearer impression of the nearer objects than the more distant ones, because less atmosphere intervenes between them and the eye. Were the eye (incapable of movement) to be fixed on one object, were the observer incapable of moving his head, or of moving on his feet, then might the human eye bear some relation to the camera. But we know this is not the case ; for the eye has a mean vertical angle of 50° above and 50° below its line of axis. The head, with the movement of the eyes, has a vertical angle of 195° : the head, with the eyes, has a horizontal angle of 237°.

The eyes alone have a horizontal angle of 121°. The head alone, with the eyes fixed, has a horizontal movement of 116° ; and a man can easily turn through about 390° with one movement of his body. Let us call the angle of a certain picture 85° ; where, then, is the similarity—the eye moving in a moment through all the angles mentioned, the lens having but an angle of 85° ?

Therefore, in composing a picture, it is necessary, if we wish to give a pleasing effect, that the picture should contain a large and varied sweep of vision ; although the eye, strictly speaking, does not focus this, but compensates for it by its varied movement. It is held among artists, and also among photographers, that all the accessories should point to the principal object, or the idea, suggested by the picture. The way that photographers generally understand this is, that should they be called upon to take, say, a portrait, they sharply define the figure, while a balustrade, a pillar, or the portal of a near mansion (which are too often considered necessary accessories) are all thrown into one blurred mass. Few photographers have the art at their command of introducing interesting accessories without spoiling the principles of the picture. I observe that lately a photographer has broken through this custom, and struck out a bold path for himself, by publishing a photograph of Mr. Ruskin surrounded by a pleasing natural background of trees and ferns. The background is in sharp focus, each plant having its individual interest ; and Mr. Ruskin appears more at his ease than if he had been photographed unnaturally leaning against a pillar, with velvet curtains overhead.

The artist photographer must remember, when struck with the beauty of a subject for a picture, that its capabilities to become a pleasing photograph lie in its character, interest, or form; for although, to the eye, colour or distant surroundings, or to the ear, pleasing sounds, or to the mind, sweet memories, may make the picture before him, yet but three of these will be reproduced by the aid of the camera. Often, when a picture is pleasing upon the focussing-screen, the image on the developed plate will lack interest; it is because colour was the attraction of the original. In these points which I have mentioned, I think the human eye and the camera bear but a very small relationship, and that exists in their both being able to transcribe forms.

And here I may suggest that, in ordinary landscape dry-plate practice, much disappointment might be saved, did the photographer thoroughly analyze to himself what constitutes the charm of the picture he is about to perpetuate.

Mr. Heighway has said that "the ultimatum of a picture lies in a suggestion," and, in this way, by clever and astistic handling, may the camera be made on an equality with the human eye. For that the eye is chiefly an instrument useful as giving suggestion, I think may be proved by the fact that persons seldom read the figures on the face of a clock, but merely judge of the time by the relative position of the hands. That this is so may be demonstrated by the many clocks designed by Sir Edmund Beckett, which have stars in place of the figures. The clock at the Town Hall at Manchester has a similar arrangement, and yet no difficulty is experienced in at once telling the time; in fact, the absence of the figures themselves is seldom noticed. Another and better example of this may be given in the old double-needle instruments used for telegraphy. In this case the dials were at a much greater distance apart than could be focussed at one time by the eye, yet the eye so quickly caught each composition of the deviations of the needles, that the instrument could be read with facility. I lately tried an experiment by putting two single-needle instruments at such a distance that the angle taken to them from the eye would equal 130°, yet I found I was perfectly able to comprehend the deflections on each; hence I think we may conclude that, in each of these cases, a suggestion only is given by the eye, whereas the rest is filled up by collateral knowledge; while in the camera we must, to a very great extent, absolutely define what we wish to depict. And Mr. Heighway also holds "that the object of every composition is to place the matter of the work before the observer, so that, supposing him to be tolerably intelligent and sensitive, he may be able to grasp the intention, motive, and scope of the work, and to sympathize with it."

What I have said may, I think, be illustrated by the photographs which I have brought. In the two by Mrs. Cameron there is a story or impression conveyed to the mind which we so seldom see in modern photographs. I am, of course, aware that Rejlander's "Two Ways of Life" is a composition picture; but in no portion of that is anything willingly placed out of focus. In Mr. H. P. Robinson's great picture, "When the Day's Work is Done"—which, I believe, is also a composition picture—the peasants, the cottage interior, and the landscape seen through the window are all sharply focussed; yet, in the case of the human eye, only one such portion of the picture could be seen distinctly at the same moment, although the eye would rove so rapidly from one subject to the other that it would give the same effect. Hence it is that the greater depth of focus that can be obtained by photographic lenses, the more pleasing and artistic the result will be. In all cases where I have referred to the "camera," it must be understood to comprise both the camera, the lens, and the focussing-screen. We must only regard the camera in the light of a rude mechanical contrivance, which, however, is the best we are as yet acquainted with for chemically producing delineations of light and shade. So far from believing in this supposed relationship, I think the camera is to the photographer, as the palette is to the artist, his means of expressing his ideas by pictorial representation; but, in the hands of the unskilled, they both are useless. Some photographers have lately been telling us that we must not expect every one to be a born artist. This is perfectly true; but if these gentlemen are lacking in artistic culture, how comes it that they are engaged in a profession that ought to be a truly artistic one? It would be just as sensible if a man were to set up as a shoeblack, but profess his ignorance of how to shine boots.

In conclusion, I have to point out that the eye is no single lens at all, but is a triplet, having three compound refracting media: firstly, the cornea and the aqueous humour; secondly, the crystalline lens; thirdly, the vitreous humour. Therefore, if we wish our lenses to be like our eyes (if that is of any advantage), we had better use triplets, rather than the old-fashioned single lens recommended by Mr. Clement Williams.

There is yet one more point to clear up, and this is, "How does the eye focus itself for various distances?" Now, this is the most difficult of all questions to answer, for no one quite knows how this is accomplished; but the most generally-accepted explanation is that which ascribes it to the slight advancement of the lens to the cornea for the focus of near objects; this is caused by muscular contraction. At the same time, the lens is rendered more convex by the same power, acting through the posterior elastic layer, which not only converges the rays more quickly, but also slightly increases the length of the axis of the eye.

PASSING THOUGHTS.

BY J. H. T. ELLERBECK.*

I have been asked, or rather commanded, by our ever-to-be-obeyed Secretary, to supply a paper for this evening. Perhaps if a few stray thoughts were jotted down, which otherwise might be forgotten, it may be useful; whether they are worth recording is for you to judge.

Some years ago I read a paper on "Exposure." I see Mr. L. Warnerke has turned his attention to the subject, proposing to persuade makers of lenses to mark all these and their stops with a number which shall denote the rapidity thereof, and suggests $\frac{f}{a}$ squared and divided by 4 as the quantity. The principle is good, as it saves others from taking the trouble of making the calculation which I then advised; but I would urge rather that the figures thus obtained should not be divided by 4, but left as they are, as they show at once the relative value and are more readily understood for any lens already made, or may be sent out without being so marked. Many makers might see the utility of the one without seeing the force of taking any standard of rapidity other than their own, especially as it is quite unnecessary. In coming to any decision on this point it should be remembered that it will affect more the lenses already made than those to be made. There is no doubt that if a definite quantity were given to each stop, references to exposures, &c., would be more intelligible than now; but that quantity must be made on a basis which would be understood by all, otherwise it would be worse than useless. For that reason I maintain that the first and undivided figures arrived at are the best, because the simplest.

I thought, too, that if makers of dry plates could be induced to mark them with a number indicating their rapidity it would be good. It could easily be done in conjunction with the foregoing, thus:—The bulk of plates I have tried (and their name is legion) require for an ordinary subject as many seconds for exposure with $\frac{f}{20}$ (=400) as it takes minutes to make one tint equal to the Autotype actinometer, or the 3rd of Woodbury's. Could not this be taken as a standard, and call such plates 30 (30 seconds being the time required to form one such tint in the best English light we ever get)? A quicker one might be 20, or the (at present) quickest 10, slower 40 or 50. This, of course, is only a suggestion; but there can be no doubt that some such method would be better than vaguely stating they are 10, 20, or even 30 times quicker than wet plates—themselves always variable. Perhaps when Mr. Warnerke's committee looks after the making of lenses it will look after the marking of plates also.

I have been thinking it is a great pity that stereo. views are so utterly gone out of fashion. I intend this year to devote a portion of opportunity to this branch, using the stereoscope as made by Warner. It is a great pity, too, that panoramic views cannot be utilised for this purpose. I cannot but think it is only due to a mechanical difficulty, which may some day be overcome.

Taking of panoramas: I generally, when it is possible, take two on one plate, one above the other, oblong, so that, if the sky be dense enough, each can be printed on the lower half of a whole piece of paper, and clouds printed in afterwards, thus getting two whole-plate pictures out of one plate. To do this without losing a quarter of an inch in the centre, as is the case with extending dividers, I substitute a metal plate with a hole the size of half the plate cut out. Placing this in a groove before the dark slide, and then reversing it for the second exposure, I find that not a sixteenth of an inch is lost. The same for

* Read before the Liverpool Amateur Photographic Association.

upright, half, or quarter-plates, so that it is equally possible to get four pictures on the same plate, only taking care to give the same exposure to each, or there will be a difficulty in developing. In order to expose the lower half of the plate properly, I have made the front to slide down; and to avoid a long slit—a possible reverse of light in the camera—there are duplicate screw-holes at intervals downwards.

I have been thinking that whether we get our studio or no, many of us would be glad of a practical demonstration in posing. To me and to many others this is a most unsatisfactory task, and one we are often apt to shrink—whether it is the introduction of figures in a landscape or trying to portray a friend.

I have been thinking for a long time that, if those who can afford to do so would mount their pictures on separate mounts and get them bound afterwards, they would in their unbound state be available for exhibition at St. George's Hall and our own private show. It would be thus a great help to our hard-worked Secretary, who has at such times enough to do in arranging without hunting for them. I don't know where we would have been last year if it had not been for Mr. Watling's collection, so few were the contributions.

I have been thinking it should be an understood rule that all members be represented in our portrait album, with their names and date of entry beneath; said album to be always on the table during the meeting. This would be of great assistance in our social relationship. We are very much "at home" here to-night, but I cannot help noting that we form two sections—old and new—which, like the Arve and the Rhône, move side by side silently, only very slowly intermingling. While on this subject I would like to make another remark. I find the bulk of those who attend the Tuesday "at homes" are old friends. Now, without wishing these to stop away, I want to see new faces, that they may become old friends. This was one of the objects in proposing these meetings.

I notice in the News that Mr. Warnerke suggests rolling sensitive paper tightly round a roller to protect it. Having adopted this plan for many months, I can safely recommend it. The outside sheet can be used as a wrapping-paper for successive parcels, acting as a filter to the deleterious effects of the atmosphere.

When Messrs. Morgan and Co. first brought out their argento-bromide paper, they, in reply to a suggestion, promised to turn their attention to making it so that the film could be transferred from the paper when finished. The uses of such paper would be great for negatives, transparencies, &c. Perhaps a reminder may bring some result this time. If so, I hope they will fulfil their promise to send me some of the first batch.*

In anticipation of that good time, and for use with gelatine films, I utilise the present double dark slides, only dispensing with the inner division, making a block of light wood or card-board the requisite thickness—that is, a little more than double the thickness of ordinary glass plates. I place the films on each side. Of course when the slide is closed the films or papers are held tightly in their place by the pressure round the edges. (If blocks like Warnerke's are supplied they will be much flatter and more convenient.) If they show any signs of bulging, a coating of india-rubber solution to each will make them stick securely. Glass can, of course, be used with advantage, but wood is lighter. The arrangement allows all to use their ordinary slides without additional trouble or expense.

I have been thinking I have been taking up much valuable time this evening in what will be uninteresting to many. The demand of our worthy Secretary is my only excuse.

* Since writing the above I see that Messrs. Morgan and Co. have succeeded in this very enterprise, and the Editors speak of it in glowing terms. I immediately wrote to the makers, but unfortunately was not able to obtain any sheets for trial. By our next meeting it is to be hoped they will be ready, as our working time is rapidly approaching, and wise folks are laying in a stock of materials before the warmer weather commences.

ON A NEW DEVELOPER.

Captain Abney, at the last General Meeting of the Photographic Society, made a communication regarding a new developer. He said that, in connection with the subject of phosphates, he might mention a new developer which he had lately used as a scientific novelty. Hypophosphite of soda might be used, instead of ammonia, with pyrogallic acid. About twenty minims of a saturated solution in water took the place of the same quantity of a ten per cent. solution of ammonia. Plates which had been terribly prone to green fog when developed with it gave no trace of such an evil. This he looked upon as important, because it gave a clue to the cause of its production. The hypophosphites reduced silver salts to the metallic state; hence it might be proved that they are more energetic than ammonia.

Mr. Berkeley was surprised to hear Captain Abney's experience with hypophosphite. Some time ago he (Mr. Berkeley) tried using hypophosphite in conjunction with the hydrosulphite developer, but could not say that he had found it an improvement. It did not seem to add to the reducing capacity of the developer. The action was very slow, though, of course, that was also the effect of the hydrosulphite when used alone. He was speaking of collodion, as he had not tried it with gelatine. If ammonia was added to the hydrosulphite, it quickened the action.

Captain Abney: But then you are developing with ammonia. The hydrosulphite developer is very slow, but the hypophosphite is not.

Mr. Berkeley: It is curious the hypophosphite did not make the hydrosulphite more rapid.

Captain Abney: You used it with hydrosulphite, and I used it by itself. If the members try it, I think they will not get any green fog; and for that reason, as throwing a light upon the origin of this fog, I look upon it as interesting.

Mr. Spiller inquired whether Captain Abney had succeeded in developing with hypophosphite alone.

Captain Abney: You must use bromide with it, of course.

Mr. Bird: It replaces ammonia in the developer?

Captain Abney: Yes.

Mr. Maxwell Lyte: With the many new processes consequent upon the use of gelatine, I think that any improvement in developing is of the highest importance. I would add to the list of developers one other deserving of study, and that is glucic acid, obtained by taking grape sugar and saturating it with hydrate of lime or any alkaline earth capable of being subsequently extracted by precipitation. By the addition of oxalic or sulphuric acid, glucic acid is separated, while the lime is separated as an oxalate or a sulphate. As a developer, glucic acid possesses some properties which render it worthy of experiment. It gives a negative when used alone, but with not much intensity. I find intensity can be increased by mixing it with an iron developer, the action of which seems considerably improved by it.

A SUGGESTION FOR IMPROVING THE CLEARNESS AND PRINTING QUALITY OF GELATINE NEGATIVES.

BY W. WILLIS.*

It is generally conceded that no thoroughly satisfactory method is known for the intensification of gelatine negatives. The suggestion now offered is not put forward as a solution, but rather to direct attention to untried or neglected methods.

I believe it is pretty well known that the action of acid ferric oxalate on metallic silver results in the formation of silver oxalate. If, then, a solution of ferric oxalate be applied to a negative, the dark silver image will be rapidly converted into a white image of oxalate of silver. The silver in this image may be reduced by a subsequent application of the ferrous oxalate or alkaline pyrogallic developer, but preferably by the former.

On applying this method to gelatine negatives it will be found, especially with negatives having a yellowish tint, that the shadows are cleared, while the high-lights are increased in density.

In the early days of gelatine, a large number of very yellow, feeble, and sickly-looking negatives were produced. To anyone who is possessed of such, and wishes to improve them, I would suggest the following method, which, in my hands, at least, has been perfectly successful:—

Apply ferric oxalate to the negative until the image has been whitened right through to the back of the plate; then rinse well in water for two or three minutes, and afterwards apply the ferrous oxalate developer. This will, in most cases, give a rich brown coloured negative free from the all-pervading yellowness it previously had, and much improved in printing quality.

It should be noted that the image, after the application of the ferric oxalate, frequently appears rather yellow in colour than white; and that the ferrous oxalate developer usually takes some little time before the full density is produced.

I have been endeavouring to find a simple plan for the inten-

* Read before the Photographic Society of Great Britain.

sification of negatives by means of platinum. The following method has, in some cases, been successful. The negative is first whitened by ferric oxalate ; it is then washed in distilled or rain water, and afterwards treated with a weak solution of potassic chloro-platinite. This salt decomposes the silver oxalate, with the formation of argentic chloro-platinite—

$$C_2Ag_2O_4 + K_2PtCl_4 = Ag_2PtCl_4 + C_2K_2O_4.$$

On now applying the ferrous oxalate developer, all the silver will be reduced, and with it some metallic platinum. The platinum salt has, unfortunately, a great affinity for gelatine, with which it forms an insoluble compound, and this fact may account for some failures which have occurred. I have in some cases used the potassic chloro-iridiate instead of the platinum salt ; but it seems to have no advantage over the latter.

Notes.

Major Waterhouse, the Deputy Surveyor-General of Ordnance in India, promises to send us a further paper on photo-engraving and photo-etching processes next week.

At the annual dinner of the Syndicate of Photography in Paris last week, it was resolved to raise a fund for a monument to the late M. Poitevin ; five hundred francs were subscribed at the outset.

There are at this moment two regal photographers in Europe, the King of Portugal and the King of Servia ; the former is a member of the French Photographic Society, the latter a landscape photographer of considerable ability.

Electricity and photography are just now working hand in hand with a result of which few people appreciate the importance. The electric light in the studio has been made much of recently as an effective means of taking portraits, and electric studios are now to be seen in the principal capitals of Europe. But a far more valuable application of electricity has meanwhile been gaining ground in London and New York. We mean the copying pictures and sketches for publishing purposes.

Some months ago we gave an account in these columns of a visit to a City Photo-type establishment. At that time the camera work was done by daylight, but still so quickly were the different processes carried out, that it was sometimes possible to fulfil them all within twenty-four hours; that is to say, if you brought a sketch on paper into the establishment at noon one day, by noon the following day you would receive a zinc photo-type block ready for the printing press. Our cheap illustrated journals cannot afford woodcuts, so they get printing blocks made in this way from a black and white sketch upon paper.

Instead of four and twenty hours, the work is now done in three or four. The artist finishes his sketch late at night, and in the early morning the photo-type block is already in the machine printing off pictures along with the letter-press. Indeed, in the City, they prefer to do the camera work at night, for there is then no vibration in the studio. The artist's sketch is stretched on a board, a wet collodion plate is put into the camera (for collodion is more easily intensified), and by the aid of the electric light a negative is secured. The film is rapidly dried, and then, on prepared bichromated paper, an impression is secured, also by electric light, which, quickly moistened and treated with greasy ink, is now pressed upon a lithographic stone. The lithographer rolls up his impression, improves it to the utmost of his ability, and then takes off an imprint, which is pressed against a sheet of zinc. The latter is put into an acid bath (very slightly acid to begin with) and gradually the metal is eaten away, except where protected by the greasy lines forming the sketch. In three hours, as we have said, the hollowing out of the zinc plate is complete, and the photo-type is in the hands of the printer.

The big posters one often sees that display an enlarged sketch of a sensational picture, to be found in some newspaper or other, are generally produced by photography. At the photo-type establishment an enlargement of the artist's sketch is made in the camera, and a large greasy imprint then transferred to a zinc plate of giant size, which is etched in the ordinary way. The publisher thus gets rid of the expense of making large and small wood blocks, the cost of zinc photo-types from first to last being but twopence-halfpenny to fivepence per square inch.

We are glad to see that Mr. Woodbury has brought the Stannotype process out of the domain of theory into that of practice. Some pictures we have recently seen printed by this simple method appear quite equal to those furnished by the original Woodbury process, where the engraved plate is produced by powerful hydraulic pressure.

Herr Victor Angerer states that the addition of tannin is advantageous in the development of gelatino-chloride and gelatino-bromide plates. In the case of gelatino-chloride, the tannin is added to the citrate-of-iron developer, bringing about a more vigorous tone. Added to the oxalate solution in gelatino-bromide development, tannin, according to Herr Angerer, brings out more detail, and a greater variety of tone.

No place now-a-days seems too isolated or remote for the establishment of an observatory. The top of Ben Nevis has for some time been a meteorological station, and a few months ago, an observatory on the summit of Mount Etna—the loftiest in the world—was established by the Italian Government. The Russians have a polar observatory at Nova Zembla, and now talk about establishing a second station in that frozen wilderness. Strange to say, there is never any lack of volunteers among our scientific men to take charge of these veritable hermitages, though the inhabitants of convents on the Mount St. Bernhard, the Simplon, and other lofty passes, are in clover compared to these solitary observers.

Tuesday evening at the Photographic Society was rather quiet. Still there was plenty to occupy attention in a paper on "Green Fog," by Captain Abney, and another by Mr. C. R. Wood on the "Production of Coloured Transparencies by Converting the Silver Image into a compound of Lead, Copper, Chromium, &c." The tinted images might possibly be employed in enamel photography, if only they would keep their colour in burning; this, however, is very doubtful in the case of some, at any rate.

Mr. William Bedford, on the subject of coloured transparencies, re erred to the gelatino-chloride pictures of Dr. Eder, which were recently exhibited at the Society of Arts, and which varied from a deep red or ruby, to sepia and black. Mr. Bedford stated that, by following implicitly Dr. Eder's instructions about development, he had experienced no difficulty in reproducing the beautiful tones in question, and he recommended the process, therefore, as a thoroughly practical one. An amusing incident, by the way, occurred through a confusion of Captain Abney's specimens with those of Mr. Wood, one choice example of "green fog" being mistaken for an attempt at colour by Mr. Wood.

But perhaps the most important feature of the evening was Mr. G. L. Addenbrooke's new shutter, which is timed to give regulated exposures varying from one-twenty-fourth of a second, to a period of two seconds and three-quarters. A tiny clock-work arrangement with spring supplies the motion, which the inventor prefers should commence some slight interval before the exposure is made. We hope to publish a description of the new exposer in our next.

We know the peripatetic photographer often does a good day's work, but it is something new to hear of a young fellow, half in joke and half in earnest, taking a camera to Hampstead Heath on Easter Monday and netting between three and four pounds in portrait taking. He assures us that not only did the job pay him handsomely, which we can well believe, but that the incident gave himself and friend a fund of funny reminiscences for a twelvemonth. "If a lady and her swain thought a shilling too high, I took the pair for ninepence. It is usually the lady who wants the photograph, and who finds the money. 'Arry thinks cash invested in a less æsthetic manner more satisfactory. But then it is the lady who keeps the portrait, you see, so of course she doesn't mind paying." In these days, when being photographed together constitutes good evidence in a case of breach of promise, obviously the lady invests her money with considerable discretion.

By-the-way, it is not generally known that in the case of professional peripatetics who frequent places of public resort, they are not unfrequently all of them assistants to the same principal. This is so, we are told, with those to be found on Margate and Ramsgate sands, many being engaged simply from the Saturday to the Monday, and on high-days and holidays. The "standings" of many out-door photographers are of considerable value.

We hear Her Majesty has completed the catalogue of "presents" which have been made to her during her reign. The work, which is not intended to be published, is illustrated throughout with photographs of the objects in question. The illustrations, if not all, are, at any rate, for the most part, the work of Mr. Jabez Hughes, the Queen's photographer at Ryde.

His Royal Highness the Prince of Wales has always shown himself appreciative of photographic art. When at the Pall Mall Exhibition some years ago, he begged permission to carry back with him to Marlborough House an album full of Rejlander's studies, that he might inspect them at his leisure; and a similar request he has now made to Mr. Muybridge, in whose "attitudes of animals in motion" the Prince has taken a lively interest. Mr. Muybridge has, indeed, arrived in London at a fortunate time. Several invitations have been extended to him to assist at fashionable "at homes" and other gatherings of the élite, and to bring his wonderful photographs with him.

A grand international art exhibition, the greatest of the kind for many years, was opened on Saturday at Vienna by the Emperor. While France, Germany, Austria, Hungary, Belgium, Spain, and even Sweden and Norway, are represented by at least a hundred pictures a-piece, Great Britain, it appears, exhibits but six paintings and one piece of sculpture. Altogether there are 7,000 paintings arranged under the direction of the well-known Viennese artist, Makart. Our readers may call to mind that the promenade portrait is in Vienna and Hungary termed the Makart portrait, out of compliment to the great local painter.

We hear that one of the eclipse "staff," which proceeds to Thebes next month, to observe the total eclipse, is a novelist, no other than Mr. William Black, the author of "A Princess of Thule." Mr. Black is a mutual friend of Mr. Lockyer and Captain Abney, and although not officially appointed to the expedition, he will doubtless be its chronicler. Becoming in this way familiarised with the work of the spectroscope and of the camera, we shall not be surprised to find the charming heroine in Mr. Black's next novel chatting in a lively way about hydrogen lines in the ultra-violet, and the peculiar subtleties of gelatino-bromide development.

Professor Civiale is preparing a photographic history of the Alps. For ten years, from 1859 to 1868, the author travelled in the Alps with his camera, constantly taking panoramic and smaller (detailed) views. The latter, according to *Nature*, some 600 in number, principally show the glaciers with their crevasses, moraines, and the rocks forming their banks; the mountains, valleys, glens, natural geological sections; the rocky eminences groved, polished, or ground by former glaciers, and the course of various rivers. The panoramic views (forty-one in number) are taken from the summits, and comprise all the large Alpine chains. Each consists of a number of plates, and twenty include the whole circle of view.

As the making of sketches in Court is becoming a common practice, the following suggestion has interest for many. "I am thinking of making a detective camera, similar to Mr. Bolas', but inside a hat, the lens to peep through an orifice in the crown, where many people have a ventilator. 'Hats off in court,' is the rule, so that there would be nothing unusual in your laying your hat on its side upon the reporter's desk or elsewhere. The prisoner sits quiet enough after he has got used to the court, and then if you watched your opportunity you might get a good long exposure, uncapping your lens by simply placing your hand on the brim of the hat to touch the spring. The only difficulty I see is, that sometimes the light all comes in from a skylight just above his head." Our correspondent gives us liberty to print his letter in case any of our readers aspire to be a "Court-photographer."

Millbank is the only one of our penal establishments that possesses an official professional photographer. At Pentonville, the gentleman occupying the post of dispenser is required to undertake photography with his other duties; but in most other prisons, portraits are taken at so much a head. The negative is carte size, a half-length portrait being secured and for this a sum as low as twopence halfpenny is considered adequate in some establishments.

That our criminal portraiture frequently leaves much to be desired, is scarcely to be wondered at in these circumstances, for even the most careful photographer cannot ensure success with every plate, and if he uses a couple over the job, his narrow margin of profit is at once swallowed up. So a portrait is usually considered a portrait, for negatives at half-a-crown a dozen must not be criticised too severely. Fourpence and sixpence are common prices, and tenpence a negative is, we believe, the highest sum paid, unless it is a question of taking isolated prisoners.

TWELVE ELEMENTARY LESSONS IN DRY-PLATE PHOTOGRAPHY.

No. VI.—Lenses.

Of all the apparatus which the photographer uses, there is none of so great importance as the lens. With a bad camera shift can be made, and excellent work turned out, the only drawback being harder work and inconvenience for the operator; but with a bad or unsuitable lens nothing can be done. This being the case, it behoves us to give a short description of the various different lenses in use, saying for what kind of work each is best suited. Before doing so, however, we will give a few general facts with regard to lenses, and especially we shall lay stress on the manner in which it is possible to compare the rapidity of different lenses. It will be necessary to define a few technical terms continually applied to lenses. By *depth of focus* is meant the power in a lens to represent sharply objects both near and far from the lens. The larger the aperture of the lens, the less the depth of focus. With every lens is supplied a set of *stops* or *diaphragms*. These are simply plates with holes of larger and smaller sizes in them, which are made to slip in front of or between the combinations of a lens. The more depth of focus is required, the smaller a stop must be used, and consequently the slower the lens will be.

By *width of angle* is meant the amount of picture which can be included. For example, with a camera placed in a certain position and pointed to a row of houses, one lens will include perhaps two houses, another four.

Distortion is a fault met with in photographic lenses. It causes straight lines near the sides of the object to be represented by curved lines in the image. *Flatness of field* is the quality in a lens of having the definition at the edge of the plate good, as well as that at the edge.

The *focus*—or, more strictly speaking, the *focal length*—of a lens is the distance between the lens and the ground-glass when the image is sharply focussed. In a single lens the measurement is taken from the centre of the lens. With compound lenses it is near enough to measure from the diaphragm to the ground glass.

The *aperture* in a lens is the diameter of the stop or diaphragm, or, where none is used, of the actual lenses. The rapidity does not require to be defined, but we propose to explain the factors which regulate it. Every lens is different in rapidity from others of another form, and each lens has a number of diaphragms varying its rapidity, so that at first sight it might appear a difficult task to put a value on the rapidity of a lens using any particular diaphragm. The law which governs the rapidity of lenses is, however, so very simple that its application is most easy, and we would try to impress on the beginner that he should thoroughly master it at the commencement of his practice. If he does so he will find the estimation of the necessary exposure a comparatively simple matter. In changing one stop for another, or one lens for another, he will have nothing to guess except the intensity of the light.

The method of comparing lenses—and which applies to all lenses—is as follows. State the ratios between the apertures of the lenses and the focal lengths of the lenses as fractions—the aperture as the numerator, the focal length as the denominator. Square the fractions thus obtained, and the resulting figures will give the ratios of the rapidity. It is usual to state the fractions thus: $\frac{f}{4}$ $\frac{f}{12}$ $\frac{f}{40}$. These fractions refer to lenses the first of which has an aperture one-fourth of the focal length, the second one-twelfth, and the third one-fortieth. We shall take a practical example. We are using a portrait lens 10-inches focus, and aperture $2\frac{1}{2}$ inches; that is, the focal length is 4 times the aperture, or we say the lens is working at $\frac{f}{4}$. The focal length, be it remembered, is the distance between the diaphragm and the ground glass. We now substitute a single lens of 12-inch focus with a stop $\frac{3}{4}$ inch in diameter. The aperture is now $\frac{1}{16}$ of the focal length. The lens is working at $\frac{f}{16}$; square these two fractions, thus:—

$$(\tfrac{1}{4})^2 = \tfrac{1}{16} \quad (\tfrac{1}{16})^2 = \tfrac{1}{256}.$$

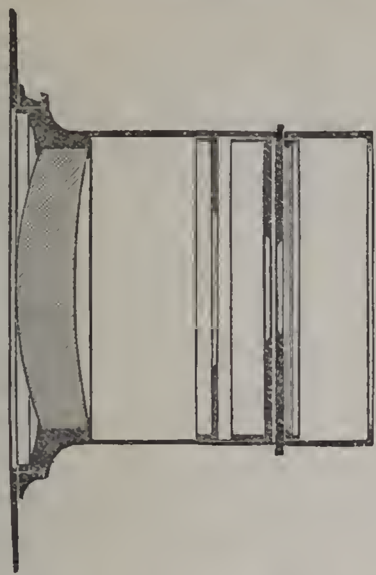
The rapidity of the lenses is as $\frac{1}{16}$ to $\frac{1}{256}$. The exposure required will therefore be as 16 to 256, or as 1 to 16. Thus, if we had been giving two seconds with the portrait lens, we should have to give thirty-two seconds with the single lens. If the beginner will exercise himself in this rule for a little time, he will find that he soon gains wonderful facility in applying it, and he will find that it gives him a very great power in estimating the necessary length of exposure. With the same lens and different stops the rapidity varies as the square of the diameter of the stop, or as the area of the stop.

We shall now go rapidly over the different kinds of lenses most in use, giving the purposes for which each particular form is best adapted.

We have first

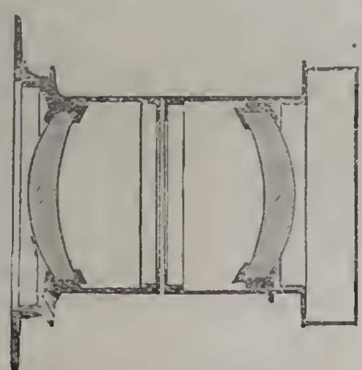
The Single Lens.

It is the one with which we should recommend the beginner to provide himself, as it is the simplest form of lens, and is also the most generally useful. It is fairly rapid, has a fairly large angle, and gives wonderful definition and depth of focus. Its only drawback is that it gives slight distortion. If, for example, it be attempted to pho-



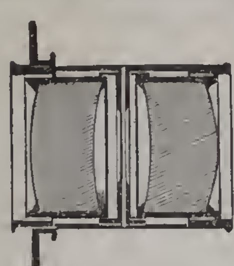
tograph a building of large size with it, the boundary lines will appear slightly curved, and the building will appear barrel-shaped.

The Rapid Rectilinear or Rapid Symmetrical



is one of the very most useful of lenses. It is very rapid, and one should be purchased when the photographer has so far advanced as to wish to attempt instantaneous effects. It gives no distortions, and about the same angle as the single lens.

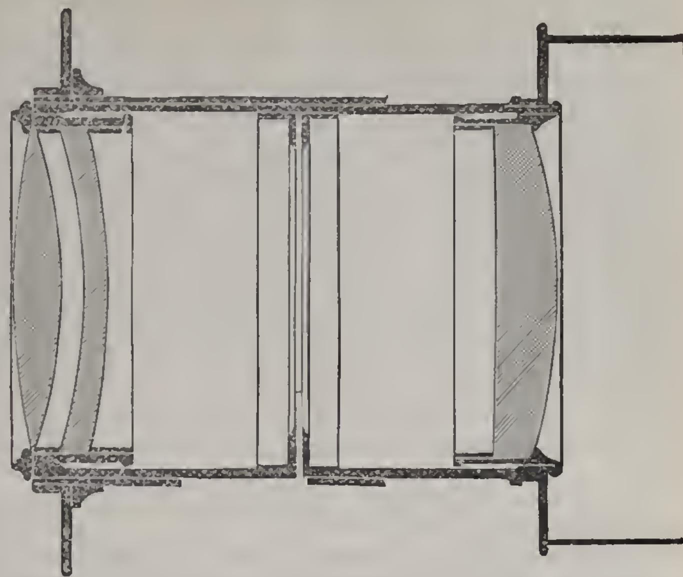
The Symmetrical or Wide Angle Rectilinear



is a very slow lens, but takes in a wonderfully wide angle, so that it is useful for photographing objects when it is impossible to get the camera far enough away from them to use the rapid rectilinear. It is quite free from distortion.

The Portrait Lens

is intended for portraiture pure and simple. The utmost ingenuity has been spent in the case of this lens to get the greatest possible rapidity, but many other good qualities have been sacrificed. Thus the field is round, the marginal definition bad, and there is very little depth of focus. For its own particular purpose it is, however, admirably adapted. With the very rapid plates which can now be had, it is quite possible to take portraits even indoors with the rapid rectilinear or even the single lens, and we would not advise the beginner to purchase a portrait lens, at least, at first.



There are numerous photographic lenses sold under names different from any of the above, but all of them will be found to be very similar to one or other of the kinds described. As we are entirely avoiding in these lessons all historical reference, we shall not say anything of this form of lenses, which have now gone out of use, and are not manufactured.

PRINTING ROOM NOTES.

BY LYDDELL SAWYER.

Does the printing of photographs, as a rule, receive the necessary amount of attention in photographic houses? I should say no—that is, on the average, and when we except our leading studios, for there they are generally fully cognisant of its importance, and reap an immense advantage by their recognition of this fact.

A good operator assisted by a bad printer is like a valuable jewel in a brass setting.

It is a common natural law that "extremes meet," and a negative, brimful of true modelling and delicacy, yet exacts more skill and consideration in printing than a cliché rendered really inferior by greater intensity.

Many an operator's heart has temporarily sought a new berth in the region of his boots on beholding the begrimed-looking assortment of proofs yielded from a negative which in itself he had almost opined was to make him famous; and, however earnest he may be after the shattering of a few of his idols in this fashion, he invariably yields to circumstances, accepts the inevitable, and makes negatives not what he considers best, but rather what he hopes will print, intensified until the more gentle details have succumbed, and merged into high lights.

Printing is not purely a mechanical process, and the early acceptance of this fact will greatly conduce to the further assimilation of art—that is, of course, when monetary considerations will permit of its recognition. I fear, by the way, that this same £ s. d. question has much to answer for with photographers. But I am diverging: I commenced writing, intending only to jot down a few notes of what I find of utility in practice at our own place.

There is never any occasion to have mealy or impoverished silver prints. When they do show signs of these disorders, it is due to either weak or acid silver bath. Keep a small carbonate of silver deposit in the bottom of the bath bottle, and retain the strength of the silver solution at from forty to fifty grains per ounce, and I can confidently assert that the proofs will be healthy, unless the albumenized paper is primarily bad, which, in my experience, I have seldom found is the case. Of course, it i essential to avoid sun printing—at least, in the summer months.

I notice that an article in a contemporary journal alludes to the utility of the argento-meter for indicating the strength of the silver printing bath; but this really useful little instrument for *new* silver solutions is only monopolised as an argento-meter because of its being guaged to the density of nitrate of silver salts in solution; and the writer of the paper in question apparently omits to remember that it is still amenable to other influences (although in a different degree), such as nitrate of soda and organic matters which are sure to accumulate and affect the density of baths when in ordinary use. Of course that renders this guage very untrustworthy for the purpose indicated by its advocate. I do not know any more reliable method of regulating the strength than to ascertain by experience what diminution of strength attends a certain recognized decrease in the bulk of the bath, and to make a reserve solution, proportionately stronger, with which to keep up the original quantity and density of the bath at one and the same time.

In drying sensitized paper, blotting-boards are decidedly preferable to spreading it out in the clothes-drying fashion. A book, consisting of about a quire of blotting-paper, will remain all right in use for an almost indefinite period, long after it has become blackened, if it be kept clean and free from extraneous dust, &c. It economizes space; it protects the paper; it effects a more perfect dispensation of free nitrate; and it dries the sheets flat, making them easier to handle; indeed, it is not often that so many advantages accrue from so small an alteration.

Why is sensitized paper not universally cut and trimmed in the first instance to the required carte or cabinet sizes? A sheet of paper may, with practice, be cut as quickly as it can be torn, doing away with subsequent trimming, and producing a good saving of material.

If it be found necessary to keep on the edges for handling purposes, it is the condition of the fingers, and not the paper, that wants looking to. I am used to see forty-eight carte sizes obtained out of one sheet of paper, and no more difficulty experienced in "filling-in" the printing-frames than if there remained an inch to spare each way in every carte piece. Indeed, it is only carelessness that tolerates this waste; it is derogatory to workmanlike ability that such slovenly methods are accepted, and prolific of good to no one, unless it be the albumenizers and chloride of gold manufacturers.

Let me explain a new method of preserving sensitized paper, one which certainly deserves recording, if only for its simplicity. It was shown to me by our printer some time ago, and has since acted admirably. He cuts all the sensitized paper to whatever sizes are required; say, that it is C.D.V. size—he then piles all the pieces squarely on top of each other, and places them between a couple of 12-sheet boards, cut to precisely the same dimensions; and now they present almost the square and trim appearance of the edges of a book. All that is wanted is to wrap them in brown paper, and put them under a heavy weight, which will so far exclude atmospheric influence, that the paper is little or nothing impaired by a month's keeping, and its perfect flatness is an additional pleasant recommendation. For cabinet or other sizes it is only necessary to have stout boards increased in proportion.

The placing of this ready-trimmed paper in proper position on the negative to be printed is easily managed by the printer having his changing light in front of him, when by slightly raising the top end of the printing-frame it is generally sufficient to show the image perceptibly enough through the sensitized paper to readily square it.

Perhaps the termination of my notes smacks little of that art which I insinuated as requisite in printers at the commencement of them; but what I have written pertains to mechanical skill—a power so beloved by his sister art, that she seldom, in her coyness, woos the world and lives safe beneath his encouraging smile.

Correspondence.

ADDING IODIDE AND CHLORIDE TO GELATINE EMULSION, FOR PHOTO-LITHOGRAPHIC WORK.

Dear Sir,—I quite agree with Mr. Hartwig that the addition of iodide and chloride to the gelatino-bromide emulsion is not always an advantage; but it is so in the case of photo-lithographic work, and where great density and transparency are necessary in the negatives. I have never been able to employ the gelatino-bromide process for photo-lithography, for the simple reason that I could not get sufficient density and transparency in my shadows in the plates I purchased. All the commercial plates I am acquainted with (and I have used those of many makers) gave me plenty of detail; but, intensify as I would, there was never sufficient contrast for black-and-white work. I am told that there is, nevertheless, both iodide and chloride in most of the plates sold.

My own home-made emulsion was just the same, until I added the scrapings of a collodion plate, as recommended in the News. I suppose I have overdone the dose for ordinary work, but for black-and-white subjects my emulsion is now just the thing. Not only is there much more density, but my clear glass is now really clear, a thing seldom seen in gelatino-bromide plates. I followed your advice, and put into six ounces of the gelatino-bromide the scrapings from two 10 by 8 inch collodion plates.

I have tried the scrapings from two iodized plates, from two chlorized plates, and from one iodized and one chlorized. The two former samples (that is, either pure iodide or pure chloride) gave the best photo-lithographic negatives—*i.e.*, negatives with the most violent contrasts.—Faithfully yours, A Photo-Lithographer.

[The recommendation in the News was to add the iodized or chlorized collodion from two 10 by 8 plates to *eight* ounces of emulsion; but, no doubt, for photo-lithographic work, the quantity recommended by "A Photo-Lithographer" would supply the increased contrast necessary for black-and-white pictures.—Ed. P.N.]

THE PRINTING BATH.

Sir,—Although so much has been written on the above subject, the minds of many photographers appear to be still unsettled as to the best method of managing the printing bath to insure good and uniform results. There can be no doubt, as Mr. C. J. Hopkins and others have pointed out, that solutions used for sensitizing albumen paper soon become contaminated with impurities, which, if not removed from time to time, are certain to injuriously affect the character of the resulting prints. The presence of these objectionable matters is indicated by the solution becoming more or less brown, and although there are many ways of removing the discolouration, most of them are open to the objection that, while rendering the bath clear, they quite fail to remove the impurities referred to. This applies to the use, now so much advocated, of a bath kept in a neutral condition by means of carbonate of silver, which, though recommended by some high authorities, has not in my practice yielded entirely satisfactory results. After many experiments, I have arrived at the conclusion that nothing fulfils the required conditions so well as the now almost forgotten permanganate of potash, and I find the following *modus operandi* to be convenient and expeditious. Keep the permanganate in a solution of twenty grains to the ounce, and when about to float your paper, add half a drachm to each pint of the discoloured bath solution. Give it a shake, and after allowing it to stand for a quarter of an hour, run through a funnel loosely plugged with cotton wool. The filtering need only occupy a few minutes, and the waste of silver is almost inappreciable, while the brightness and uniformity of the prints obtained will amply repay the slight extra trouble.—Yours, &c.,

H. C. Parlour.

PHOTOGRAPHIC CLUBS.

Sir,—In last week's News a letter appears from Mr. E. Dunmore, concerning the advertisement calling a meeting to discuss the advisability of forming a new club. Mr. Dunmore should have had the good sense to have waited until the meeting in question took place before he wrote his letter. He would then have found that the proposed club was no "sham society," but a stern reality, and that thirty-three gentlemen, including several officers of the Photographic Club, were enrolled on the spot. Besides, several gave monetary guarantee to make up any deficiency that might arise in consequence of the small annual subscription—viz., five shillings.

It is the intention that the new Club be large, and number its members by hundreds, if not thousands. Take the Edinburgh Society per example.. If Mr. Dunmore will become a member of the new Club, he will, no doubt, get a wrinkle or two that may be useful to him in his position as Hon. Secretary of the old Club.

Apologizing for encroaching on your valuable space—but I am compelled, in self-defence, and as the author of the advertisements, to reply to Mr. Dunmore's courteous letter,—I remain, yours respectfully, A. L. Henderson.

Sir,—I notice a letter from Mr. Dunmore in your issue of the 31st ult., as to the new photographic club. It is a pity that Mr. Dunmore did not re-read his letter before sending it on to you—or, better still, wait until after the meeting, at which I was advertised to take the chair, had been held, and then I think he would not have written of "sham" societies. It is a fact, and Mr. Dunmore knows it, that the Photographic Club does not meet the requirements of the art, and non-publication is one of its failings. The popularity of the "Thursday Evenings" is a proof of this. Its reports are read by all, and by many supposed to be the reports of the Club. Thus, you see, the Club gets a "sham" credit.

It is to be regretted that Mr. Dunmore did not attend these meetings; he would have found them far more "social," and, I think, more interesting than his other meetings.

As to the new Club (for it is *un fait accompli*) being a sham, why that is for new members to say, as thirty-three were enrolled on the first night (many of them members of the present club), and of course if this Club be a source of weakness to the old Club, the managers have themselves to thank for that entirely. As to its being a source of weakness to the old societies, that I think all must deny, as I rather think it would be a source of strength to them; and on South London nights the meetings never begin till past nine, so as not to interfere with the Society.—Yours truly, C. G. Cutchly.

INCANDESCENT LAMPS IN THE DARK-ROOM.

Dear Sir,—I am glad to see that an experienced photographer like Mr. England is taking up your suggestion to employ the incandescent lamp in the dark-room. I have also been making experiments in the matter, and I can bear out all you and he have written on the subject. The subject of the battery has been a stumbling block to me also, but now I see the existence of a two-candle carbon lamp of Swan, mentioned in the News, I do not see why a bichromate battery should not be made to answer the purpose.

Could you refer me to any other information on the subject of these lamps and batteries—I mean for use in the dark-room? I have read your admirable leader in the News of the 10th ult., but I may possibly have overlooked other information. I see Mr. England in his letter refers to the fact of attention having been called to the subject.—Faithfully yours, W. G.

[We think Mr. England was simply referring to our leader. See the description of Mr. Paterson's battery in another column.—Ed. P.N.]

"PHOTOGRAPHY WITH EMULSIONS."

Sir,—May I ask the favour of your inserting the following rather important errata which occur in the second edition just published of my work on "Photography with Emulsions."

At page 139, after the different weighings, it is said:—"Nos. 1 and 2 are rapidly covered with water, &c." It should read:—"Nos. 3, 5, and 6 are rapidly covered with water." And in the fourth line below, instead of "They are then dissolved in 1 dr. and 1½ ounces of water," it should read: "Nos. 1 and 2 are then dissolved in 1 dr. and 1½ ounces of water."

Some of your readers may be in possession of the book, and I would ask them to note these corrections. The publishers have taken steps to make them in all copies which have not left their hands.—Yours faithfully,

W. de W. Abney.

Proceedings of Societies.

Photographic Society of Great Britain.

The eighth technical meeting was held on Tuesday, February 28th, 1882, Captain Abney, R.E., F.R.S., vice-president, in the chair.

Mr. Cowan showed two negatives taken under two sensitometers, and stated that commercial plates usually brought out 18 to 20 under the standard sensitometer.

The Chairman remarked that in making plates he had tried to arrive at 23.

Mr. Cowan said that he developed with ferrous oxalate or pyrogallic. He was satisfied when 20 was arrived at, but under 15 the plates were slow. He also exhibited three bromo-chloride plates developed with ferrous citro-oxalate, and stated that they were from five to ten minutes in the solution.

Mr. Charles Whiting then gave an outline of the matter in reference to collodion films being repellent, after an exposure of about twenty minutes on 24 by 18 plates. Upon examination of a plate after exposure, and previous to development, it was found that the silver had drained down the plate about half way, terminating in an abrupt although very uneven line, and leaving isolated patches or pools of free silver on the upper half. In developing such a plate, it invariably happens that a much more vigorous image is produced upon the parts of the plate that are covered with the free silver, while the portions which are surface-dry remain poor and flat. He thought it was sometimes due to the cotton used in making the collodion giving a horny and repellent film.

Mr. Brownrigg stated that, when in Dublin, he had given two hours' exposure to some collodion plates. He rejected iron, and used pyrogallic acid, with plenty of acetic acid, and the results came out very clean.

Mr. Whiting said that when his exposures were only five or ten minutes he did not get stains.

The Chairman remarked that if a collodion emulsion is boiled with nitric acid the film becomes repellent, and the same might occur with wet collodion, with nitric acid in the bath. He also stated that some years ago he had to give three hours' exposure; but he dipped the plates in distilled water, and there were no stains.

Mr. T. S. Davis alluded to a practice he introduced many years ago in the manipulation of wet collodion, which was to move the plate up and down in the bath, and not allow it to remain still until the solution flowed evenly; also that where there was a large quantity of collodion on a plate there would be greater intensity in the markings, according to the direction of the dip of the plate.

Mr. W. Bedford said that possibly the defect complained of might be due to the use of a super-iodized collodion; in that case the addition of plain collodion, or strengthening the silver bath, might rectify the evil.

The Chairman suggested that a bath should be made with 500 grains of silver nitrate to 16 ounces of water.

The conversation then became general; details of treating the bath, its usage, and other matters relative to the collodion being discussed.

The Chairman put a question asking for any experience of intensification by any method of development of gelatine plates with ammonia and pyrogallic, with the subsequent addition of ammonia.

Mr. Cowan stated that the slow addition of ammonia gave the greatest intensity.

Mr. Davis said it might be interesting to state that he had been experimenting with hydrochloric acid introduced into gelatine emulsion, five minims to one ounce, at a temperature of 140°. The negatives were very clean. When there was an excess of hydrochloric acid, the development could be pushed to a much greater degree than without the same.

The Chairman also had tried hydrochloric acid; it gave wonderful clearness, and seemed to be perfectly incapable of fog.

Mr. Berkeley said that hydrobromic acid had the same effect.

Mr. W. Bedford stated that emulsion prepared with hydrochloric acid and excess of bromide darkened in the light, proving the presence of chloride of silver; there resulted great clearness of shadows.

The Chairman observed that there was one advantage in adding acid to gelatine, it got rid of something, the absence of which also seemed to get rid of fog; that when fresh gelatine was mixed with a gelatine emulsion prepared by ammonia, after washing, wavy markings were sometimes seen; also that rapid plates seemed generally dull looking, and slow plates shiny.

A conversation took place respecting gelatine—its tendency to form pits when it sets too quickly, its conduct when soaking in water, and the quantity taken up.

Mr. Davis added that the purest gelatine contained impurities, but which were left behind if the gelatine was passed through wash-leather.

The monthly meeting of this Society was held on Tuesday, at 5, Pall Mall East, Mr. J. Glaisher, F.R.S., in the chair.

Mr. W. Wainwright, Junr. was elected a member.

Capt. Abney read a paper on Sensitometers, in which he pointed out that the ratio of sensitiveness of different plates, judged by phosphorescence, was not always to be depended upon. Some plates appeared to be more rapid under such circumstances than when tested by gas light. For this reason he preferred to use the latter rather than the phosphorescent surface. Capt. Abney showed, by the experiments he had made, that the sensitometer was not to be uniformly depended upon, but that the instrument should be used with judgment and care.

Capt. Abney also read a paper on the cure of green fog by the use of ferric oxalate and redevelopment with ferrous oxalate, and gave a formula by which the ferro-citrate-oxalate developer might be prepared.

Mr. C. R. Woods read a paper on "Coloured Transparencies from Silver Images," in which he detailed a number of experiments with the double cyanides of iron and platinum, by means of which he had converted the silver image into the salts of other metals, thus obtaining different colours. Mr. Woods also stated that he had succeeded in developing the photographic image with molybdous salts. This developer was energetic in its action, but gave so thin a negative as to be practically useless.

Mr. W. Bedford observed that he had found no difficulty in producing coloured transparencies by Dr. Eder's method.

Capt. Abney said the difference between Mr. Wood's method and Dr. Eder's was, that in the one case the result was certain, while in the other it depended upon the skill of the operator.

Mr. Addenbrooke then described a new apparatus for automatic exposure. This instrument consisted of a clockwork adjustment which opened a double shutter, and which could be regulated to give exposures varying from a minimum of $\frac{1}{24}$ of a second to a maximum of $2\frac{3}{4}$ secs. Mr. Addenbrooke claimed for this shutter an advantage over the shutter of M. Boca, inasmuch as, being detached from the camera, there would not be any vibration.

In reply to Mr. Davis, Mr. Addenbrooke said he meant the instrument to be held in the hand.

Mr. Davis suggested the use of a stand, which might be placed in front of the camera.

Capt. Abney said this plan was already in use in connection with photographing torpedo explosions. He could see, however, no difficulty in exposing with the instrument held in the hand.

Mr. W. K. Burton thought very highly of the apparatus, especially commending it for the adoption of as much as $\frac{1}{24}$ of a second for a minimum. He ridiculed the idea of being able to construct a shutter which would give an exposure of a 5000th part of a second. No apparatus would stand the shock.

Mr. England did not think the plan of holding the instrument in the hand a good one. It was sometimes necessary to wait five minutes for the exposure, and to hold the apparatus would be very tedious.

Mr. Ined concurred. He had used a drop shutter attached to the lens, and found no vibration.

Major Brownrigg was also in favour of the shutter being attached.

Mr. Payne Jennings said that theoretically the separation of the shutter from the camera was right, but practically it was difficult to carry out.

Mr. Maxwell Lyte believed that the best place for the shutter was behind the lens as nearly as possible in the centre of the camera.

Mr. Francis Galton thought it was quite possible to give an exposure of 1-5000th part of a second, and gave some calculations derived from Mr. Muybridge's photographs in support of his statement.

Mr. Burton said that if his (Mr. Burton's) calculations, derived also from Mr. Muybridge's photographs, were correct, he was still of opinion that such an exposure could not be attained without a shock to the instrument.

Mr. Addenbrooke, in reply, said his object was not so much to make an instantaneous shutter, as to construct an apparatus which could be adjusted to instantaneous shutters, and to give photographers the means of estimating correctly an exposure, which they could not do at the present time, and so had to stop down their lenses, and thus injured the picture. With regard to vibration, he might say that the apparatus could be attached to the camera if necessary.

The President said that the great desideratum in an instantaneous shutter was that it should not cause vibration, and in all the shutters hitherto exhibited, except those which opened by means of a pneumatic bulb, this defect was noticeable. The apparatus of Mr. Addenbrooke, he thought, was most ingenious.

A vote of thanks having been passed to Mr. Addenbrooke, the proceedings terminated.

Liverpool Amateur Photographic Association.

The monthly meeting of this Society was held on Thursday, the 30th ult., at the Free Public Library, Mr. E. Roberts (president) in the chair.

The minutes of the February meeting having been read and confirmed,

The Hon. Secretary brought before the meeting a letter which he had received from the Hon. Secretary of the Executive Committee of the Associated Scientific Societies of Liverpool, asking if the Liverpool Amateur Photographic Association would be willing to continue its membership of the Association, and to renew its contribution to the guarantee fund for 1882. It was unanimously agreed that this should be done once more, and the Hon. Secretary was requested to write to that effect to the Hon. Secretary of the Executive Committee.

Mr. W. H. Kirkby then read a paper on "Instantaneous Shutters."

Messrs. Ellerbeck, Forrest, Bean, Bruce, Kirkby, Crowe, Roberts, and others, exhibited instantaneous exposers of different kinds.

Dr. Kenyon objected to the bulky size of most of the shutters, and expressed a decided preference for exposers constructed on the principle of that invented by the late Mr. M. Noton, of Manchester.

Mr J. L. Corkhill complained that many shutters, through faulty structure and design, produced a jerk of the camera at the very moment of exposure.

Mr. W. T. Bruce said that he was about to introduce an important improvement in his shutter by making the aperture of the shape of a heart, so as to give a longer exposure to the foreground.

Mr. J. H. T. Ellerbeck read a paper entitled, "Passing Thoughts" (see page 182). He exhibited an improved form of actinometer by Mr. Crowe.

Mr. J. H. Day passed round some excellent negatives taken on Morgan's paper with an exposure of three seconds in bright sunlight, with stop $\frac{f}{15}$. After development and fixing the paper had been well washed, dried, and waxed. The prints from these negatives were exhibited by Mr. Day, and were of excellent quality.

Mr. J. A. Forrest remarked that the sight of these pictures recalled to his mind the very early days of his own photographic work, when beautiful results were obtainable by the old waxed-paper process. In answer to a question by a member, he (Mr. Forrest) stated that the usual exposure in those days was half-an-hour.

The Chairman then announced that some of the members were desirous of renting a studio in some in some central part of the city. After much trouble and inquiry he had found exactly what was needed in Church Street, at the corner of Whitechapel. He proposed that those members who would be glad of the advantage of a studio for practice in lighting, posing, &c., should pay an annual subscription of a guinea, and so be entitled to a key of admission. He thought that now the Society was in an increasingly-flourishing condition it might contribute from its funds a portion of the rent.

Mr. Forrest warned the Society against the temptation to rely too much upon financial success. Twenty-five years ago, in a similar mood of enthusiasm, the Association had constructed a studio for the use of its members, but had involved itself in considerable financial difficulties in consequence.

Mr. W. H. Wilson re-echoed the warnings of the last speaker, and strongly deprecated the adoption of the proposal on the responsibility of the Association.

The Rev. T. B. Banner remarked that when the Society possessed a studio it was never used. He strongly objected to any scheme which might involve the Association in debt.

Mr. W. H. Kirkby was afraid that the studio proposal might result in the formation of a separate society.

Mr. H. N. Atkins thought that the common use of apparatus and chemicals belonging to the Association would prove a serious difficulty.

Mr. J. Pelham wished to remind the meeting that there were other expenses, in addition to that of rent, to be taken into account. He was sure that when taxes, cleaning, warming, and lighting had been paid, the annual expense would not fall short of £40.

Mr. W. Macindoe proposed as a resolution—"That the Hon. Secretary be requested to issue a circular to ascertain the number of members who would be willing to join in renting a studio at a rental of £1 or of 10s. 6d. per annnum a-piece."

Mr. A. Tyrer seconded the proposal.

The Rev. T. B. Banner proposed as an amendment—"That it is unadvisable for the Society to move at all in the matter at present."

Mr. Forrest seconded the amendment.

The Chairman, in putting the question to the meeting for decision, remarked that the question was not one of building, but of renting a studio, and that he did not intend the Society to incur any risk of debt; because if an insufficient number of members came forward to support his scheme, it would, *ipso facto*, fall to the ground.

The amendment was then put to the meeting, and carried by a majority of votes. The resolution accordingly fell to the ground.

The Rev. H. J. Palmer exhibited Messrs. J. Lancaster and Son's enlarging lantern, and gave a demonstration of its usefulness by enlarging a quarter-plate negative of a waterfall in Switzerland up to the size of a full sheet of Morgan's paper. In answer to questions put by members, he (Mr. Palmer) stated that the condensers were five inches in diameter; that the lens in use was Dallmeyer's lantern combination; and that the requisite exposure for a negative of medium density, and without stopping down the lens, was ninety seconds. He further stated that the best lens he had seen for enlarging purposes was one of Mr. Knott's make, which cost 25s. This lens gave good definition up to the edges of the enlargement. He (Mr. Palmer) then developed the picture, and, in spite of the difficulty in the development of so large a sheet of paper in an ordinary room, the result was entirely satisfactory.

The Hon. Secretary (the Rev. H. J. Palmer) announced that there would be an excursion to the Falls of Dolgarrog, in the Valley of the Conway, on Wednesday, April 19th, and requested all members who desired to join to be good enough to communicate with him. He (the Hon. Secretary) said that he had received from Mr. A. Pumphrey, of Birmingham, a donation of prints made by his mechanical process for the Society's album.

A number of prints taken by Messrs. Kirkby and Bruce, in illustration of their respective shutters, were handed round, and were much admired.

Dr. Kenyon exhibited two prints from a portrait negative—the one weak and unsatisfactory, and the other brilliant and all that could be wished. The latter had been printed from the original negative, strengthened by the superposition in printing of a glass positive.

Mr. Day exhibited one of Lancaster's new *Le Meritoire* cameras.

Votes of thanks were proposed, seconded, and carried unanimously to Messrs. Kirkby and Ellerbeck for their papers; to the Rev H. J. Palmer for his demonstration of the process of the enlargement of views; and to Mr. Pumphrey for his donation to the Society's album.

The meeting, which was very largely attended, then separated.

Glasgow Photographic Society.

A meeting of this Association was held in the Religious Institution Room on Thursday, the 31st ult., at 8 o'clock p.m., Mr. John Parker, president, in the chair.

The minutes of last meeting were read and approved of. Mr. Thompson gave notice that at next meeting he would move—"That arrangements be made for a photographic exhibition to be held in Glasgow."

Mr. John W. McCall, F.R.H.S., London, delivered a lecture before a large attendance of members and friends, his subject being "Holiday Rambles in Texas; how I went, and what I saw." His lecture was most interesting and instructive, and was profusely illustrated by a large number of coloured transparencies thrown upon the screen by the lantern; thereafter he recited the poem "Jane Conquest," which was also illustrated by the same means, by a series of pictures taken from life models.

After a very enjoyable evening, the proceedings were brought to a close by the Chairman proposing a hearty vote of thanks to Mr. McCall for his kindness.

Thursday Evenings for Photographers.

At the meeting (largely attended) on the 30th ult., the question of forming a new club was taken into consideration. In the unavoidable absence of Mr. Cutchey, who was to have taken the chair, Mr. A. Haddon was unanimously elected chairman. Letters were read from Messrs. Brown, Cutchey (the late Hon. Secretary of the Photographic Club), and others, giving their views, &c. It was proposed by Mr. Riemann, and seconded by Mr. Coles, "That, in the opinion of this meeting, it is desirable that a new club be formed, the proceedings at all meetings of which shall be open for publication." This was carried with but one dissentient, who subseqently gave in his name as a member of the new Club.

A long discussion then took place as to the nature of the new Club, in which Messrs. Cobb, Fry, Henderson, Pearsall, and others took part.

Messrs. Debenham and Coles having borne their testimony to the advantage they had derived from attendance at the Thursday evening meetings,—

The following resolution, proposed by Mr. Prestwich, and seconded by Mr. C. G. Cutchey, was put to the meeting and carried unanimously:—"That a photographic club be formed, the annual subscription to be 5s., and that the names of those willing to become members be now taken."

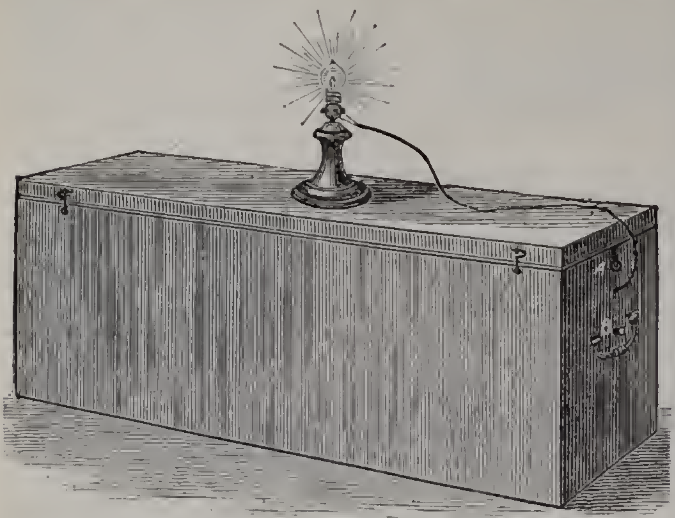
Over thirty names were then handed up to the Chairman as intending members, and a provisional committee was formed to draw up a set of rules to be submitted to the next meeting, to be held that day fortnight.

A cordial vote of thanks to the Chairman terminated the proceedings.

Talk in the Studio.

Royal Institution.—The following are the lecture arrangements after Easter:—Mr. E. B. Tylor, four lectures, on the "History of Customs and Beliefs," on Tuesdays, April 18 to May 9; Professor A. Gamgee, four lectures on "Digestion," on Tuesdays, May 16 to June 6; Professor Dewar, eight lectures on the "Chemical and Physical Properties of the Metals," on Thursdays, April 20 to June 8; Mr. F. Pollock, four lectures, on the "History of the Science of Politics," on Saturdays, April 22 to May 13; and Professor D. Masson, on "Poetry and its Literary Forms," on Saturdays, May 20 to June 10. The Friday evening meetings will be resumed on April 21, when Professor Dewar will give a discourse on the "Experimental Researches of Henri Ste. Claire Deville, Hon. M.R.I."

The Swan Lamp in the Dark Room.—We are now enabled to place before our readers a cut of the portable battery with the Swan lamp attached, as manufactured by Mr. Paterson, of 76, Little Britain, who informs us that he has fitted



some of these with red shades, so as to adapt them for dark room use. The lamp gives a steady light equal to five standard candles, and the five-cell bichromate battery contained in the box is brought into immediate action by lowering the plates into the cells, a pulley-like arrangement for this purpose being shown at A B. Not only is an apparatus of this kind useful for dark room use, but, should it be necessary to work with ether or other inflammable liquid in the evening, a safety light of this character will prove of considerable value. We intend before long to describe some new arrangements which we have made for facilitating the use of the incandescent lamp in the dark room.

How do the Horses Go?—Most horses are four legged: the legs arranged like those of a table—whence we often hear of a horse and his 'table companions (the famous Table Bay is, we may note, neither a bay horse nor a bay table). The difficulty is to know which of the legs are used in certain movements (in the table, by the way, you can always tell, however quickly it is moved, the near legs from the *off* leg). Mr. Muybridge, of San Francisco—or Frisky, as they call it over there; appropriately with respect to horses—has solved this problem, with the aid of the camera. This he has demonstrated to the Royal Institution and the Savage Club, so that all the *savans* are satisfied. In walking, the horse raises two feet on the same side, and in doing so supports himself on two feet on the same side, which of course is the other side. In the amble he is, so to speak, ambledexterous (it doesn't matter how many "hands" he is); in the canter (is it Mr. Muybridge who gives the Canter Lectures at the Society of Arts ?) and gallop he varies at will, apparently, in a sort "of go as you please" style. One result is to show that almost all the horse-painters are at fault, including Frith, who in his "Derby Day" has shown ten horses galloping with all four feet off the ground at once—an impossibility, but perhaps due in his case to the misleading though familiar Derby cry, "Now they're off!" when they are simply going *on*. Mr. Muybridge's wonderfully clever photos. are shown in action by an instrument the name of which we forget, but Aunt Towzer thinks it's the Zoedone's-cup.—*Funny Folks.*

Singular Explosion of Oxygen.—M. Sébère, of St. Brienne, has been in the habit of storing his oxygen in a large gas-holder of galvanized iron, holding a hundred litres, and sunk in water. After being nearly half full for several weeks, he was about to make use of it by carrying a jet of the gas to a flame, with the result of the whole violently exploding. An investigation proved that no carelessness was at the bottom of the matter, the explanation being of a most simple nature, and one that theory would have predicted. A galvanic action had been set up between the iron and the zinc, and hydrogen had been liberated, an explosive mixture of the most powerful character being thus manufactured in the middle of the laboratory. M. Sébère's arm was broken, the place was deluged with water, and considerable further damage resulted. In order to prevent a similar accident, for the future M. Sébère will always keep the interior of his gas-holder well varnished.

Solvent for Gallic Acid.—Mr. Frederick Long says, in the *British Medical Journal*, that he has accidentally discovered a method of dissolving gallic acid. Having a short time since a case of hæmaturea, the result of uric-acid gravel, he chanced to prescribe a mixture containing half a drachm of gallic acid and a drachm and a half of citrate of potassium, and, to his surprise he found he had a perfectly clear liquid, the gallic acid being completely dissolved. He has since made further experiments, and he finds that, with care, 20 grains of citrate will dissolve as much as 15 grains of gallic acid in an ounce of water, and remain quite clear for any length of time. To be able to give gallic acid in perfect solution is a great advantage, as absorption must take place more rapidly when the salt is in solution than when simply suspended in mucilage. The citrate, being a very simple salt, can do no harm in any cases in which gallic acid is required.

A Horse in Church.—On Saturday afternoon, about five o'clock, a horse belonging to Messrs. Marsh Brothers, photographic artists, Henley-on-Thames, which had just been brought out into the street to be attached to a trap, started off at a rapid pace, and the principal entrance of St. Mary's parish church being open, and in a direct line with where the animal was left standing, trotted into the sacred edifice, going as far as the chancel steps, where it reared up on its hind legs facing the altar. When seized by the bridle it was found that the horse could not be turned round in the open space, and so with some difficulty it had to be backed the whole length of the church to the door by which it had entered. No damage whatever was done either to the horse or to the church.—*Globe.*

To Correspondents.

All Communications connected with Advertisements and Business to be addressed to Messrs. Piper & Carter, "*Photographic News*" *Office, 5, Castle Street, Holborn, E.C. Advertisers are requested to make all Cheques payable to* Messrs. Piper & Carter, *and crossed* "*Union Bank, Photographic News Co. Account.*"

*** We cannot undertake to return rejected communications.

W. Rogers.—Thank you for the suggestion, which has already been under consideration; the plan has its advantages, but also its disadvantages, we find.

A Beginner.—There are many advantages resulting from the use of a moderately small stop when the increased time of exposure is allowable; but it is doubtful whether it is ever desirable to reduce the diameter of the stop to less than one-fortieth or one-fiftieth of the equivalent focus of the lens. In all cases, when a small stop is used, care should be taken that the hole is countersunk; so that the light is cut off by a sharp edge, and not by a tube of appreciable length in relation to its diameter.

P. D. R.—No thoroughly satisfactorily instrument of the kind exists.

Easton.—1. You will find the exposures nearly 30 per cent. less than in this country. 2. Hardly. 3. Unless you are prepared to carry a considerable amount of luggage, you had better put off the development of the bulk of the plates until you return.

Thos. J. Bennett.—You might apply to Mr. Paterson, of 76, Little Britain.

Edwin Billing.—We cannot find space for an illustrated notice.

J. Robinson.—1. You should use a much weaker developer, say five grains of iron to the ounce. 2. Add about four drops of water to each ounce of collodion, carefully dust the interior of your dark slide, and place moistened blotting-paper at the back of the plate. 3. For the present, be content with the lenses you possess.

C. M. Hargreaves.—All the samples of the gelatine in question which we have tried have been so uniformly good, that your experience surprises us. It might be well to assure yourself that your thermometer is correct.

Fritz.—One part of cuttle-fish bone in the state of an impalpable powder, and six parts of oil of turpentine, forms an admirable mixture for the purpose, and it may be applied by means of a pledget of cotton-wool or the top of the finger.

James Bloore.—1. Not unless some reducing agent is also present. 2. Although nearly insoluble in alcohol, a very perfect decomposition is attained if the directions are carefully followed.

C. B. Cooper.—1. Not if the washing has been sufficient. 2. Several complaints have reached us, and we are glad to say that the matter will soon be fully discussed.

Robert Laking.—Neither salt will produce the effect which you describe; get your friend to go carefully into the matter again, and you will probably arrive at the truth.

THE PHOTOGRAPHIC NEWS.

Vol. XXVI. No. 1232.—*April* 14, 1882.

CONTENTS.

A NOVEL METHOD OF CONTROLLING A SHUTTER BY AIR CURRENTS.

Few of the minor appliances incident to photographic manipulation have been received with so much favour as the pneumatic arrangement of Mr. Cadett, by which a shutter can be opened at will, or allowed to close; and the application of Mr. Cadett's idea to the release of a drop or spring-shutter has, perhaps, come more into general use than the original invention. A Brighton photographer, whose name has not yet transpired, has constructed a pneumatic apparatus on a novel principle, which not only allows of the shutter being opened, but also closed, by the impulse of a current of air; and the simplicity of the whole arrangement warrants us in thinking that it is likely to come into very general use for studio and out-door work. As the inventor sent his apparatus for exhibition at a Thursday Evening meeting (see page 207), and we are authorized by the management of the meeting to publish a description, we suppose that the arrangement is not patented. The mechanical principle on which its action depends may be summarized as follows.

A flap (which forms the shutter) is mounted on an axis placed at a point below the centre of gravity, and stops are so placed that the flap can move to a limited and equal extent, either to the right or to the left. Under these circumstances the flap will remain at rest when in contact with either one of the stops, but will be in a state of unstable equilibrium when in any other position; and, as a matter of fact, it is so delicately mounted that a slight puff of air can easily blow it from one position of rest to the other. It is almost needless to say that one of these positions corresponds to open lens, and the other to light shut off.

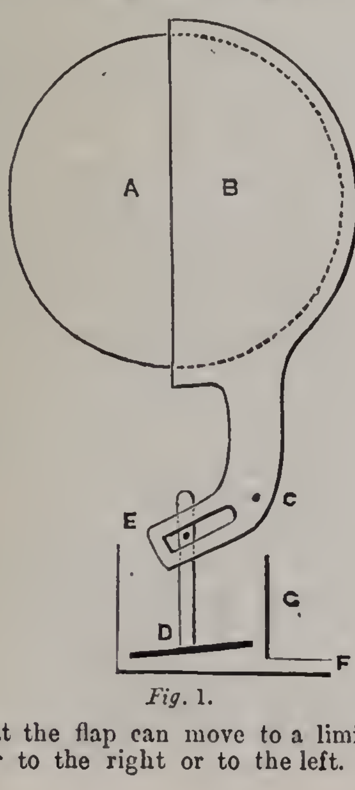


Fig. 1.

It is evident that numerous arrangements could be devised in which the above mechanical principles are carried out; but it is interesting and satisfactory to note that the inventor of the arrangement we are about to describe deserves as much credit for the mechanical details as for the principle of action which he has adopted. The forward air current is obtained by *rapidly* compressing the usual india-rubber pear or injection bottle, and the backward or exhaust current arises when the compressed pear is *suddenly* released, the gradual compression of the pear, or its gradual release, producing no effect on the shutter. In actual practice, two half-round flaps are used, so as to obtain the advantage of more equal lighting than would otherwise result, and fig. 1 is a diagram of the shutter when closed, A being the aperture of the lens, and B one of the half-round flaps. G is a cylinder in which the piston D fits quite loosely. The india-rubber pear or injection bottle is connected by means of any required length of flexible tube with the inlet pipe, F. When the pear is

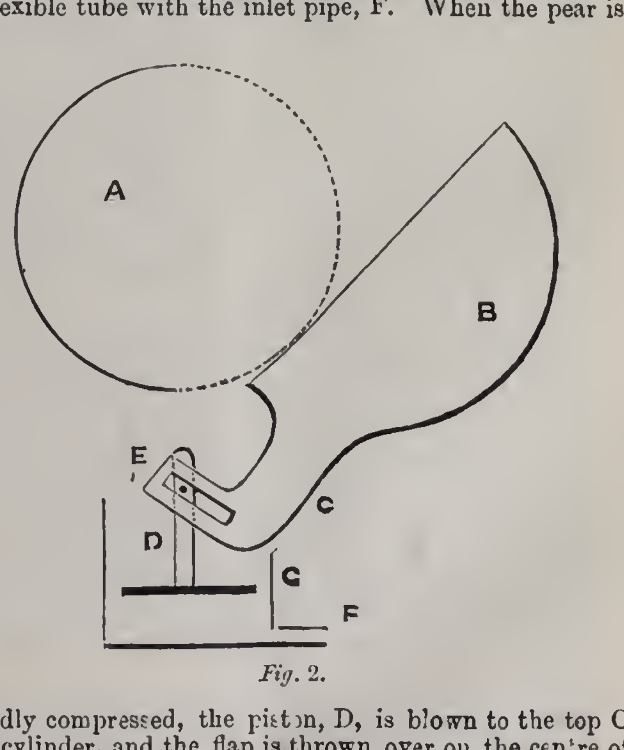


Fig. 2.

rapidly compressed, the piston, D, is blown to the top C the cylinder, and the flap is thrown over on the centre of into the position shown in fig. 2, the compressed air rapidly escaping through the space between the piston D and the cylinder G. If, now, the pressure on the pear is suddenly relaxed, the rush of air against the upper surface of D tilts the flap back into its first position, or closes the lens ; but should it be desired to leave the shutter open for some minutes, it is merely necessary to relax the pressure gradually, so that the returning air shall pass between D and G so slowly as not to move the piston. When it is wished to close the shutter, it is merely necessary to once more compress the ball, and then to allow it to expand suddenly. In our diagrams we have, for the sake of simplicity, represented the apparatus as having only one flap, but there are, as before stated, really two; the parts represented by B C E being duplicated so as to cover the other half of the aperture.

The complete command which one has over the shutter while handling the pneumatic ball is surprising ; but as it is hardly practicable to give a much shorter exposure than one-fifth of a second, it will not serve for the most rapid work unless a spring arrangement is attached.

While speaking of shutters, we may call attention to the extremely ingenious and simple electric release as fitted to a drop shutter by Mr. G. F. Williams, and exhibited by him at the meeting of the South London Society (see page 206). A small electro magnet is bolted against the face-board of the shutter, and angular pole-pieces actuate a small armature, which is included in the thickness of the face-board. When this armature is attracted, the shutter falls. Mr. Williams uses a small Gaiffe's chloride of silver battery contained in an ebonite tube rather over an inch in diameter, and perhaps three inches long, contact being made by a button at the top of the ebonite cell. A connecting cord of two-strand telephone cable completes the arrangement.

MEASURING THE LIGHT OF HEAVENLY BODIES BY PHOTOGRAPHY.

We stated the other day that the eminent French astronomer M. Janssen proposes to employ photography as a precise and ready method of measuring the luminosity of the heavenly bodies. One of the most valuable advantages of this method of photometry, writes M. Janssen, will consist in the permanence of the elements of comparison. While photometric observations by the eye of the intensity of two separate sources of light are necessarily fugitive, and generally require the simultaneous presence of the sources, photography will be able to furnish us with permanent elements of comparison which can be referred to whenever necessary, and which may even be transmitted to posterity. Further, the property which a sensitive plate possesses of allowing an almost infinite accumulation of luminous actions to be impressed on it, will afford the means of studying and comparing the action of radiations of the very lowest degree of power, such as are quite outside our present means of measurement.

The photographic result of the action of the luminous radiations is, so far as our present processes are concerned, to produce a metallic deposit on the support ; and it is this deposit which we can take as our standard of measurement. We cannot weigh the deposit—its quantity is too small—but it is very easy to take its degree of opacity as the base of our measures, since on this opacity depends the image which the light produces. Besides, in adopting this base we take advantage of the natural parallelism which exists between photographic and ocular photometry, for in the latter method we look to the degree of illumination of a surface. This first point being fixed, we have still to fix the method to be adopted for taking the measurements.

For measuring the intensity of the luminous radiations from two different sources of light, two methods present themselves. We can take, as our base, either the ratio of the opacities of the metallic deposits produced in equal times, or that of the times necessary for obtaining the same degree of opacity. The latter of these methods appears to be the most practicable ; it is comparatively easy to judge by the eye which two deposits are equal in opacity, but, since the opacity of a deposit does not vary as to the intensity of the source of light that has produced it, it would be very difficult to measure correctly two different degrees of opacity. On the other hand, it is evident that, if two deposits on the same plate are equal in opacity, the action of the light in the two cases must have been equal in degree. In other words, this action for each source of light must be proportioned to its intensity, and to the time during which it acts. We have, in fact,

$$i \times t = i' \times t'$$

Or

$$\frac{i}{i'} = \frac{t'}{t}$$

That is, the intensity of a source of light varies inversely as the time necessary for producing a constant opacity in the deposit—or, if it is preferred, for performing the same amount of photographic work ; hence we are able to refer the measure of the intensity of two different kinds of light to the measure of the times necessary for producing the same degree of deposit on the plates treated in precisely the same way.

It was, however, found possible to demonstrate the truth of this principle by actual experiment; this experiment was carried out with two dry gelatino-bromide plates, and with a candle as the source of light. The candle was placed at a distance of 0·79 metre from the plate, the latter being in a vertical position. In front of the plate there was a series of screens increasing in height in such a way that by lowering them successively, more and more of the plate was exposed to the light. The first screen was lowered so as to give an exposure of 4 seconds for the upper part of the plate, and each of the other screens was lowered in order, at an interval of half a second. In this way a number of horizontal bands was obtained on the plate corresponding to the exposures of 4, 4½, 5, 5½, and 6 seconds. Then the candle was placed at twice its former distance from the plate—that is to say, at a distance of 1·58 metre ; and the first screen was lowered after 16 seconds, the other screens successively at intervals of 2 seconds, which gave exposures of 16, 18, 20, 22, and 24 seconds—that is to say, four times those in the first series. It was found that the two plates (made of the same emulsion, and developed in the same way) gave a scale of equal tints in the corresponding order. Thus, a source of light at a distance 1 (the intensity of which we may call 1), and acting for the time 1, gave the same degree of opacity as the same light placed at twice the distance (whose intensity would therefore be $\frac{1}{4}$ 1), but acting for the time 4.

In practice, when measuring the ratio of the intensities of the sources, it is best to obtain from each source a series of tints gradually increasing in depth, by exposing in such a way that the two series may have the largest possible number of corresponding terms. Each tint in the one series, which finds its equal in the other, may be compared by making equal the ratio of the times during which the two sources have acted, to the ratio of their intensities ; care must, however, be taken to compare feeble tints only, as they will give more accurate ratios.

It is, moreover, evident that, if from the action of two different sources of light on the same plate may be deduced the ratio of their intensities, then the action of the same source on two different plates will give the ratio of their sensitiveness. For each plate there must be taken a number of exposures, forming a series, of which the terms may be compared with those of the series for the other plate, the source of light remaining the same. The sensitiveness will then be in the inverse ratio of the time of exposure.

M. Janssen, who has pursued these researches for several years, has recourse to graduated bands, obtained either by means of the screen above described, or by that of the flap of a frame which can be opened to any required extent, according to the width of bands desired to be produced. For investigations of a more precise character he has had a special instrument constructed, to which he gives the name of *photographic photometer*. This instrument consists of a frame to hold a sensitive plate, and in front of which a shutter pierced with an aperture is made to pass; the movement is effected by mechanism, so that it is capable of measurement, and the shape of the aperture varies according to the effect which it is required to produce.

When the aperture is rectangular in form, a uniform tint will be produced on the plate; but if it is triangular, the opacity will decrease from the edge of the plate corresponding to the base of the triangle towards the opposite edge: moreover, the rate of decrease in this opacity is the same as that of the decrease in the intensity of the light, which is given by the form of the aperture. One of the results obtained with this instrument is the observation that the opacity of the photographic deposit is not proportional to the luminous intensity when the latter is very great. For if two similar plates, after being exposed under the action of the same triangular aperture, be superposed in opposite directions, it will be seen that they do not present a uniform tint, but that the opacity is increased towards the centre — a proof that the photographic deposit does not increase so rapidly as the luminous intensity.

To measure the relative sensitiveness of two plates made with different emulsions, they must be placed, one after the other, in the frame of the photometer, and exposed under the triangular aperture. The points which possess the same degree of opacity must then be referred to the corresponding points of the aperture, and the relations of the openings at these points will express the ratio of sensitiveness. By making the light from two different sources act successively on two similar plates, we can also use the instrument for finding the ratio of the intensities of the two lights. Finally, by means of the same instrument, the principal laws of photometry may be verified photographically.

PHOTOGRAPHY IN AND OUT OF THE STUDIO.

Photographic Competition at the Alexandra Palace—Photography in the County Court—Panoramic Lantern Slides.

The Photographic Competition at the Alexandra Palace.—It is long since "Arry and Arriett" have had so much honour paid them as on Easter Monday at the Alexandra Palace. We are afraid that from "Arry's" point of view the photographic competition was rather slow, and that he would infinitely have preferred a "big mix" and "go as you please" match; still he obeyed the directions given him in the advertisements faithfully, and assembled in his thousands on the south slopes, and to this extent evinced an interest in art. It must be confessed that a "chaffing" rather than a reverential spirit prevailed among the huge crowd, but a few there were who showed a proper anxiety to be "taken." Indeed these exceptions carried their anxiety so far as to remain stationary for several minutes, under the impression that if they so much as moved a muscle or stirred an eyelash, the whole picture would be spoilt. Regarded simply as a mass of people, the enormous crowd which gathered in front of the score of cameras ranged on the top of the grand stand no doubt will present points of interest in the photographs; but so far as picturesqueness is concerned, by far the most effective picture was presented when the sitting was over, and the crowd began to sweep back towards the Palace. If the object had not been to get as many faces as possible into the photographs, a far more entertaining competition would have been a contest with "detective" cameras. Innumerable pictures of Phillis and Corydon disporting themselves lovingly might have been secured. The self-satisfied expression of the young gentlemen who give themselves up with so much energy to the concertina would alone have been worth a journey to Muswell Hill to obtain. Family groups picnicing on the grass on sandwiches—by no means of the Vauxhall type—and bread and cheese brought in the family basket, could have been immortalised. What an inexhaustible field for study of character! It is to be hoped that if Messrs. Jones and Barber cannot see their way to give a prize for pictures of this kind, some of the photographic societies or clubs will take up the idea. Seriously speaking, a series of humorous bits of real life of this kind would pay for the trouble.

Photography in the County Court.—Is a photographer bound to send home the photographs of his customers? The point appears at first sight to be a trivial one, but there are occasions on which it may prove very important. At Southwark County Court, recently, Mr. Kirkby, a photographer residing in South London, brought an action to recover the sum of £1, the balance of £2, the price at which he agreed to enlarge a photograph of the defendant's deceased wife, and to colour and frame the same. It seems the defendant brought the plaintiff a carte-de-visite of his wife, and from this carte-de-visite an enlargement in oils had to be made. When the enlargement was made, defendant called to see it, and made certain suggestions which the artist carried out in his presence. The picture was then in crayons, and it was afterwards finished in oils. The defendant, however, did not like it, and applied for the return of £1 he had deposited, which application Mr. Kirkby naturally refused. The picture was still retained by the plaintiff, who said, in reply to the judge, "I was in hopes, or rather considered it was defendant's duty, if he really wanted the portrait, to come and pay the remainder of the money. I have already expended £1 over the work, and then there was the frame and the mounting. I did not send the picture to defendant, because he made no request, and because he said he did not like the portrait. Under these circumstances I thought he would come for it." Defendant, however, does not appear to have had any intention of so doing, and in this he had the law on his side, for the judge held there had certainly been no delivery of the picture. But he put it to the defendant whether it was worth delaying the settlement of the matter by objecting to the non-delivery, seeing that plaintiff could deliver the picture on that very day, and then sue again. To this very obvious and common-sense suggestion defendant would not agree, his counsel relying upon the non-delivery as one point in the defence; so the judge had no alternative but to declare a non-suit, with liberty to bring another action; and Mr. Kirkby has thus been put to an expense for which, if he gains the day in the second action, he can scarcely hope to be recouped. Photographers, therefore, will do well to remember that, if they have a dispute over their work, they must send the latter home, or deliver it in some way to the customer, if they wish to recover. The case, it may be mentioned, is an instructive one, from a remark made by the judge, which went to the very root of the matter. In referring to the difference of opinion between the plaintiff and defendant, he said: "The question is, whether the picture is like the small portrait, and not whether it is like his (defendant's) wife." In this case the photograph was pronounced by his Honour to be "a wretched, faded thing, and he did not know how it could be enlarged at all;" while the plaintiff stated that defendant himself owned that the carte-de-visite was not a fair likeness of his wife. How often is not this kind of thing repeated within the experience of most photographers! People bring photographs of deceased relatives, which photopraphs are, in nine cases out of ten, declared not to do justice to the original; and yet they expect the artist, out of his inner consciousness, to make good all defects. Whatever the defence may be in the present instance, apart from the non-delivery of the enlargement, we cannot, of course, say; but *prima facie*, Mr. Kirkby appears to have had a good chance of winning the day, had he not committed the oversight referred to.

Panoramic Lantern Slides.—The late Mr. Johnson's panoramic camera, in which the lens moved at a regulated speed, made a sensation at the time of its introduction, but has not, for various reasons, been made use of. A correspondent of the *English Mechanic*, who says that when in India he invented and patented a camera about the same time as Mr. Johnson invented his, and on the same principle, suggests that panoramic slides could be easily made for the magic lantern now that gelatine films can be curved, while, owing to their rapidity, the clockwork movement could be done away with. "M. I. C. E.," the correspondent in question, constructs his camera on the principle that a lens can be turned through a considerable angle round its vertical diameter without moving the picture it produces. "In the same way," he says, "it can be shown that there is some vertical line between the two lenses of the ordinary combination used for portraits, round which the combination may be turned through a small angle without interfering with the picture it produces." To decide the radius of the curve of a dark slide, the distance from this vertical line to the image of a distant object produced by the lens must be measured. The camera, he thinks, should be fan-shaped, the lens being fixed between pivots top and bottom, and in a line with the vertical line, at the small end of the camera. To the back combination is attached a flat tube, through which all the light passes, the end of the tube nearest the film being practically a slit about ¼-inch wide. With one sweep of the hand the lens can thus be turned through the whole angle that it can turn, and so the picture is taken. "M. I. C. E." asserts that transparencies printed from negatives so obtained could only be exhibited in the magic lantern bit by bit, but would be much better than "the peepshow views we are accustomed to." This is quite possible.

ON ACTINOMETERS.

BY DR. H. W. VOGEL.*

The actinometer which I have described in former numbers of the News will find its employment mostly as a means of comparing the relative sensitiveness of photographic plates which have been exposed at the same time, and developed in the same solution. In such cases the temperature of the developer plays no part.

It is another thing, however, when two plates are developed in separate solutions of uneven temperature; in this case the result is materially influenced by temperature. Thus, I obtained with two plates of the same emulsion, which were exposed at the same time, and for the same period, with one, the figure 8, on development by means of a warm solution, and with the other the figure 12, by means of a cold developer. The developer was in both cases the same, with the exception that one had a temperature of 10° R, and the other a temperature of 18° R. The figures 8 and 12 might lead one to think that the plates were sensitive in the ratio of 2 to 3.

Results obtained with the same plates in the case of scientific observations on the relative chemical intensity of light made at different times are, therefore, only comparable when the developing solutions are of the same composition and the same temperature, and the development is conducted for the same period.

Such comparison of results of the light at different periods is required less in practical work than in scientific observations. In most cases I would recommend for the developer a temperature of 15° R., which can easily be secured in summer by means of ice, and in winter with warm water. I may call attention here to the extent to which the development is advanced by a moderate increase of temperature, a circumstance which in practical work, where a very cold developer is frequently employed, should command some attention.

One other important point in connection with this photometer is the necessity for absolutely clean plates; a slight stain or inequality, for instance, in the neighbourhood of the spot where the last number appears makes the result quite useless.

Finally, there remains to be considered the unit of light to be adopted in this actinometer. Magnesium wire furnishes us with a convenient standard. One gramme of the wire is weighed and burnt without reflector, exactly at one metre distance, while the actinometer remains open; then development follows, and the number that appears is read off.

All other observations of the chemical intensity of light may then be reduced to that of magnesium, by dividing the number which appears on the burning of the magnesium wire by that of the other observation.

Warnerke's phosphorescent tablet I do not consider a good unit of light, as its intensity is very materially affected by temperature, the amount of light increasing with the amount of heat at the time being.

* Continued from page 80.

PROPOSED INTERNATIONAL ASSOCIATION.

We have much pleasure in complying with the request of the Chairman of the International Society of Photographers at New York, to publish the following intimation, which is addressed to the photographers of the world:—

The resolution adopted in this city by the last convention of the "Photographers' Association of America," and consequent appointment of a committee looking to the establishment of a grand international society of photographers, is the occasion of this appeal to the fraternity at large, both in this and the old world.

The purposes to be effected are of a character so laudable and desirable, that their excellence becomes evident on a mere statement.

It is greatly to be regretted, but, unfortunately, true, that the profession has been impeded in its progress and in the full unravelment of the possibilities of its art by a feeling of jealousy among its members. Whatever tends to eradicate this feeling—to create a spirit of brotherhood—must inevitably result in incalculable benefit, not alone to the photographer as an individual, but also to his art, and, through it, to mankind at large.

The first steps in this praiseworthy direction have been taken; the photographer the world over has begun to recognize that each is not sufficient to himself; that something may be gained to him by a comparison of the methods and results of his neighbours; that which the individual cannot effect, the united efforts of the fraternity will accomplish.

Local organizations of photographers have done, and are doing, much for the advancement and development of our art, but their efforts are, and naturally and necessarily must be, confined in their limits, hampered in their operation.

Photography is a universal art, not confined to one locality or one nationality, but broad as humanity, as undefined as nature, and her votaries should be united in a bond as complete, as grand and liberal, as unrestrained and unlimited. This object we seek to attain, this union of the efforts of our profession, an interchange of benefits, a dedication to the fraternity of what each has gained for himself, an enlargement of the scope and utilization of the art, a truer and more perfect recognition of the position and merit of the photographer by the outside world.

To co-operate with us in this effort we ask of all, wherever located; to those who have seen and know the advantages of local and national associations, we expect that you will heartily and enthusiastically lend your aid and the benefit of the experience you have gained in that direction. But to the photographer remote from such organizations, we say that you, as well, can aid in this great work—you as well will profit by it.

Photographers! ours is an art of which we should be genuinely proud; it is the only, the true, art preservative. Who will refuse his co-operation in placing that art yet higher, in securing for it the recognition it deserves, the estimation to which it is entitled, in developing to the utmost its wonderful resources, in uniting the brotherhood throughout the world, regarding not race or climate?

Very fraternally yours, D. N. Carvalho, New York City,
Chairman of Committee on Formation of an International Society of Photographers, P. A. of America.

By sending their names and addresses to the Chairman of the Committee, as an evidence of their adhesion to these objects, photographers will most practically and effectually aid this movement.

An expression of views as to the best methods of attaining these ends is cordially invited.

SOME EXPERIENCES IN ANIMAL PHOTOGRAPHY.

BY CHARLES REID.*

In consenting to write a paper on animal photography, the first thought that occurs to me is, that I would much prefer to join you in one of your pleasant excursions to some part of the country where animals are rife, and have some practical illustrations; the camera being to me a far more agreeable article to handle than the pen, and even the development of dry plates in the faint light of the dark room is a more congenial employment than the arranging of my ideas in a form in which they will bear the light.

Portrait photography in the studio has its uncertainties, but they are few compared with those met with in the securing of animals outside of it. Yet to me the latter has a charm peculiar to itself, which makes it a positive pleasure compared with the monotony of the former. The photographing of animals has grown so strong with me, that I can see no attractive or unusual subject without feeling the desire to secure it; hence my camera has been pointed at almost every accessible creature, from the ponderous elephant to the tiny half-fledged robin.

Speaking of the elephant, our town was favoured the other day by a visit from Wombwell's Menagerie, which comprises, among other novelties of which portraits would be desirable, two elephants of tremendous height. Excepting the camels which I had taken during a previous visit, these seemed the only accessible portion of the collection. To the question whether he would consent to have them photographed, the keeper replied, "With pleasure, if you let me have a copy, and if it is to my mine, I shall want more." The task of separating the crowd from the huge pair, though difficult, was easy compared to the obtaining of anything promising. If one of them should remain still for a moment, the other was sure to be rocking his body, or solving the problem of perpetual motion with his trunk. Plate after plate was exposed, some of which were evidently wasted, and about all there was some misgiving in my mind as to the result, so long as the two beasts were together. It occurred to me that perhaps with one of them there might be a better chance of success. Mentioning this to the keeper, I asked if they were trained to go through any performance. "Yes; this is the performing one," said he, pointing, with a wave of the whip, to the tallest and best behaved of the two, with a look of satisfaction, if not of pride. "Show what he can do then," said I; "perhaps he may be quieter alone, when he finds he has got something to take up his attention." To which request the keeper shouted, "Come away now, Theodore!" at the same time bending his knee. In response, the unwieldy brute raised his foot, and placed it gently on the outstretched knee of his keeper, who, no doubt, to make the effect as striking as possible, and perhaps recollecting for the moment that he was assuming an attitude in which he was to be scanned by his friends and handed down to posterity, completed the composition by reclining with his elbow on the leg of his friend, and with his hand placed up to his head, while he again shouted, "Up, up, up, Theodore, further up." Matters really assumed a more hopeful aspect as the docile brute flung his trunk in the air and then allowed it to rest on his forehead; but the rest was brief, it seems so impossible for that organ to be still, yet it was long enough to allow of two exposures being made, a copy from the best of which is sent for examination.

The only other opportunity I ever had of taking an elephant was on the occasion of a visit of a menagerie to another town in which I had a studio, but between the late hour of the day, the wind, the crowd, and the unceasing rocking of this particular animal, the result was a poor picture. Expressing a wish to one in charge to have photographs of the lions and other wild beasts, I was met with the frank assurance that I might have every facility for so doing; they would be willing to assist in exposing different occupants of the dens to the gaze of the camera, and a whole day could be devoted to the work. Need it be said the case wore a different aspect, and that the offer was declined with thanks, when it was known that the happy day was to be on Sunday!

Perhaps the most vicious brute I ever took was a huge travelling bear. Hearing of his arrival in the town, no time was lost in finding him out, while performing in the street. After witnessing his performances and watching his slouching gait—a sight in itself—I made up to his owner, a foreigner, and with considerable difficulty got him to understand that I wished to have a picture of his bear. Like the elephant, this subject was very unsteady when left to himself; nothing could be done till he was put through some of his antics. A favourite attitude with him seemed to be standing rampant, clutching a long pole, but the poor fellow was tired with the day's exertions, and always turned away his head, so as to allow it to rest on his fore-paws. As a picture of him in such a position would be worthless, he had to be frequently stirred up, a proceeding he evidently had no relish for, and, judging by his looks and growl, he would have warmly resented it but for the muzzle he wore. After every conceivable expedient to secure his attention had failed, it occurred to me to try and growl as like another bear as possible. Whether he regarded the hideous noise as proceeding from a friend or an enemy, I cannot tell; at all events, he bestowed on me a look of attention, which I would rather witness in the streets of Wishaw with his muzzle on, than behold without it in the forests of Russia. Thanks to the sensitive plate—a wet one—this look was secured, and can be scanned at leisure by such as care to look at the portrait sent.

As no arrangement could be made with the owner to send him a copy for his kindness, he said he would take money instead. This, I may note, is the only time I have paid for liberty to take a picture. People are usually so willing, and even anxious, to have their animals taken, that the photographer is almost unprepared for a blunt demand for coin, such as I had from an Irishman whom I once observed passing through the town with a flock of goats. The sight of such a fine lot induced me to ask if he would allow me to take a photograph of them when they halted, but he could not be got to understand what a photograph was, till an urchin who overheard what had passed shouted out to him that I wanted to "tak' their likeness." It was useless to make him the usual promise of a picture or two. He would give his consent only on condition that he got unreasonable backsheesh. However he ill-naturedly dispelled my hopes of getting a good thing, by rushing among the goats, and ultimately marching them off beyond my reach, to my great disappointment and regret.

It is not my practice to take any sample of an animal that offers, but to select, when possible, the best specimens within reach, and this, as a matter of course, often necessitates a good deal of extra trouble and anxiety; for "the selection of the fittest," in my opinion, not unfrequently means the best health and spirits, and a strong disinclination to have anything to do with photography on the part of my chosen subjects.

In animal as well as in landscape work, a class of people is met with of a stamp altogether different from the goat-herd—people whose readiness to assist amounts to officiousness, whose services could be dispensed with to advantage, and whose absence or non-interference would be cheaply bought by the outlay of some change, should the circumstances admit of such a proposal. If the pleasures of out-door photography are greater than those which pertain to the studio, its disappointments are more galling. Who that has looked forward with anticipation to a day's outing, and has turned the day to good account, but perhaps, through some mishap, allowed the box containing the negatives to fall on the way home, can look with composure on the shattered fragments of what were once considered valuable trophies, got under, it may be, great difficulties?

The misfortune also of losing something of interest or importance which was within our reach is very annoying, more especially if a considerable effort has been made to obtain it. An

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experience of this sort fell to my lot last year. Taking advantage of a holiday, I resolved to visit a farm-steading at a distance, everything about which had a picturesque, tumble-down appearance, hoping to obtain, among other things, a picture of a pair of horses drinking from an old trough beside a delapidated wall which enclosed an orchard. This was to be the picture of the day; but, as it could not be taken till the mid-day rest, there was time to expose some plates on other subjects, and make every possible preparation. The horses were waited for with anxiety, and, when they did arrive (thirsty enough), the man received all the instructions which would be thought necessary as to keeping them from the water till all was ready, and to keep perfectly still while the exposure was being made. The day was clear, but so gusty, that some delay occurred in waiting for a lull. At last a favourable chance occurred, and the signal was given to allow the horses to have the draught they so much needed, and to remind the rider to be steady. The caution was, however, unheeded. Whether his thoughts were all about his horses, or whether he thought he was not sitting erect enough, he knew best himself; but, as soon as the cap was off the lens, he began to draw himself gradually up, and kept so doing during the exposure. It was no use giving way to the feeling with which every photographer is doubtless familiar in such circumstances. The slide was rapidly reversed, in the hope of having another chance before the horses had drank their fill; but it was too late. The fresh grass on the wall beside the trough was the attraction, and kept them in constant motion, thus dispelling all hope of the coveted picture for that day. No doubt they could have been brought back again, but it would only have been to verify the old saying, that "One man can bring a horse to the water, but ten men will not make him drink." It is on occasions such as this, when time is precious, and the photographer feels his helplessness to control the subjects he chooses to depict, that he most perceives the necessity of having himself well trained in the handling of his apparatus, both as regards his method of working, and particularly in being able to go through certain operations with as few movements as possible.

On a previous visit to the same farm I obtained some good pictures of cattle in a stream. The day opened very unfavourably, being dull and showery, and as there was no indication of the clouds clearing off, and being unwilling to lose the day, several plates were exposed, the results being beyond expectation, showing that for some subjects and for the obtaining of certain effects, sunshine is not indispensable. No. 251 is a print from one of these negatives, and is considered among the most successful in my collection.

Being out one day last summer, and after some special studies favoured with a lovely day—a day such as is but seldom seen in a whole season—I found myself with some spare time, after getting through with these subjects (one of which is sent, No. 75). Considering how to turn it to the best account, it occurred to me to try and get a picture of a maid milking a cow. The materials were just at hand. Of cows there were plenty, grazing in a field near by, and no difficulty was experienced in enlisting the services of the dairy-maid, and in the event of the cow being disinclined to perform her part, the services of a son of Erin who was employed on the farm were proffered, he being all alive to see how the thing was done, but little dreaming of the active part he was destined to play before the game was finished. The first thing, of course, was to catch the cow, which turned out to be no easy matter. The one selected was reputed symmetrical and supposed to be quiet, but when the attempt was made to drive her to the spot chosen—a broken piece of ground, covered with daisies, and flanked by an old hedge—she persistently refused to leave her companions. Her obstinacy roused the temper of the young Hibernian, who resolved to corner her at all hazards. After some spirited running this was accomplished, but not before the brute's blood was up to the point at which the prospect of a picture seemed very remote. Pat didn't think so, however. He entered the arena to cope with her single-handed, and his manœuvring to secure a hold was eventually successful. Seizing her by the nose with one hand, and the horn with the other, he managed to pull her up for a moment, thinking no doubt he had got the victory, but this was but the prelude to the combat. The cow resented such treatment, and plunged and struggled for freedom while her captor held on with the tenacity of a bull dog. It was an exciting scene—you might pay a shilling for a poorer entertainment any day—the pair were so well matched that for some time the issue was uncertain; the eye could scarcely follow their movements as they wheeled and dashed here and there, but the possession of an extra pair of legs makes a vast difference in such a tussle. Pat, labouring under a disadvantage in this respect, felt so to his loss as the cow jammed him against the gate, where, something interfering with the free use of his legs, he fell prostrate among her feet, when she instantly shook him off and bounded away, to enjoy her hard-earned freedom, while another of less beauty but greater docility was successfully approached in an open part of the field, she also refusing to oblige us by going near the hedge, where a prettier picture could have been got. Two plates were exposed in haste on account of the uncertainty of her standing any length of time in one position, a copy from one of which is sent.

The most tantalising animals I ever attempted to photograph were deer. Some two dozen of them are kept in a park about two miles off, but there is the greatest difficulty in getting within reach of them. The only party who can do so is the man who feeds them in winter, and if a photographer could manage to visit them every day for weeks with an offering in his hand, there is no doubt he would be rewarded in the end. But as this plan is out of the question, anyone who desires to take them must follow them from place to place with caution. This has been done by me many times without success. On rare occasions the intervening distance has been shortened to an extent which has caused the camera to be set up and hurried preparations to be made, only to find that before the exposure could be effected, the coy creatures were beating a hasty retreat; baffled in this way, the only alternative was to accompany the party who fed them to the field, and though this was done oftener than once, the only passable picture ever got was the one now sent, taken when the ground was covered with snow, which is little better than a silhouette.

To one who is a photographer and nothing more, such failures repeated again and again are very mortifying, and tend to anything but equanimity; but happily the photographer may be a lover of nature, and if so, he can easily afford to forget about his camera and plates in certain circumstances, and enjoy the beauty of the landscape, or be interested in the habits of the animals, though they refuse to disport themselves in the manner he would wish. In the case of the deer, it was positively exhilarating to see them, when it was attempted to corner them, rush past in single file, with startled looks, and to witness their gambols after they had reached a place of safety.

The desire to obtain photographs of animals sometimes leads to strange adventures and into odd company. During a recent fair held here, when quite a host of showmen were about with their horses, it happened that one of them had a fine specimen of a donkey which took my fancy. Finding the owner, and expressing the wish to have a picture of his "neddy," he gladly assented, and agreed to assist as far as he could. It was no use trying to take him in the open field. When approached too closely he had a disagreeable habit of striking out and otherwise showing his displeasure, so it was decided to capture him and tie him up to a waggon. As he absolutely refused to allow anyone to touch him, an extra lot of showmen were called to render assistance. The mode of capture decided on was to surround him at some distance and cautiously approach, a proceeding in which I heartily joined. As the circle narrowed the uneasiness of the donkey increased, and when anyone ventured nearer than the others, he was rewarded with the sight of a pair of heels, no doubt by way of a hint as to what might be expected by anyone who attempted to lay hands on him.

Although thus restricted in his movements, the prospect of a picture seemed no brighter; but while wondering what end could be served by thus encircling a furious donkey, the owner, a lithe little fellow, who had been watching his chance, sprang at him like a cat, and clasping him round the neck held him fast. Thus secured, the animal seemed subdued for a time, but before the bridle could be put on, he made a desperate struggle to get free, and had every appearance of succeeding, when, prompted by excitement and the fear of losing my subject, I also closed on him, and not being able to shake us both off, he was eventually bridled, and secured to the waggon, in which position he may be seen in the picture No. 275, looking round as if he owed me a grudge for the part I took in depriving him of his liberty.

It is very interesting to note the behaviour of different animals while endeavouring to obtain their portraits. The dog and fox are said by naturalists to be nearly related, and indeed their appearance bears out the statement, while in their manner the dissimilarity is very apparent. A good opportunity of observing this occurred in my wanderings last season. A friend had got possession of a fox, and as I had previously lost a chance of photographing one, I resolved, if possible, to secure a picture of this; but when I went to take it, it would not allow me to get near without bolting into its kennel or skulking behind it. There being no chance of getting it after that day, we were at our wits' end, and almost despairing of obtaining a picture unless it was one taken at too great a distance, when it occurred to the keeper to call one of the children with whom it was on good terms, and even playful at times, provided no grown person was in sight. After the girl led it out into an open space, I drew near, keeping behind the camera as much as possible, but as I dared not go so near as was desirable, I effected a compromise by keeping at a sufficient distance to allow the soothing effect of the girl's presence to neutralise the disturbing tendency of mine; with the aid of my boy, who retired to a little distance and diverted the animal's attention, the picture was soon obtained.

The wish to obtain pictures of birds' nests with young, last spring, cost me a deal of trouble. In the first place, the nests were very scarce, owing, probably, to the severe winter. Such a thing as a robin's nest could scarcely be found, even by the most experienced hands—the school-boys, and to obtain a starling's the services of a party with a good steady head had to be obtained. While it was being brought from the top of a high house, a nest was extemporised as like a starling's as the material at our disposal would allow. An old black-bird's nest pushed into a hollow piece of virgin cork, with the addition of a few ivy leaves, formed an appropriate surrounding to our "sitters," although one they did not relish. Being thus disturbed they came to know that they had wings, and were eager to try them; however, they were kept in the nest till a few plates were exposed, the first being the best, as one of them—the fellow in the bottom of the nest—got sick and hung his head all the time he was out in the bright sunshine. In the picture sent the sick one may be noted.

Another picture—geese and goslings—shows what may be accomplished in adverse circumstances by the excercise of patience and perseverance. The silliness of the goose is proverbial, yet sometimes she will behave better during an exposure than other sitters of whom better things might be expected. In the photograph, the geese and goslings appear to be on the best of terms, yet this would be the first time that they would be in such close proximity, as they were mutually averse to each others company, the goslings having been hatched by hens which had at this time to be kept off. To obtain the picture sent, we had to wait on for a considerable time, and actually weary out the goslings till they were glad to squat anywhere. This, and a picture of spangled poultry, No. 89, were taken by the aid of a drop shutter with an aperture about three times the length of the diameter of the lens—a Dallmeyer's Rapid Rectilinear—for which I procured a brass mount exactly corresponding to the original one, being unwilling to disfigure it by cutting a slot for the shutter to work in, which, by the way, works between the lenses in front of the diaphragm slot.

Several of the others shown were taken with a pneumatic shutter, the chief objections to which are its liability to shake the camera in making brief exposures, and the extra amount of exposure given to the foreground.

All those sent were taken on gelatine plates, which I have used exclusively for out-door work for nearly two years. The gain in convenience and sensitiveness is great, while much remains to be desired as to their reliability.

Having used the plates of, perhaps, a dozen makers, I decidedly give my preference to one sold at a low price, of which I once had the good fortune to secure a large supply, giving the order from a sample; but in fairness it must be added that others obtained from the same maker have not been so good. Though I have obtained good results with several high-priced plates, I must join with many others in affirming that there is just cause for complaint in regard to the quality of many of them. It is to be hoped that, by-and-bye, all plates will be more reliable, and as sensitive as they are at present stated to be.

In reference to the latter point, my opinion is, that from three to six times as sensitive a collodion would better represent the comparison, than from ten to twenty-five times, as usually advertised.

In conclusion, I feel as if an apology were due for engaging to write a paper while having so little in the shape of information to convey. Let the apology be that my photographic life, though not brief, has been an almost solitary one, and that circumstances have made me more of a benificiary than a benefactor—more of a copyist than an originator. But, in regard to the subject of this paper, I have learned by experience that, while a happy hit may at times be made by anyone, anything approaching to general success can only be achieved with the aid of skilful assistance, the possession of a love of the work, and fertility of resource; with the exercise of patience, self-reliance, and, above all things, a temper capable of bearing a heavy strain.

Notes.

There was a debate on science teaching in the House last week, when Sir John Lubbock and Mr. Story Maskelyne, late of the British Museum, championed its cause, and urged that more encouragement should be given to it. Unfortunately pure science has few representatives in the Legislature, these two gentlemen, with Dr. Lyon Playfair, being all that are directly interested in the subject.

Germany is bestirring itself to help in the monument to Daguerre, and already the list of subscribers number upwards of fifty. The donations vary from two marks to fifty marks, and the first instalment, amounting to fifteen pounds, has already been sent to the Committee in Paris.

The monster lens for the California Observatory has been attracting attention at Paris. It is of flint glass, and will cost two thousand pounds. The casting of the glass, which, by the way, has been completed without a single bubble, took no less than four days. The weight of the lens is 340 pounds, its diameter is upwards of a yard, and at the thickest part it measures about twenty inches.

The Russian Geographical Society have marked their sense of the value of photography as a means of illustrating travel by presenting to a lady, Madame L. Poltoratzkaya, a silver medal for a collection of photographs of Western Siberia. Another traveller, M. Lakhmaeyer, who has lately visited the Caucasus and Ural ranges, and also put before the Society a series of photographic records of his travels, has been similarly rewarded. Travellers tell less strange stories when they carry a camera, is evidently the notion of the Russian Geographical Society.

A correspondent, touching the subject of photo-type blocks for the printing press, about which we spoke last week, writes: "If pressed for time, why is not the fatty ink impression pressed straight upon the zinc plate, and this put at once into the acid bath. It seems only a waste of time putting the inked transfer down upon the lithographic stone first, and I don't see the good of it." If our correspondent were a practical photo-lighographer he would "see the good of it." Not only is it very desirable to keep from the zinc plate any chance spot of grease (which would prevent the action of the acid), but it is also very requisite that the lines of greasy ink forming the image should be perfect, and without any trace of rottenness, for the same reason. The photograph inked up for transfer is likely to present these defects, and so the transfer to stone takes place first of all, when the skilful lithographer soon remedies all faults. The very reason why so many fail to get clean *photo-type* blocks is because they omit the intermediate process.

Dr. Lagrange recommends, in the *Wochenblatt*, the employment of the ferrous oxalate developer to recover silver from waste solutions, the silver being then precipitated in metallic form. Impure chloride of silver residues, he recommends, should be treated with hyposulphite solution first of all; the hyposulphite dissolves out all the chloride, and then, if ferrous oxalate is added to the solution, all the silver is precipitated in a metallic state. The silver recovered is washed in water and dilute sulphuric acid, and may then be regarded as the pure metal.

To restore the ferrous oxalate developer after it has been employed, Dr. Lagrange recommends powdered iron. To five hundred grammes of the developer are added fifteen grammes of oxalic acid, fifteen grammes of carbonate of potash, and five grammes of iron powder.

The news of the week is certainly M. Garnier's new photographic process, which the inventor terms atmography—printing by vapour. It is a dusting-on process, the deliquescent film being ingeniously produced by the action of hydrofluoric vapour. Our Paris correspondent describes the process, which seems likely to be useful for the production of vitrified photographs.

Siemens' new gas-burner is well worth the attention of photographers, since it affords a ready means of increasing the luminosity of ordinary gas to a most extraordinary degree. The whole secret of the invention may be said to lie in the simple fact of heating the gas to a high temperature—800 to 900° F.—before it is burned. The gas-flame is circular, surrounding a porcelain ring, and becomes pear-shaped by being drawn into the chimney above. From this chimney proceeds a bye-tube, conveying the hot atmosphere downwards, and making it heat the reservoir that contains the gas.

Mr. Wight, an English chemist resident in Berlin, recommends the intensifying of gelatine plates with gallic acid, rather than pyrogallic, since the former, though slower in its action, is more certain and more under control. His formula is :—

a.—Nitrate of silver	... ...	3 grammes
Water ...	... ...	50 ,,
Glacial acetic acid	... ...	1 gramme
b.—Gallic acid	... ...	1 ,,
Alcohol	... ...	10 grammes

The gelatine plate is well washed and alumed, and then one volume of solution *a*, mixed with four volumes of water and with a few drops of *b*, are poured over it.

It is a pity the interesting Submarine Exhibition which opened on Monday at the Agricultural Hall affords no example of a submarine camera. Many attempts to photograph under water have been made—the last, we believe, by Messrs. J. Valentine and Sons, of Dundee, at the time of the Tay Bridge catastrophe—and now there is little difficulty in affording sufficient illumination by means of electricity, there is obviously better chance of success at hand.

Since in developing it is only necessary at intervals to have a light, photographers are in the habit of covering up their developing dishes most of the time, to protect the plate; in these circumstances, the bichromate battery might well be used to start the incandescent lamp into being in the dark room. If the lamp were only luminous just when the photographer desires to see how the development is getting on, there would be no necessity for this covering up of the developing dish at all; while the battery power would be employed most economically. Our idea is to have a treadle to make electrical contact, so that all the photographer need to do is to press his foot down every time he requires to see in his dark-room.

This plan, too, would be far less trying to the eyes than having a red glare always before them. The photographer, developing dish in hand, would be in darkness so long as he does not press the treadle with his foot. In preparing emulsion the plan might not be so convenient, although there are intervals here, when the photographer can dispense with light altogether.

Molybdous acetate, the latest developer in the field, is not likely to trouble photographers much. The metal molybdenum is found in small quantities in lead, and resembles plumbago very closely, the acetate being produced by dissolving the metal in acetic acid. The cost of the acetate, we believe, is about five shillings an ounce; but since Mr. Wood explained that after a long course of experiment he is unable to recommend the compound for practical use, its hard name is likely to disappear from among us as suddenly as it sprang up.

A correspondent thinks we should apologise for bringing before our readers again so soon the sketches of lenses that appeared in our columns last week; this we do, most sincerely, and promise, moreover, that the pictures shall not reappear for some weeks to come.

Mr. W. K. Burton proved pretty conclusively, at the last meeting of the Photographic Society, that it is hardly possible to construct a drop shutter giving an exposure so short as $\frac{1}{5000}$ of a second, or indeed anything like it, the speed of a shutter set in action by a spring moving not in proportion to the strength of that spring, but at a rate only equal to the square-root of its energy. In fact, said Mr. Burton, an object moving at a velocity sufficient to give an exposure of $\frac{1}{5000}$ of a second would have the energy of one of our modern projectiles as it is hurled through space from a rifled cannon. Any structure of the nature of a camera would inevitably be shattered to pieces in arresting a shutter moving at such a high speed.

But what is impossible with a shutter is perfectly possible with a revolving disc; if the latter is employed to open and shut the lens, an exposure of $\frac{1}{5000}$ of a second, or even briefer intervals, might be given. And here it may be well to mention that these brief intervals of time, strange as it appears at first sight, are quite capable of being measured. In fact, it is possible now-a-days to measure the millionth part of a second, which, some clever arithmetician has explained, bears the same relation to a whole second as one minute does to a fortnight.

And since we have referred to modern artillery, it may be pointed out that our scientific gunners actually do measure the flight of a shot to within the millionth of a second. The matter is not so difficult, after all. It is done by revolving a metal disc at a high speed, and leading electric wires from the gun into the vicinity of this disc. The disc is covered with fine soot, and when an electric spark passes from one of the wires on to the revolving disc, the black soot is flicked away, and a tiny bright spot results. The further ends of the wires are fixed inside the gun at certain intervals, and, when the gun is fired, are cut one after another as the shot passes along the bore. As each wire is cut, a spark passes along it to the disc, so that when this is afterwards stopped, the spaces between the little bright spots represent the time the projectile has taken to pass the wires in the gun. As the speed at which the disc is revolving is known, it is easy to translate the distances between the spots into periods of time, and, as we have said, the millionth part of a second may thus be estimated. Captain Noble, C.B., is the inventor of this subtle instrument, which he terms a Chronoscope.

Colours in photography are terribly disappointing. If we are told that an albumenised paper will tone a rich violet, it is not unusual to find the colour a slatey grey, or, instead of being dark purple, to result in a dull sepia. When we are promised ruby red, it generally turns out the appearance of brick-dust. The commutations of Mr. Wood, in which he cleverly changes the colour of the silver image surprising as many of the tints are, embrace very few pleasing results. The pictures produced are no doubt red, brown, yellow, &c., but it is not a nice red, or brown, or yellow.

Perhaps Mr. Wood may be able to improve the colours so as to make them less disappointing, for photographers would be glad enough, no doubt, to get coloured transparencies if the tints were what they wanted. Some years ago we remember paying a shilling at the Dramatic College Fancy Fair to see a fine cherry-coloured cat that was on exhibition at one of the booths. The cat was produced, and a plate full of cherries as well, so that we might compare the two. The cherries and the cat on that occasion turned out both of them to be black, and we were naturally disappointed; but the dis-illusion then, was not greater than it has been subsequently when we have been shown coloured photographic films.

Photography is never more aptly employed than when it records questions of fact. Some experiments have recently been made at Peterhead, to quiet the waves on the bar by pouring oil upon them, so that vessels may pass in stormy weather. Pouring oil upon troubled waters is not a mere figure of speech, as most people know; and at Peterhead they seem to have succeeded, after pumping oil for three-quarters-of-an-hour through an inch tube, to have quieted the waves very considerably, and, in a word, to have changed an unnavigable channel into a navigable one.

Unfortunately, it is a case in which people want to see before they believe. A pair of wood-cuts have been issued, showing the waves raging on the bar before the flow of oil, and the temporary smoothness afterwards. But this is not enough. Woodcuts do not inspire confidence and in any case cannot be taken as evidence of a fact; whereas photography would have carried conviction, with it A pair of "certified" photographs would have established at once the success or otherwise of the experiment, and there would have been no need to bear other witness to the value of the suggestion.

Noted at the Volunteer Review on Monday. During the march past two photographers, one with a smal camera, the other with a large bellows instrument, made their way across the course. At once "spotted" by the eagle eye of the Commander-in-Chief, a couple of aides were immediately despatched with the stern order to capture the trespassers. The small camera man, fleet of foot, was able to make good his retreat; but the other, brought to bay by the gallopers, bravely defended himself with his instrument. To carry out their orders and to bring back the offender, the gallant aides found to be more than they bargained for, as the photographer had simply to flourish his camera in the face of the nearest horse to cause the latter to shie and wheel round spitefully.

Other determined officers came riding up, and the battle between photographer and the mounted military waxed fast and furious. The camera at the end of its stand was a formidable weapon that no horse would face. The photographer dodged and the horses plunged. At last one of the aides caught hold of the bellows with one hand; but his hold was precarious, and with an effort the photographer got loose, and again had the best of it. There was, indeed, nothing for it but a parley; so the victorious photographer was permitted to march off with honours and his camera, and the gallant gallopers rode away to fight again another day.

Monday was a beautiful day at Portsmouth, and many dry-plate workers were hard at it, taking instantaneous pictures of the march past, the staff, and the lookers-on. Both the *Illustrated London News* and the *Graphic* were represented by photographic special correspondents.

FRENCH CORRESPONDENCE.

The French Photographic Society—Postponement of the Gaillard Competition—The Death of Poitevin.—M. Garnier's New Process.

The French Photographic Society.—The French Photographic Society held a most interesting meeting on the 7th inst. The prize commission entrusted with the award of the Gaillard prize gave in its report on the termination of its labours; the report announced the prorogation of the competition until the 31st October, 1883, when the prize of M. Gaillard, of 500 francs, supplemented by a similar sum from the funds of the Society, will be awarded. Five candidates had presented themselves, but as none of them fulfilled the conditions set down by the programme, it was decided to make no award of the prize. But two silver medals were given to those among the candidates who seemed entitled to some encouragement. A new programme was announced, a copy of which I shall have pleasure in forwarding to the Photographic News as soon as it has been revised.

Death of M. Poitevin.—M. Davanne announced the death of Poitevin, and gave an impressive account of the contributions made to the progress of photography by the deceased *savan*. M. Davanne also spoke of the exertions that were being made in combination with the *Chambre Syndicale* to raise subscriptions for a monument to Poitevin. The French Photographic Society officially subscribed two hundred francs for the purpose, and measures were taken to form a society to collect subscriptions.

M. Garnier's New Process.—A most important matter was then brought forward by M. Garnier. That gentleman demonstrated his new process, termed atmography, which is as simple and rapid in operation as its results are surprising. Atmography, as its name implies, is a mode of printing by means of vapour or atmosphere, and, without exaggerating, I may at once say that the demonstration given by M. Garnier was marvellous. In the space of a quarter of an hour or twenty minutes he had produced before the eyes of the assembly as many as thirty or forty atmographic prints. New names are necessary for new processes, and this one of M. Garnier will add another to the long list already known to photographers. M. Garnier's process is, indeed, a curious one. To begin with, we may say, it is based upon the property that certain vapours possess, on being disengaged in contact with a compound capable of producing certain effects, an effect of deliquescence for instance, as is the case here. The deliquescence in this instance is, however, in no way of a spreading character, which would inevitably bring about a diffusion of the fine lines of a print. M. Garnier has found that if you obtain first of all upon a metallic plate a photographic image by a powder process —dry powdered albumen, sensitized of course, being employed for sprinkling in this instance—an atmographic *cliché* may subsequently be produced by the action of vapour. To do this, the plate impressed by photography is exposed for a few seconds to free hydrofluoric acid; the acid vapour condenses upon the lines of the photographic image, and then, on pressing a glass plate against it, the glass plate being covered with a mixture of borate of soda, honey, and dry linseed, the mere contact of the two surfaces is sufficient to bring about a radical change. The hydrofluoric acid vapour retained by the photographic image becomes attached to the prepared glass, and renders its surface more or less deliquescent, exactly in proportion to the vigour of the photographic image. A dusting-on of coloured pigment, reduced to an impalpable powder, follows, and the finished picture is at hand. The same operation may be performed upon paper direct. The process is decidedly ingenious. The same plate submitted from time to time to hydrofluoric acid vapour will serve for the production of a large number of impressions. The printing, too, takes place with a rapidity that is surprising. If the colour pigment employed for dusting-on is a metallic oxide, the image may be forthwith vitrefied, supposing it has been obtained upon glass. No doubt M. Garnier will be able to improve some of the details of his process yet; but already, as he showed it before the members of the French Society the other night, the results obtained were most remarkable, and possessed of a fineness and delicacy one would scarcely anticipate in a chemical reaction produced by the action of vapour. Here, then, is a new byebath of research opened to the experimentalist. My friend Garnier is one of those who have not hitherto benefitted much by photography, albeit he has contributed an important quota to photographic progress. The beautiful process of heliographic engraving employed at present by the firm of Dujardin, and which served to produce the Fox Talbot portrait in last year's News, is the invention of M. Garnier; but while this firm is thriving and prosperous, M. Garnier, I am sorry to say, has derived little satisfaction from his invention, which does not even bear his name. Let us hope that his new process will be more beneficial to him. Leon Vidal.

GELATINO-CHLORIDE OF SILVER PICTURES BY DEVELOPMENT.

BY B. J. EDWARDS.*

From the earliest days of photography chloride of silver has been most largely used in the production of photographs; but hitherto very little has been done in developing the latent image formed by the action of light on chloride of silver films. The idea is not, however, a new one. I have brought for your inspection some fine transparencies developed on collodio-chloride by Mr. H. J. Newton, President of the Photographic Section of the American Institute, New York. These beautiful pictures were presented to me in America in the year 1872—just ten years ago. Since that time others have experimented in the same direction. Mr. Herbert B. Berkeley has from time to time published the result of his researches; and more recently Dr. Eder and Captain Pizzighelli have given details of their method of producing diapositives on emulsion plates containing chloride of silver in combination with gelatine. The same gentlemen have also shown at Vienna, and at the recent technical exhibition in this building, a series of beautiful transparencies which were universally admired. As these pictures seem to have awakened considerable interest in the process by which they were produced, I propose (this evening) to demonstrate the method of producing transparencies on gelatino-chloride plates, and to describe certain modifications in the development which I have found to give the best results.

For the preparation of the emulsion the following simple formula is all that is required:—

Gelatine	... 300 grains
Cold water	... 4 ounces
Nitrate of silver...	... 240 grains
Distilled water	... 2 ounces
Chloride of ammonium... ...	... 100 grains
Water	... 4 ounces

Mix the above in three separate vessels, allow the gelatine to soak for ten minutes, and warm all the solutions to about 120° F. Now add the silver to the gelatine, and immediately afterwards add the chloride. Emulsify at the same temperature for about an hour; then allow the emulsion to set. Pass through canvas, and wash in running water for some hours in the usual way. When washed and dissolved by gentle heat the emulsion will be ready for coating the plates. The glass chosen should be as thin and flat as possible, to ensure contact in printing from the negative. The dried film should appear pure white by reflected light, and of an orange tint by transmitted light. The latter colour is owing to the chloride of silver being held in an extremely fine state of division.

With regard to the sensitiveness of these plates, I have found them at least a hundred times less sensitive than ordinary gelatino-bromide plates. The time of exposure will depend, to a great extent, upon the colour desired in the transparency and the strength of the developer. With a moderately-strong developer an exposure of two or three seconds to diffused light under an ordinary negative will give all the detail.

The developer I use is a modification of Dr. Eder's formula, and that of Captain Abney. A stock solution is made as follows:—

Citric acid	... 5 ounces
Distilled water	... 20 „
Strong ammonia	... 2 „

The heat produced by the addition of the ammonia will cause the crystals of citric acid rapidly to dissolve. As soon as the mixture is sufficiently cooled the solution is ready, and will keep a long time. When required for use, mix three parts of the

* Read before the South London Photographic Society.

above solution with one part of the ordinary ferrous oxalate developer, freshly made, by adding one part of a saturated solution of sulphate of iron to three parts of a saturated solution of neutral oxalate of potash. Now add to each ounce of the mixture two or three drops of a twenty-grain solution of bromide of potassium.

This will form a very powerful developer for the gelatino-chloride plates, and, with a moderately-short exposure, will give a rich purple tone to the transparency. For a pure black tone expose less time, and use equal parts of the ferrous oxalate and citrate of ammonia solutions, with an extra drop or two of restrainer, if required. If much warmer tones are desired, six or eight parts of the citrate solution should be used to one part of the ferrous oxalate. Any shade of colour may be obtained, from jet black to bright ruby red; but, with the weaker developer, it will be necessary to increase the exposure considerably. For instance, to obtain the ruby colour, two or three times the exposure will be required than for the black tones with the stronger developer. In this way, a great variety of beautiful tones may be produced at will; but the great advantage of this method of development consists in the very great latitude allowed in the exposure. When working by daylight, and with negatives of different degrees of density, it is practically impossible to be sure of getting the correct exposure except by repeated trials, unless the developer can be regulated to suit the exposure given. By my method this is easily done. I make three or more portions of developer of different degrees of energy—that is, containing a greater or less proportion of the ferrous oxalate. Should the transparency appear under-exposed, the developer is at once poured off, and the development completed, and all the details brought out with a more energetic solution. In the case of over-exposure the operations are reversed. This power of correcting under or over-exposure in the development of pictures on chloride of silver has not hitherto been obtained by any known method; and I think I may venture to assert that, without the power of compensating for errors in exposure, the process of printing by development on chloride of silver, however beautiful in some of its results, would be practically useless. With regard to the keeping qualities of the developer, I find that after being mixed it gradually but slowly loses its energy, otherwise keeping in perfect condition for several weeks. It can, however, at any time be restored to any desired strength by adding the proper proportion of freshly-made ferrous-oxalate developer, as in the first instance.

With regard to the utility of this really beautiful process, I think few will question its superiority for the production of the most exquisite transparencies for lantern slides, or for making enlarged negatives. There is, however, another application of the process which may eventually prove of far greater importance. I allude to the rapid production of silver prints on paper by development, instead of the present slow process of printing out under the negative. I have already made a few experiments in this direction, and, from the results I have already obtained, I should judge that it is not improbable that the process I have described to you to-night will prove in time the quick-printing process of the future.

ON THE EFFECT OF THE SPECTRUM ON THE HALOID SALTS OF SILVER, AND ON MIXTURES OF THE SAME.

BY CAPTAIN W. DE W. ABNEY, R.E., F.R.S.*

Silver Iodide.

Visible Effect of the Spectrum on Silver Iodide.—If paper be soaked in a 10 per cent. solution of potassium iodide and dried, and then be floated on a 10 per cent. solution of silver nitrate and exposed whilst moist,† the spectrum will be impressed in five minutes as given in fig. 1, where it will be seen that the whole visible spectrum is impressed. Similar paper, if exposed to the spectrum coming through a weak solution of potassium chromate, exhibits after ten minutes a slight action in the least refrangible region (fig. 3). If, however, the paper be exposed for ten seconds to diffused light, and then be exposed to the same spectrum as the last, the action is more intense than before, though the exposure be for only two minutes (fig. 2). From this we learn that part of the action of the spectrum in fig. 1 is due to the action of diffused light. It next remained to trace the action on the different silver compounds existing in this paper, [which was ordinary sized Saxe paper. Paper was prepared as before, but washed in common water till nearly all excess of silver nitrate was eliminated, and it was then given a wash of potassium nitrite, an absorbent of iodine. Such paper was exposed to the spectrum, first coming through chromate, second unshaded. The print obtained is that shown in fig. 4, by which it will be seen that the same limits were reached as before, but that there is not that abrupt descent of sensitiveness near G; evidently some cause of the extreme sensitiveness near this point had been eliminated, and apparently that could only be the silver nitrate and the presence of the potassium nitrite. To test the matter further, paper was prepared in the same manner, but before applying the potassium nitrite it was soaked in common salt and water, and washed. This would effectually remove all traces of silver nitrate, converting it into silver chloride. Exposure for five minutes to the spectrum gave the result shown in fig. 5, in which it will be seen that whilst the most refrangible portion took a grey colour, the small portion below G became a pink, the line of demarcation between the two being well defined. It now seemed probable that the pink part of the spectrum was due to the chloride, and the grey to the iodide.

To further investigate the matter, the same paper without iodide was floated on silver nitrate and exposed to the spectrum, with the result given in fig. 6, a very faint trace of action being visible where the paper was exposed for a quarter of an hour to the spectrum transmitted by the potassium chromate.

Iodised paper prepared as in the first experiment was well washed, and simply exposed, with the result to be seen in fig. 7. Finally, paper was prepared and washed, then immersed in a weak solution of potassium iodide, washed well, and flooded with potassium nitrite, and the result is given in fig. 8. Now, fig. 1 coincides with the observations made by Sir J. Herschel, on paper similarly prepared, in 1842, and described in the *Phil. Trans.* for 1843, and he classes this spectrum as due to the silver iodide. It will be seen that the printed spectrum due to silver iodide is that given in fig. 8, and that the tail extending to the least refrangible end is really due to the action of that region on the organic salt (and perhaps chloride) of silver present in the paper. Further, it will be seen that the greater part of the darkening in fig. 1 of that tail is due to the action of the different rays after or whilst diffused light has acted or is acting on that organic compound. Confirmatory experiments were made with pure silver iodide in collodion with excess of silver nitrate, and also without such excess, with the result shown in fig. 8.

If further confirmation were required, it was only necessary to add to a film of collodion containing the iodide and excess of silver nitrate a small trace of organic matter, such as resin or albumen, and the result given in fig. 9 was obtained.

Thus, then, we may say that the parts of the spectrum capable of direct action on silver iodide are shown in fig. 8.

The next point to which my attention was turned was to ascertain the true region of the spectrum which was active on silver iodide when developed.

There are several developers for silver haloids:—

Acid Developers.

1.—Ferrous sulphate and silver nitrate.
2.—Pyrogallic acid " "
3.—Gallic acid " "

Neutral Organic Iron Developers.

4.—Ferrous oxalate.
5.—Ferrous citro-oxalate.

Alkaline Developers.

6.—Pyrogallic acid and ammonia.

Now, the first three gave precisely similar results as did the last three. It will, therefore, be unnecessary for me to state for every experiment which developer was used. With collodion or gelatine plates I preferred the 2nd and the 4th developers, and with paper the 3rd and the 5th.

It may be necessary to point to the different materials employed. In the first place, very pure potassium iodide was obtained by Stas's method, and as much as would dissolve was put into collodion; by the free use of water with the alcohol as much as 4 grs. was dissolved. This was employed with a silver bath prepared in the usual way, containing 35 grs. of silver nitrate to each ounce of water.

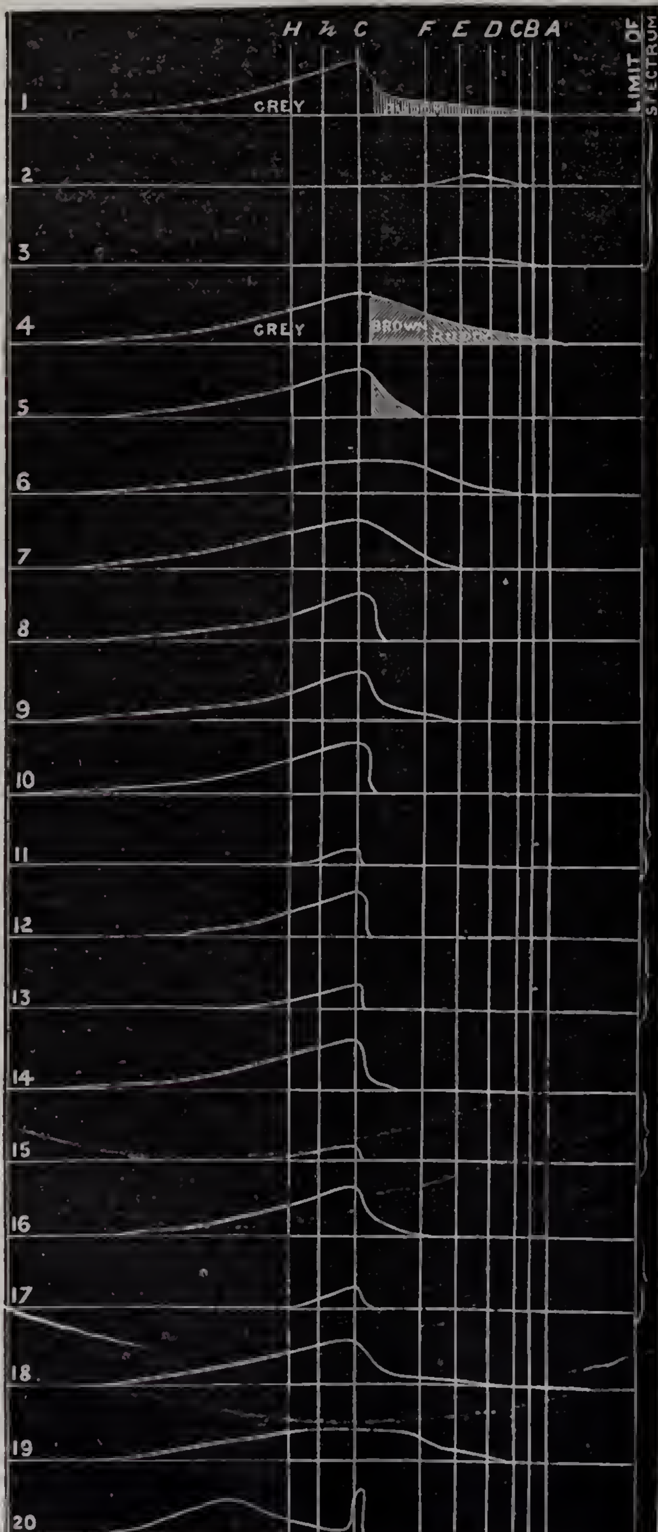
5 grs. of commercial cadmium iodide was dissolved in an ounce of collodion, and this was also used with a silver nitrate sensitis-

* Continued from page 181.

† The same action was observed where the paper was allowed to dry, but the darkening was less.

ing bath. The pyroxylin forming the collodion was carefully selected. Before taking into use it had been precipitated from solution by water, washed in alcohol, again precipitated, and washed and dried, and then redissolved in equal parts of pure ether and alcohol, at the rate of 7 grs. to each ounce. Such a solution, after prolonged exposure, when impregnated with nitrate of silver, gave no reduction of the salt.

The emulsions of silver iodide were made by dissolving 6 grs. of silver nitrate in alcohol, adding this to collodion, and gently adding the equivalent to 5 grs. of silver nitrate of the soluble iodide (dissolved in alcohol) to it. This formed a perfect emulsion of silver iodide in the presence of a slight excess of silver nitrate, and also, of course, of the soluble nitrates formed by the double decomposition of the above. I may at once say that the



AgI+AgNO$_3$ on Paper ... ... *Print.*

" " ... ... *Print.*

" " ... ... *Print.*

AgI on paper washed from excess of AgNO$_3$, and treated with KNO$_2$. *Print.*

AgI on paper washed from AgNO^3 soaked in NaCl, washed from excess, and exposed with KNO$_2$. *Print.*

Paper floated on AgNO^3 ... ... *Print.*

AgI on paper washed from excess of AgNO$_3$, ruddy tint. *Print.*

AgI on paper washed from excess of AgNO^3, treated with KI and KNO^2; or AgI in collodion. *Print.*

AgI+AgNO$_3$ in albumen ... ... *Print.*

AgI prepared in bath treated with KI, washed, re-dipped in silver bath, developed with pyrogallic acid. *Developed.* (long exposure).

Ditto ditto ... ... (short exposure).

AgI purified and exposed in presence of sensitizer, developed by acid or alkaline developer. *Developed* (long exposure).

Ditto ditto ... ... (short exposure).

AgI unpurified, treated and developed as above ... *Developed* (long exposure).

Ditto ditto ... ... (short exposure).

AgI with trace of AgCl or AgBr, developed by acid or alkaline method. *Developed* (long exposure).

Ditto ditto ... ... (short exposure).

AgI+AgNO$_3$ in albumenized collodion, or on paper washed, acid development. *Developed.*

AgI+AgNO$_3$ in albumenized collodion, or on paper washed, ferrous citrate developer. *Developed.*

AgI+AgNO$_3$ prolonged exposure ... ... *Developed.*

presence or absence of these soluble nitrates had no effect at all on the results, and may at once be dismissed from further consideration.

Gelatine emulsion was prepared in the same manner, keeping in mind, however, that in this case it was prepared with an excess of soluble iodide instead of silver nitrate. It is well to remark that it is impossible to get a fine emulsion of silver iodide in collodion unless the plan indicated above be followed of first dissolving the silver nitrate in the collodion, and then adding the iodide to that, in addition to which it is necessary that the silver nitrate be in excess, or the emulsion becomes granular. With gelatine the emulsification is an easier matter, but in order to prevent spontaneous decomposition of the gelatine it is necessary that the soluble iodide be in excess. Emulsions of both kinds were "washed" by the usual methods known to photographers. In the case of the collodio-iodide of silver great care was taken that nothing but pure distilled water was employed.

It will be well to show here how it was we ascertained that nothing but pure iodide of silver exists in a film. The impurities to be met with are oxides, chlorides, and bromides. Now when an oxide of silver, or silver chloride or bromide, is placed in a solution of potassium or other soluble iodide, the silver compound is at once decomposed, and silver iodide formed in its place. If, then, a film of iodide of silver in collodion (whether prepared from an emulsion or by the bath process) be washed from silver nitrate, and be then immersed in a weak solution of potassium iodide (it must not be strong, or it will dissolve out the silver iodide from the film) or other soluble iodide, it may be seen that there will be nothing but silver iodide in the film, all impurities being decomposed. If the film be washed well with distilled water, and again immersed in the bath, or flowed over with some sensitiser, such as potassium nitrate, sodium sulphite, beer, pyrogallic acid, &c., it may be exposed with the certainty that only pure silver iodide is under examination. It was necessary to make these remarks, since the whole of the utility of the research depends on the use of the pure substance, the collodion being absolutely inert as regards the silver salt. The silver iodide emulsion made from the purified potassium iodide proved to contain nothing but the pure iodide; but that prepared with the cadmium and other iodides, as will be seen, proved untrustworthy as to purity. It was owing to this that I was led into a mistake in a paper which appeared in the "Proceedings of the Royal Society," wherein I stated that owing to the oxygen-absorbing properties of potassium nitrate, I was able to obtain an image lower than ordinary. It seems now that this may have been due to a contamination of bromide or chloride, or to the formation of silver nitrate, any of which would have given me the same results.

One word also as to the neutral or alkaline developer employed. It has been customary to state that silver iodide is unamenable to alkaline development. This is, however, not the case. The ferrous oxalate and the ferrous citro-oxolate bring out a distinct image, as does pyrogallic acid and ammonia, when no restraining iodide is employed. In all dry plates prepared with the iodide and other silver haloids, the iodide is developable (though it gives a weakly image compared with that due to other salts) by the alkaline or organic iron developer.

A plate was coated with cadmium iodised collodion, and placed in the bath for a couple of minutes, and exposed to the spectrum. The top half of the slit was uncovered for one second, the bottom half for ten seconds; the results are seen in figs. 14 and 15. The development took place by the acid developer. Plates similarly prepared and washed, and then similarly exposed, also gave as results figs. 14 and 15. When using ferrous oxalate, the cadmium emulsion also gave the same result. Plates coated with a film of the same collodion, washed, and then immersed in a weak solution of potassium iodide or cadmium iodide, again washed clean with distilled water, and finally treated with silver nitrate, beer, pyrogallic acid, potassium nitrite, when developed by the acid or other methods, gave the results in figs. 10 and 11. The purifications of silver iodide by this treatment cut off the small tail on the least refrangible side of G seen in fig. 14. When the pure silver iodide prepared by the aid of the pure potassium iodide was used, figs. 13 and 12 resulted. A plate was next coated with collodion iodised with the pure potassium iodide, immersed in the bath, washed, and then placed in a solution of common salt (1 gr. to 5 oz.), with the result that figures similar to figs. 16 and 17 were obtained.

A plate similarly treated, except that potassium bromide was substituted for the common salt, gave as a result figs. 16 and 17. There was no marked difference whether the plate was developed by the acid developer or by the ferrous oxalate. It would be useless to describe the many other experiments which were made, all tending to prove that the true action of the spectrum on silver iodide in collodion is that given in figs. 10 and 11. No deviation from it had been obtained, unless impurity in the pyroxyline or in the soluble iodide was proved to exist.

With gelatine emulsions of yellow silver iodide, when rendered sensitive by the use of potassium nitrite or silver nitrate, the same action was found to hold good, and the same may be said for plates prepared with albumen as a vehicle, when all the silver was converted into iodide, and the sensitising was effected by potassium nitrate or some other similar sensitiser.

We next come to the iodide of silver when held *in situ* by paper. The same method of preparation was adopted as that given above for the printing experiments. When paper was exposed with the excess of silver nitrate, on acid development, fig. 18 was obtained. When developed by an organic ferrous developer, fig. 19 was obtained; figs. 14 and 15 were obtained when similar paper was washed and salted with common salt, and washed again, and then sensitised with potassium nitrite.

Figs. 18 and 19 are worthy of attention. It is seen in fig. 18 that the iodide has much greater power of attracting freshly deposited silver than have the impurities present with it in the paper. On the other hand, fig. 19 shows that the ferrous oxalate developer has more power of reducing the impurity (or rather the reduction is better seen) than it has the iodide.

When silver iodide paper is prepared and washed, and treated with a weak solution of potassium iodide and re-sensitised by potassium nitrite, figs. 10 and 11 are obtained.

Fig. 20 shows the action of the spectrum on pure iodide when the exposure is very prolonged. It appears as if the sensitiveness on the more refrangible side of G had diminished. This is not the case, however. The prolonged exposure causes a commencement of what is called a reversal of the image due to oxidation, which I have already investigated in the "Philosophical Magazine," 1880, and the maximum effect has, therefore, apparently shifted to the least refrangible side of G, as shown. This is important, since pheuomena which have been described and figured by other investigators can be shown to be caused by this reversing action. I shall have to allude to it myself again further on.

What has been noted regarding the action of impurities in the silver iodide points to a method of acertaining if an iodide or iodine itself is pure. It is believed that the merest trace of impurity may be recognised by this method of spectrum analysis.

(*To be continued.*)

NEW METHOD OF OIL PRINTING.

Bogaerts, of Herzogenbusch, has inveuted a new method of printing in oil colours, which is said to furnish a very close imitation to oil painting, far surpassing what was possible by means of chromo-lithography. It may be applied to painter's canvas, wood, or metal. The following description of his method is given in *New Discoveries and Inventions.*

The first thing to be done is to make a facsimile of the painting that is to be copied, in which the outline of each simple colour is accurately reproduced. This copy is then transferred to a plate of zinc, which is cut up into as many pieces as the picture contains different colours, in such a way that each piece represents all the parts which in the original are of one colour. Separate electrotypes are made from each piece, and from these the proper colours are printed in corresponding order upon prepared paper. (So far the process is similar to printing chromos.) At the end of this operation, when all the colours have been printed on the paper, the picture resembles an ordinary chromo-lithograph, and like that it is perfectly flat and smooth; the brush marks and roughness of surface noticed in oil paintings are wanting. In order to imitate this part, too, the original painting is covered with a solution of gelatine, in which are impressed with great accuracy the elevations and depressions of the painting. From this plastic copy of the surface another impression is taken in gutta-percha, India-rubber, or other elastic substance, which will stretch so that it can be made larger or smaller, according as the copy is enlarged or reduced. This elastic impression is used for preparing a copper stereotype, with which a negative or depressed copy can be made in a suitable plate. This last plate, of course, will have depressions wherever the painting had elevations or raised spots, and these depressions are filled up with pigment of the same colour as the raised portions of the original. The plate thus prepared is put in a press and the printed chromo laid on it, and then pressure and heat are applied to cause pigments in the depressions to unite with those already on the paper. The picture is now finished all but varnishing. To carry out the resemblance to oil painting it is afterward transferred from the prepared paper to canvas, wood, or metal.

Correspondence.

ECLIPSE EXPEDITION TO EGYPT.

Sir,—I am sorry to say that, owing to medical advice, I shall be unable to take part in the eclipse expedition to Egypt, advice which I need scarcely say has been most unwelcome. I am glad to say, however, that Dr. A

Schuster, F.R.S., is to fill my place, and with Mr. C. R. Wood's assistance I hope will be able to settle what dark rays are in the corona, besides making other photo-spectroscopic investigations during the short minute and twelve seconds for which the eclipse lasts.

I write this note to you as you have mentioned my name in connection with the expedition, and feel that it is due to yourself and the readers of the News to let you know exactly how matters stand.—Yours faithfully,

W. de W. Abney.

ABNEY'S METHOD OF MIXING EMULSION.

Sir,—I have just prepared some emulsion by Captain Abney's process lately mentioned in your paper, in which the silver is mixed with the gelatine, then the bromide is added, and lastly the iodide. The finished emulsion looked exceedingly fine. When, however, I came to expose and develop one of the test plates and look at it by transmitted light, lo and behold, I saw the green-eyed monster —green fog, so often mentioned in your valuable journal. In my experience of over two years in preparing dry plates I have seen nothing like it, and I enclose part of plate. I prepared about twenty-one ounces. Could you or some of your able correspondents say by what means the fog could be eliminated? Could it be judiciously treated by re-washing in bichromate of potash, as recommended by Dr. Kenyon? Peter Collins.

[The texture of the negative picture sent is exceedingly fine, and we found that soaking in a saturated solution of alum for twenty-four hours served to almost entirely remove the discolouration. There appears to be as much brown staining as there is of red fog, and we may mention that our experience indicates that certain qualities of gelatine will not give a good result when the silver nitrate is mixed with the gelatinous solution previously to the addition of the haloid salts.—Ed. P.N.]

THE NEW CLUB.

Sir,—With your permission, I should like to say a few words in reference to the correspondence which has already taken place with regard to the two Photographic Clubs. I must premise that, being myself a member of both these so-called clubs, I may at least be supposed to view the situation in an impartial light—or, at all events, not actuated by feelings of bitter partizanship.

I am by no means an advocate for reports of our meetings being made *in extenso*, but I do consider that country members and others who are unable to attend the meetings regularly, should have the advantage of knowing what is going on amongst us, and to that end I shall work and co-operate with others who are of the same opinion.

Mr. Henderson, in his reply to Mr. Dunmore's letter, is, as usual, too severe and satirical. Mr. Dunmore is made to say "sham society," where it should be "sham club." This is a distinction with a material difference.

One cannot fail to be struck with the funny little echo of Mr. Henderson's letter sent forth by Mr. Cutchey, and I cannot resist the temptation of quoting part of Mr. Henderson's letter, and applying it to that gentleman: "He should have had the good sense to have waited"—well, till doomsday, before referring to the shortcomings of the Club, when he himself was obliged to step aside to allow the chariot of progress and reform to pass, finding that he had not the power to resist effectually its onward march.

It must be admitted that it becomes a serious tax upon one's time and energies—to say nothing of the pocket—to attend the multifarious photographic meetings, and I think it is only fair to assume that the existence of these societies and clubs, whose meetings are so numerous, and, as a rule, so largely attended, furnishes an unmistakable proof that the time has fully arrived when an amalgamation of divided interests should take place, and the attempt be made to establish not a sham, but a veritable club, where we shall not meet simply on sufferance around the tables of a mercenary landlord, and where the desirability of our presence is estimated by the number of glasses with which we are accommodated. Such is the humiliating state of affairs at the present moment. Surely this subject is one which might lead to an interesting discussion, and probably to some practical issue, if introduced at any of the meetings of either society or club. W. Cobb.

Proceedings of Societies.

South London Photographic Society.

The ordinary monthly meeting of this Society was held on Thursday, April 6th, at 8 p.m., in the Large Hall of the house of the Society of Arts, Adelphi, the Rev. F. F. Statham (President) occupying the chair.

The minutes of the previous meeting having been read and confirmed, some formal business was transacted, after which certain new arrangements as regards the prize picture competition were announced; but as minor details were left open, we defer giving particulars until next week.

Mr. B. J. Edwards then proceeded to read his paper on "Gelatino-Chloride Pictures by Development" (see page 202), and after this he demonstrated how, by modifying the exposure and altering the strength of the developer, widely varying tones could be produced.

Some remarks were then made by the President and by a few members who had, like Mr. Edwards, tried Dr. Eder's gelatino-chloride process, when Mr. G. F. Williams was called upon to exhibit his electric shutter. The convenience and excellent design of this apparatus were thoroughly appreciated by the meeting; but, as we describe the shutter in another place see page 193), it is unnecessary to enter into particulars.

Mr. Cowan's automatic dry-plate packer was then shown in action, and block-like packets of plates which had been packed by its aid were handed round.

The meeting adjourned at a late hour, but not so late as to prevent the usual social gathering being held afterwards.

West Riding of Yorkshire Photographic Society.

An ordinary meeting was held on Monday, April 3, at the Market Tavern, Godwin Street, Bradford. There was a fair attendance of members.

After the usual greetings and conversation, the evening was devoted to a lantern exhibition by Mr. Howarth, of Bradford, assisted by Mr. Garratt, of Dewsbury. There were exhibited a number of views of England, France, Italy, China, America, Egypt, Russia, and Japan.

Mr. Forsyth, of Bradford, brought a number of slides made from negatives taken at various times when out "viewing" in Yorkshire.

Mr. Hepworth, of Dewsbury, brought a number of views taken in and around Dewsbury.

Mr. Garratt exhibited several local views, transparencies made in carbon, which were justly admired.

Mr. Howarth exhibited a series of views of tea gardens, and the processes which tea undergoes in its preparation in China, which he had got from a noted firm in London. The said views of life in China could only be termed caricatures, as they were disgraceful daubs, to say the best of them.

At the close, a vote of thanks was given to Mr. Howarth.

A deputation was appointed to wait on the late Secretary and ask him for the books and accounts of the Society.

The last business of the evening was to determine on an excursion, when, after a number of places had been proposed, it was ultimately decided that "Studley Park" should be visited. The next excursion is to be in June, on a date to be settled at next meeting.

Sheffield Photographic Society.

The usual meeting of this Society was held in the Freemasons' Hall, Surrey Street, on Tuesday evening, the 4th inst., Mr. S. Firth in the chair.

After the transaction of the usual business, Mr. Albert Davy was elected a member.

Arrangements were made for an excursion to Haddon on April 27th, and a large number of members and friends are expected to be present. Members of other societies will be cordially welcomed.

Communications from the Photographers' Association of America were placed on the table, the consideration of which was left to a future meeting.

Mr. Ainley exhibited some gelatine negatives made from emulsion of his own preparation, which he had developed with ammonia and pyrogallic in the usual way; but they were useless on account of the green fog which had covered them. He then showed negatives from plates of the same batch of emulsion developed with washing soda and pyrogallic, which, for clearness and delicacy, were all that could be desired.

This peculiarity gave rise to considerable discussion, Mr. Yates expressing an opinion that the fog arose from over-cooking.

A large number of excellent enlargements on Morgan's paper by a Bradford firm were exhibited by Mr. Yates.

Mr. Ainley also brought some of his own enlargements on Morgan's paper, and explained his method of working. They were enlarged by ordinary gas light, without condensers, using a screen of tissue paper to diffuse the light; exposure four minutes.

The results were considered extremely satisfactory, and his simple method of working excited great interest.

Mr. Fixon also showed enlargements by the same process.

After further discussion and votes of thanks to these gentlemen, the meeting adjourned.

Edinburgh Photographic Society.

The sixth ordinary meeting of the current session was held in 5, St. Andrew Square, on the evening of Wednesday, the 5th inst., John Lessels, Esq., the President, in the chair.

The minutes of the March meeting having been approved of, the following gentlemen were unanimously elected honorary members:—Provost James Pringle, David Pringle, James B. Morrison, David Paterson, W. H. Cowan, and D. Chisholm, Jun.

The Secretary read the following communication from Professor C. Piazzi Smyth, Astronomer-Royal for Scotland:—

"15, *Royal Terrace, Edinburgh, 3rd April*, 1882.

"Mr. M. G. Dobbie.

"Dear Sir,—Will you kindly present the two pamphlets I send you by book-post to the Edinburgh Photographic Society, with my respects. Their subject, that of gaseous spectroscopy, does not seem to have much to do at present with photography; but as each science continues to progress and widen its scope year by year, their mutual bearings will doubtless come out by-and-bye to the advantage of both.—I remain, yours very truly,

C. Piazzi Smyth."

The pamphlets were laid on the table, as also a copy of the *Nineteenth Century* for April, 1882, containing an article by Dr. Siemens, F.R.S., on "A New Theory of the Sun," which Professor Smyth requested should also be presented to the Society, suggesting at the same time that the article by Dr. Siemens should be read at one of the ordinary meetings on an early date.

The Secretary was instructed to convey a hearty vote of thanks to Professor Smyth for these papers. His thoughtfulness in sending them was looked on as one of the many evidences of the warm interest he has always manifested in the welfare of the Society, and the progress of photographic art science.

A paper by Mr. Charles Reid, entitled "Some Experiences in Animal Photography" (see page 197), was read, and a vote of thanks for the interesting and racy communication, proposed by Mr. William Dougall, was accorded.

A series of very beautiful landscape photographs by the Hon. A. U. Erskine was examined with much interest. These pictures were subsequently distributed by ballot, under the superintendence of Mr. Jameson, a cordial vote of thanks being awarded for the donation.

The examination of a handsome volume of landscape views by Mr. Robert Murray, C.E., concluded the proceedings.

Photographers' Benevolent Association.

This Association held its usual monthly meeting at 181, Aldersgate Street, on the 5th inst. The minutes of the previous meeting having been read and confirmed, Messrs. G. G. Philips (London), George Wilton (London), and A. R. Hambly (Plymouth) were elected as members of the Association.

The Soirée and Ball in aid of the funds will take place on 27th inst., at Seyd's Hotel, Finsbury Square. Tickets can be obtained of the Secretary. Price: Ladies, 6s., Gentlemen, 9s.

Thursday Evenings for Photographers.

At the meeting held on the 6th inst., Dr. G. D. Thomson in the chair,

Mr. Henderson exhibited some asbestos fibre and cloth, which it had been suggested would be useful for filtering purposes; he also exhibited a shutter (see page 193), the invention of a Brighton photographer. This was constructed to work inside the camera, and consisted of two semi-circular pieces of ebonite, opening from and closing to the centre of the aperture, balanced after the manner of a pair of scissors, and was worked by air acting upon a piston enclosed in a cylinder. The advantage claimed for this arrangement was that, by a slight pressure of the ball, the shutter was opened, and would remain open (giving any required length of exposure) until again pressed, but by a sharp pressure, followed by an immediate relaxation, the shutter was opened and closed instantaneously.

Mr. York showed a very novel and ingenious plate-packing machine, the invention of Mr. Cowan, which will shortly be in the market.

Mr. Haddon asked if anyone present could explain why paper prints change tone when subjected to hot water.

Mr. Henderson could give no explanation, but he promised to exhibit at the next meeting two collodio-chloride prints, hermetically sealed, from which the purple tones had disappeared.

Mr. Henderson suggested that a bromide emulsion might be made without gelatine as follows:—Triturate the bromide and silver together, then add alcohol, and if necessary a few drops of water. This, he thought, would set up a solvent action of the salts, and, as the bromide began to form, the water would pass to the salts still undissolved until all was converted, when the precipitate might be washed, and collodion or any other vehicle added.

Dundee and East of Scotland Photographic Association.

The second annual meeting of the above Society was held in Lamb's Hotel on Thursday evening, April 6th. There was a large attendance of members and office-bearers; Mr. James C. Cox, President, occupied the chair.

The Hon. Secretary read the minutes of the last meeting, which were confirmed.

Mr. W. F. Hill was admitted a member of the Association.

Reports by the Secretary, Treasurer, and Auditors for the Association, and also those of the Hon. Secretary and Treasurer of the Exhibition Committee, were presented.

The President then said—Gentleman, *apropos* of this the last meeting of the Society for the season, it falls to me to draw your attention to the report of our Hon. Secretary, Mr. Johnson, and to the financial statement of our Hon. Treasurer, Mr. Robertson. In the former there is one thing I notice our Hon. Secretary has never had the opportunity of embodying before in his well-compiled and prolific reports, and I feel we must all be pleased to view it as tending to advance the interests of the Society—viz., the reading of papers by its members; and allow me to add that I feel these papers must come more frequently henceforth, to keep life in us. The Exhibition and lantern entertainments are also new undertakings—in a year or two we may have another Exhibition—but the lantern entertainments we must, to the best of our ability, try to secure public interest in. Gentlemen, I beg to move that we approve of and adopt the report, and that we express our thanks to our Hon. Secretary for the clear and full manner in which he has produced it. As regards our money matters, I think they are hardly in the state they should be. Such an item as fifteen subscriptions long past due and still unpaid causes me to make this remark. It is to be regretted that we have so many bashful members. I hope you will accept the balance-sheet, and that we show our appreciation of the services of our Hon. Treasurer by a vote of best thanks. We are also highly indebted to Mr. Baxter and Mr. Roger for their trouble in examining our accounts. Still another report which we must take as read. I have great pleasure in referring to Mr. Rollo (Hon. Secretary) and the Exhibition Committee's report—concise and complete. Like the thorough manner he wrought as our Exhibition Secretary, so has he produced his report. Our Exhibition was in every respect a grand success, and I cannot but congratulate you on the happy result; and I hope that, in two or three years, we, as a society, may be able to bring together another collection worthy of public support and sympathy, which were by no means wanting in the late Exhibition. To the public sympathy and support our success was very much due. You have also heard the clear financial report from Mr. George D. Valentine (Hon. Treasurer to the Exhibition). Few, indeed, know the amount of time and trouble Mr. Valentine has expended on behalf of the Exhibition. The handsome balance he reports, transferring to you to-night, must be very gratifying to him as well as to us, and I cannot but draw your attention also to what the Hon. Exhibition Secretary, in his report, says in flattering terms, anent his assistance. Gentlemen, it affords me great pleasure to propose that we ask our Secretary to embody a special vote of thanks to these two gentlemen, Mr. Rollo and Mr. Valentine. The two auditors for the Exhibition Committee have our acknowledgments for their kind assistance. Before passing from the subject of the Exhibition, I have to ask our Secretary, on behalf of the Society, to embody a vote of thanks to the hanging committee, the judges, and the Free Library Board for the use of their galleries; and last, but not least, to the Exhibition Committee, who have done credit to the undertaking and to the Society. Still one thing more. The term of office held by the various members of the Society terminates at this meeting, and it remains with you to appoint members to re-fill these offices. For myself, gentlemen, allow me to thank you very kindly for the unvarying courtesy and the kindly forbearance I have all along experienced from you.

The election of office-bearers for the ensuing year then took place with the following result:—

President—Mr. James C. Cox.

Vice-Presidents—Mr. W. D. Valentine and Mr. David Ireland.

Treasurer—Mr. John Robertson.

Secretary—Mr. Charles Johnson.

Council—Messrs. G. D. Valentine, S. Rollo, J. Geddes, A. C. Lamb, G. D. Macdougald, and H. G. Fraser.

On the motion of Mr. G. D. Valentine it was resolved that the annual outdoor meeting be held at the Den of Airlie on the first Wednesday in June, and a Committee was appointed to carry out the arrangements.

A communication from Capt. Turton, R.N., Florence, together with letters from New York inviting co-operation in an International Convention, were received, and referred to Council.

A vote of thanks to the Chairman brought the meeting to a close.

Talk in the Studio.

Collodion Afloat.—A Jersey paper says:—"On Thursday last two fishermen, named Mansell and Simon, each picked up a case of collodion which was floating about five miles to the eastward of St. Peter's Port. The cases are about two feet long, and a foot-and-a-half wide and high, and from the marks upon them they seem to have been shipped on board the steamer *Ellora*, of Glasgow, bound to Calcutta. They were brought by the men to the Customs' authorities, who have handed them over to the Queen's Receiver. It appears from the Shipping List that the *Ellora* is a steamer of nearly 2,000 tons, and is owned by the British India Steam Navigation Company, of London.

The Transit of Venus.—The French Government will send out eight different expeditions for the observation of the transit of Venus on the 6th of December next. Four of them are to make observations in the northern and four in the southern hemisphere. They are as follows:—French West Indies, M. Tisserand, membre de l'Institut Astronome de Paris Observatoire; Patagonia, Rio Negro, M. Perrotin, Directeur de l'Observatoire de Paris; Santa Cruz, M. Fleuriais, naval captain; Chubutt, M. Hatt, engineer; Chili, M. de Bernadieres, naval lieutenant; Duba, M. D'Abadie, member of the Institute; Florida, M. Ferrier, lieutenant-colonel, member of tho Institute; Mexico, M. Bouquet de la Grye, engineer. The phenomenon is to be observed in three different ways. 1. By the direct observation of the contact. 2. With the assistance of double refracting prisms and by micrometric distances. 3. By photography. The positions of the stations are placed nearly on the same meridian, so as to observe the whole phenomenon of the entry and issue of the planet, the astronomers hoping thus to determine the exact distance of the earth from the sun. The parties to be sent on the missions have been practising at the observatory, where an apparatus representing the phenomenon has been constructed for the purpose.

The Alexandra Palace.—No less than twenty-five photographers were in readiness to expose on Mr. Barker's balloon "Reliance" as it slowly rose on Easter Monday at the Alexandra Palace; but a very much larger number of cameras were in use for the production of pictures intended to be put in for competition as regards the medals offered for the best pictures of the Easter Monday festivities.—*Globe*

On Thursday last the employées of Mr. A. Bassano were entertained at a dinner given by that gentleman, at Lord's Hotel, Mr. C. Bassano taking the chair, and Mr. E. Lancaster occupying the vice-chair. During the evening some very excellent songs and recitations were given by Messrs. C. Bassano, Lancaster Wyld, Mill, Stephens, Goring, Barrett, Burnill, Butt, Thomas, &c., accompanied on the pianoforte by Messrs. Adkins and Henderson.

To Correspondents.

All Communications connected with Advertisements and Business to be addressed to Messrs. Piper & Carter, "*Photographic News" Office*, 5, *Castle Street, Holborn, E.C. Advertisers are requested to make all Cheques payable to* Messrs. Piper & Carter, *and crossed "Union Bank, Photographic News Co. Account.*"

*** We cannot undertake to return rejected communications.

*** Press of matter compels us to leave over this week Lesson No. 7 on "Dry-Plate Photography," and "By-the-Bye."

J. Maguire.—Thank you.

J. H. O.—1. Black glazed cotton twill. 2. It is a very useful form, but is subject to the disadvantage of not being suitable for use with a pair of lenses, as when one wishes to take stereoscopic pictures. 3. Ordinarily not more than one-sixteenth of an inch. 4. There is not much literature on the subject, as a mere inspection is calculated to teach more than even long articles; but a few papers will be found distributed through back volumes of the News, and in the Year-Books.

A. F.—Such chemicals do not exist; but if you will let us know the purpose for which you require them, we can doubtless suggest to you the names which you have misunderstood.

A Foreign Reader.—There is not one at present; but we hope that this state of things will be altered in the course of a few months.

Assistant.—You should experience no difficulty if you have fairly good recommendations. Probably the simplest and quickest way would be to run over and call on a few of the principal photographers and dealers in materials, these latter usually acting as agents in such matters.

Beeswax.—1. Place the prints, together with the corresponding sheet of glass, in a warm solution of 1 part of gelatine in 10 parts of water, and draw both out together, after which all excess of the gelatinous solution is removed by the application of a squeegee to the back of the print. 2. Approximately as follows: 3½ pints; ½ ounce; 1 ounce.

Nitrogen.—You are mistaken as to the action of nitric acid in this case, as the binoxide is actually liberated during the reaction, and this becomes converted into trioxide or tetroxide on coming in contact with the oxygen of the air.

Bath.—It is quite evident that your solution has become considerably weakened by continued use, and as signs of organic contamination begin to show themselves, you would do well to prepare a fresh stock, and consign that which troubles you to the residue jar.

Enamel.—New glasses often refuse to take the wax evenly, but by long friction on the heated surface you can.

John Bertrand.—The case is certainly one of some difficulty, as by increasing the proportion of gelatine, the tendency of the film to chip off becomes so much greater; but we are inclined to think that the addition of one part of honey for each six parts of gelatine might prove advantageous.

Bradford.—1. Plaster moulds are almost always used. 2. Copper in an extremely fine state of division. 3. No free acid should be present. 4. Not more than thirty grains to the ounce. 5. Those best suited for the purpose are made in Paris, and generally measure about 20 by 16 inches.

Argent.—1. Nothing is better than fusion with the mixed carbonate of potassium and sodium. 2. Numerous articles on the subject have appeared in the News from time to time. 3. See page 46 of Dr. Eder's new book on Dry Plate Photography.

Gelatino-Bromide.—The spots are due to irregularities or pimples on the glass plate.

Charles Grover.—1. It invariably contains a large proportion of mineral matter, sometimes as much as one-sixth of its weight, and nearly half of this is silica. 2. Not at present.

THE PHOTOGRAPHIC NEWS.

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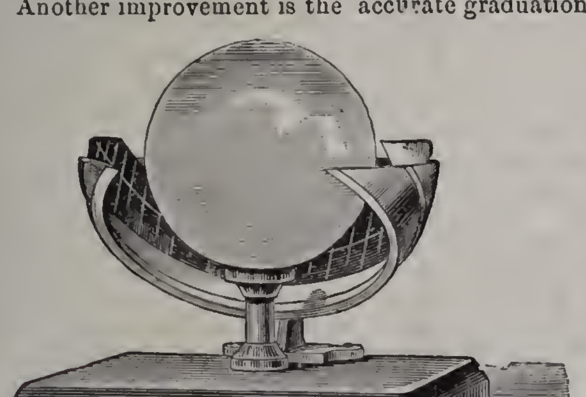
CONTENTS.

HOW TO MEASURE THE SUNSHINE.

About thirty years ago, Mr. Campell, of Kensington, fitted a ball of glass into a wooden bowl, the adjustment being so made as to ensure the coincidence of the heat focus of the solar rays with the surface of the wood, so that whenever the instrument is exposed to sunshine of sufficient intensity, the great luminary leaves its trace in the shape of a charred mark on the internal surface of the wooden bowl. This somewhat crude apparatus was found to yield most valuable results, as the depth to which the wood was burned or charred, indicated approximately the intensity of the solar radiations. Professor Stokes has recently pointed out that it is not by any means necessary to sacrifice a whole wooden bowl for each experiment, and that a highly satisfactory result can be obtained by using a strip of card mounted on a kind of half-round gallery placed as shown by the subjoined woodcut. Another improvement is the accurate graduation of



the cards into hours and half-hours; and in order to render the same cards available at all seasons, the frame is so marked off that the position of the printed card can be varied according to the time of year. In this form the apparatus is a sun-dial of no mean value, it being often easy to tell the time by it within ten minutes, and all calculations are rendered unnecessary, owing to the facilities provided for the accurate adjustment of the cards.

Not only does the "sunshine recorder" in its present convenient form register sunshine, but the extent to which the card is charred indicates in a very striking manner the intensity of this sunshine; it being most curious to note how the course of the sun is sometimes marked by a fine line only just visible when the card is carefully placed in relation to the light, and at others by a thorough charring of the card throughout its entire thickness. The photographer knows very well that the thermic energy of the sun's rays does not correspond exactly with their actinic activity; but notwithstanding this, valuable information may be obtained by an inspection of the card when an exposure is about to be made.

The improved form of sunshine recorder as now referred to is in use at most of the meteorological stations throughout the country, and the indications obtained with it seem likely to show that intimate relations exist between sunshine and health on the one hand, and sunshine and fertility of the soil on the other hand. We understand that Mr. R. J. Leeky, of Lorton Terrace, Ladbroke Road W., who is agent for the apparatus, will shortly be in a position to publish important information bearing on these points.

It should be mentioned that an extremely feeble sunshine does not, as might be expected, visibly affect the card; but on a moderately bright day it will record considerably over 90 per cent. of the sunshine; and if the cards were charged with a very small proportion of slightly sensitive chloride of silver, it is probable that even the extremely feeble sunshine might also be recorded.

Any of our readers who adopt the instrument can easily carry out our suggestion for themselves.

THE GRADUAL OXIDATION OF SODIUM HYPOSULPHITE WHEN IN AQUEOUS SOLUTION.

A number of very interesting experiments bearing on this subject have been made by Mr. S. U. Pickering, and he finds that the oxidation of hyposulphite in solution proceeds so slowly, that in ordinary cases the effective strength of fixing solutions is not likely to be seriously diminished by keeping for a moderate time. In the case of a series of solutions which were kept for no less than a year, the proportion of hyposulphite oxidised amounted to 0·14 per cent. as a minimum, and to 2·5 as a maximum. The former solution was, however, preserved in a blue bottle kept in the dark, while the latter was in a white bottle exposed to diffused daylight. A solution which was kept in a white bottle and exposed to daylight and sunlight for four hundred and twenty-one days, lost no less than 7·63 per cent. of its hyposulphite by oxidation.

The practice of keeping a lump of chalk in the hyposulphite is a very common and excellent proceeding, as it neutralizes any trace of acid which may be formed. Mr. Pickering's experiments seem to indicate that a trace of a fixed alkali like potash is much more effectual as a preventive against oxidation than is the volatile alkali ammonia; and other things being equal, the oxidation proceeds more rapidly in a white bottle than in a blue bottle.

THE APPROACHING ECLIPSE OF THE SUN.

The expeditions sent out by Government to observe the Solar Eclipse on the 17th May next, at a spot about one hundred miles north of Thebes, sailed from Gravesend on Wednesday in the *Kaiser-i-Hind*. The principals of the expedition are Mr. Norman Lockyer, F.R.S., and Dr. Schuster, F.R.S., both of whom have had experience in expeditions of the same kind. These are accompanied by Messrs. Lawrence and Woods, and it is hoped that Professor Tacchini will join the party at Cairo.

The nature of the instruments and of the observations to be undertaken are well described in a daily contemporary, which justly says that now-a-days the resources of science place many means of attack in the hands of the astronomer. To get an idea of the physics of the solar atmosphere—what it looks like—to study, so to speak, its circulatory system, to which such special attention has been recently directed by the bold hypothesis of Dr. Siemens; to investigate its extent, and to determine the luminosity of its various regions; we have the astronomical telescope, and, better even than this for some purposes, the photo-heliograph, that is an instrument which enables us to obtain a photograph of all the sun's surroundings visible during the eclipse. To determine the chemical nature of the various regions, a question to which the keenest interest attaches at the present time, we have the spectroscope and the spectroscopic camera. By means of these instruments we can see what we cannot photograph, and photograph what we cannot see.

In former eclipses, when the duration of totality has been longer, it has been possible to have different instruments mounted on different stands—there has been time to go from one to the other. But on this occasion such a course would be impossible. On one stand, therefore, we have four telescopes and two spectroscopes for eye observation. On another stand we have a photo-heliograph and spectroscopic camera for photographic registration. In the observing telescope two spectroscopes are so arranged that a movement of the eye through two inches is all that is required to pass through the whole range of spectroscopic dispersion which can be conveniently employed during an eclipse. In this way it is hoped that the spectrum of the brightest and the spectrum of almost the dimmest part of the sun's atmosphere can be observed, and for the first time in the history of eclipse observation, comparisons will be made with the solar spectrum itself, as a solar photograph taken before totality will be used as a scale. Much is hoped in the way of the photographic record, for since the last eclipse the science of photography, following step by step the new views of molecular grouping suggested by the spectroscope, has provided us with silver salts, identical in chemical composition, but so different physically, that the red part of the solar spectrum can now be recorded as satisfactorily as the blue part of the spectrum has ever been. Nor is this all. The rapidity with which an image can be impressed upon a sensitised plate has been enormously increased, so that if all goes well, seconds now take the place of minutes, and more can be recorded in five seconds now than was possible in five minutes twenty years ago.

Although on the 17th of next month the moon will come between us and the sun here at home in such a way that part of the sun will be covered, at Greenwich, which may be taken as a short title for the British Islands, for this reason our astronomers must go elsewhere to view a *total* eclipse. A thin line can be drawn on the globe from the West Coast of Africa, through Egypt, Persia, Central Asia, and China, along which the moon will entirely cover the sun; and here, instead of a partial eclipse, we shall have a total one.

This is one of the most important phenomena we can observe in the whole domain of physical astronomy, for a reason with which our readers are already familiar—namely, that when the light of the bright interior nucleus of the sun which we usually see is prevented from illuminating our upper air by the interposition of the dark moon, the sun's atmosphere, which we never see except at such times, is revealed in all its majesty, and invites study on the part of those who care for the mechanism of the universe in which their lot is cast. The expedition is going to a point on this thin line—viz., a little north of Thebes, and with camera and spectroscope will no doubt bring home some valuable observations.

By-the-Bye.

DARK ROOM DISEASE.

With the partial, if not general, abandonment of the wet collodion process, we anticipated an improvement in the sanitary condition of the dark room. The fumes of ether and alcohol with which the photographer was troubled, when "cabined, cribbed, confined" in his sombre laboratory, were no more to poison him, and he would be able to breathe air as fresh and good as that in any other room of his establishment. There was no doubt about the noxious influence of these fumes, albeit many were fortunate enough to escape their ill effects. One instance is still fresh in our memory, and to this day we wonder how an assistant we once met during the sultry days of a Paris summer contrived to exist in good health in his close confinement. The dark closet in which he was located was on the roof of one of the big houses on the Boulevards, and here he stayed from morning till afternoon, just under the roof, coating plates with collodion as fast as they were called for in the studio close by. The heat of the studio was already oppressive, and now and then, when the dark room door opened to receive one dark slide and give out another, some idea could be obtained of the hot noxious atmosphere therein. But, like Albert Smith's engineer in a gunboat in the China seas, whose engine-room thermometer stood above a hundred, and who always sat down to enjoy himself, because his confined space prevented him from standing upright, this assistant, we remember, never grumbled at his lot, but took it as a matter of course. He perspired freely in his shirt sleeves, and seemed to exhale in this way anything noxious he might absorb.

That many gentlemen have suffered from inhaling ether and alcohol, and suffered seriously, too, there cannot be a doubt. Ether and alcohol swallowed as vapour is quite as bad, doctors tell us, as ether and alcohol swallowed in the form of liquid. It is for this reason that the use of effervescing and mineral waters has been so strongly advised for such sufferers, together with the cessation of all spirituous liquors; while, of course, fresh air and exercise should be taken as abundantly as is possible.

Unfortunately, it appears that although we may discontinue the use of wet collodion, and thus get rid of ether and alcohol fumes, we cannot get rid of sickness from the dark-room. Several examples have, of late, been cited of disease brought about, it is said, through the practice of alkaline development. One patient recently described an attack as commencing with a small irritating spot on the back of the hand; a number of small pustules next appeared, which spread rapidly up the arms to the shoulders; they next appeared in his legs, especially under the bend of the knee. The disease is very stubborn, and does not, we are told, readily yield to treatment. Its characteristics are sores and lowness of the system.

Now, the difficulty has been to find out really what is the offending agent. In alkaline development we have to deal with ammonia, pyrogallic acid, and bromide of potassium, and it has been sought to fasten upon one of these the insidious action. The ammonia, especially of the strength at which it is used, is almost above suspicion, and no medical man would think of attributing a disease such as we have mentioned to its agency. There only remain, then, pyrogallic acid and bromide of potassium.

Now pyrogallic acid, virulent poison as it is, when taken internally, would not be prone to injure by contact. Its principal feature is, that it is a powerful absorbent of oxygen, but as such is not likely to be harmful to the skin. Again, pyrogallic acid has been so generally used for years past by the photographer *sans peur et sans reproche*, that it is rather late in the day to call out about its noxious influence. Combined with silver it causes some stubborn marks on the skin, but the marks are only skin-deep, and their character, from a hygienic point of view, has never been seriously questioned.

So that there only remains bromide of potassium to be considered, and since the suggestion has been made that there is an eruption already known as "bromide spots," it is to potassium bromide that several photographers have pointed with a warning finger. Now bromide of potassium is of course almost invariably present in an alkaline developer, but it is by no means a dangerous agent. No doubt fingers continually dipped into a liquid containing a solution of bromide might absorb the same into the system, but is it likely that the compound would be taken up in dangerous quantities? Bromide of potassium is a valuable medicine, and it is taken not in small quantities, but in large doses. Twenty grains three times a day—that is, sixty grains per day—is the regular dose prescribed for epileptic patients. Eruptions from the use of the bromide, if they follow, are of exceedingly rare occurrence, so much so that doctors, as a rule, do not take the result into consideration. Bromide has a lowering effect, as most people know, and it is also prescribed as a valuable medicine in connection with bronchial affections. But the effect of such amount as could possibly be absorbed by photographers putting their hands in a weak solution of bromide—like that employed in alkaline development—cannot for a moment be compared to the influence upon a patient who drinks many grains of it a day.

In the interest of our readers we have placed this subject of alkaline development, and its likely influence upon the human system, before two medical men of repute, and have sought their advice. We have detailed the cases of three different photographers which have come to our knowledge, and have placed before them the solutions in general use in the photographic laboratory, so that they might form as sound an opinion as possible on the causes of sickness. Both of these gentlemen agreed there was nothing in the solutions to account for the symptoms complained of. These symptoms were evidence that the sufferers were very much out of health; but that any of the solutions with which they had to do was the cause, there was no evidence at all to show. When further questioned upon the subject of the gelatine process, we mentioned that bichloride of mercury was employed for intensifying. A solution of this, if frequently touched by the hands, might bring about salivation, and attack the gums; but of this there was no complaint. In a word, our medical friends were at a loss to ascribe the disease to any noxious chemicals in the dry-plate laboratory.

But they readily agreed as to the probable cause of the attack, notwithstanding; it was, in their opinion, the dark-room itself that caused the mischief. Cutting off free access of air and light was very likely to produce the symptoms, the absence of light being quite as deleterious as want of ventilation. Many hours a-day in the dark-room—especially in dark-rooms as they are arranged for the gelatino-bromide process—were exceedingly likely, in the opinion of both medical men, to bring about a low state of health, for which they would prescribe steel and plenty of fresh air. We may, indeed, here set down a prescription which one of our friends did not hesitate to advise at once, in the case of a photographer who was in a low state of health from an excess of dark-room work. Here it is, perchloride of iron and strichuine being its principal constituents:—

Liq. ferric perchl. dil....	...	...	$1\frac{1}{2}$ drachms
Liq. strichnæ ...	...	...	...	1 drachm
Aqua chloroform	...	...	...	6 ounces

One-twelfth, three times a-day, after meals.

It would seem from this that it behoves photographers who have much dark-room work to do still to be careful of their health. They may get rid of ether and alcohol fumes by giving up the wet process, but because they do this they must remember that ample ventilation is still necessary, if they wish to enjoy good health. Sensitive gelatine plates necessitate the stopping of every crack and cranny in the most careful manner, and in doing this photographers sometimes stop up at the same time their last chance of ventilation. They breathe a vitiated atmosphere hour after hour, and it would be wonderful indeed if their health did not suffer. Well ventilated dark-rooms are quite as readily constructed now as formerly, although a little more care may be necessary to exclude light.

The matter of darkness, or ruby light, upon which our medical friends laid much stress—for it is a mistake to suppose that only the optic nerves are thereby affected—is a more serious question, especially if the photographer is subject to it for long, and combined with lack of ventilation. Medicine alone will not combat the ill-effects; plenty of fresh air and out-door exercise are the most efficient remedies, the photographer should remember, and these are restoratives, fortunately, within the reach of all. An energetic walk every day after business hours is said to be one of the best antidotes for dark-room sickness.

The "At Home" next week will be "The Bruckmann Establishment at Munich;" the following "By-the-Bye" will be "A Unit of Light."

THE NEW COPYRIGHT BILL.

We have extracted such particulars from the new Bill on Copyright now before the House of Commons as will interest photographers, but we may mention that those who desire to possess a copy of the document can do so on payment of twopence.* It is scarcely likely to pass into law without some amendments, and of these we shall take note at a future time. The title of the Bill is the Copyright (Works of Fine Art and Photographs) Act, 1882.

9. The author of every photograph which shall be or shall have been lawfully made, and which shall not have been published before the commencement of this Act, such author being a British subject, or domiciled in some part of the United Kingdom, the Channel Islands, or the Isle of Man, at the time when such photograph shall be published, shall have the sole right of copying, reproducing, and multiplying the same for the term of *fifty years*, commencing on the first day of the calendar month in which it shall be published: Provided always, that where, in making a photograph, a negative is first made, the said right shall belong to the maker of the negative.

10. Whenever after the commencement of this Act any photographic likeness of any person is executed on commission, it shall be unlawful for the photographer, or for any other person, whether he owns the copyright therein or not, without the consent in writing of the person for whom the work was executed, to sell, offer for sale, or exhibit in public in any shop window or otherwise any copy of such likeness, and if any such photographer or person shall sell, offer for sale, or so exhibit any such copy, it shall be lawful for the person for whom the work was executed to summon the offender before any two justices of the peace, court, sheriff, or other person having jurisdiction in summary proceedings, and such justices of the peace, court, sheriff, or other person, on being satisfied that such photographer or other person has any copies of such likeness in his possession for sale, or that he has exhibited the same in public, shall make an order upon such photographer or other person to deliver up to the person for

* 13, Great Queen Street, W.C.

whom the work was executed all copies thereof in his possession and the negative thereof, and if such photographer or other person shall not forthwith deliver up to such persons all such copies and such negative, or upon proof by the evidence of one credible witness that there is reasonable cause to suspect that such photographer or person has not delivered up all such copies and such negative which are in any house, shop, or other place belonging to him, it shall be lawful for such justices of the peace, court, sheriff, or other person, and they or he are or is hereby required to grant a warrant for some peace officer or officer of the court to search in the day time such house, shop, or other place, and if any such copies or such negative shall be found therein to bring the same or cause the same to be brought before them or him or some other justices of the peace, court, sheriff, or other person as aforesaid, and the same shall be forfeited and delivered up to the person for whom the work was executed as his property.

11. If any person, being a British subject, or domiciled as aforesaid, employs another as his assistant, servant, or workman to work for him for salary, wages, or hire, for the purpose of executing, making, or taking, or assisting in executing, making, or taking, any work of fine art, or any photograph, the copyright in such work or photograph shall belong to the employer.

12. Nothing herein contained shall prejudice the right of any person to copy or use any work of fine art in which there shall be no copyright, or to represent and obtain copyright in his representation of any scene or object, notwithstanding that there may be copyright in a copy or imitation previously made of the original work, or in some previous representation of the same scene or object.

13. If a work of fine art or a photograph in which there is copyright happens to be an object in any scene, the copying of such work or photograph merely as forming part of the scene shall not be deemed to be any infringement of the copyright therein, unless the special purpose for which the scene is copied is the exhibition of the copy of the copyright work.

14. (1.) Copyright under this Act shall be property of the kind called in England personal and in Scotland movable.

(2.) Every assignment thereof other than an assignment by operation of law, and every license respecting the same, shall be in writing signed by the assignor or licensor, or by his agent appointed for that purpose in writing.

15. No person shall repeat, copy, colourably imitate, or otherwise multiply, or cause or procure to be repeated, copied, colourably imitated, or otherwise multiplied for sale, hire, exhibition, or distribution, any work of fine art, or the design of any work of fine art, or any photograph, in which work, design, or photograph, or in the negative of which photograph, there shall be subsisting copyright, or any part of such work, design, or photograph, by any means in any material, or of any size, either in or by the same or any other class or kind of art as or than that in and by which the original work was executed, unless he is the owner of such copyright, or has obtained the written consent of the owner thereof to the making of such copy, repetition, or imitation for the purposes aforesaid, or some or one of them, nor shall any person, knowing or having reasonable cause for believing that any such copy, repetition, or colourable imitation has been made without such consent, import or export any such repetition, copy, or imitation, or exhibit, sell, expose, or offer for sale, or distribute any such repetition, copy, or imitation so made, or so imported or exported, or cause or permit the exhibition, sale, exposure, or offer for sale, or distribution of the same, unless he is the owner of such copyright, or the written consent of such owner has been given so to do. Every person convicted of an offence under this section shall forfeit to the owner of the copyright in the original work, design, photograph, or negative for every copy, repetition, or colourable or other imitation in respect of which an offence is proved, a sum not exceeding *twenty pounds*, and double the full price, if any, at which all such repetitions, copies, or imitations shall have been sold or offered for sale.

16. If after the commencement of this Act any person shall repeat, copy, colourably imitate, or otherwise multiply, or cause or procure to be repeated, copied, colourably imitated, or otherwise multiplied for sale, hire, or distribution any work of fine art, or the design of any work of fine art, or any photograph, in which work, design, or photograph, or in the negative of which photograph, there shall be subsisting copyright, or any part of such work, design, or photograph, by any means in any material or of any size, either in or by the same or any other class or kind of art as or than that in and by which the original work was executed, or shall import or export any such repetition, copy, or imitation, or shall exhibit, sell, expose, or offer for sale, or distribute any such repetition, copy, or imitation so made, or so imported or exported, or cause or permit exhibition, sale, exposure, or offer for sale or distribution of the same, then and in every such case, unless a written consent for so doing shall have been obtained from the owner of the copyright in the original work, design, photograph, or negative, the owner of the copyright may, in addition to any other remedy under this Act or otherwise, recover damages and obtain an injunction in an action or other proceeding allowed by the law of the place where the proceeding shall be taken.

17. In every case of infringement of copyright the owner of the right, instead of bringing an action, may apply in a summary manner to any two justices of the peace, court, sheriff, or other person having jurisdiction in summary proceedings, and such justices of the peace, court, sheriff, or other person may order the person who has been guilty of the infringement to pay a penalty not exceeding *five pounds* and all costs, and the money so paid shall be given by way of compensation to the owner of the copyright.

18. All copies and colourable imitations unlawfully made or imported of any work in which there is copyright, and all plates, blocks, slabs, moulds, dies, negatives, implements, and machinery made or used for the purpose of or in obtaining or making such copies or imitations, shall be the property of the owner of the copyright therein respectively, and they, or damages for their detention, or both, may, after demand for them in writing signed by the owner of the copyright or his agent, be recovered by such owner in addition to his other rights and remedies, and by the same or any other action or proceeding.

22. No person shall do or cause to be done any of the following acts, that is to say:

Sign, place, or affix, or cause to be signed, placed, or affixed upon or to any work of fine art, or photograph, or negative of a photograph, any name, initials, monogram, or mark with intent or in manner calculated to produce belief that the work, photograph, or negative was executed by some person who in fact did not execute it:

Sell, publish, exhibit, or dispose of, or offer for sale, exhibition, or distribution any work of fine art or photograph, or negative of a photograph, with any name, initials, monogram, or mark signed, placed, or affixed thereon or thereto in manner calculated to produce belief that the said work, photograph, or negative was executed by any person whose name, initials, monogram, or mark, or a resemblance or colourable imitation of the same, is or are so signed, placed, or affixed, knowing or having reasonable cause for believing that in fact it was not so executed:

Sell, publish, exhibit, or dispose of, or offer for sale, exhibition, or distribution any work of fine art, photograph, or negative of a photograph as having been executed by, or copied or taken from a work of a particular person, knowing or having reasonable cause for believing that the same, or some material part thereof, was not respectively executed by, or copied or taken from a work of such person.

If the author or maker of any work of fine art, photograph, or negative of a photograph, made either before or after the commencement of this Act, shall have sold or otherwise parted with the possession of it, and any alterations shall afterwards have been made in it by any other person or persons, knowing or having reasonable cause for believing that such alteration has been made, shall sell, publish, or offer for sale such work, photograph, or negative, or any copy thereof, as or for the unaltered work, photograph, or negative of such author or maker.

24 (1). There shall be kept at the Hall of the Stationers' Company, by the officer appointed by the said Company, for the purposes of the Act passed in the sixth year of Her present Majesty, intituled, "An Act to amend the Law of Copyright," a book or books entitled, "The Register of Owners of Copyright in Engravings and Photographs," wherein shall be entered a memorandum of every copyright to which any person shall be entitled under this Act in any engraving, photograph, or negative of a photograph; and such memorandum shall contain a statement of the name and place of abode of the author of the work in which there shall be such copyright, the name and place of abode of the owner of the copyright, the name or firm and place of abode of the publisher of the work, and the calendar month in which it was published, and the date of making the entry, together with a short description of the work; and, in addition thereto, if the person registering shall so desire, a sketch, outline photograph, or other copy of the said work.

(2.) A memorandum of every assignment of any such copyright and of every licence by the owner of any such copyright to copy or multiply copies of any such work, shall also be entered in the register aforesaid, which memorandum shall contain a statement of the date of such assignment or licence, the names of the parties thereto, and the name and place of abode of the person in whom such copyright shall be vested, or to whom such licence shall have been granted by virtue thereof, as the case may be.

FRENCH CORRESPONDENCE.

New Photo-Etching Process—*Zinc and Platinum* Process—Public Lectures on Photography—Resin Sensitized by Potassium Bichromate—Turn-Table—Dialysis through Gelatine.

New Photo-Etching Process.—Captain Biny, who is no less indefatigable than he is successful with his results, has recently brought out two new processes, both of which are, in my opinion, capable of being applied practically. In the first of these processes, a zinc plate is coated with bitumen and exposed beneath a positive; it is then developed, and the image is seen to be formed by the denuded metal. The plate is then coppered either by immersion or by electrolysis (the latter gives greater thickness), and after the remaining bitumen has been dissolved away by benzine, it is etched by a solution of 2½ per cent. of nitric acid in water. The etching must be continued until the fine lines of copper just show signs of disappearing. When this has been completed the plate is brushed with a fine brush under water, and thoroughly washed, and, so soon as it is quite dry, the relief parts in copper are rolled up with transfer ink. A hot solution of pure gelatine containing from 2 to 4 per cent. is then flowed over the plate, and is worked into the depressions with a painting brush, after which it is allowed to dry perfectly. To take a typographic impression in the lithographic press from a plate prepared in this way, it must be slightly wetted; this causes the gelatine in the depressions to swell, and if now the whole plate is sponged over and rolled up with printing ink, the latter will adhere to the parts coated with transfer ink—that is, to the relief in copper—and will be repelled wherever it comes in contact with the moist gelatine. This evidently forms the foundation of a practicable process for typographic printing, when there is reason to fear any stickiness in the lines; filling the depressions with wet gelatine adds to the effect of ordinary printing that of the chemical action which prevents the adherence of the fatty substance. We may therefore hope that this process opens up a new path of progress for typographic printing.

Zinc and Platinum Process.—Captain Biny has published another very interesting process, an improvement of the one in copper and platinic oxide by M. Gronfier. He proposes to treat with dilute platinum bichloride a polished zinc plate on which a negative image, with all the half tones (taken from a positive) has been impressed by means of coal-tar. He finds that a kind of Daguerreotype of great delicacy is produced on the zinc, and with exquisite modelling. These prints will be cheaper than the Daguerreotypes produced by the deposit of mercury on silver plates. So far as I know—and it will be easy to verify the statement by experiment—the black oxide of platinum is deposited to a greater or less degree on all the parts of the zinc plate that are denuded; the half tones of the image formed by the coal-tar will be the resist, and the deposit will be proportional to their intensity. In other words, we shall have an image which, owing to the black colour of the oxide of platinum, will be in harmonious contrast with the bright tint of the metallic zinc, and which will be perfectly modelled.

Public Lectures on Photography.—The month of March has been productive of several photographic demonstrations. I ought properly to leave to others the account of my own performances, but in my position as correspondent of the Photographic News I am bound to give a faithful report of any occurrence which may be of interest to my readers; the more so when, as in this case, the proceedings are a proof of the progress of our art in this country. On the 21st March last I delivered a lecture at the public lecture hall on the *Boulevards des Capucines*, the subject being, "The Chemical, Physical, and Mechanical Effects of Light," and on 31st March a second lecture, at the *Cercle de la Librairie*, "On the Graphic and Industrial Applications of Light," to a numerous audience composed of the principal publishers and printers of Paris. In addition, a lecture has been given every Sunday on all the methods of reproduction for industrial purposes. On the 12th of April M. Davanne was to give a lecture at the *Société pour l'Avancement de Sciences*, on the work of Poitevin, and perhaps in a few days I shall be called on to read a paper to the Congress of the Directors of the Training Schools of the French Departments, which is to meet at Paris, on the "Advantage of giving Special Instruction in the Methods of Copying Manuscripts and Drawings, either by or without the help of Light." It will be enough for me to point out that all these public lectures are so many indications of the interest excited in France by the progress and extension of photography.

Resin Sensitized by Potassium Bichromate.—M. Fisch, whose skill and investigations in our art I have already had occasion to bring under the notice of my readers, writes to me to say that he has discovered a means of incorporating bichromate of potassium with resin. This mixture will give a very sensitive film capable of resisting the action of acids.

Turn-Table.—The same inventor exhibited at the meeting of the Photographic Society of France, a turn-table constructed on the same principle as the pneumatic holder. It is a simple little instrument which will be of great service to those who desire to obtain an even coating on their plates.

Dialysis through Gelatine.—M. Gobert has made a very interesting observation of the dialysis of liquids through gelatine. He made a solution of gelatine, and introduced into it a certain quantity of bromide of ammonium, and when the mass became set, he poured on the top of the cake of gelatine a few cubic centimetres of a solution of nitrate of silver. At the end of four days he found that all the bromide of ammonium had risen to the surface, and had then combined with the silver nitrate to form silver bromide. The salt of ammonium had, in fact, passed through the gelatine to such an extent that in the upper liquid there was no trace left of silver nitrate. Unfortunately, M. Gobert thought that it would be possible to proceed at once to the emulsification of the bromide of silver thus formed, but he tried in vain. M. Fabre, Secretary of the Photographic Society of Toulouse, who attended the meeting, stated that Van Monckhoven had made the same experiment, and that by leaving the bromide of silver long enough in contact with the gelatine he had succeeded in obtaining a modification of the salt, which he was able to emulsify, and which gave a very rapid emulsion.

Leon Vidal.

A RETROSPECT OF PHOTOGRAPHIC EXPERIENCES.

BY T. BIGGS.*

My taking up photography dates back as far as 1852, when I returned to England from India on sick leave; but before entering on the main subject of this paper, I must refer briefly to the circumstances and objects which led to my studying and practising it.

While previously in India I had spent some six years on the Survey, had to pass in three native languages in which the entire work of the Survey was conducted, and, in the course of my duties, visited not only some of the most magnificent scenery in the world, but came across old temples, caves, wells, tanks, idol cars, &c., most elaborately and minutely carved and

* Read before the Bristol and West of England Amateur Photographic Association.

ornamented, and also numerous sculptured and inscribed stones of fields and villages of various dimensions, then used for boundary marks. I was aware that attempts to copy the inscriptions on these stones by hand had failed, and that a more perfect way of copying was most desirable. I brought home with me a large number of copies of sculpture done by hand, and employed myself for upwards of a year in recopying the same in Indian ink into a large folio made on purpose, which is still in the India Office Library. Whilst copying these sculptures into the folio, and having seen somewhat of photography with my brothers, who had lately commenced it, it struck me that it would be a perfect method of copying the sculptures and inscriptions.

When I commenced photography the calotype or paper process was exclusively used for landscapes, and the collodion process, which had just then been introduced, was rapidly superseding the Daguerreotype for portraits. I visited the laboratories of Andrew Ross and Lerebours, and saw the various processes used in grinding, graduating, and preparing the lenses. I also studied the chemistry of the processes, and then set to work to learn by experience what could be attained in no other way. With the collodion process the silver bath presented one of the chief difficulties—if not *the* chief difficulty—and continued to do so for many years.

The paper process was, on the whole, far more easy of manipulation and more satisfactory in its results ; and some negatives taken by it in those days will still bear comparison with many produced on collodion plates even now, particularly those by the late Mr. Samuel Buckle, of Leamington. The formulæ followed by Mr. Buckle were much the same as given in the *Photographic Journal*, page 109, as exercises, and the only lessons I ever had were from Mr. Buckle—two lessons of one hour each. The paper for the calotype needed to be of a fine, hard surface, even texture, and free from metallic particles. No paper I ever saw or heard of equalled Turner's 1874 drawing-paper, though made for quite a different purpose.

In a short time I succeeded with the calotype better than I expected, and before returning to India I represented to the Honourable Court of Directors the advantages of photography for copying the sculptures and inscriptions in India, which were rapidly falling into decay and ruin, and would ere long be entirely lost. I showed the folio of sculptures I had etched, and as they were very desirous to place the folio in the India Office Library, I presented it to them. In return they presented me with a photographic apparatus, by Andrew Ross, for landscapes 16 by 12 and collodion plates 10 by 8.

Shortly after my return to India, orders from the Court came out to Lord Elphinstone, then Governor of Bombay, to employ me on the special duty of copying the sculptures and inscriptions in Western India. His lordship took great interest in the project, and placed every facility in my way. The chief objects laid down were the copying of the inscriptions, and the endeavour, by a careful and studied comparison of the same—with the aid of educated natives who thoroughly understood the Sanscrit, Maharatta, and Canareese languages—to recover the lost language in which the inscriptions of earlier date are written, and thus to regain the hitherto lost and unknown history of India. Also, by a careful comparison of the sculptures on the various temples and caves, portraying the most minute particulars of their religious rites and ceremonies—their wars, their feasts, their sports, their customs, their employments, and manufactures—to trace the rise and decay of art and civilisation in India.

In Bombay itself I found the calotype process much the same as in England in summer, the exposure being three or three and a-half minutes ; but on going to Beejapoor—some 250 miles from Bombay, and 100 miles from the sea, situated in a very dry part—the required exposure averaged fifteen minutes, and the radiation of heat from the ground was so great after ten o'clock in the morning that I could never get a good negative after that time. I used almost always to excite my negative paper overnight for exposing next morning, and as my double frames were quite air-tight they kept perfectly, notwithstanding the heat. Of course I had to carry a still with me wherever I went, in order to secure a supply of distilled water.

At first there was some difficulty in copying the inscriptions perfectly, as the letters were indistinct, filled with dirt, mutilated, and the same colour as the stone ; but I soon found a device which removed all difficulties and answered admirably. I had the stone well washed, then the surface whitewashed, wiping off as much of the whitewash as possible with a cloth while still wet. After a few minutes, when the whitewash was quite dry, the surface of the stove was rubbed over with a rag dipped in indian ink, and wrung nearly dry. This darkened the surface of the stone, leaving the letters and any marks in the stone quite white, and thus the copying became easy and perfect, every letter being discernible.

I had scarcely commenced my second season's operations—after having made minute inquiries through the civil authorities as to the locality of interesting buildings and relics, and gathered all the information I could, having procured a *suite* of tents, carriage, and everything necessary for a long season's work—than the Persian war broke out, and my services were required with my regiment. I had, therefore, to resign the work I was so interested in.

After some months, when it was found that my services were no longer indispensable with the artillery, Lord Elphinstone offered me my former appointment on special duty ; but, as I was holding a good staff appointment with my regiment, and had three times been taken away from civil employment for field service, I preferred remaining with my regiment. The next year the mutiny broke out, and, when the officer who succeeded me as photographer to Government died, the work was altogether stopped.

In 1862 I came home again, and was not a little surprised and disappointed to find the copies of Sanscrit inscriptions, which had been sent to the India Office, had been forwarded to the Sanscrit professor at Oxford, and had never left his portfolio, and that no attempt had been made to decipher one of them, the change of Government seeming to have destroyed all interest in the matter.

The waxed paper process was practised extensively by some, but I never got a really good negative by it, nor did I ever see one produced by it. During my second stay in England I studied more particularly the dry processes, which were then being introduced. Finding the tannin process succeed better than any other, I adopted it in preference, and I put its keeping properties to a severe test on returning to India. I prepared and sensitized a dozen plates at Cheltenham, and exposed them more than three months afterwards at Ahmedabad, in Goozerat, getting good negatives. On my return to Bombay, I was once more employed by Government to photograph the temples, mosques, &c., in Goozerat, chiefly in the city of Ahmedabad, which abounds with numerous elaborately-carved and highly-ornamental buildings, tombs, wells, and tanks.

The climate during the greater part of the year was very dry and hot, the thermometer rising to 115° or 120° during the day for weeks together. The difficulties with either dry or wet collodion were legion, and such as are never experienced at home. Flies and flying insects of all kinds abounded, and seemed to delight in settling on the film of collodion just as it was poured on the plate ; the atmosphere was loaded with dust, which entered every crevice ; rats, squirrels, and cats were constantly careering on the canvas ceiling over the dark room, and shaking down volumes of particles of lime and dust, to say nothing of the intense heat and dazzling radiation from the ground. At one time, after long-continued heat, I could not keep a single negative after I had obtained and finished it. I tried to create a damp atmosphere, and coated the film with albumen, gum, &c., but to no purpose ; for in an hour the whole film had peeled off, and the plate was left quite clean. This continued for a fortnight, when a heavy thunderstorm came, and all went well again. Wet collodion was worked with difficulty in a tent under the above circumstances ; but I got many good negatives—some of animals (bullocks and camels) almost instantaneously.

In 1866 I came to England again at the desire of Sir Bartle Frere to superintend the publication of the three volumes of photographs—namely, Beejapoor, Western India, and Ahmedabad—under the auspices of several native gentlemen in Bombay, whose subsequent collapse and failure put a stop to the publications after some forty copies of each had been issued.

After I left India a distinct department was formed—"The Archæological Society of India"—and I have been furnished with copies of their *Proceedings ;* but I am unable to discover the aim or object of the department. There seems to have been no settled plan or system of research, and no practical results. The old inscriptions are still undeciphered, and, as far as I can gather, no systematic attempt has been made to recover the history of India from the sculptures. Many of the photographs which have been taken are the same as I took in 1854 and 1855, only on a smaller scale. The original grand aim and object appears to have been lost sight of altogether.

In conclusion, I would remark that photography now is very different from what it was. It was formerly a science, and an amateur, to succeed, was obliged to study the chemistry of the science as well as the manipulation. I frequently made my own gun-cotton and collodion, and always my chloride of gold, and albumenized my positive paper. Now, since the introduction of dry plates, photography with many has become a mere mechanical process. No knowledge is necessary beyond the time of exposure and how to develop the negative; nevertheless, many amateurs still study it thoroughly, and I believe it is mainly through their careful researches and experiments that the art has attained the great perfection it has, and will continue to do so.

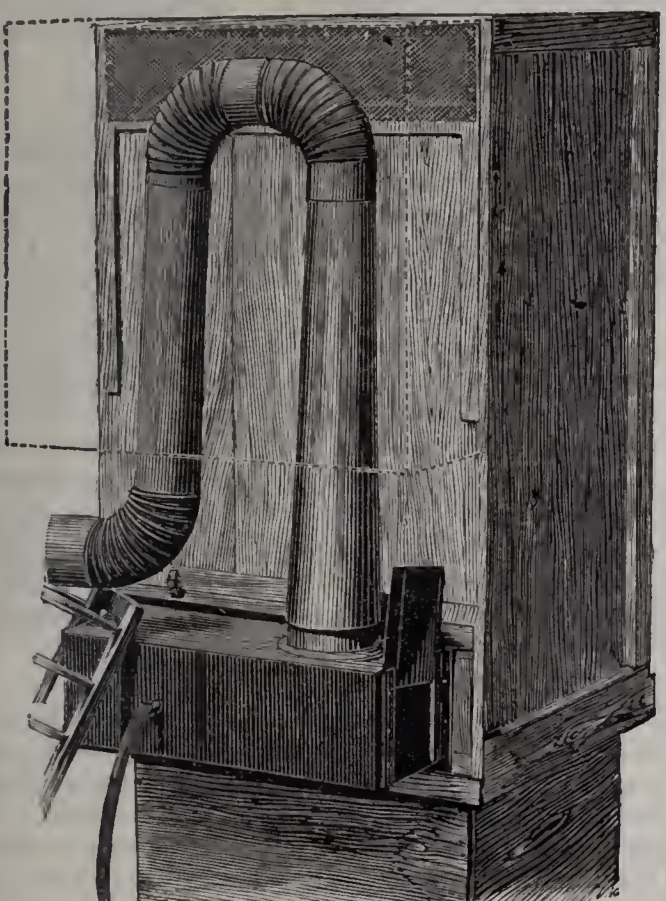
A SIMPLE DRYING-BOX FOR GELATINE PLATES.

BY A. GREINER.

I take the liberty to send you a few photographs of a drying-box made by me for gelatine dry plates. Should you think it to be worthy of a place in the Photographic News, here is a brief sketch of it.

The box is made from a common packing-case, which I lined inside with black paper, to make it light- and air-tight, the door being made also light and air-tight.

Against the inside of the box I nailed some small laths, to put the little frames upon, with pins between. At the back of the box are two openings—one at the top, through which the air enters, and one at the bottom, to let the air out. The openings are about 8 centimetres wide. Across



the upper opening I nailed a piece of brass gauze, to prevent the entrance of dust, &c. Against the lower opening I attached a little box, with a small movable frame with a piece of ruby glass in the centre, to allow at all times to see if the light is burning. On the top of the little box I attached the pipe, which is bent up and down before it enters the chimney. In the inside of the little box I have a Bunsen burner, exactly below the draught-pipe, to increase the current of air; this at the same time gives an agreeable warmth to the outside of the pipe, while warm air constantly enters the drying-box, and circulates among the plates, to leave the box again through the draught-pipes.

The dotted line indicates a cover or outer box outside the pipe, to keep the warmth in the box, and to exclude the light. Inside the box are two boards at the top and at the bottom, to prevent the light entering, and not interfere with the air currents.

The simple construction of the box will enable any person to make a drying-box at very little expense, and I can assure you that the drying-box is one of the best I have been using; and I have tried several.

COPYING DRAWINGS.

Tilhet's method of copying drawings in any desired colour is thus described in the *Polytechnisches Notizblatt:*

The paper on which the copy is to appear is first dipped in a bath consisting of 30 parts of white soap, 30 parts of alum, 40 parts of English glue, 10 parts of albumen, 2 parts of glacial acetic acid, 10 parts of alcohol of 60°, and 500 parts of water. It is afterwards put into a second bath, which contains 50 parts of burnt umber ground in alcohol, 20 parts of lampblack, 10 parts of English glue, and 10 parts of bichromate of potash in 500 parts of water. They are now sensitive to light, and must, therefore, be preserved in the dark. In preparing paper to make the positive print another bath is made just like the first one, except that lampblack is substituted for the burnt umber. To obtain coloured positives the black is replaced by some red, blue, or other pigment.

In making the copy the drawing to be copied is put in a photographic printing-frame, and the negative paper laid on it, and then exposed in the usual manner. In clear weather an illumination of two minutes will suffice. After the exposure the negative is put in water to develop it, and the drawing will appear in white on a dark ground; in other words, it is a negative or reversed picture. The paper is then dried and a positive made from it by placing it on the glass of a printing-frame, and laying the positive paper upon it and exposing as before. After placing the frame in the sun for two minutes the positive is taken out and put in water. The black dissolves off without the necessity of moving back and forth.

A HINT AND A DISCOVERY.

BY REV. J. J. S. BIRD, B.A.*

I.—How to Dry Gelatine Negatives Rapidly.

An inconvenience which has caused no little trouble to workers with gelatine plates, is the length of time they take to dry. A collodion plate can be held to the fire and dried in a very short time, but a gelatine plate under the same conditions would melt and run. Now, a gelatine plate may, under different conditions, be dried quite as rapidly as a collodion plate; and I have frequently taken a negative, dried it, and printed a proof in considerably less time than half-an-hour.

The principle is simply to remove the superfluous moisture before holding the negative to the fire, and this can be done by applying a piece of perfectly clean blotting-paper to the surface of the gelatine, using at first a moderate pressure, and increasing this pressure to any degree required. The blotting-paper will in no way injure the negative, and any stray pieces of fluff will dust off when the plate is dry. Still, it is better to carefully dust the blotting-paper, and to remove any stray pieces of material before it is applied. It will now be found that the negative can be dried at any degree of heat in the space of from thirty seconds to two minutes. This fact led the writer to the following—

II.—Useful Discovery.

If a gelatine negative be dried as above, at only a moderate heat, it will not perceptibly differ from a negative which has been allowed to dry spontaneously; but if a negative from which the superfluous moisture has been extracted by blotting-paper be exposed to a greater heat, the whole complexion of the negative is altered. Not only does the film become horny and tough, but the picture on it appears in relief—so much so, that it seems to me quite possible to produce a cast from the negative capable of being printed from in an ordinary press. This is an extension of the principle referred to in this year's annals, in which hot water is used as a developer; but this does not seem either as simple or efficacious as the method I suggest above. At all events, I think the matter is worthy of the consideration of this Society, and I commend the hints to my fellow-members.

* A communication to the Bristol and West of England Amateur Photographic Association.

Notes.

An International Exhibition of industrial art is open at Lille, which includes a section devoted to photography.

A competition for the "best travelling camera" has been organized by the Photographic Society of Toulouse; all competitors must send in their contributions before the end of the month.

We spoke the other day of two regal photographers—the King of Portugal and the King of Servia—but it seems photographers can count an Emperor among them, one, moreover, who practises the art professionally. According to the *Rèvue Photographique*, the Tycoon of Japan, who has abandoned the empire to the Mikado, has quietly settled at San Francisco, where he has established a photographic studio.

There are still many wet plate workers who have never handled a gelatine dry plate, but we doubt if in this country is to be found the counterpart of a gentleman—Mr. T. M. Easterly—who has just died in the United States. It was his boast that he was never a photographer, but purely a Daguerreotypist. According to our contemporary, the *Practical Photographer*, Mr. Easterly died at the age of seventy-three, and was one of the oldest, as he was the last, to practise regularly the beautiful process of Daguerre in the States. Unfortunately, his principle never to abandon Daguerreotype made him poor in health and pocket, though he appears to have been one of the most competent and worthy followers of Daguerre.

All interested in science and science instruction cannot but feel deeply pained on reading a little pamphlet just issued by an "ex-professor" of twenty-six years' standing, who details the obstacles against which he has had to contend during his teaching at one of the great military educational establishments of the country—the Royal Military Academy. We have merely to point out that the chair of chemistry at this Institution was held by Faraday and by Professor Abel, C.B., before Professor Bloxam commenced his twenty-six years' service, in order to show the dignity that attached to it, while the circumstance that the "ex-professor" is still the popular instructor of chemistry at King's College is proof enough that the Military Academy was well served by its former officer.

Yet, from the pages of this pamphlet, we find that Professor Bloxam has for years past been treated with grave insult and contumely by the military pupils, and that, despite repeated remonstrances to the Governor, the latter systematically omitted to support the civilian Professor, or even to reply to his appeals for help. The most childish and wanton conduct seems to have taken possession of the cadets, as soon as they found that the Professor of Chemistry was at their mercy and unsupported by the Governor's authority. Professor Bloxam, in his own defence, seems to have been compelled to erect an iron barrier in front of his lecture table, and to whitewash the walls of the lecture room, so that the obscene jests thereon might be expunged; but such aggressive measures as an attempt to blow up a wing of the building by the students "maliciously turning on more than a dozen gas taps," as well as the organized disrespect and coming late to lecture, were beyond the power of the Professor to circumvent.

The manner in which the civilian Professor was treated by the military Governor is best shown by quoting one of the latter's curt communications addressed to the Professor, who, broken down in spirit and health, resorted, as a last expedient, to locking his class-room door. This communication, it should be stated, comes from a governor of twelve months standing to one who has occupied the professorial chair for a quarter of a century: "Mr. Bloxam, I must again, for the second time, ask you to obey my orders, and not to lock the door after the second bell.—J. Browne, Major-General." To attempt any longer to impart instruction in the subtleties of chemistry or explain intricate theories in physics, was naturally out of the question after this, and Professor Bloxam very wisely desisted from the unequal combat.

We were at Stratford-on-Avon the other day, and marvelled to find so little that was new to us. Shakespeare's house must have been taken from a photograph, is the somewhat inverted idea that gets into one's mind, so familiar is the little black and white building, thanks to Mr. Francis Bedford and other capable photographers. The grey old church, with its tapering spire rising above the tall elm trees, and at its foot the placid Avon flowing through green meadowland, is also a sweet English scene with which we have grown familiar through the camera. Why should not the photographer go further, and give us scenes from the old manor of Charlecote, where Justice Shallow resided, and Shakespeare "killed the deer," and pictures of the woodland slopes and rich parkland in the neighbourhood where Jacques and Rosalind dallied?

"A painstaking photographer on canvas," is the description of Mr Frith, R.A., by an art-critic in last week's *Truth*. If this means anything, it is, that painters need not go out of their way to be true to nature; and yet our contemporary itself holds so much to the use of the mirror, that it is depicted on the title page with this emblem of veracity in its hand.

By-the-bye, we have thought of a good way of making painters less hostile to photographers and their works. As soon as a painter becomes intimate with the higher efforts of photographers (as he does when he accepts the position of judge at a photographic exhibition, and studies the best work of disciples of the camera), he gains sympathy with his humbler brethren, and is at once charmed with the pictures and poetry they hold fast with the pencil of light. Sir John Gilbert, George Leslie, H. Marks, P. H. Calderon, Walter Ouless, and Henry Moore—to take half-a-dozen well-known names—have all of them thought more kindly of photography since they officiated on the jury at the Pall Mall Exhibition. *Ergo*, ask our great painters to be our judges, and they become at once our friends.

Lest we should appear to be exaggerating in this respect, we would call as witnesses the cordial letters written by painters who have consented to serve on the jury year after year. The close intimacy with the best works of the camera brought about by their duties has led them to express over and over again their appreciation of photographic art. The high opinions of Mr. Marks and Mr. Moore about eighteen months ago we published at the time, and although the communications received by the Photographic Society from Mr. Calderon and Mr. Leslie at the conclusion of their labours last year did not appear in print, it is well known that these artists expressed themselves in high terms over the progress made in fine art by photographers.

They are going to try a strange experiment in Paris. The idea is to combine amusement with scientific instruction, by producing at one of the theatres a series of scientific dramas. The Folies Dramatiques is the theatre chosen for the purpose, and the experiment is to commence during the summer months. Already three plays have been provided for this bold scheme, and their titles indicate plainly in what direction the audience is to be instructed. The first drama is called "Denis Pepin, or the Invention of Steam;" the second is entitled "Kepler, or Astronomy and the Astrologer;" and the third is "Güttenberg, or the Invention of Printing." We would suggest yet another title: "The Triumvirate—Niepce, Daguere, Talbot—or the Invention of Photography."

A new Copyright Bill is before the House of Commons, dealing very definitely with photography, which is classed with engravings. It is to be introduced by Mr. Hastings, Lord Sandon, Mr. Hanbury, Tracy, and others. It is proposed that the duration of the copyright should extend in the case of paintings and sculpture to thirty years after the death of the artist, and in the case of engravings to fifty years from the time of publication. With photographs, the term is also to be fifty years; but photographic portraits taken on commission are not to be sold or exhibited in shop windows without the consent of the person photographed. On another page will be found the more important clauses of the Act.

Most of the staff of the Thebes Eclipse Expedition, including Mr. William Black, the novelist, left England for their destination on Wednesday. Dr. Schuster, F.R.S., is said to command the expedition; but we are incredulous on the subject of his commanding Mr. Norman Lockyer.

Mr. R. A. Proctor, the well-known astronomer, has grown so enthusiastic over Mr. Muybridge's "Attitudes of Animals in Motion," that he offers fifty pounds towards making up the sum necessary to photograph a rowing match, so that we may have an analysis of the various styles of rowing. It is well worth while, thinks Mr. Proctor, to record any pure style of rowing we may witness, and Mr. Muybridge's plan affords a ready means of doing this. Mr. Proctor adds: "Hanlan might, I have no doubt, be persuaded to row past twelve cameras, and so hand down to posterity the perfection of his marvellous style."

At the last meeting of the Physical Society, Mr. C. V. Boys read a paper on a new method of finding the index of refraction of lenses, based on the principle employed by the French physicist, Foucault, of causing the ray of light to return on the same path.

Mr. W. J. A. Grant starts with his camera once more to the Polar Seas next month. This time, the intrepid amateur does not take passage in the *Willem Barents*, but goes in a little vessel built and specially fitted for Arctic voyaging by an adventure-loving friend. The chief object will be to search for Mr. Leigh Smith in the *Eira*, whose crew has been nipped in the ice and imprisoned during the winter. The rescue of this gallant band will be the principal mission of the little craft that carries Mr. Grant due north, but he hopes at the same time to secure and bring back with him some photographic records of the voyage that may be valuable hereafter to Arctic explorers.

A very fine example of the Waterhouse photo-engraving process, in which the grain is produced by sprinkling sand, previously waxed, upon a newly-developed carbon print, was shown us the other day. It was an architectural subject, and if only an ordinary amount of retouching had been performed, the result would have been well-nigh perfection. We congratulate Major Waterhouse on his prospects.

Two charming poses—not nosegays—seen in a show-case at Worcester Station; the first, that of a tiny lad in a man o' war suit hauling away lustily at a coil of monster rope; the other, a girl in nautical costume looking out to sea, her hand deftly poised above her eyes.

Notwithstanding the many shortcomings exhibited b the photographic records of the last Transit of Venus, the French Academy of Sciences has decided to employ the camera once more to make observations. Eight expeditions have been named to take part in the work, but, strange to say, the name of M. Janssen, who has certainly had more experience of photo-astronomy than any one living, is not among those nominated to take charge.

The "caricature-portrait" is the latest squib from the Continent. A huge mirror, sufficiently concave or convex to distort the features considerably, is placed before the sitter, and the reflection in this mirror is then photographed. By slightly altering the way the hair is worn, the cravat or the collar, the most ludicrous effects are secured.

The director of the Jardin des Plantes—the Paris Zoological Gardens—has prepared photographs of all the animals in the collection, forming a series of 500 photo-engravings. These are furnished to the libraries of all the Government schools in France to aid in instructing the classes in natural history. A better means of educating boys and girls in this subject could hardly be devised, for the ordinary coloured drawings of wild animals distributed among our youth are invariably much exaggerated.

These coloured pictures, indeed, do more harm than good, for the child having seen the huge monsters here depicted, gets an altogether false impression of the real size and nature of the animal. Crocodiles and alligators, instead of measuring thirty or forty feet long, he finds in reality to be scarcely half that size; and pythons and bears, far from being able to swallow a buffalo, appear to the youthful visitor at the Zoological Gardens to have some difficulty in managing a rabbit. Thus we feel sure photographs of the animals themselves will be a most valuable aid to the education of young people. The pictures will not be so romantic to look upon as the old coloured prints; but since every child is in the habit of asking "is it true?" we may safely predict that the truth of the photographs will render them quite asattractive.

TWELVE ELEMENTARY LESSONS IN DRY-PLATE PHOTOGRAPHY.

No. VII.—The Management of the Camera in the Field.

If the young photographer have diligently perused the former lessons, and have gone through the various manipulations which are described in them, he will now be ready to sally forth into the field, and, selecting the beauty spots of nature, transcribe them by the aid of his camera and lens. He may, in fact, make pictures.

We have declared our intention of not entering into the question of art in connection with photography, but have referred our readers to more advanced works for guidance in this direction. Yet we may make a few general remarks on the subject, especially in indicating those points wherein the requirements for a photographic picture differ from those for a painting. The chief of these is, of course, the absence of colour. We cannot have transcribed by the camera the broad contrasts which are frequently brought out by colour alone. We must trust to form and to light and shade apart entirely from colour. Very frequently a scene will make a most perfect picture on the camera ground glass, when the experienced photographer knows it will make nothing in the print. Alas! the colour which makes the picture cannot be reproduced. This fact makes it the more necessary in the camera picture to have the form and light well balanced. The picture must not be all on one side, nor must there be running through it in any direction long uninterrupted lines. For the rest, there is wanting to a perfect landscape picture—be it painting, drawing, or photograph—a foreground, a middle distance, and a distance. It is in the latter that photography fails. What to the eye appears a definite distant landscape, the distance, but lending enchantment and softness, comes out in a photograph so dim and faint, that it would seem to be almost hidden by a thick mist. The slight haze which, in this country at least, always stands between us and the distance, is exaggerated so as almost to obscure those things which are quite clear to the eye. A certain amount of haze covering distant objects is necessary to give the idea of distance, but the exaggeration of fog, mist, or haze, which the camera always gives, must be allowed for.

Perhaps the greatest difficulty in photographing, however, is that the sky is not, as a rule, rendered at all. An exposure which will suffice to bring out all the detail in a landscape is such that the sky will be so over-exposed as to show no trace of clouds. It is necessary, to get the sky, to make a special exposure, perhaps about one-tenth of that required for the landscape, and to resort to a "double printing" process, which it is without our province to describe.

The subjects best suited for the camera are of the nature of the following. Any landscape having, apart from colour, broad and well marked contrasts of light and shade, and decided outline of form, are specially suitable. Trees of all kinds are well rendered, both with and without their leaves; in the former case, the difficulty is to get them motionless. A quiet windless day is necessary. Architectural subjects of all kinds are most perfectly reproduced by the camera.

The most charming effects of all are, perhaps, produced in a scene in which there is water—a quiet pool with reflections of trees, for instance.

We will suppose our pupil has determined on some locality where he is sure to find some subjects such as those we have indicated. We shall follow him, indicating how he should act as he proceeds. First, he has to fill his slides. We will suppose he has three of these; they must be packed into a case which should be made to hold them and the camera. Besides these, he must take his lens, his tripod—and let him be most careful not to leave the screw behind him—his focussing cloth, and possibly a "focussing magnifier." This is a small eyepiece to magnify the ground glass image, and enable him to focus with precision. It is useful mostly because it increases the light. When a small stop is used the ground glass image is frequently so dull that it can barely be seen.

Arrived at the scene of action, the photographer must select his point of view most carefully. Let him be in no hurry. Frequently a picture will be made or spoiled by altering by a few yards the position of the camera. When he is quite sure of his point of view, let him unfold his camera, erect it, and place it opposite the scene to be depicted.

A few words on the management of the tripod stand. With the beginner this is apt to prove most wonderful and fearful in its movements. The effect of moving any one leg appears to be the exact opposite of what might have been expected. After long struggles the whole apparatus assumes an appearance of hopeless inebriation, and finally collapses, very possibly pinching severely the tyro's fingers between the tail-board and one leg. Let the stand be, however, once for all placed on the ground with its three legs about equally far, and a good distance, apart, and with one of them pointing towards the middle of the scene to be photographed, and all trouble will cease. There will be room for the photographer to focus comfortably standing between the back legs. To tip the camera up, all that is necessary is to draw the forward leg towards him; to tip it down, he need only push it from him. He may still further tip it up by spreading the back legs apart; and down, by bringing them together.

When the camera is fixed, and the view focussed, it will probably be found that there is too much foreground, and too little sky. Now, one of two things may be done. The camera may be "tipped" up. In this case, if there be any parallel vertical lines in the picture, they will be made to converge at the top, and it will be necessary to bring the swing-back into play, so as to make the ground glass once more vertical. If there be no vertical parallel lines, the camera may be tipped a little without appreciably modifying the result. The camera front and lens may be raised. This is usually the best course to adopt. The use of the swing-back always *strains*, so to speak, the lens, and necessitates the use of a very small stop. Raising the lens also strains it, but to a less degree. Tipping the camera does not at all. Most cameras are made so that either a vertical or horizontal picture can be taken, and judgment must be used to determine in which position it shall be. All the points above indicated having been considered, and the picture being all on the ground glass—proceedings so far having been conducted with open aperture or a large stop—the final focussing must be done. The principal object—generally in the middle distance—must be made absolutely sharp. Now, stops smaller and smaller must be tried till the distance is *just* sharp.

Now all is ready for exposure. Let plate No. 1 be exposed first, and on no account let any plates be exposed other than in their correct order, else the photographer will be likely to expose two views on the same plate. A much more aggravating thing he cannot do. In exposing, procedure is exactly as described in a former chapter. We shall try to give a general idea of the length of a few exposures.

We described fully in the last chapter the means of comparing the rapidity of different lenses and stops. The student ought, therefore, to be able to make the necessary estimation for the particular stop he is using.

With a good spring or summer light and "open landscape" (that is, a view having no objects with very heavy shadows in the foreground), and with the average of rapid commercial plates, the exposure with $\frac{f}{20}$ will be from one to two seconds; with river scenes or seascapes, it may be reduced to one-quarter of a second—about the shortest possible to give by hand. With heavy shadows or dark-coloured trees it may run up to four or five seconds, and, in the shades under trees, even up to minutes. In interiors, such as churches and cathedrals, it is very much longer, even when they appear well lighted. Four or five minutes is a short exposure for an interior with $\frac{f}{20}$, and even when the eye can penetrate to every corner of the building, exposures of several hours may be necessary.

We should say that, for a landscape, the most pleasing lighting is usually a side-lighting. The lighting looking towards the sun is sometimes very pleasing, but care must be taken not to include the sun itself. This must be either to one side or above the picture, or may be kept out of it by the camera being placed in the shadow of a tree or some such object.

(*To be continued.*)

HARDWICH ON THE LIME LIGHT.*

It is now many years since I commenced the use of the optical lantern for educational purposes, and each season I have been in the habit of noting down any little points which struck me as being worthy of record. Some apology is needed for presenting this communication to our Association in so crude a form, but the members will understand that experiments are not so easily conducted in a village school-room as in a well-appointed chemical laboratory with all the appliances suitable for the purpose.

The lime light is often described as radiating from "a point," and the optical parts of the lantern are ground on that supposition. No doubt it is true that the radiant should be a point, and all the aberrations are increased when it is not so. It will be found, however, in practice, that no amount of pressure on the gases will produce a sufficiently-powerful flame unless the heated surface be of a certain size, and that, so far from the distinctness of the picture on the screen being impaired by enlarging the lime spot, it will be increased. Not that the definition of the image is really improved, but that a strong light brings out into view more details than a weaker light.

To give an idea how far we are as yet from the perfection of the theory that the radiant should be a true point, let a clear and bright disc be thrown on the screen, and the front lens of the lantern be removed; then, on placing a sheet of white cardboard in the anterior focus of the condenser, a circle of bright light will be seen of at least half-an-inch in diameter. Such being the case, I fail altogether to perceive how a condenser can be made which will bring the rays from the lime spot to a true focus, so that they will pass through the high powers of a microscope without any loss. Your worthy President, if he should be in the chair during the reading of this paper, will perhaps be able to speak more favourably of the electric light; but as regards the lime light I am satisfied that an incandescent point is not sufficient.

How, then, is this point to be increased in size until it emits enough light for the purpose required? It may be done, partly, by enlarging the aperture through which the gases escape; but to this there is a practical limit, as I shall presently show. It may also be effected by throwing the flame at a small angle of (say) 15°, so as to shoot it along the face of the lime. This produces a very strong light, and I have worked in that way for a whole season; but the objection is, that the lime must of necessity be very near to the jet, or the flame falling at so small an angle will not reach it; consequently, if the cylinder should be badly centred, or should crack during the lecture, it will touch the jet in rotating.

A better plan, and one which I have adopted for the last two years, is to project the burning gases on the lime at a larger angle of (say) 45°, and to remove the cylinder to a greater distance. The flame then spreads, and the heated spot is larger than when the lime is brought quite close. I am aware that jets have been made in this way for many years, and that there is no novelty in the suggestion; but it has not, I think, been generally recognized, otherwise it would be difficult to explain why such directions as the following should be published, namely, "To keep the source of light as nearly as possible to a point, and to bring the nozzle of the jet close up to the lime when the picture is to be of a very large size." I should prefer to read it almost entirely the other way—that is, to heat as large a surface of the lime as you conveniently can, and to remove the jet further off in proportion as the flame strikes the lime at a greater angle.

The small blue flame of the mixed oxy-hydrogen gases is usually spoken of as solid throughout; but I have generally noticed it to be hollow, like the flame of a candle. The hottest part is on the outside, and within is a cone of imperfect combustion. To observe this in perfection, adjust the proportion of the two gases until you obtain the maximum of light on the screen; there will then be a very slight excess of coal-gas tinging the flame red at the edges. Now, if you look closely, you will see a small dark cone projecting from the end of the jet, and, if you push in the lime until it touches the cone, there will be a dark nucleus in the centre of the spot. The hottest part of the flame is immediately beyond the point of the cone, and if you go much further, the force of the blast will be lessened. Now turn on a little more oxygen, and you will find the central dark cone almost entirely to disappear; but the light will not be so good upon the screen. This, therefore, I believe to be the reason why more than the theoretical quantity of coal-gas is needed, namely, to allow for some amount of oxidation by the air as the flame passes through it and carries it mechanically forward.

The coal gas which I use is not pure; it contains free nitrogen and also carbonic acid. One effect of these impurities is to produce a roaring noise in burning, which distracts the attention of the lecturer, and also, to some extent, of the audience. I had often observed that the noise was greater with some burners than with others, which I thought to be due to want of care in polishing the bore of the jet. I now find, however, that, besides this cause, much depends on the size of the "mixing chamber." If you suppress that chamber altogether, the noise becomes intolerable; but if you increase it until it holds (say) a fluid drachm of water, then the flame is quite noiseless. I do not think that the chamber acts by ensuring a better mixture, but rather by *equalising the flow* of the gases— just as the fly-wheel of an engine regulates the speed. With pure coal gas and oxygen free from atmospheric air it may not be necessary to use any mixing chamber, provided the two gases are turned on in exactly the correct proportions.

I shall conclude my communication with a few remarks on the supposed danger of employing the oxyhydrogen lime light. Never on any occasion have I met with the smallest accident, and I can only conjecture that most of the explosions spoken of have been due to carelessness in making wrong connections and putting coal gas into a bag already containing oxygen, or, perhaps, by lifting a weight from one or both of the bags without pre-

* Read before the Newcastle-on-Tyne and Northern Counties' Photographic Association.

viously turning off the taps. This would certainly cause a suction backwards, and would be dangerous even in a case where only one bag was used, and the coal gas supplied direct from the main.

I prefer to keep all the tubes as open as possible, and to dispense entirely with wire gauze, packing of every kind, back pressure valves, &c. These valves are apt to get out of order, and in the long run, by necessitating heavier weights on the bags, to do more harm than good.

The form of jet known as the "safety" jet is more simple than the other, although I do not use it in my own practice; and, perhaps, it may not be generally known that when gas is not laid on, it will answer quite well to store it in a bag, and to weight the bag with a single brick—equal to about seven pounds. The light is not as good as that given by the oxyhydrogen, but it is much better than would be supposed, considering the rough way in which the gases are mixed. The spot is larger, and this compensates in a measure for the lesser intensity. I am sorry that more attention is not paid to the manufacture of these safety jets; no two that one buys are exactly alike, and they are very unequal in heating power. The best form, in my opinion, is where a rather small outside tube carrying the hydrogen projects beyond an inside oxygen tip, having an aperture of about one-twenty-fifth of an inch.

I conclude by a brief description of the mode of working the oxyhydrogen lime light which experience shows me to be easiest for a lecturer employing no assistant:—

1. The mixed gases to issue from an aperture of one-twentieth of an inch, and to strike the lime at an angle of 45°. Ascertain by suction that the burner is gas-tight, and if not, make it so by a small washer of leather or thin sheet lead placed near to the nipple.

2. The lime cylinder, which must be upright, to be fixed at a distance of a quarter of an inch from the burner. It is a great convenience when the lime is made to turn from the outside of the lantern.

3. The soft limes give rather more light than the hard, but I have found them latterly to be unequal in quality, and often badly centred.

4. Three-quarters of a hundred-weight on the oxygen bag is amply sufficient in the general way; but the tap must be "full on" if you are to have a certain measure of the quantity of gas which will be used. The coal gas bag should be weighted a little more heavily than the other, so as to give the required excess of gas, and this may be done with perfect safety, since the flow of the gas can be easily regulated by the tap.

A single set of pressure-boards may be used for both gases if desired, but it has been shown by more than one experimentalist that you do not necessarily obtain equal pressure in that way. I, myself, have found that the pressure varies not only with the leverage, but also with the extent to which the bags are filled. In purifying coal gas, for instance, a half-hundred-weight will force it through a column of liquid seven inches high when the bag is drum-tight, whereas a hundred-weight and a-half will scarcely suffice to do so when the bag is nearly empty.

For lectures such as I am in the habit of delivering, a single lantern answers sufficiently well. The lens and condenser which I use were made for me by Mr. J. H. Dallmeyer; the former being of two inches diameter and six inches combined focus, and the latter a plano-convex of four inches diameter and two and a-half inches focus as it stands in the lantern.

I have latterly tried a biunial lantern, lent to me by Mr. J. H. Steward, to examine whether an aperture of one-twentieth of an inch for the burner could be relied upon. I found that it was not too large, but that if it were much increased the flame passed back into the mixing chamber in dissolving. It is evident that the larger the hole the greater will be the pressure required to keep the flame at the outlet.

In preparing the oxygen gas it is well known that the black powder is apt to rise and choke up the passages, and that explosions have been caused in that way. A simple plan of preventing this is to connect the retort with the purifier by about six feet of stout india-rubber tubing of seven-sixteenths or half an inch in diameter. In passing through this coil of tubing the gas deposits the powder, which can afterwards be sent up the chimney in the form of a dense black cloud of smoke, by blowing through the tube with the breath. Another coil of the same length may be connected with the bag, to collect any water which otherwise might be forced into it if the gas came over with unusual violence.

Correspondence.

TEMPERATURE IN EMULSION MAKING.

Sir,—No doubt your correspondent, Mr. P. Collins, will be interested in the following facts, and will draw his own conclusions from them.

A few weeks ago I prepared a batch of emulsion by Captain Abney's method, in the usual way—nitrate to bromide—with excellent results. These plates being used, I prepared a second batch, green and brown fog resulting; but before they were tested, I prepared a third batch, so confident of results, and these were good in all respects.

In all cases the same sample of gelatine and the same sample of nitrate and bromide were used, and in all respects, so far as possible, the same method of preparation. Now, what made the difference? "There's the rub!" I believe it was in the amount of heat, although, in a water-bath, the bottle may be so near the bottom of the vessel as to become overheated. I have noticed also that a portion of the bromide was deposited, which I consider due to the partial decomposition of the gelatine, and, in future, shall avoid the possibility of overheating, and also reduce the time from thirty minutes to twenty, which I believe to be sufficient. Perhaps, after all, the safer way is in prolonged cooking at the lower temperature.

As to remedy for bad emulsion, I believe the best way is to reduce the silver at once, and make a fresh lot.—I am, yours truly, Frederic Row.

DRYING CUPBOARDS.

Dear Sir,—In your Year-Book appeared a woodcut of George's patent Calorigen; its suitability for drying plates was forcibly inpressed on my mind, and I resolved on a trial, so procured one. It is now fixed under my cupboard, and it will dry perfectly, free from all marking, ten dozen $6\frac{1}{2}$ by $4\frac{3}{4}$ in twelve hours. The principle is this (as most of your readers and yourself will know). Fresh external air is drawn through a pipe, which winds in a coil, through the stove jacket. This coil is heated by gas, the products of which pass off into the open air through another chimney, and nothing but the pure warm air is emitted from the top of the stove. What more is needed by the dry-plate maker? Again, when the stove is alight, it emits not a ray of light, another great advantage. In fact, a better apparatus could not be desired by anyone. I should be glad to send you a detailed description of the drying-racks in the cupboard, which are something novel, and, I may add, thoroughly efficient, only I am afraid drying cupboards have really become dry.—Yours obediently, W. Barry.

STAINED FILMS.

Dear Sir,—I perceive that Mr. Pumphrey has been advising that to avoid stained films, the gelatine plate should be placed direct from the alkaline pyrogallic into the fixing solution. Now, Mr. Pumphrey is one of the scribes, and therefore speaks with authority.

Is this advice "rank heresy," or is it "improved practice?" I should like to hear what the experts say, because I should like to know, being myself only a "bit of a muff." My custom has been to give the plate a good washing before going into the hyposulphate, and I have hitherto thought this the orthodox plan; I must own that my plates always possess the orthodox brown tint.

But, while I am asking, I should also like to enquire whether this yellowish-brown tint is always objectionable? I sometimes think it is advantageous, especially in very thin negatives; for while the shadows are tinted, the deposit on the high lights is by comparison much more strongly coloured, and thus a weak negative is really strengthened.

To illustrate, take a thin yellow tinted negative that produces a fairly passable print, and immerse it in one of the clearing solutions. The yellow colour will now disappear, but the print produced from the negative will be so impoverished as to be useless. And further, if the negative be intensified to compensate for the loss of colour, the negative (if the original thinness be caused by under-exposure) will only yield a hard print much inferior to when it remained in its original tinted condition. Such is my experience, but I should like to hear what others say, as I am only a THICKHEAD.

[We believe M. E. de Zuccato was the first to suggest this plan.—Ed. P.N.]

PHOTOGRAPHIC CLUBS.

Sir,—Had Mr. Cobb have had "the good sense to have waited, &c."—well, doomsday would certainly "have been, and come, and gone" before he had written his funny letter; but Mr. Cobb always is funny.

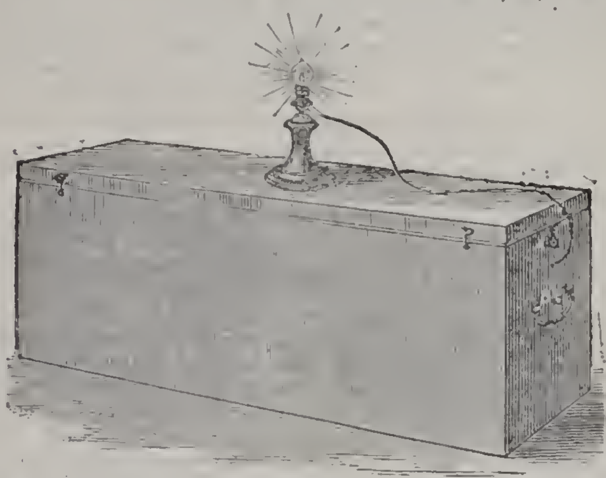
If insults be the reform Mr. Cobb says I stepped aside to allow to pass, why, I certainly did, and will do so again. I am, however, glad to see Mr. Cobb is, at last, a convert to the reform so much pressed by myself and others—viz., the publication of a *resume* of the Club's proceedings.

I must also say I go heart and soul with him in the reform the last part of his letter so forcibly advocates, and shall hail the day with joy when the two Clubs shall be able to throw off the mercenary landlord, and a room or rooms can be found where not only the Clubs, but the Societies can meet and be social, and where such sociability is not to be measured by the number of glasses ordered in addition to the rent of the room, itself a very heavy item (£60 a-year, I think); and if Mr Cobb could find such accommodation that the Clubs, &c., could meet, and, having their own stewards, be sociable, I am sure he would be looked upon as a "friend indeed" to the profession.—Yours truly, C. G. CUTCHEY.

PHOTOTYPES.

Dear Sir,—It may be interesting to the very many readers of your most invaluable journal, to the printing profession in particular, and especially to the correspondent mentioned in last week's issue, relative to the laying down of photo-lithographic transfer direct on zinc, instead of putting to stone, to learn that Messrs. Manning and Son, of Old Street, St. Luke's (the purchasers of the patent, plant, &c., of Messrs. Banks and Co.), have superseded the old and troublesome method of transferring to zinc, and are now photographing direct upon a prepared plate of zinc, thus avoiding the very many intermediate and intricate processes. Any one having had to make the bichromatised gelatine transfer paper in quantities will ever remember the painful sensations occasioned through being closed up, perhaps for some hours, in an ill-ventilated dark-room, and inhaling the fumes from the gas and the warm bichromatised gelatine. It might be as well here to state the several stages through which this material passes before the transfer on zinc is completed. The paper, after receiving the coating of the bichromate gelatine, is taken from dark room to a second dark room, ventilated, &c., so that a constant current of warm air passes through, and hung up to dry, which takes, when in large sheets, a matter of twelve hours; it is then put out to print, and returned to the dark room, in which a lithographic press is kept. A stone being thoroughly cleaned and inked, the paper is passed several times through the press, and receives a fair coating of ink; it is then placed in a dish of cold water to soak, and all surplus ink is washed off with a clean sponge and cold water; it is now hung up to dry, a stone is polished, the transfer laid between damp paper, then laid on stone and passed through the press in the ordinary way. The stone is now prepared for the artist to put in such portions as may be desirable. I need hardly state that all these intermediate manipulations are detrimental; there is a loss of work which, of course, has to be put in by the artist, and it also thickens through the great amount of pressure, which is impossible to remedy. I have only here stated what is actually necessary, to do all of which is superseded by the plan now adopted by the above firm. Of course you will readily understand that it is one of the many trade secrets, else I would freely give formula in detail. My idea in writing is, that yours being the leading journal of this particular art, it is only right, taking an interest in the profession at large, to communicate what is actually being done, and that the art is progressing. I have accordingly produced the accompanying from page 192 of your paper, slightly reduced

The Swan Lamp in the Dark Room.—We are now enabled to place before our readers a cut of the portable battery with the Swan lamp attached, as manufactured by Mr. Paterson, of 76, Little Britain, who informs us that he has fitted



some of these with red shades, so as to adapt them for dark room use. The lamp gives a steady light equal to five standard candles, and the five-cell bichromate battery contained in the box is brought into immediate action by lowering the plates into the cells, a pulley-like arrangement for this purpose being shown at A B. Not only is an apparatus of this kind useful for dark room use, but, should it be necessary to work with ether or other inflammable liquid in the evening, a safety light of this character will prove of considerable value. We intend before long to describe some new arrangements which we have made for facilitating the use of the incandescent lamp in the dark room.

in the first and last stages, so that you may, if desirable, pass any comments on same. I have also sent you a few others, so that you may be able to judge of its merits.—Yours truly, OPERATOR.

[We insert the "copy" sent us, that our readers may see how successful the process is. The process of photo-lithography, &c., as now practised with the velvet roller, is, however, far more simple than that described by our correspondent.—Ed. P.N.]

Proceedings of Societies.

Bristol and West of England Amateur Photographic Association.

The usual monthly meeting was held at the Studio, Portland Street, Kingsdown, on Wednesday evening, 5th inst., the President, Col. T. Biggs, in the chair.

The minutes having been passed,

Mr. H. A. Hood Daniel proposed the first resolution standing against his name on the agenda paper, viz., "That Rule VI. be altered," the words "first Wednesday" giving place to such as may be decided upon by the meeting. This question affecting the days of meeting was fully discussed, and Mr. Daniel proposed, and Mr. E. Brightman seconded, the proposition of the *fourth Wednesday* in the month being fixed upon as the future time of meeting; carried *nem. con.* The meeting being rather a small one, Mr. Daniel begged leave to postpone his second resolution till the next meeting; he, however, brought forward his third resolution, "That there having as yet been no competition, the titles decided upon last year for four competition pictures shall be continued this year." Also, "That two additional simpler titles be decided upon, and bronze medals given for pictures thereof, open to competition by those members who have never previously received any medal or other awards. Such competitions to be conducted upon the same rules as the preceding four." The mover of the resolution remarked that as there had not been sufficient pictures sent in to complete the competitions, he thought it hardly right that those who had taken the trouble to prepare pictures should be in reality worse off than those who made no preparations of any sort, which they would be if the titles did not staud till worked out.

Mr. W. Tribe seconded the resolution, especially as it would have the effect of, in reality, making two classes in the competitions. After some discussion, the resolution was carried *nem. con*.

The Hon. Secretary having brought a second application as to the French Monument to Daguerre, it was decided that it be acknowledged, and allowed to be on the table.

The President then read his most interesting paper entitled, "A Retrospect of Photographic Experiences" (see page 213), which was listened to by the members with evident appreciation.

Mr. Daniel asked if the effect of the radiation of heat from the ground was similar in appearance to the quivering "mirage" noticeable on a hot day in England.

The President replied that it was, only it assumed a much exaggerated form.

Mr. Brightman said he had met with the peeling of the collodion film from the plate in hot weather when the plate was of a lower temperature than the surrounding atmosphere, but not to such an extent as described by the President.

The President said he had never seen anything like it before or since, and found none who could explain it, especially the fact of its not re-appearing after the occurrence of the thunder-storm. He always used a very structureless collodion for hot climates, as being the most suitable. He much regretted that the only inscription ever deciphered was the one he did himself. The sculptures were, in a large number of cases, most beautiful, representing every-day domestic and other employments and events.

The Hon Secretary then read a communication from the Rev. J. J. S. Bird—a member not able to be present—entitled, "A Hint and a Discovery" (see page 215), relative to which,

Mr. Brightman feared that some atoms of fibre from the blotting-paper would adhere to the film obstinately, although Mr. Bird had stated the contrary.

To the President and Rev. J. J. S. Bird hearty votes of thanks were voted, and the meeting was shortly adjourned.

Bolton Photographic Society.

On Wednesday, April 12th, this Society held an "open meeting" in the Baths Assembly Room, Bridgeman Street, and although the weather was unfavourable, there was an assembly of upwards of three hundred and eighty ladies and gentlemen, the latter including most of the members of the organisation.

The President (John Hick, Esq., J.P.) extended a cordial welcome to those present who were not members of the Society. He then stated that about the year 1879 a number of young men, twenty or twenty-four in number, fond of photography, and desirous of making themselves acquainted with and efficient in one of our most delightful arts, banded themselves together for that purpose. It was one of the most unselfish amusements that he knew of, for none could take an interest in it without wishing others to join in their pleasures. Single-handed, it was felt that no great progress could be made, and those young men who originated the movement saw that co-operation in photography, as in other things, was of benefit to all. The attendances had been very good, and the members now, he believed, numbered over forty. Alluding to a large collection of specimen views tastefully arranged on several stalls, Mr. Hick said he had noticed some views which he had never seen equalled. He hoped the Society would go on progressing.

The views displayed for exhibition (between 600 and 700) were for the most part excellent specimens of the photographic art. Picturesque scenery, both local and from a distance, was well depicted, and many spots familiar to visitors were vividly brought to mind, recalling happy reminiscences of past rambles and excursions. Among the principal contributors were Messrs. Harwood, Parkinson, Dalton, Rideout, Taylor, Hawksworth, Foy, Fothergill, Perry, and Sewell. A table in the centre of the room was devoted to a collection of scientific instruments—microscopes, stereoscopes, &c. Mr. Sewell also exhibited a reversing stereoscope containing a number of Breeze's transparencies. The chief attraction of the evening, however, was an exhibition of views by the aid of a powerful lantern, which was excellently manipulated. The members had sent mounted transparencies which showed clearly and most effectively upon canvas, eliciting frequent applause. The views were very numerous and of every possible character, embracing statuary, architecture, and scenery, both local and foreign. Several views of local buildings and of rural landscape were faithfully represented, and some cheering scenes from Lake Killarney district were especially admired, as were also a number of American scenes.

Mr. J. H. Galloway acted in the capacity of cicerone, Mr. George Halliwell gave selections on the piano, and the choir of Claremont Baptist Chapel sang several glees.

The Bolton Photographic Society is to be congratulated on the work it is quietly doing, and no doubt one result of the "open meeting" will be an accession to the members of the Society.

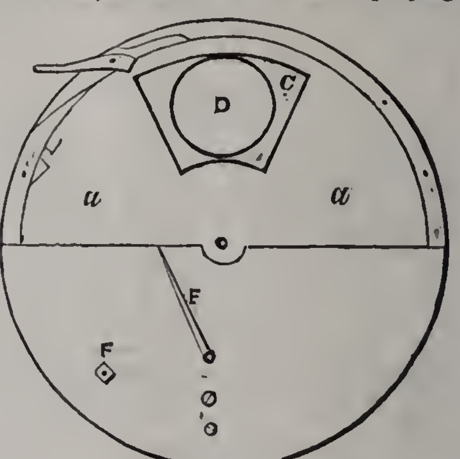
Thursday Evenings for Photographers.

At the meeting held on the 13th inst. the chair was occupied by Mr. R. J. Palmer.

Mr. A. Cowan exhibited an apparatus for filtering emulsion. It consisted of a Doulton-ware jar open at both ends; to the upper part was fitted an air-tight cover, and several thicknesses of wash-leather were strained over the bottom. The emulsion, having been placed in the jar, was rapidly forced through the leather by means of a stream of air admitted through a tube in the cover from another jar, out of which the air was forced by means of a stream of water.

Mr. Prestwich suggested that, instead of the second jar and stream of water, a biscuit-tin inverted, and weighted after the manner of a gasometer, should be used, as the water would force the air out through a hole which might be made in the tin.

Mr. Brown showed a very light and convenient form of shutter for out-door use; it consists of a semi-circular piece of ebonite revolving on a screw, as shown in the accompanying diagram,



and having an opening at C, this passing over the aperture of the lens, D, giving the exposure. To focus, the ebonite is set as in the diagram; it is then pulled round another quarter circle, and is kept in its place by the detent of the trigger, H, falling into a notch in the ebonite; a light touch on the trigger releases the disc, and the exposure is made. There is an india-rubber spring, the tension of which is regulated by the pins as shown in the diagram. The advantages claimed by Mr. Brown are simplicity and lightness (the shutter exhibited was for a 5 by 4 rapid symmetrical, and only weighed ten drs. and one scruple); and last, though not the least, cheapness, as he thought it could be retailed for 2s. 6d.

Mr. G. M. Satchfield showed a chloride plate showing both positive and negative images, and varying in colour from green to purple; this effect, which Mr. Satchfield said he could produce at will, was obtained by giving a short exposure by contact, then developing with a solution of citrate ammonia 4 parts, ferrous oxalate 1 part, a few drops of oxalate, and weak hyposulphate solution being added as an accelerator.

Mr. Henderson showed two pictures taken some years ago by Wharton Simpson's process, and which had been hermetically sealed; all purple tones had completely faded.

Mr. Cobb said he had a picture by the same process in an ordinary frame, and he thought it was as perfect as when first taken.

Mr. Henderson also showed a negative taken by a quarter-plate Voightlander lens, of the 1858 eclipse on plates by Dr. Hill Norris' process.

Mr. Ashman showed a very interesting series of prints from negatives taken at Kimberly.

Glasgow Photographic Association.

A meeting of this Association was held in the Religious Institution Rooms, on Thursday, 13th inst., at 8 o'clock p.m., Mr. John Parker, president, in the chair.

The minutes of the last meeting were read and approved of. Mr. Steven was elected a member.

On the strength of a report given in by the President on behalf of the Exhibition Committee, Mr. Thompson formally moved "That arrangements be made for a Photographic Exhibition to be held in Glasgow," which was seconded by Mr. Gilfillan.

Dr. Fairlie delivered a lecture on "The Phenomena of Colour," which he illustrated with a number of experiments. His object was to prove that the primary colours are not red, yellow, and blue; but red, green (or almond blossom colour, which is greenish pink), and blue. The lecture was most instructive, and was listened to with much attention by the members present.

Thereafter the nomination of office-bearers for the ensuing session took place, after which the meeting closed with the usual votes of thanks.

Manchester Photographic Society.

The usual meeting of this Society took place at the Manchester Mechanics' Institution, on Thursday, April 13, Mr. Alfred Brothers, F.R.A.S. (Vice-president), in the chair.

The minutes of the previous meeting were read and confirmed. Messrs. Daniel Buckley and Obadiah Folds were elected members of the Society.

The Chairman called attention to the chemical composition of hyposulphite of soda, but promised to give further information on the matter at the next meeting.

The subject of out-door meetings was then discussed, and a committee for managing the affair was appointed, consisting of Messrs. Coote, Pollitt, Leigh, and the Hon. Secretary.

Mr. Pearson brought forward the subject before the members in May last respecting prizes to be given for the best pictures produced amongst the members for fixed subjects—such as, for instance, "The best landscape with cattle"—and proposed a committee be again appointed to carry out the arrangements.

Mr. John Warburton said there was a very good feeling existing amongst the members at the present time, and he thought that by offering prizes a jealousy would be brought about, as there were many members of the Society who were young photographers, and he would prefer to run no risk of jeopardizing the harmony which now prevailed. He therefore proposed, as an amendment, that no such committee be formed, and the matter be not entertained with reference to prizes, which amendment was carried by a large majority.

Mr. Holding said he felt quite sure many members like himself would like to see the work done by the Society during the year, and thought that if a special night was set apart as an exhibition night for members' work done during the current year, the case would be met. He had, therefore, great pleasure in proposing that an annual Exhibition of Members' Work be held at the November meeting, which was carried; and after some matters of a private nature had been discussed, the members retired in peace and harmony soon after nine o'clock.

The Photographic Society of Ireland.

The usual monthly meeting was held on Friday, the 14th inst., in the Royal College of Science, Stephen's Green, Dublin, Mr. J. Woodworth in the chair.

The minutes of the former meeting having been read and confirmed, the following gentlemen were duly elected members:—Messrs. Thos. Mason, R. Forbes, Wm. Kewley, and Theo. R. Webb. Mr. Robert Mitchell was proposed for membership.

Mr. Geo. Mansfield read a communication entitled "Notes and Gleanings from a Season's Work," and gave it as his experience, regarding the most suitable plates for out-door work, that the best results were obtained from rapid plates by giving a comparatively long exposure and using a weak developer, than by allowing a short exposure and applying a more normal solution. Some pictures which he exhibited, and which were treated in this manner, certainly were all that could be desired. In the intensification of negatives, he admitted there was considerable difficulty, the silver intensifier causing the plates after a short time to stain, and as with the above method of exposure, &c., great density was obtainable, in a very few instances only was intensification at all necessary.

A lively discussion thereupon arose as to the best kind of intensifier. Some of the members expressed themselves thoroughly satisfied with bleaching the plates with a saturated solution of bichloride of mercury, and afterwards soaking them in a strong solution of ammonia; while others found they could not get good results, as the plates seemed to stain.

Mr. J. V. Robinson explained that this arose from imperfect washing both before putting the plate into the mercurial bath and after fixing, and also after the bleaching before using the ammoniacal bath. He had used Monckhoven's with satisfactory results; but as Mr. Mansfield remarked, intensification of gelatine negatives was always more or less risky, and in his opinion it would be better, if possible, to avoid the necessity for it. The pictures produced were taken on Swan's plates, and in no instance did trouble arise from frilling, the alum bath preventing this evil. He also exhibited a collection of apparatus, including Shew's instantaneous shutter, which evoked a great deal of comment, the majority of those present agreeing that the principle of opening from the centre, and thus allowing most light to pass through the centre of the lens instead of the edge, was bad.

A developing-lamp, burning ordinary candles, was shown, it being constructed so that there was a large current of air passing through, thus avoiding all heating.

There were also an enamelled developing-dish and a new Parisian printing-frame on the table.

Mr. Thomas Mayne exhibited and explained both the single and double-chambered filmograph, as well as a new dark changing-box for either films or plates; his explanation of the above, and also some film negatives, being very interesting.

Mr. J. V. Robinson produced a new japanned tray for inspection, the advantage claimed for it being that there was no possibility of the japan rising and chipping off in the manner that enamel does, thus avoiding the possibility of rust.

Mr. Watson exhibited a "home-manufactured" camera-stand.

Mr. J. L. Robinson exhibited and explained a cheap dry plate camera, which met with much approbation, considering the price, &c.

A cordial vote of thanks was passed to Mr. Mansfield for his communication.

It was then proposed by Mr. Woodworth, and seconded by Mr. Pim, "That the thanks of the Society are due, and hereby given, to Captain Edwards and Mr. Nugent, for kindly placing their negatives at the disposal of the Society," and from which the presentation prints were taken. It was then proposed by Mr. Watson, and seconded by Mr. Mansfield, "That copies of the prints be forwarded to both Captain Edwards and Mr. Nugent." Both the above resolutions were carried unanimously

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Talk in the Studio.

Photographic Society of Great Britain.—The next Technical Meeting of this Society will be held on Tuesday next, April 25th, at 8 p.m., at the Gallery, 5A Pall Mall East, when the following questions will be discussed:—"What is the Experience respecting the various kinds of Gelatine as Photographic Media?" "What is the Ratio of the Light emitted by Warnerke's Phosphorescent Tables, compared with the Standard Candle?"

A Photometrical Battery Cell.—An ingenious arrangement, by which light is transformed into electricity, has been devised by Laur, and the intensity of the current indicates, to a certain extent, the power of the light. A porous cell containing mercury, and a plate of platinum, are immersed in a solution containing sodium chloride and copper sulphate (this being contained in a glass cell), while a plate of silver sulphide dips into the solution. The plates are connected by a wire through which an electric current passes when light shines on the arrangement, as the silver sulphide is reduced. A galvanometer to measure the current completes the apparatus.

Spectrum Photography.—In a paper on the spectrum of carbon, communicated to the Royal Society by Professors Liveing and Dewar, these gentlemen give a map and table of the wave-lengths of the lines due to carbon in the visible part of the spectrum. The observations were made, for the most part, by means of photography, and the authors thus describe the way in which the photographs and measurements of wave-lengths were secured. A small photographic slide, containing the sensitive plate, fitted the telescope in place of the eye-piece, and so could easily be turned about an axis coincident, or nearly so, with the optic axis of the telescope. In taking a measurement of the position of a line the approximate wave-length was first found by interpolating between the nearest cadmium or other lines of known wave-length in photographs taken with calcite prisms. The telescope was then set to the angle corresponding to this approximate wave-length for the spectrum of the fourth order. The lower half of the slit was closed by a shutter, and the photographic slide having been adjusted for level, the plate was exposed to the light which came through the upper half of the slit, and gave an image of the lines in the lower half of the field. When this exposure was completed, the photographic slide was turned round through 180° about the axis of the telescope, so as to bring to the top that part of the sensitive plate which had been before lowest. It was then exposed a second time, and thus two images of the same line were impressed on the plate, which were necessarily at equal distances on either side of the point where the axis of the telescope met the plate. By a subsequent measurement with a micrometer under a microscope of the distance between the two images, and the conversion of this distance into angular measure, a correction was found, which was added to, or subtracted from, the reading of the circle to get the exact deviation of the ray producing the line under observation. Another photograph of the same line was next taken in the same way as before, except that the telescope was placed at the corresponding angle on the other side of the collimator. From the two angles thus found, the wave-length of the line was calculated. The process was repeated three or four times for each line, and the mean wave-lengths thus found for carbon lines were 2296·5, 2478·3, 2509·0, 2511·9, 2836·3, and 2837·2. The wave-lengths of the remaining lines were obtained by interpolation from measures of photographs on which the iron as well as the carbon lines were shown. The wave-lengths of the iron lines used in the interpolations were deduced from photographs taken with the grating in the same way as that above described for the carbon lines.

A White Enamel for Paper or Pasteboard.—A glaze or coating which is tolerably easy to apply, and can be readily varied as regards hardness, is a desideratum among collotypic printers, and the following formula recently published by Pauer will be found thoroughly reliable. A paste is first made by boiling 10 kilo-grammes of wheat starch with 110 litres of water, and to this is added 150 kilo-grammes of the finest gypsum, 1·5 kilo-grammes of sodium hyposulphite, and 50 grammes of ultramarine. It is generally advisable to thin it down for use with 100 litres of boiling water; and when it is desired to soften it, glycerine should be added, as much as 2 kilo-grammes not being too much in extreme cases. Zinc white may either wholly or partially replace the gypsum, and by stirring about half a kilogramme of stearine into the hot mixture, a much finer surface or polish can be produced. The presence of hyposulphite unfits cards enamelled with this mixture for use as mounts for silver prints.

Phosphorescent Light Emitted by Plants.—Among plants recently observed to show signs of phosphorescence, the following may be mentioned :—Tropæolum majus, agaricus olearius, auricularia phosphorea, polyporus citrinus, and xylaria polymorpha. Crié, who has made these observations, has also studied the light given out by the rhizomorphs of certain fungi, and he will probably publish results of considerable interest before long.

The Solubility of Silver Chloride in Water.—This is known to be much greater than that of the bromide, and Mr. C. P. Cooke has recently shown that one litre of a saturated aqueous solution of silver chloride deposits ·002 gramme of the salt when treated with silver nitrate, but only ·0009 gramme when treated with hydrochloric acid. Photographers who experiment with silver chloride should not forget that it is slightly soluble in pure water, although practically insoluble in many saline or other solutions.

Light and Vegetation.—It appears, from recent researches, that the transpiration of water by plants is directly proportional to the intensity of the light, and Paudion has published an interesting and elaborate series of investigations on the influence which light exerts on the respiration of seeds during germination. As in the case of large plants, less carbon dioxide is exhaled in light than in darkness.

To Correspondents.

All Communications connected with Advertisements and Business to be addressed to Messrs. Piper & Carter, *"Photographic News" Office, 5, Castle Street, Holborn, E.C. Advertisers are requested to make all Cheques payable to* Messrs. Piper & Carter, *and crossed "Union Bank, Photographic News Co. Account."*

*** We cannot undertake to return rejected communications.

A. Greiner.—You will see we have made use of your communication, for which accept our best thanks.

Centaur.—If you refer to scum on the bath, a careful filtration will prove a remedy; but if the bath is so impure as to produce an appearance of scum on the plates, the best thing will be to render the solution slightly alkaline with carbonate of soda, and to expose it to the prolonged action of sunlight. It must, of course, be acidified before being again used.

West Kent.—1. It is difficult to categorically answer your question, but the simple drop or spring shutter is probably as convenient as any for general use. 2. Only when the most favourable conditions of light exist.

Tiger.—1 and 2. Certainly; and it is often preferable to hyposulphite, especially when subsequent intensification is contemplated. 3. Such a proceeding is very undesirable, and is only admissable when no other course is open. 4. It differs from pyrogallic acid by containing one atom less of oxygen. 5. No.

Otto Pfenninger.—1. It is probable that by using a small proportion of iodide in the emulsion, and developing with more dilute solutions, you will get over the difficulty referred to. 2 We do not think that the coloured shade which you refer to would prove useful; but for the class of out-door work you mention, it is very advantageous to adapt a large funnel-shaped hood to the lens. This may be made of blackened cardboard, and should have a series of square cardboard screens or diaphragms fitted inside, each one being of such a size as just to weaken the image on the extreme edges of the plate. Let us know if these suggestions prove useful.

Bustler.—Probably not so many as in this country; but the highest class work commands a rather better price than is the case in England.

A. N.—Numerous articles on the subject will be found in back numbers and in the Year-Books, but any short directions, such as could be given in this column, would be of no value to you.

T. Cowley.—1. The best material with which we have met is a closely-woven black cotton twill; two thicknesses of this being sufficient if care be taken to shade the bag while working. 2. Simply sewn in, and provided with bracelet of elastic webbing. 3. Ours was about two feet square. 4. Simply drawn together by a tape running in a turned-down edge; but we have seen the jaw-bones of a superannuated carpet bag pressed into service for making a satisfactory and easily closed-opening. 5. It should seldom exceed two seconds, but very often a small fraction of a second would suffice. 6. About one-twenty-fifth of the focus.

H.—We have found nothing to answer better than from 50 to 60 grains of gum-dammar dissolved in one ounce of chloroform.

W. Power.—That which you refer to answers admirably, but there are five or six others which will give as good a result. A simple drop shutter is less likely to get out of order than most of the highly complicated forms.

F. K.—1. We do not think it is an article of commerce, but we recommend you to print in the ordinary way, and to tint by subsequent floating on an aniline dye bath. Judson's blue, diluted with water, and acidified with acetic acid, answers well. 2. A cold saturated solution should be used.

A. N. L.—Apply to the makers of plates, most of whom undertake to demonstrate the process of development.

G. M.—Dissolve one ounce of tungstate of soda in six pints of water, and add from 15 to 20 grains of chloride of gold.

How is it Done.—1. It makes but little difference. 2. The cutting of "cartes" a little smaller than usual is probably a key to the mystery.

R.—They are both of doubtful utility in such a case, and until you can judge the exposure approximately, you will not be a successful photographer.

G. H. P. Jones.—A solution of amber in chloroform would be preferable.

W. Barrington.—There can be no doubt that the continued inhalation of ammoniacal fumes would be injurious to anyone having weak lungs, and it is desirable that you should provide a cover for the dishes you use, and arrange a sink which slopes rapidly down to a trapped outlet.

John G. Noake.—There is no alternative but to slightly warm the plates in such a case.

Palestrine.—There is no need to renew, as it holds good for fourteen years.

E. B.—The general quality of the plates is evidently good, but there are numerous marks arising from particles of dust or dirt, and you have over-exposed.

THE PHOTOGRAPHIC NEWS.

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CONTENTS.

NEW METHODS IN GELATINO-BROMIDE WORK.

STRIPPING FILMS FROM THE GLASS.
REMOVING DEPOSITS OF REDUCED SILVER.
INTENSIFICATION WITH SILVER.
ISOLATION OF THE SENSITIVE MATERIAL.

The easy separation of the gelatino-bromide picture from its glass support has long been regarded as a desideratum, but has, as a rule, only been uniformly successful when the plates have been prepared beforehand with a view to the subsequent separation of the pellicle. Mr. Joseph Plener has, however, found that by immersing the plate in weak aqueous hydrofluoric acid the film becomes almost immediately loosened from the glass plate, owing to the solvent action of the acid. The etching action of the hydrofluoric acid is so slight as not to injure the glass to any extent, it doing but little more than to thoroughly clean the surface. Mr. Plener's hydrofluoric acid process may be carried out in various ways, as, for example, by building up a wall of cardboard strips round the negative, and, after levelling, pouring on a warm solution of gelatine. When the film is dry, or nearly so, it is immersed in the dilute acid until it can be easily stripped off, after which it is rinsed thoroughly and allowed to dry. If the wet film be carefully squeegeed down on a sheet of waxed glass, it can be easily separated as soon as dry, and under these circumstances the film negative is of course obtained with a beautifully even surface. Another method, which may be occasionally useful, is to immerse the stripped and still wet film into a bath of methylated spirit, a proceeding which causes the swelled film to rapidly shrink to near about its original size; after which drying between sheets of blotting-paper serves to remove almost every trace of spirit, so that the negative may be ready for printing from in a very short time. Wenderoth's method of squeegeeing a sheet of soaked gelatine could be doubtless made available instead of pouring a gelatinous solution on the levelled negative, and if the alcohol method of drying were employed, one would expect to be able to strip a negative and dry the stripped film in the course of fifteen or twenty minutes.

When a positive on paper is wished for, it is very convenient to make the picture on a plate in the first instance, and then to transfer it to paper. In such a case the positive picture on glass may first be coated with a thin layer of gelatine, to which a sheet of smooth-faced paper is next attached, or the paper itself may be brought into contact with the film under a warm gelatinous solution as when prints are mounted in optical contact with glass; remaining operations being so similar to those already mentioned as to require no special description. Mr. Plener showed us many pictures which had been transferred to paper in this way; and the negatives, which had been transferred to a fine or close-grained paper, had evidently lost none of their printing qualities, excepting so far as the paper backing would, unless waxed, considerably retard the process of printing.

Our readers have doubtless often met with negatives which appear to have a fog or deposit of silver between the film and the glass, this deposit being yellowish-brown if viewed by transmitted light, and rather metallic in appearance when looked at by reflected light. A deposit of this kind may, in some instances, be the result of using dirty glasses, but Mr. Plener thinks that in many cases it arises from the fact that the denser grains of the sensitive material (probably a compound of haloid salt and gelatine) settle down to the face of the glass, where those parts of the grains next the plate are so imperfectly protected by surrounding gelatine that the developer induces a general reduction to the state of metallic silver. This view is confirmed by the fact that when such a film is stripped on paper by the method detailed above, so that the deposit originally under the picture is brought to the face, the deposit may be removed by means of metallic mercury, the metal amalgamating and dissolving the coarse granular silver forming the fog or veil, while the true image, which consists of silver intimately united with gelatine, remains untouched, and at the same time comes out clearly and boldly.

Mr. Plener finds that a film which has been stripped by his method, and has thus been washed or cleansed on both sides, is so much more amenable to silver intensification than a film on the glass support, as to render it advisable to strip a film which requires to be intensified; but it is possible that the action of the hydrofluoric acid may have something to do with this circumstance.

Mr. Plener's most important discovery in connection with gelatino-bromide emulsion is, however, his method of separating the sensitive compound of bromide and gelatine. This is rapidly effected by mechanical means, which we shall not be at liberty to describe until the inventor has secured foreign patents bearing on the matter: and, after separation, the material may be washed, and then incorporated with fresh gelatine. Mr. Plener finds, in most cases, that, by separating the sensitive body from an emulsion which gives green fog, with an extremely thin image, and mixing it with fresh gelatine, an unusually vigorous and clean emulsion is obtained; but, in some cases, the desired end may be attained by removing the coarser particles only—an operation which takes but a few minutes.

It is also possible to incorporate the sensitive constituent of gelatine emulsion with collodion; but the result is not so uniformly satisfactory as when gelatine is again used. Mr. Plener, however, showed us a very successful negative made with the collodion mixture. We hope shortly to publish detailed papers by Mr. Plener.

A NEW METHOD OF RECOVERING SILVER FROM OLD FIXING SOLUTIONS.

The recovery of silver from the fixing solutions used in the treatment of gelatino-bromide plates is a matter of considerable importance, much more important than when only wet plates were treated with the hyposulphite solution. And for this reason. In the case of gelatine emulsion plates, from half to three quarters of the silver they contain goes into the fixing solution; whereas in the wet collodion process, a quarter of the silver at most was carried away by the hyposulphite solution. In these circumstances it is obvious that the fixing solution employed for emulsion plates—which, by the way, is usually kept in a dipping bath—is of a valuable character, and it becomes a question of deep interest to the photographer, therefore, how he can best recover the silver contained therein.

As most of our readers know, two methods are in practical use in the photographic laboratory for recovering silver in hyposulphite solutions. The first is that we recently referred to as being in favour with Messrs. Valentine and Sons, at Dundee, viz.: the precipitation of the silver in metallic form by means of sheet zinc; the other method is to add the so-called liver of sulphur to the fixing solution, and recover the silver in the form of sulphide. A third process, apparently equally practicable, has now been put forward by Dr. Lagrange, of Berlin. This chemist recommends the treatment of old fixing baths with the ferrous oxalate developer. In this case the silver is precipitated in a metallic state, and, when it has been washed, may be converted into nitrate of silver by dissolving in nitric acid and evaporating to dryness. The fine division of the metal facilitates its solution, and if the crystals of nitrate are dissolved a second time and recrystallized, or fused, a product is obtained that any photographer may employ with confidence.

We have tried Lagrange's method with success. We dissolved some bromide of silver in hyposulphite solution, and then treated it with a quantity of ferrous oxalate developer. At a low temperature the reduction of the silver was very slow; but on slightly warming, the solution became at once turbid, and silver was precipitated in a fine powder. This finely-divided silver was collected on a filter paper, carefully washed, and examined as to its purity. It dissolved wholly in nitric acid, making a clear solution, and this gave no precipitate either with ammonia or a solution of nitrate of baryta. It was therefore free from sulphur and from iron.

The ferrous oxalate had extracted from the fixing solution the whole of its silver, with the exception of a slight trace; had we treated the hyposulphite solution for a longer period, probably all the silver would have been recovered. After standing twenty-four hours, some iron was precipitated with a trace of silver.

An old fixing bath was now taken in hand which had served for the treatment of a larger number of negatives; as the plates had been developed with pyrogallic acid, and the developer had not been very carefully washed off them, prior to their introduction into the fixing bath (as is the wont in many photographic laboratories), this fixing solution was very brown, and contained decomposed pyrogallic acid and ammonia. On adding to this ferrous oxalate and warming it, a rapid precipitation ensued; but in this case the precipitate was darker than that of the former experiment. A chemical examination showed that the precipitate here contained a small quantity of iron, and traces of an organic substance, clearly observable on heating in a test tube; so that the silver recovered was not quite pure. Still it would be quite possible, we cannot help thinking, to remove such small impurities as present themselves, by treatment with dilute sulphuric acid, as, indeed, Dr. Lagrange suggests.

In order to determine what influence the developer employed has upon the purity of the silver recovered, we next experimented with some old fixing solution in which plates had been treated which had been developed with ferrous oxalate. On adding ferrous oxalate to this fixing bath and warming, we obtained precipitated silver perfectly free from iron, and exhibiting but the very slightest trace of sulphur.

We may, therefore, say of the Lagrange method that it enables one to precipitate a comparatively very pure silver from old fixing baths, and that the method is moreover very rapid and very direct in its action. The finely divided silver may in a short time be converted into silver nitrate, which, when re-crystalized or fused, can be employed in any photographic operation.

There is, however, the question of cost to be considered. Ferrous oxalate, albeit it may be itself reconverted, is a somewhat expensive article. When large quantities of fixing solution have to be treated, or when a fixing bath is poor in silver, the recovery of the precious metal with ferrous oxalate is undoubtedly a more expensive operation than treatment with zinc or liver of sulphur. Precipitation in the form of sulphide of silver—that is, using liver of sulphur—we should still recommend to all who collect their fixing solutions and work them up only at long intervals, and who do not mind the tedious operation afterwards of reducing the silver; or, precipitation with zinc, as practised on a large scale by Messrs. Valentine, when, if not so much silver is obtained, this is in a metallic condition. But in the case of those who desire to secure their silver quickly, and to convert it as soon as possible into nitrate of silver, they cannot do better than resort to the use of ferrous oxalate for recovery of the precious metal from old fixing solutions.

THE LATE CHARLES DARWIN.

There can be no better criterion of the estimate at which a man is held, than the reflection of opinion from all parts of the world that follow so speedily the announcement of his death. On Friday morning last the news was first published to the world that the author of "The Origin of Species" was no more; the following day came back to us from every quarter of the globe heartfelt sympathy and tender regrets at the death of Charles Darwin. The great Englishman's name was a household word at every foreign school and college, for the Darwinian theory is discussed wherever students assemble and men of science gather together.

It is not in our province to pronounce any eulogium upon Charles Darwin; that has already been done by abler pens. But while yet the great man's name is still upon every tongue, we may call here to mind the fact that Mr. Darwin had much to do with photography and photographers. A work published in 1872 on "The Expression of the Emotions in Man and Animals" was very widely read in this country and abroad, and by the aid of photography Mr. Darwin was enabled therein thoroughly to illustrate his words and give full weight to his opinions. We can but ascribe it to Mr. Darwin's deep foresight that he should have chosen as an assistant in his work the man of all others among photographers who was most likely to sympathise with the author's aim, and appreciate and understand his wants: we mean the late Mr. O. G. Rejlander.

To Rejlander, Darwin explained the photographic illustrations of which he stood in need; the philosopher desired to pourtray how definitely in man were the expressions of emotion, and Rejlander threw himself into the work with an energy well worthy of the cause. So enthusiastic was the photographer, that he posed himself again and again as the model, and in the end Mr. Darwin had no cause to regret having placed so important a work in our old friend's hands.

We have extracted a few of the "expressions" to show how worthy was Rejlander of his master. The top figures 1 and 2 are to indicate how the mere fall or separation of the lower lip will indicate care or trouble. Photographers


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in their everyday work may make note of this for alterations in the features of their sitters, quite as trivial, are enough to mar their work at any moment. Two other pictures indicate very plainly, joy and grief, or tears and laughter. The lady's face—no other, we believe, than Mrs. Rejlander—indicates scorn or contempt, while the four pictures of Rejlander himself are so graphic, there is no need for any explanation at all. There is anger, astonishment, horror, and indifference very apparent in these photographs, or rather wood-cuts from photographs. In a word, a mere inspection of the pictures will, we feel sure, convince our readers that Darwin could not have selected a more fitting helpmate to illustrate "The Expressions of the Emotions" than the late O. G. Rejlander.

At Home.

HERR FRIEDRICH BRUCKMANN AT MUNICH.

Bruckmann's photographic establishment at Munich is the largest in South Germany, if not in Southern Europe. Herr Bruckmann was one of the first to take up the Woodbury process, and, with the exception of MM. Goupil et Cie., his is the only Continental firm that has worked the method on an extensive scale. In a big oblong building in the Garten Strasse, which has been erected especially for photographic purposes, there are wonders to be seen which no other establishment unites under one roof. The Bruckmann establishment is interesting from another point of view; it is indicative of photographic progress. "Once we used to sensitize 600 sheets of albumenised paper daily," said Mr. Bruckmann junior; "now we only treat 300 sheets." The reason for this is that the mechanical printing processes are rapidly growing in importance, and that the time is not far distant when producers of photographic prints will turn over a new leaf altogether. For some years the Woodbury process was sufficient, in conjunction with silver printing, to keep up with the demands for photographs; now silver printing is declining rapidly in the face of collotype, and it really seems as if for photographic publications the employment of albumenized paper will soon be no longer resorted to.

The Bruckmann establishment, then, is indicative of what we are coming to. Here we find the Schnell-press at work, although it has been installed but a few months; next year, however, will see the addition of another such machine, if not two. "Whenever more than 500 prints are required, we resort to Lichtdruck," says our young host; "if the order were not quite so large, we should probably employ Woodburytype; and very small orders we print in silver." This is the present plan, but any moment may see it again altered.

Here are the Woodbury presses. They are not at work just now, but the circular tables upon which the printing machines stand are in apple-pie order, and fit to begin at any moment. The roomy apartment is paved with flags, and is below the level of the ground, so that it is always cool even in the height of summer, and there is no fear of the gelatinous ink "running." It is only the small Woodbury presses that are on the moveable circular tables; the larger ones, in which ten-inch prints are produced, are placed in a row upon a bench under the window. The place has half the appearance of a cellar, it is so cool and dark.

Some photographs print better by the Woodbury process, and others by the collotype; neither is as perfect as silver printing, as everybody knows, but then the permanence of the latter cannot be guaranteed. Practically, the difference between Woodburytype and collotype may be thus set down. Says Herr Bruckmann: "You cannot always get good white surfaces in a Woodbury print, and you cannot always get good deep blacks in collotype." Collotype printing is cheaper than Woodburytype printing, and that has given a greater impetus to the former.

We pass from the Woodbury room to another similar apartment, a huge place, half cellar, half wash-house. Here the silver prints are washed, toned, fixed, and washed again. The preliminary washing, as also the toning, is done in big oval and very shallow washing tubs; they measure four feet across, and are bound with iron hoops. They look like dairy tubs in which milk is left for the cream to rise. Big receptacles in the apartment receive the first washings, &c., the chloride being thrown down with common salt, and collected with great care, for the silver residues in such a large establishment are worth several hundred pounds a year.

The washing of the prints is effected in a very energetic manner. They are placed upon a tray made of stretched canvas, and put under a water tank at a distance of three feet. In this position the water falls upon the prints with considerable force, in a multitude of little jets, not unlike those that emanate from a watering cart. These jets play unceasingly upon the prints for a period of not less than fifteen minutes, after which they are put for the night in running water. This is deemed sufficient washing, and it is, indeed, a very thorough one.

One of the principal products at the Bruckmann establishment just now, in the way of silver prints, are modern studies, which are coloured and sent to America, in return for the vast quantities of prints that issue from the studios of Mora, Sarony, &c. They are, for the most part, cabinet pictures of beautiful women, the photographs produced at Vienna and Munich. To such an extent are these turned out, that, at the Bruckmann establishment, we counted, in the colouring-room, no less than twenty girls, all of them engaged in painting these pictures for the American market. The painting is not done roughly, although so extensively carried out; the girls are skilled artists, at any rate for the most part, and some of the little paintings are exquisitely finished. The portraits we saw were all upon albumenized paper, proving pretty clearly that, for the best work, the Bruckmann establishment must still have recourse to silver printing.

At the same time, it must be asserted that by the time some of the collotypes have been gelatined and immersed in spirit varnish, they are difficult to tell from albumen prints. By close examination with a sharp eye—or, better still, with a magnifier of low power—the grain is, of course, soon discovered by photographers; but few of the general public, we suspect, would know the difference between prints produced by silver printing and collotype, especially when they have not the means of making comparison between prints from the same negative. In the Bruckmann establishment they produce very good collotypes, and although, as we have said, there is a Schnell-press at work, this is not driven by steam power as yet, but by hand, in the same way as type printing-machines at small offices. Otherwise, the arrangements are the same as we have described in our account of Albert's establishment in Munich, and Löwy's in Vienna. Nearly all the collotypes are printed with black and brown inks, so as to impart some sort of colour, and to make the result appear as much like a silver print as possible. There is also more attention paid to the glazing and varnishing of the prints at the end of the process; of course, with the same object in view. The shellac varnish employed, after the prints have been gelatined and dried, is of the same nature as that referred to in Herr. Löwy's studio. This varnish lightens up a collotype considerably, and gives it the well-known gloss of an albumen print.

The mounting department is also on a large scale, and alone well worth a visit. There is a complete bookbinding establishment, for binding the photographs into albums when mounted. The mounting is invariably done with starch freshly prepared, which is applied by means of very broad sable-hair brushes.

The "By-the-bye" next week will be "About the Royal Academy"; the following "At Home" will be, "Mr. J. E. Mayall's New Electric Studio in Boud Street."

FRENCH CORRESPONDENCE.

Process for taking Positives from Negatives by Contact—The Image with Half-tones on Bitumen—Direct Application of the Method to Woodburytype and Collotype.

Process for taking Positives from Negatives by Contact.—Captain Biny's energy is really inexhaustible; already he has brought out another process, of which the Photographic News will be the first to give an account. In my opinion, this process will not only offer an opportunity for most interesting experiments, but it will also be a point of departure for other discoveries of great value in improving the graphic arts. From Captain Biny's statements it appears that he is able to take images with half-tones by treating them the same as impressions upon gelatine—the carbon process, for example. The action of light renders insoluble a greater or less thickness of bitumen, and, if it be then developed on the side opposite to the impression, a number of depressions, more or less deep, is the result, corresponding to the degree of opacity of the different parts of the negative. Thus very thin pellicles coated with bitumen, and exposed on the reverse side, will give prints with half-tones. This is a most important fact, for it may lead to a very simple and complete process of photo-engraving.

The Image with Half-tones on Bitumen.—Captain Biny thus describes his new process:—He takes any kind of negative on collodion or bromized gelatine, not varnished, and, if possible, not gummed, but in any case perfectly dry. This image he coats with a layer of a 20 per cent. solution of bitumen of Judæ in benzine. The plate is then carefully laid on the turning table, and warmed, until it is quite dry, in a dark room lighted through yellow panes. The bitumenized negative is then exposed to full sunlight with the glass upwards. When the exposure is sufficient (and this may be ascertained by placing a piece of chloride of silver paper underneath the negative, and against the bitumen), the positive in bitumen which adheres to the glass is developed by spirit of turpentine; it is next well washed under the water tap, and it is then very slightly and very rapidly acidulated in order to remove every trace of the turpentine and of the bitumen which has not been exposed. Next, without waiting until the negative is dry, it is placed in a basin containing a saturated solution of bichloride of copper in water; the reduced silver of the negative is at once changed into silver chloride. So soon as the white colour is come out sufficiently, the negative is washed again, and it is dipped into a solution of chloride of potassium, or of hyposulphite of soda. Observing now the process, the silver salts will be seen to disappear completely; the plate becomes transparent, and on removing it from the bath a beautiful positive image in bitumen of Judea, and with all the half tones fully expressed, will make its appearance, since the bitumen has been exposed by the surface in contact with the image itself. This positive will serve for a great number of applications, which any one who is a photographer will be able to discover for himself, so that it is not necessary to mention them. But it is important to lay stress upon the fact that the method above described may be used with bichromatized gelatine, or albumen, or gum, coloured or not, as may be convenient, either for carbon prints, or for printing with fatty ink on glass, or any other transparent support. For example, bichromatised mucilage, coloured with Indian-ink, may be flowed over a glass plate which has been rubbed with French-chalk, and then, having been exposed in contact with a collodion negative, may be detached, afterwards being treated with bichloride of copper (bichloride of mercury will also answer the purpose, but it is much less soluble) and with cyanide of potassium or hyposulphite of soda, the result will be a very fine carbon positive. A bichromatized mucilage, not having any colour in suspension, but, like the bitumen film, taken on a ground-glass plate in contact with a negative, will, after exposure, give a positive, with a fine grain, suitable for printing in fatty ink. Any excess of gum not rendered insoluble by light, or of unreduced silver of the negative image, must, of course, first be removed. Bitumen, either with or without the addition of coal-tar, will, perhaps, render the half-tones on ground-glass better than bichromatized gelatine, because there will be no reason to fear, after the plate has been well wetted, that the relief of the substance not exposed will be too great. In any case, line drawings on bitumen superposed on collodion from which all reduced silver has been removed, and which has afterwards been thoroughly wetted, take the ink beautifully. When the bitumen positives taken from gelatino-bromide negatives by contact are slightly wetted, they show very marked depressions and proportional depth in the half-tones in every part where there is any bitumen; on the contrary, where the gelatine is not enclosed in the film of insolated bitumen, they show relief. Hence, a plaster mould could probably be readily taken from one of these positives, and from this mould a fresh plate by electro deposit.

Direct Application of these Methods to Woodburytype and Collotype.—Having brought these methods to the notice of my readers, I will leave them to reflect on the very interesting facts which I have been able to describe, and will only further mention two most important applications. The first of these refers to the Woodburytype. In the new processes of the Woodbury we all know that a relief is taken in gelatine, which is then developed on glass the same as a carbon print. To produce this relief the paper coated with the mixture requires to have a tolerable thickness of gelatine, and its use is hence often attended with great difficulty. I should prefer to take on a glass plate an image in gelatino-bromide, which, according to circumstances, will be either a positive or a negative, and then to coat this with a film of bichromatized gelatine slightly tinted; after which I should dry the preparation in a box with chloride of calcium, and then develop with hot water, in order to dissolve all the gelatine which has not been acted on by light. By this arrangement, if we began with a negative, we should obtain a positive in relief, and if we began with a positive, the relief would be a negative. As we know, Mr. Woodbury can use either kind of plate and he is able to form a direct mould by forcing a sheet of tinfoil into a negative relief. In the second place, as regards collotype, I would modify the ordinary process, so as to obtain greater solidity in the following way. I would coat a thick glass plate, in the first place, with a substratum of albumen and silicate of soda, according to Obernetter's formula; I would then cover this with a film of gelatino-bromide. I should then print on this sensitive layer a negative by contact with a positive on glass, and when the development is complete, and the plate quite dry, I should plunge it into a bath containing a solution of bichromate of potash; I should then expose, and place it in cold water in the ordinary way. By this means we should be able to get prints of very considerable durability. Of course it would be necessary to take care to remove any salt of silver by means of hyposulphite, so as to have nothing remaining but gelatine rendered more or less insoluble.

Leon Vidal.

EXPERIMENTS WITH A NEW DEVELOPER.

BY C. R. WOODS.*

I have a novelty here in the shape of a new developer, or, more

* Read before the Photographic Society of Great Britain.

strictly speaking, a substance that has not hitherto been put to developing purposes.

Molybdous salts are prepared by taking a saturated solution of ammonic molybdate, adding sufficient hydrochloric acid to re-dissolve the precipitate first produced, and reducing with zinc. The final result is a mixture of zincic and molybdous chlorides. On trying this solution (considerably diluted) on a gelatine plate which had had the usual exposure, an image appeared which could be developed till it was visible at the back of the film, and yet possessed no density. The film was stained a deep yellow, which appeared very marked on fixing.

Molybdous oxide was then prepared in the usual manner by adding a large excess of potassic hydrate to the above solution, and washing well by decantation. The oxide dissolved in hydrochloric acid gave about the same result as the mixture of zincic and molybdic chlorides. The sulphate did not develop the picture so quickly, and gave a yellow stain as before. The nitrate acted a little quicker than the sulphate, but not so quick as the chloride, and the film was not stained so badly. The molybdous oxide, treated with oxalic acid, formed insoluble oxalate, little, if at all, soluble in potassic oxalate. A similar result was obtained with citric acid and potassic citrate. Acetic acid dissolved the oxide readily, developed a gelatine plate with more density than any other molybdous salt; but the image was still very weak, and still accompanied by the yellow stain. The oxide dissolved in ammonic carbonate developed a gelatine plate without this stain; the image was weak, and, owing to the very considerable quantity of carbonate of ammonia required, it furnished a desperate case of frilling.

The solution of zincic and molybdous chlorides also developed a collodion-emulsion plate. Molybdous acetate required the addition of bromide to prevent fog. Both gave no density, and the addition of pyrogallic acid failed to give density.

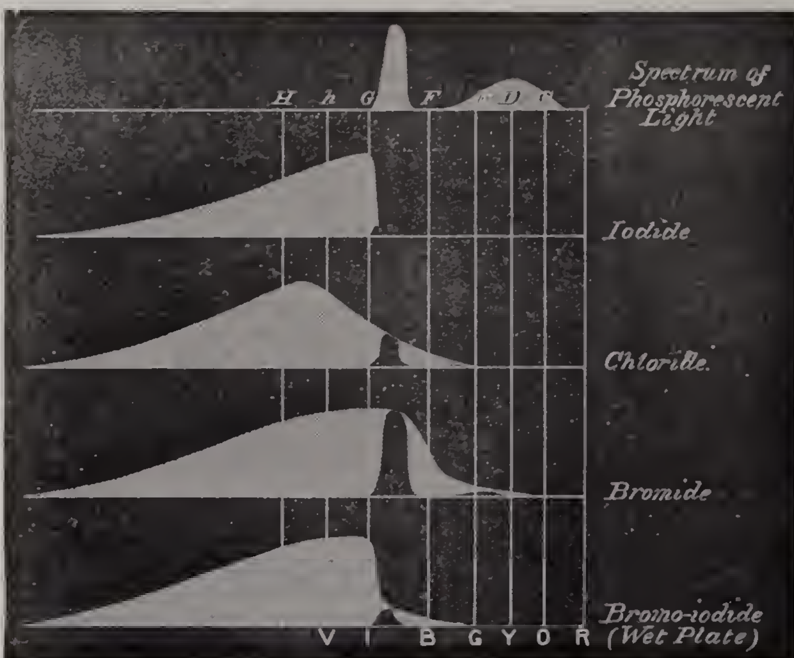
Thus there seems little probability of molybdous salts being practically useful for developing purposes, and their developing power can, therefore, only be regarded as a photographic curiosity. Still, the subject is certainly of theoretical interest, for the developer, in spite of its inability to give density, is a powerful one, acting pretty quickly with ordinary exposures.

ON THE "SENSITOMETRIC" SENSITIVENESS OF GELATINE AND OTHER PLATES.

BY CAPTAIN W. DE W. ABNEY, R.E., F.R.S.*

In my recent Cantor lectures before the Society of Arts, I touched very briefly on certain failings in sensitometers when illuminated with light from phosphorescent tablets; and I propose to-night, amongst other things, to enter a little more fully into the matter. This subject I undertook to investigate for the Sensitometic Committee. When you examine the light from a phosphorescent plate by means of the spectroscope, it is found that it is composed of a strong band in the indigo below G of the spectrum, and also of faint rays commencing in the green and extending to the limit of the visible red, and no doubt there are some faint rays which lie below the limit of the red. But with those we have not to deal, since ordinary photographic compounds are unaffected by them. The question then arises as to what effect such light would have on such ordinary photographic compounds.

Let us endeavour to trace what would occur. We will commence with the iodide. Silver iodide in its perfectly pure state is sensitive only to a little way below G, and it has very small sensitiveness at all below G. Its real sensitiveness lies in the violet, and also in the ultra-violet, the maximum intensity lying very close to G in the solar spectrum, from which point the sensitiveness makes a rapid descent, as shown in the figure. Now let us see how the light from a phosphorescent plate would affect the iodide. An inspection of the figure will show that it can affect it to a very small extent, only one small portion of



the light, and that nearest to G, being capable of making any impression on it. When we take the case of the chloride, we have the same effect; the light from a phosphorescent plate only indicates a small percentage of the light capable of acting upon it. When we come to the bromide we have a far different result. In the bromide we have the bright band in the spectrum of the phosphorescent light absolutely coincident with the regions of maximum sensitiveness. Perhaps, however, one of the most interesting cases is that of the ordinary bromo-iodide wet plate, in which again we have the position of maximum sensitiveness lying beyond the band in the phosphorescent light spectrum, so that in this case it is only very slightly effective (see fig. 5). I now wish to come to a practical application that must be made of these observations. We are in the habit of saying that a gelatine plate is so many times more rapid than a wet plate, and I believe that this statement is often founded on a measurement of the rapidity of the plates by means of a sensitometer. Let us suppose for an instant that a bromide plate and a wet plate are equally sensitive to white light, and then let us trace what would happen suppose the exposures were gauged by the sensitometer. If the area of the curve of sensitiveness be measured in each case, and called unity (since by hypothesis the sensitiveness is to be equal), and the area of the curve of the phosphorescent light after being drawn be also measured, and the second measurement be divided by the first, we shall have a fraction indicating the sensitiveness to the phosphorescent light. The ratio of these two fractions one to the other will represent the relative exposures that would have to be given, supposing them regulated by a sensitometer illuminated by a phosphorescent plate.

* Read before the Photographic Society of Great Britain.

The respective areas for the iodide, chloride, bromide, and bromo-iodide of silver (wet plate), and the areas of the curve on which the phosphorescent light will act, are as follows :—

	Total area of curve.	Area acted on by phosphorescence.	Proportion acted on.
AgI	189 ...	1 ...	$\frac{1}{189}$
AgCl	266 ...	8·7 ...	$\frac{1}{30}$
AgBr	354 ...	35·8 ...	$\frac{1}{10}$
AgI+AgBr (wet plate)	205 ...	4·9 ...	$\frac{1}{42}$

It will be seen, then, that, judging by the sensitometer, the relative times of exposure between a wet plate and a gelatino-bromide plate would be 42 to 10 ; or, roughly, the wet plate would be given four times too much exposure, or the gelatine plate would be given four times too little, according to which was used as the standard for exposure. With a plain iodide plate compared with a bromide plate the former would be exposed nearly nineteen times too much. Comparing a bromo-iodide plate and an iodide plate together, the exposure of the former would be four and a half times too much.

It is thus seen that the plan of comparing a wet plate with a bromide plate by means of the phosphorescent light is fallacious. The question hence arises, How can you compare these two kinds of plates together ? Without entering into details, I may at once say that a gas-light gives a much nearer approach to truth. In some experiments carried out with a Warnerke standard sensitometer, the following numbers speak for themselves. Bromide (gelatine) plates of the same batch were used in the whole experiments.

Plate used in the sensitometer.	Exposed to	For	No. on sensitometer	Remark.
Gelatino-bromide gelatine	Phosphorescent light	½ minute in the usual way	24	2 separate
Wet plate ...	... ,, ...	1 minute ...	7·8	exposures
Gelatino-bromide plate	Gas light ...	¼ minute ...	24	of ½ minute each were
Wet plate ...	... ...	1 minute ...	15	given

Comparing the wet and gelatine plates excited by phosphorescence and by gaslight, we find, according to Warnerke's table, that with the former light the gelatine plates appear much more rapid than with the latter.*

By gaslight the gelatine plate is only 48 times more rapid than the wet plate, whilst by phosphorescence it is about 200 times. If the first result is divided by the second, it will give the ratio of effective gaslight to phosphorescent light, and this is 4 nearly. The ratio of effective daylight (which is variable, by-the-bye) to phosphorescent light, as obtained by calculation, is 4·2. It is thus evident that gaslight is nearer to white light in its effect on a plate than is phosphorescence. I think it may be safely said that when a comparison is made between a wet plate and a bromide plate by means of phosphorescence, the true superior rapidity of the latter over the former may be very nearly obtained by dividing the result by 5. Thus if a wet plate, according to sensitometer, is 150 times slower than a gelatine plate, the true figure to estimate it at will be somewhere about 30 times.

So far I have only touched upon the sensitiveness of bromide plates in comparison with wet plates. It now remains to remind my hearers that any mixtures with a bromide in gelatine plates also alters the sensitiveness as shown by the sensitometer. In a recent communication to the Royal Society I showed that one salt acted as a sensitizer to another—that is, that silver sub-iodide (Ag_2I) acted as a sensitizer to silver bromide (AgBr), the bromine liberated from it forming a new molecular combination, Ag_2BrI. The result of such sensitizing was to cause a dip in the curve of sensitiveness near G—in fact, at the place of maximum sensitiveness of silver iodide. The same result was shown also to hold good where chloride was mixed with iodide, and where all three were in combination, or rather mixed. It will be seen, therefore, that when using a sensitometer illuminated by phosphorescence, the dip in the curve about G is wholly neglected, and not taken into account. In fact, to reduce the thing to an absurdity, were all rays beyond G towards the red of no effect, the sensitometer would show an equal sensitiveness. Hence, in comparing a bromide plate with any bromo-iodide plate, or chloro-bromo-iodide, or chloro-iodide, the sensitometer-results for the latter would be slightly too high.

* Of course, owing to the double exposure, we have to divide the rapidity of the former by 2, which gives the number shown.

A CURE FOR GREEN FOG.

BY CAPTAIN ABNEY, R.E., F.R.S.*

In an interesting paper read at the last meeting of the Photographic Society an account was given of obtaining intensity by means of converting the image developed by the alkaline method into silver oxalate by means of a solution of ferric oxalate, and then re-converting it into metallic silver by means of ferrous oxalate development. This plan of converting the silver image into oxalate I had described last year in the Photographic News, in an article on a cause of lack of density of the developed image, and had shown that the image could be re-converted into the metallic state by ferrous oxalate development. I had not noticed, however, that it gave any particular density to the image. In repeating these experiments lately it struck me that, if green fog was caused by a silver deposit, it should, on treatment as described above, yield a negative free from any coloured veil, the green veil being replaced by a small deposit of metallic silver. I had by me one or two specimens of plates which had yielded from fog with alkaline development, and on these I operated. The result was, that green fog disappeared entirely, no trace of it remaining ; at the same time there was, undoubtedly, a small trace of veil, due to deposited silver.

I exhibit a couple of plates—one in which the green fog has been abstracted from half the surface, and the other in which the green fog has been totally eliminated ; the first of these plates was treated with ferric oxalate in a cell, and then developed with ferrous oxalate ; the other was differently treated. Potassium bromide, of twenty grains to the ounce, and a solution of ferric chloride of about equal strength, were mixed together, and the plate immersed in it. The image was immersed in ferric bromide, or that and chloride, till it was bleached ; it was then rinsed under the tap, and the ferrous oxalate applied. The result is, that not a trace of green fog is apparent, though it was about as bad a specimen as any I have ever seen ; in fact, the image was absolutely pink, and the shadows pea-green. This negative I had laid aside as useless ; but now it has some value. It appears, however, as if there was a very minute deposit on the shadow—so minute that it can only be seen by placing the negative on white paper. Ferric chloride I also tried by itself ; and this answers the purpose equally well, though it is rather slower in action than the ferric bromide as described above. I should say that any body which has the property of converting the image into a bromide or chloride would be equally effective. Cupric salts with gelatine I am not fond of, as the cuprous salts are insoluble and cannot be washed out of the film, and there is a tendency for muddiness to result when they are used. The ferrous salts are soluble, particularly in potassium oxalate ; hence they may be used with impunity.

At our last meeting I made some remarks on the use of hypophosphites as developing agents, and remarked that plates with which I got green fog when using the alkaline developer did not give this veil when using sodium hypohosphate instead of ammonia. The natural inquiry to make is the reason of the difference. I think we may trace it to the fact that silver bromide is soluble in ammonia, and not in the hypophosphites. The action then seems thus :—In the shadows, ammonia dissolves a certain small quantity of silver bromide, and the gelatine (which in some cases, and only in some, is in a fit condition to act) forms a compound with it which is insoluble in the toning bath. The dissolved silver bromide is very minute, although the compound is strongly coloured. The example of an aniline dye is sufficient to show what a minute quantity of colouring matter is able to give bodies a very definite colour. When the ferric chloride, which gives up chlorine, or ferric bromide, which gives up bromine, is brought in contact with it, the silver is converted into a very delicate layer of silver chloride or bromide ; and in applying ferrous oxalate, this is reduced to the metallic state. I would ask my hearers to recollect that a negative which has to be forced up with ammonia is much more liable to this defect than one which yields to ordinary strength of developing solutions. If any present have negatives which show green fog, let me ask them to try the use of the ferric chloride or bromide, and a subsequent re-conversion of the white image into metallic silver, and I think they will welcome this plan as a boon. It is interesting to watch the parts most covered with the green fog : it will be noticed that they assume a whitish opalescent appearance, which remains until the image is once more reduced to the metallic state. All the operations involved can be carried out, of course, in daylight. A negative should be washed from the fix-

* Read before the Photographic Society of Great Britain.

ing solution previous to treatment with the ferric salt, as otherwise the hyposulphite reduces the ferric salt to the ferrous salt, and the bleaching action is consequently retarded.

Notes.

The present Honorary Secretary of the Photographic Society, Lieutenant Leonard Darwin, Royal Engineers, is a son of the author of "Origin of Species."

The author of "Modern Dry Plates" is becoming a universal favourite in this country; the Photographic Club recently elected him an honorary member.

Mr. Norman May writes us from Malvern, that the two photographs at Worcester to which we referred last week in one of our "Notes," emanate from his studio; we are very glad to it.

Negatives taken on gelatino-bromide paper were shown at the Technical meeting of the Photographic Society on Tuesday, and, as in the case of calotype negatives, the grain of the paper was visible enough, but no trace could be observed on prints made from them.

Our friend, Mr. W. K. Burton, tells us that when he has a batch of plates that exhibit green fog, he stores them awhile in a dry place, when the defect no longer troubles him.

Now that Mr. Plener's simple method of stripping gelatino-bromide films on paper has been published, many will be anxious to make the portfolio take the place of the plate-box.

It must not be forgotten that the paper negatives are very easily shaded at the back, either by washes of transparent colour, or by blacklead in powder applied with a stump; but this work should be done before waxing.

At the same meeting, Mr. Sebastian Davis called attention to the convenience of using a maximum thermometer in regulating the temperature of a water bath in the dark-room. It is merely necessary to take it out occasionally in the light and to observe the temperature; the instrument being re-set during the time taken up in returning it to its place.

The two-candle Swan lamps mounted on a moderator stand is the latest form of our non-actinic electric light. The body of the moderator contains a two-cell Planté battery made on the principles indicated by us in our issue of February 10.

A suggestion of Mr. Plener that hydrofluoric acid might be used with advantage for cleaning glass deserves to be noted. The acid would impart a new and very smooth surface, even to old and worn material. We need scarcely warn our readers of the corrosive action of hydrofluoric acid.

It was a dull day on Wednesday to get a first sight of the Royal Academy. Even that hardy race, the critics, seemed to be affected by the weather, for one or two of the rooms were actually empty, in the afternoon, when we entered. The arrangement of the rooms is a little altered this year; the "lecture room" has been devoted to sculpture, and there is no break of busts and statuary in the rooms devoted to paintings, as there used to be. This is hardly an advantage, we think; for the break was not only a relief, but caused some attention to be given to the sculptor's art, before the visitor was quite wearied out.

The best thing we can advise portraitists to do when they visit the Academy this year, is to study well Mr. Ouless' work. Though the youngest Royal Academician, Mr. Ouless is the most trustworthy of portrait painters. For simplicity of pose and natural grace his studies are unrivalled. He never attempts too much, and, therefore, if he failed, could not fail egregiously. But he never does; a standing portrait (122), and a sitting portrait (446), we consider the best and most unaffected in the gallery. Millais, we are glad to see, has very few portraits this year.

No. 391, Van Beers' "Sirène," is sure to attract the attention of photographers. This, it will be remembered, is the picture about which the Belgian Laws Courts have been so busy of late, in order to decide whether it is a coloured photograph, or a painting pure and simple. The picture is a very taking one. A wooden pier juts sharply out of smooth water, and down the steps comes the Syren, to take boat in a smart little craft manned by smarter sailors. The sky and water are white and clear to a degree, and the Syren, the sailors, the craft, and the landing stage, are vividly sharp against the background. It is this fine, hair-like detail, no doubt, that caused the critic to talk of photography. But whether the camera has aided or not, the painter shows his skill unmistakably.

The costume of the sweet-faced, olive-complexioned Syren is perfection. There is a contrast of angular lines with the most delicate of curves. The waist and arms, enveloped in supple jersey and long silken mittens, impart an exquisite softness and roundness to some portions of the figure, while the diaphanous lace and crushed tulle of the belle's skirt increase the effect still more. Van Beers is not only a consummate artist, but a very ingenious one into the bargain.

"It may be of interest," writes Mr. Whipple, the director of the Kew Observatory, "to know that a magnetic storm of unusual intensity raged about midnight of the 17th." This storm and its duration was observed by photography—for the magnetic needle wrote it down on sensitive paper—and naturally enough Mr. Whipple, on developing his other photographic records, looked to them to see if the abnormal phenomenon could be traced in any other direction. In Mr. Whipple's mind, the magnetic storm coincides with an irruption on the solar disc, for he adds that "a tremendous spot, which appeared on the sun's disc first on the 13th, is now rapidly approaching the meridian, and a group observed on Saturday a little in advance of it appears to have undergone considerable change." It is only since photography has been introduced into our observatories that these subtle comparisons and deductions have become feasible.

The late Sir Henry Cole, who died last week, was one of that small class of men who contrive to do good to the public and themselves at the same time. If Great Britain has benefited by the establishment of the South Kensington Museum—and we do not deny that it is a most important institution—Sir Henry Cole, when at its head, enjoyed rank, emoluments, and patronage without stint. He ruled pretty well as he pleased, and had a voice in most of the appointments. Sir Henry's death was very sudden; he was in his usual health until Monday, when he visited a photographic studio and sat for his portrait. On returning home he complained of feeling unwell, and gradually became worse. Disease of the heart was the cause of death.

Mr. Francis Galton, F.R.S., dating from 42, Rutland Gate, makes an appeal to amateur photographers to help him in adding to his collection of composite portraits. Mr. Galton's method of producing composite pictures—which, by the way, is summarised in the Year-Book, 1882—consists, as our readers know, in superposing, as correctly as possible, portraits of the same family, and making a composite negative. "What I need," says Mr. Galton, "are prints of the portraits of individual members of any family. They may be males or females, and of any ages, but they must not be fewer than of four different persons." Mr. Galton, on application to him, will say how these prints should be taken, and he hopes in return for them to send the photographer a composite portrait, upon which he earnestly entreats the opinions of friends of the family.

Our readers may remember that some time ago M. Forel made some experiments in the Lake of Geneva with a view of ascertaining how far down into the clear blue waters the action of light penetrated. He employed in his trials sensitised albumen paper which was sealed up in glass tubes, and he found that as far down as 40 metres, or 130 feet, there was light enough to impress the paper perceptibly. The subject has now been taken up by another Swiss *savan*, M. Asper, who has experimented in water quite as clear—the lake of Zurich—but who, by employing a more sensitive medium, has been able to secure more valuable results.

M. Asper used gelatino-bromide films in lieu of albumenised paper, and began his experiments where M. Forel left off. Gelatino-bromide plates were sunk to a depth of 40, 50, 60, 70, 80, and 90 metres, and permitted to remain immersed for twenty-four hours, a summer's day being chosen for the purpose, the 3rd August. All the plates were similarly developed with ferrous oxalate, so as to secure comparative results; but in every case, down to 90 metres—that is, at a depth of nearly 300 feet—there was ample light to affect the sensitive films. Unfortunately, all waters are not so clear as those of Lake Leman and the lake of Zurich, otherwise submarine photography would be surrounded by less difficulty.

TWELVE ELEMENTARY LESSONS IN DRY-PLATE PHOTOGRAPHY.

No. VIII.—Third Lesson in Development.

In our last lesson on development, we considered the ferrous oxalate developer only, this being, as we have said, the best for a beginner. There are some who prefer this developer to any other, even after long experience: but the vast majority of photographers find qualities in the so-called "alkaline pyrogallic" developer which seem to be wanting in the others. The most notable of these is the power to compensate for a certain error in exposure.

In considering the subject of exposure in a former lesson, we assumed that correct exposure is a fixed point, and that any deviation from it would give imperfect results. This is not the case, however, for there is a certain "latitude," which is due to two causes: first, a certain latitude of effect is permissible. Thus, if the plate be a little under-exposed, there will be somewhat less detail in the resulting picture than is visible to the eye, but this need not spoil the effect. Again, if the plate be somewhat over-exposed, the effect will be a slight fog or want of transparency in the shadows of the negative; but the only result of this will be that what is called a "slow printing negative" will be produced. The latitude in effect is not great, however. It may be said that if two seconds be the best exposure, anything between one and a-half and four seconds will give good results. We have, however, a second method of gaining latitude, and this is by means of the treatment with the developing solutions. Thus, simply by leaving the plate for a longer or shorter time in the developer, we can compensate to a certain extent for under or over-exposure. It is, however, by varying the proportions of the ingredients of the alkaline developer that we gain the greatest latitude. We must enumerate the chemicals used in this developer, and try to make clear what are the properties of each one of them.

The essentials are as follows: First, pyrogallic acid, or more properly, pyrogallol; second, liquid ammonia, or occasionally some other alkali; third, a soluble bromide, usually bromide of ammonium or of potassium. The pyro. is the true developer, and acts very energetically when rendered alkaline. The stronger the developer is in pyro., the denser will be the negative; but the effect of increasing the pyro. is to "restrain" development—that is, to make it take a longer time, and to prevent a certain amount of detail from appearing.

The ammonia is used to render the developer alkaline, and the greater the quantity in the solution, the more energetic the action. The effect of increasing the ammonia is to shorten greatly the time of development, to increase to a slight extent the amount of detail, and to increase the density. A point is reached, however, where the action is so energetic as to reduce or blacken even those parts of the plate which have not been acted on by light, and fog is the result. Some plates will stand much more ammonia than others.

The use of the bromide is to retard development—to make it slower, so that it may be more under control. Without it the development is very rapid, and unless the quantity of ammonia be very small, it is difficult to avoid fog. The result of increasing the bromide is to make the developer much slower, to keep back a little of the detail, and to increase ultimate density greatly.

A little consideration of what we have said will show that by varying the proportions of the constituents we have enumerated we have the power of greatly modifying the resulting negative, and have a power of compensating to a great extent for error in exposure. This is especially the case for over-exposure. It is true that in the case of under-exposure we can correct to a certain extent by using an increased quantity of ammonia; but the fog point is soon reached, and thus it is only to a small extent that we can correct in this direction. In the case of over-exposure, however, it is different. Either pyro. or bromide may be increased indefinitely. The latter is the best to increase, as it is the cheaper. By largely increasing the quantity of bromide the development is rendered slow as regards the appearance of detail, but less so as regards the increase of density. It is thus possible to stop the process in the case of an over-exposed plate before the shadows veil over, and yet to have a sufficiently dense negative.

We have said that it is right, in using any particular make of plates, to use the developer given in the "instructions;" but it is by no means necessary to mix the "stock solutions" exactly as directed. On analysing any of the sets of stock solutions given, it will be found that they consist essentially of the three chemicals mentioned before made up in solutions of certain strengths, and generally with some preservative in the case of the pyrogallic solution to prevent its turning brown by oxidation. In almost every case there is a most needless complication introduced which makes considerable calculation necessary to find what quantity of each chemical really is in an ounce of the final developer. There can be no simpler plan than to mix three solutions each containing ten per cent. of one of the three ingredients. The developer can then be made up in any proportion without trouble, and the developer given in any instructions can be used without the intervention of complicated formulæ.

We recommend that the solution be mixed in the following manner:—

Dissolve quarter of an ounce of citric acid in eight ounces of water. Add this to one ounce of pyro. Make the whole up to ten ounces, and label "Pyro solution."

Take one ounce of bromide of ammonia and make up with water to ten ounces. Label "Ten per cent. bromide solution." Take one ounce ammonia, strength ·80, or two ounces of the ammonia diluted with an equal amount of water as recommended before, and make up with water to ten ounces. Label "Ammonia 10 per cent. solution."

There is no developer which is suitable for all subjects. Those given in instructions can only be taken as typical. If the photographer expects to excel, he must vary his developer to suit his subject. Thus, when the contrasts are very strong—say in the case of an interior with white columns and deep shadows—he must reduce the amount of pyro, or he will have a negative giving a "chalky" print.

If the contrasts are naturally weak, as is sometimes the case in open landscape, he must increase the quantity of all the ingredients, but specially of the pyro and bromide. If he knows that he has under-exposed, he must increase the ammonia. If he knows that he has over-exposed, he must increase the bromide.

The following we have found to be a good developer for general purposes:—

Pyro	from 1 to 2 grains
Ammonia	3 minims
Bromide	... $1\frac{1}{2}$ grains

To each ounce of developer.

This is a more restrained developer than is usually recommended. We find, however, that the increase of the bromide beyond that commonly used does not necessitate an appreciable increase in exposure, whilst it gives a better quality of negative, and permits of a considerable latitude in exposure simply by allowing the plate to be a longer or shorter time in the developer.

We shall now tell how the best result can be got from a plate when there is uncertainty as to whether or not it has had the correct exposure.

A developer made as follows should be flowed over the plate:—

Pyro ...	1 to 2 grains according to subject
Ammonia	2 minims
Bromide	$1\frac{1}{2}$ minims

To each ounce of developer.

This is a very slow developer, and even if the plate be much over-exposed, the image will not appear for some time. A little experiment will enable the photographer to know whether the plate has been over-exposed, correctly exposed, or under-exposed by the length of time which elapses between the time of pouring on the developer and the appearance of the image. If the exposure appear to be correct, let one minim of ammonia be added to bring the strength up to that recommended. If it appear to be over-exposed, let development proceed, or even add more bromide. If the image be very long of appearing, showing that there has been under-exposure, ammonia may be added to any amount short of that which will produce fog.

Good plates should stand ten minims of ammonia with one and a-half grains of bromide. The greater the quantity of bromide, the larger the amount of ammonia that may be used; but the quantity of ammonia permissible is not proportionate to the bromide used. Doubling the quantity of bromide will not permit double the quantity of ammonia to be added.

With the ferrous oxalate developer, under-exposure and over-exposure may be corrected to a certain extent, but not so greatly as with the alkaline developer. The developer may be accelerated by the addition of any quantity up to ten minims of a 1 per cent. solution of hyposulphite of soda to each ounce of developer, or retarded by the increase of bromide.

It is commonly said that there is difficulty with gelatine plates in getting a sufficiently dense image. Such a difficulty results from ignorance of the principles of development. The secret of getting "plucky" negatives lies in using an alkaline developer strong in all the constituents, but specially so in bromide, and, if necessary, giving a slightly longer exposure than might otherwise be thought necessary. The real difficulty lies in judging when the density is sufficient.

PHOTOGRAPHY AND THE ECLIPSE.

BY CAPT. W. DE W. ABNEY, R.E., F.R.S.

First Article.

It may be interesting to the readers of the News to have an idea of what will be attempted by photography at the ensuing eclipse, and as all the necessary preparations were carried out in my laboratory, I am in a position to state generally what will be done.

Dr. Schuster will, I have every reason to believe, carry out the work as originally planned, with the aid of Mr. C. R. Woods. The first point to which attention will be paid, is the photograph of the corona itself. The corona, I may perhaps be allowed to explain for the benefit of unscientific readers, is the "glory" which surrounds the eclipsed disc, and which is only visible during the totality of the eclipse, or for a very short time before and after. In the various text-books on astronomy we have various forms of the corona shown, and when the corona as photographed is compared with the corona as sketched by the eye, there are often such remarkable differences as can scarcely be accounted for by want of power of observation of the sketcher. Photography in such matters cannot speak falsely. Whence, then, the discrepancy? Mr. Brothers' famous photographs of the corona have been succeeded by others, but all produced in the same manner, for if we except the eclipse visible in America the year before last, the process used for their production has been the old wet process. The results of the American eclipse have not as yet come to hand, but it is rumoured that gelatine did not behave with one distinguished American astronomer as it should have done. It is whispered that he kept his plates to develop subsequent to the eclipse, and that no image was obtained. Whether this be an accurate statement or not, I cannot vouch. If it is, then gelatine plates did not behave as we are accustomed for them to behave at home. The English eclipse expedition, however, on my recommendation, have mainly pinned their faith on gelatine for this work, though they take with them a complete equipment for wet plate and collodion emulsion work, should it at the last moment seem desirable that they should abandon the new process, though I don't think they will abandon it. The great drawback to the gelatine is the high temperature in the Upper Nile in May. From information received, it may be expected that the shade temperature will be between 100° to 110°, a heat which would be unbearable except in a very dry atmosphere, which, luckily, the contiguity of the desert ensures, there often being a difference between the wet and dry bulb thermometers of 15°. Again, a dry air means cool nights, and a cool night means sleep, and a consequent recuperation of vital energy. When in Egypt in 1874 for the Transit of Venus during October, the thermometer reached 96° to 100° during the day, and at night used to fall as low as 45° when the sky was clear; when cloudy, as was sometimes the case, the night temperature was occasionally as high as 75°. During May we may expect the sky to be cloudless, and it is probable that the night temperature may reach as low as 50°. Of course, if the air were moist, the moisture would prevent the radiation from the earth from proceeding at a rapid rate, and the day and night temperature would, as in some parts of India where I have been stationed, range probably between 96° and 100°. I have been thus precise as to the cooling of the air at night, as it necessarily has a bearing on the process to be used. It would manifestly be a hard task to develop a gelatine plate in a temperature of, say, 100°.

The temperature of the air, however, at night, it seems probable, will be such that a gelatine plate may be developed with the greatest safety. From daily observations made in 1874, it appears that the temperature of the Nile water will be somewhere about a mean between the day and the night temperature, possibly not more than 75°. Care has been taken to send out a freezing mixture which will reduce a large quantity of water 30° below this temperature, so that there will be no danger of the gelatine melting. We may, therefore, hope that gelatine plates may be used and developed on the spot, which is a desideratum.

Now as to the photographs of the corona. The photoheliograph employed consists of one of Dallmeyer's photographically corrected lenses of about 5 feet focus and a diameter of about 4½ inches. This will give an image of the eclipsed disc of a diameter of about half an inch. The plates to be used are quarter-plates, having a sensitiveness of about sixty times that of a wet plate as prepared with a new bath and Mawson's collodion when in its best state. A couple of seconds' exposure on such plates will thus be equal to two minutes' exposure on a wet plate. As the eclipse itself will only last about seventy-two seconds, it is manifest that by the the use of gelatine we are prolonging it to a wet-plate-photographic-equivalent of seventy-two minutes. Experience has shown that with the wet process every extension of exposure gave increased dimensions to the corona; but the size seen, as a rule, by the eye, was never absolutely reached, the brightness of the light rapidly decreasing as its distance from the sun increased. May we not hope, then, that by using these sensitive plates the same area as depicted by eye observations may be registered as photographs? It is expected that one exposure of thirty seconds will be given, besides some shorter ones. A plate sensitive to the dark rays below the red will also be exposed, for comparison with the plates which are not thus spectrally sensitive. In every photograph which I have inspected, the prominences which are seen beyond the eclipsed disc have encroached on the limb of the dark disc, presumably owing to halation. The plates used will have a thick backing of asphaltum, which it is hoped will eradicate—or, at all events, mitigate—this defeet. Thus, then, by photographic means, we may hope that the shape and dimensions of the corona may be recorded for comparison with the photographs and sketches of other and longer eclipses. The phenomena visible during eclipses seem to vary according as the sun is in an active or in a comparatively passive state, the state of activity being shown by the number and areas of sunspots. During the last American eclipse the sun was almost devoid of eruption, and the phenomena noted were few and unsatisfactory as compared with those of the eclipses of a few years earlier, when the sunspots were comparatively abundant. This year we are having frequent outbursts on the sun's disc, and, whilst I write, a spot of enormous size is visible, showing a state of great activity below the solar surface. Such being the state of the sun's disc, we may hope that the phenomena observed during eclipses when we had a maximum of sunspots, and which were absent in the eclipse which took place during a minimum, may again recur.

A NEW AUTOMATIC ADJUSTABLE EXPOSER.

BY G. L. ADDENBROOKE.*

In adding another to the many shutters already brought to your notice, my apology must be the importance of the subject, and the shortcomings of those already in use. While there are innumerable plans more or less ingenious for giving one exposure of indefinite length, and a few shutters attempting regulation to some extent, the matter does not seem generally to have been treated with comprehension; and therefore, before entering into detail, perhaps I may be permitted to say a few words on the need which at present exists for accurately regulating short exposures.

In the days of wet plates, exposures of 5, 10, 15 seconds to a minute, or more, with large stops, were the rule, and could easily be regulated by the seconds-hand of a watch. With the advent of gelatine emulsions, however, conditions were changed; few plates now manufactured are less than ten times, and many twenty or more times, as rapid as wet collodion.

These plates, admitting readily of exposures of a fraction of a second, brought quite a new range of subject within the reach of photographers, of which they were eager to avail themselves, and have led to the invention of innumerable appliances for opening and closing lenses rapidly, with the result of an indiscriminate shooting in all directions. Photographers are, however, now beginning to apply the same criterion to pictures of objects in motion as to others, and, consequently, there has arisen a want for a properly adjustable rapid shutter to meet varying conditions. In confirmation of these remarks, I pass round for inspection two photographs—one of the Khedive of Egypt's yacht passing up the Suez Canal at about seven miles per hour, taken with the third stop of a portable symmetrical; the second is a Sea View off Cape Bon, taken from the deck of a steamer going nine knots an hour, at six o'clock in the evening, with same lens, full aperture. Both were taken on Mr. Bennett's ordinary plates. I do not pass them round as good photographs, which they are not, but merely to confirm this statement, and to show that the plates were altogether ahead of my powers of exposure.

Again, for ordinary landscape work, even the slowest lenses have now to be stopped down as far as possible to obtain a regulatable exposure, and some of my friends apparently think little of two seconds with the smallest stop of a landscape lens. Now I think I may affirm that, supposing two seconds to be a fair average exposure, unaided humanity, acting directly, is unable of itself to make the minute additions or subtraction from this which varying light and the exigencies of occasion demand, and that we may so account for many of the over- and under-exposed gelatine plates of which most photographers must have some

* Read before the Photographic Society of Great Britain.

stock. And, while on this topic, I may say that generally I do not think that photographers take sufficiently into consideration the effect produced by small stops, or shutters opening from the centre, unless placed between the lenses. Since the advent of photography, one of the chief aims of opticians has been to devise lenses to give as equal illumination as possible; and this will be found in their catalogues advanced as one of the chief points in a good lens, as undoubtedly it is. But by using small stops we throw away this advantage; we greatly increase the proportionate difference between the amount of light which falls on the central marginal portions of the picture. There can be no doubt that there is in every lens a normal point at which the superior definition obtained by stopping down is counterbalanced by the increased difference in the amount of light falling on the centre and edges of the plate. To use a lens stopped to this point is to use it to the best advantage. In the symmetricals it is, I think, somewhere about the third stop. Now, to use smaller stops is not only to waste an important power, but it directly produces inartistic results; for if the centre of the picture is properly exposed, the outsides will be under-exposed, and therefore harder and in greater relief, which tends greatly to spoil the balance of the composition.

Lastly, for purposes of comparison and testing plates, the need of some appliance which will always give correctly the same or any other exposure that may be desired is obvious.

Having now glanced at some of the reasons which make it desirable that we should possess an easy means of obtaining, accurately, as short exposures as may be required, I will describe the method I have taken to accomplish this, and which I trust may meet with your favourable criticism and approval.

After much consideration of the various means available for the correct regulation of short intervals of time, there ultimately appeared to be two methods only which promised any chance of success—a clockwork train controlled by a balance wheel, and one controlled by a revolving fan. This deduction has since been fully confirmed by others. Now a movement controlled by a balance wheel would be so complicated and expensive to construct as to put it out of the question altogether. There remains, therefore, only the clock-work train governed by a revolving fan.

I had this theoretical fact in my mind, but could neither see nor devise a shutter to which it might be applied, and which at the same time seemed to fulfil other necessary conditions, until, at a Technical meeting last autumn, Captain Abney stated that tho shutter he found most successful was a drop-action with a long drop, and attached to the camera by a short bag, so as to avoid any chance of shake or vibration. He also added, that with this shutter, accelerated by elastic bands, he had been enabled to obtain exposures of $\frac{1}{70}$th of a second. I perceived at once the excellence of the suggestion; but before using it as a regulatable shutter there were two objections to surmount—the length and practical impossibility of arresting it halfway for purposes of regulation without soon straining the apparatus. The first was obviated by dividing it, so to speak, into two portions, and using two shutters, one to rise and one to fall, by which means the length was reduced to nearly a half, and the foreground obtained a slightly longer exposure than the sky, while effectiveness was in no way sacrificed. The second objection was also removed by the same means, as the opening and closing slides were separate, and could be made to act quite independently of each other.

To any one desiring a simple, compact, and very rapid shutter, correct in principle, but giving one length of exposure only, I can recommend this action.

Both slides are held, when set, by catches; and the opening slide, after traversing its course, releases the closing one automatically.

This is the form of shutter I prefer, and have adapted to my regulating apparatus, though I now see that several of the forms at present in vogue could be made to work with it.

Description.—It will be remembered that the two slides of the shutter are held in their places, when set, by two catches: these catches have each an arm projecting at right angles through the cover of the shutter. Now the problem is to withdraw these catches mechanically at any required interval of time. To do this, I fix a small brass case on the surface of the shutter, and projecting about half an inch; in the centre of this case is a long spring, with stopwork, to prevent its being turned more than once in winding, so as to secure as equal a pull as possible; geared to this spring is a train of two wheels and pinions rotating a small fan (which, first made too large, is snipped down until the apparatus revolves at the proper rate, or an adjustable fan may be used); on the opposite side of the spring-barrel to the fly there is another cog-wheel of rather less diameter than the spring, the arbor of which projects through the brass case; on this arbor, and about one-eighth of an inch above the surface of the case, a brass disc is fixed, which revolves at a steady and uniform rate when the fan is released.

To connect this disc with the catches of the shutter, on the underside of it is fixed a projecting pin, while a moveable arm with a spring carries another pin, which can be placed in any of a series of properly graduated holes round the edge of the disc. When the disc rotates, these two pins come in contact successively with two levers working on central pivots, the other ends of which are directly fastened to the two projecting arms of the catches, holding the shutters, when set, by light metal strips without the intervention of any other mechanism. Whenever, therefore, its pin moves one of these levers, the corresponding shutter is released.

No doubt some of you will be reminded by this description of a shutter lately brought out in France by M. P. Boça, and for which much honour is due to him, as it is a very material advance on anything at present in use. Nevertheless, in justice to myself, I cannot refrain from stating that my apparatus was wholly designed and in part finished before I read any description of this one; nor since have I seen any reason to modify my original plans, though I would gladly have done so if I could thereby have perfected my apparatus in any way. I cannot but think M. Boça's shutter is faulty in being attached to the camera, as such an apparatus can hardly work without some vibration, while it would be cumbersome fixed there, and can only be used with the lens whose flange is screwed to it. These objections, I think, I have avoided by making my apparatus separate from the camera—a method which also has the advantage that, given a shutter of sufficient size for the largest lens to be used, it is also instantly adaptable to any smaller one; and I may here mention that it is intended to make the exposer, as a standard size, sufficiently large for use with a 12 × 10 rapid symmetrical or rectilinear lens.

Again, in mechanical detail, I think M. Boça's clockwork is more complicated than mine, while he only releases by its means the closing shutter, which must vitiate the accuracy of the shorter exposures. I have improved on this by enabling the operator, if he desires to be very exact in the shorter exposures, to start the clockwork, say an eighth or a quarter of a second before it actually releases the shutters, and by which time it attains the proper rate of speed.

As at present made, the longest exposure obtainable is $2\frac{1}{2}$ seconds, and the shortest $\frac{1}{24}$ of a second. If, however, it were desired, the disc might easily be made to rotate in a minute, when all the exposures would be multiplied by twenty. Or, on the other hand, it might be made to move round in one-third of a second, when all the exposures would be divided by nine, and the shortest would be the 216th part of a second, provided the shutter could be made to act in so short a time, which there seems no difficulty in accomplishing, though I have not yet actually tried it.

The graduation of the disc is, of course, quite arbitrary. I will now describe my own proposal, but shall nevertheless be glad to receive suggestions. I have made the disc to revolve in three seconds, because I think longer exposures can be regulated by the watch or by counting with sufficient accuracy, using the clockwork in this case only to open and close the exposer, by stopping it after the first shutter has risen until it is time to end the exposure by letting the second shutter fall.

For a long time I was doubtful whether to graduate the disc decimally or not, but have come to the conclusion that the number twelve being so much more intimately connected with the measurement of time than the number ten, and also as it offered many more convenient fractions, that it was the better. I have therefore graduated as follows:—

The first $\frac{1}{2}$ second to 24ths, giving these convenient fractions besides four others—$\frac{1}{24}$, $\frac{1}{12}$, $\frac{1}{8}$, $\frac{1}{6}$, $\frac{1}{5}$, $\frac{1}{4}$, $\frac{1}{3}$, and $\frac{1}{2}$ of a second.

The second $\frac{1}{2}$ second to 12ths, giving amongst others the following—$\frac{2}{3}$, $\frac{3}{4}$, $\frac{5}{6}$, and one second.

The third $\frac{1}{2}$ second to 6ths.

The fourth $\frac{1}{2}$ second to 6ths.

The fifth $\frac{1}{2}$ second to 4ths.

That is to say, twenty-seven progressive exposures within $2\frac{1}{2}$ seconds.

In order to show at a glance the fraction each graduation represents without unnecessary engraving, I divide the disc by radii into $\frac{1}{2}$ second intervals. In the angle formed by the first two of these is placed the fraction $\frac{12}{24}$, $\frac{1}{24}$ being the interval between the graduations, and twelve being the number of them in the $\frac{1}{2}$-second space. This fraction is repeated below as $\frac{6}{12}$, the denominator representing the space between the graduations in

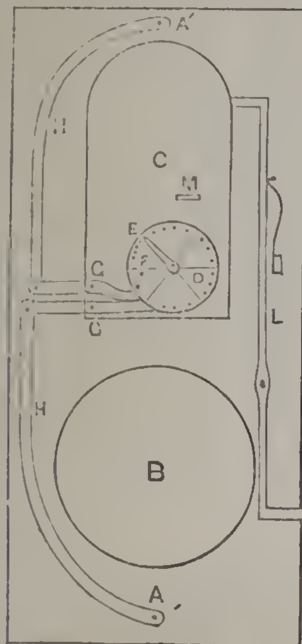


Fig. 1.

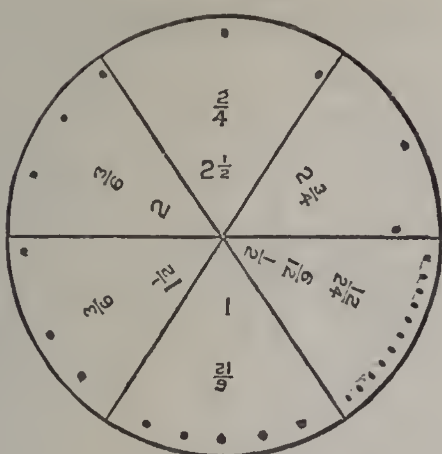


Fig. 2.

The first drawing gives a front view of the exposer, with the outer covering taken off, to show the action of the catches.

The second figure explains the graduation of the dial.

Figure 1. A A. Arms of the two catches holding the sliding shutters when set. B. Aperture. C. Clockwork case. D. Rotatory disc, with fixed projecting pin at E and movable arm, now placed at F. G, G'. Two levers coming in contact with projecting pins on revolving disc. H, H. Metal strips connecting levers with catches. L. Lever and spring which releases the clockwork when set. M. Nut for winding spring.

The dimensions are—Length, $8\frac{1}{2}$ in.; breadth, 4 in.; thickness, $\frac{1}{2}$ in; the clockwork projecting another $\frac{1}{2}$ in.; aperture, $2\frac{3}{4}$ in.

the second $\frac{1}{2}$ second, and the numerator representing the value of the first $\frac{1}{2}$ second in terms of the second $\frac{1}{2}$ second, so as to continue the fraction on, and so on round the disc. Though this may seem a little complicated at first, yet I think a few minutes' study of its principle will enable any one to place the movable arm in the graduation required at a glance. Having now completed my explanation, I trust you will be able to endorse my claim to having designed an automatic exposer which fairly meets the wants already detailed, enabling photographers to readily give any exposure they may deem proper, while at the same time the apparatus is compact, portable, contains no intricate workmanship, and is not likely to get out of order.

I have now only to thank you for your kind and patient attention to this somewhat long and involved paper; but though the apparatus, when once seen, is perfectly simple, it is not easy to accurately describe without going into some detail.

EASY METHOD OF PREPARING FERROUS CITRO-OXALATE DEVELOPER.

BY CAPTAIN ABNEY, R.E., F.R.S.*

I have been asked to give a more ready method of preparing the ferrous citro-oxalate developer than that previously described by me. The matter is very simple. The following formula may be used:—

No. 1.—Potassium citrate ...	... 700	grains
Potassium oxalate ...	... 200	"
Water	... $3\frac{1}{2}$	ounces
No. 2.—Ferrous sulphate ...	... 300	grains
Water	... $3\frac{1}{2}$	ounces

If these two solutions be mixed in equal volumes, we have a solution of ferrous citro-oxalate of strength equal to that I previously recommended. It can be mixed cold, and (of course) as required.

Correspondence.

INSTANTANEOUS SHUTTERS.

Sir,—I had intended to have written a letter further explaining my shutter on some points; but, as it is being brought out commercially, and the explanation might savour of a gratuitous advertisement, I will leave it to its merits alone, as set forth in my paper before the Photographic Society.

I should, however, like to say a few words on shutters fixed to and separate from the camera. I have not committed myself to either form. I adapted the regulating apparatus to a shutter separate from the camera, because I wished to make one as perfect in theory as possible. In the discussion which followed the reading of the paper, the only question which seemed to exercise the speakers was whether this method would be as successful in practice as it was right in theory.

Since then I have practically tested the shutter with some care, and was really myself surprised at the ease with which it could be used when attached by a flexible material to the lens. I found no difficulty in holding it, nor, after getting the thing once straight, was there any necessity to look at it again, and one's whole attention could be given to the view without fear of compromising results. It is also a great point that the shutter is instantly adaptable to different sizes of lenses.

On the other hand, I have also tried the shutter fixed to the camera—that is, to the front of the lens—and so far as my experiments yet show, there is no evidence in the negatives so taken of loss of sharpness from vibration. It must be remembered that the opening slide—the only thing that can cause shaking—though it rises with very considerable velocity, does not weigh more than half-an-ounce, and ends its course against a rubber pad.

Still, I must say I prefer it separate, and I think the prejudice against the use of a shutter in this manner can only be the result of an apparently reasonable but foregone conclusion. Though several speakers formulated this objection, I did not understand that anyone had tried the method and found it wanting, while the only gentleman who apparently had used it—Captain Abney—spoke most conclusively in its favour. It seems to be one of those things which look awkward and difficult until really tried, and then the objections vanish.

With regard to very short exposures, Mr. Muybridge's in

* *Journal and Transactions of the Photographic Society.*

particular, I have somewhat carefully gone into the question with a friend, and while I am by no means prepared to doubt the possibility of making an exposure as short as $\frac{1}{5000}$ of a second, yet it can easily be shown mathematicaly that Mr. Muybridge's results with a trotting horse could be obtained with an exposure of $\frac{1}{1500}$ of a second, a very different thing; even $\frac{1}{500}$ would be sufficient to produce an intelligible picture, though it would not be quite sharp.—I am, sir, G. L. Addenbrooke.

GELATINE NEGATIVES.

Sir,—I have met with an experience in the use of gelatine plates which I have not seen noticed, viz., that negatives produced upon them become in time less intense. For the last twelve months I have entirely discontinued the use of collodion, and have been much pleased with the many facilities and advantages the newer process possesses; but this has been much discounted upon finding that my earlier negatives have lost their printing power, and that, in fact, it is only with considerable care that passable prints can be produced from them, bearing but a poor comparison with the first prints from the same plates. The change does not take place very rapidly, and is not noticeable during the execution of the first order. Can you or any of your readers suggest a cause for this very undesirable experience? Had the plates been intensified in any way, I might have suspected their instability to have arisen from that cause, but these have been simply developed with alkaline pyrogallic, and, I may add, have been produced upon plates by one of the best makers.

I have naturally suspected the evil to arise either from insufficient washing, or from the varnish used upon them. With regard to the former, although I have not an unlimited supply of water, I have washed with great care, always leaving the plates to soak for several hours, giving them repeated changes, and finishing with a good rinse under the tap. As to the varnish, I have used a commercial sample prepared expressly for gelatine work, simply discarding, in carrying out the instructions for its use, the immersion of the plates in spirit, thinking that this was only advised to facilitate the flow of the varnish over the somewhat repellent gelatine film.—Yours truly,

Provincial.

DARK-ROOM DISEASE.

Sir,—In your "By-the-Bye" upon "Dark Room Disease" the writer says:—"Now pyrogallic acid, virulent poison as it is when taken internally, would not be prone to injure by contact." Let him try it. It is easily done. Rub, say, a quarter grain moistened with a drop of water into the skin of the soft part of the arm (his own, of course), three or four times in the course of a day or two; and if he continues this for two or three days on the same spot, he will find that it will afford him endless amusement, now and again, by way of rubbing it—he will not care to scratch, however he may long to do so. Of course this is an extreme case, as pyrogallic solution of this strength is not used in practice. I have done this, also with ammonium bromide, and a strong mixture of the developing constituents, to settle the point as to which was the enemy. The bromide had no effect; the pyrogallic appeared first, but the mixed developer—after its use was discontinued—overtook it and was quite as bad, in fact, it looked very ugly indeed. I applied linseed-meal poultice, which gave ease directly, and soon cured it, but the marks still show. The writer also appears to have forgotten, among other cases published, the one where the photographer, having one hand bad, used the other for lifting the plates, which in a day or two was likewise attacked.

I showed my arm at a Thursday meeting, and those who had suffered said it bore the same appearance as their marks—red ringworm-like patches, with external ridge, which subsequently formed into pustulous sores. Dr. Mahomet, of Guy's, saw it—though not in full bloom—and could not liken it exactly to anything he knew. I understand he would be glad to see a true case; should any of your readers be suffering, perhaps they will make an appointment with him.

It does not follow that because pyrogallic has never been accused before, that it did not deserve to be. We are ever pushing on—have much to learn in every way. It may be that the greater watchfulness required in developing a gelatine plate, the frequent lifting from the solution, the greater number of plates an operator or developer has to get through in a day, may aggravate the evil. All are not attacked; probably idiosyncracy has much to do with it. Mine did not spread in the least; I measured them carefully; nor did any other patches appear. May it not be that it is also necessary to take it (pyrogallic) internally? It was long thought that lead could work its well-known effects by absorption through the skin; it is now known that there must be either an abrasion, or it must find its way into the system through the stomach.

Some photographers, perhaps, do not wash before they take their meals—have to snatch them when and where they can. It would be interesting, too, to know if those attacked measured out their pyrogallic *d ry*. There would certainly then be more chance of inhaling some of the light crystals.—Yours truly, Alf. J. Brown.

[Pyrogallic acid has long been used as a hair dye, and we have not heard that it has ever done mischief to the skin of the head.—Ed. P.N.]

Proceedings of Societies.

Photographic Society of Great Britain.

The ninth technical meeting was held on Tuesday, March 28th, John Spiller, F.C.S., Vice-President, in the chair.

The Chairman read the questions proposed for discussion, the first being "On Protective Coverings for Gelatine Negatives."

Mr. W. Bedford, in introducing the subject of protective coatings for gelatine negatives, said that it had been found that gelatine films when varnished in the usual way, and even when treated with a thin preliminary coating of collodion previous to varnishing, after constant printing in contact with sensitive paper, are liable to become covered, sooner or later, with small specks of a non-actinic brown colour, which increased in size until the negative is ultimately ruined. He enumerated several gums and resins, amongst which were mastic, Canada balsam, india-rubber, and amber, which he had tried either as additions to or substitute for collodion applied previous to varnishing. In order to test the efficacy of these varnishes, two negatives, coated with the substances under trial, were placed face to face with a piece of blotting-paper moistened with a 20-grain solution of silver nitrate between them, and were so left for forty-eight hours. None of the substances submitted to this test seemed to have any advantage over plain collodion and seed-lac, and a plate was passed round to illustrate the effect of these experiments. The treatment he had found best, and now recommended, was to coat the negative with at least three times the usual quantity of a tough plain collodion, and having allowed it to set in a horizontal position (when thoroughly dry) to varnish with seed-lac. Negatives so treated would withstand the test he had mentioned, and would, he believed, be proof against any chemical action during the process of printing.

Mr. Maxwell Lyte said that whilst working in the Pyrenees he found the varnish of seed-lac, in the hot sun, stick to the paper: probably, however, the seed-lac was liable to be adulterated.

The Chairman said that for collodion there was nothing better than the old varnish of amber dissolved in chloroform. Had any of the members used this varnish for gelatine negatives?

Mr. Maxwell Lyte then described a method of making amber varnish, which he did not give as being new, but which consisted in dissolving the resinous part out of amber chips, such as can be had of the pipe-makers and other amber-workers, in chloroform, and then adding a volume of ether equal to that of the chloroform used. The amber breaks up into a sponge, from which the varnish may be expressed through a bit of muslin, and finally filtered. This varnish does not act on gelatine; and no solar heat will affect it. No other gum, in his opinion, could rival amber.

Mr. T. S. Davis said, one great matter was to get rid of all moisture. To facilitate this, it would be found desirable to place the plate in alcohol and water; and he found that the best white spirit varnish, when diluted with two volumes of alcohol, gave a very hard surface.

Mr. England thought the brown hard varnish was better, as shellac during bleaching became altered. Since he had used enamel collodion first and then varnished, none of his negatives had shown spots.

Mr. Mawdsley said his experience had not arisen from printing large numbers. He had used the ordinary solution of shellac; it was never tacky, and the colour was of no object.

Mr. Ayres had used orange shellac, coating the plate first with collodion half diluted with spirit.

Mr. F. Ince stated that, having used enamel collodion only, a negative came out in spots similar to that shown by Mr. Bedford. He then flowed some bichloride of mercury over the plate, which changed the colour of the spots, and the negative then printed well.

Mr. Maxwell Lyte suggested the washing of the plate with weak cyanide of potassium, with a crystal or two of iodine mixed with it.

Mr. Bolas said that spots of this character have not so great a tendency to spread in the collodion plate, as in the case of a gelatine film.

The Chairman remarked that amateurs seldom came across these difficulties. He had coated first with thick collodion, and then used white lac varnish, and he never found any penetration of the silver to the film.

Mr. T. S. Davis then introduced the question, "What would be the influence on the sensibility of gelatine plates of the addition of hydrochloric acid to the extent of five minims to the ounce?" He had prepared plates with hydrochloric in preference to nitric acid; it seemed to prevent the reduction of the silver in the film. Although five minims of hydrochloric acid, sp. gr. 1·160, may be added to an emulsion made with hard gelatine, a like quantity of "acidum hydrochloricum dilutum, sp. gr. 1·052," may be preferable with softer kinds. An addition of either strength, followed by the digestion of the emulsion at 140° for one hour, with subsequent washings, will yield films possessing about one-fourth the sensibility of "instantaneous" commercial dry plates, when developed with solutions of similar strengths. When, however, the emulsion has been prepared with the acid, a more powerful developer may be used, and the sensibility estimated as greater than the above mentioned; the silver nitrate being, in the first instance, added to the full molecular weight, in proportion to the bromide salt used.

Mr. Cowan exhibited two plates—one prepared with the formula he generally used—ammonia-nitrate and no heat; the other with addition of 5 minims of hydrochloric acid to 1 ounce of emulsion, digested at 100°. The first registered thirty-two times quicker than the other.

Mr. Davis had not found any difficulty in using the strong acid on hard gelatine, and even with some moderately softer kinds.

Captain Abney said a moderate proportion of acid, when introduced and boiled with an emulsion, would result in an orange-coloured emulsion.

Mr. Cowan stated that when the emulsion, which he had found to be thirty-two times slower, was mixed with the other one, no alteration in the rapidity was observed.

Mr. W. Bedford had tried Mr. Davis's formula with the strong acid. This emulsion, digested for three hours at 150°, gave 12 with the sensitometer, the ammonia plates giving 23.

Captain Abney said if the emulsion had been boiled three hours, better results would have been attained; and that when the acid was mixed with ammonia, it altered the quality of the gelatine. He reduced the hydrochloric to one-tenth of a drop per ounce, and boiled for three-quarters of an hour. This gave ruby emulsion, which was more rapid than the blue.

Mr. Bolas said that within certain wide limits it did not matter what acid was used.

Captain Abney replied that hydrobromic acid gave very slow plates; hydrochloric acid gave quick, and did not become slow by heat.

Mr. Davis stated that hydrobromic acid destroyed the image; in other words, it destroyed the effect of light.

Mr. England said that he had used half a drop of hydrochloric acid to each ounce of emulsion after washing; this prevented any tendency to green fog.

Mr. Ince inquired whether the introduction of hydrochloric acid or chloride in emulsion had assisted in the reproduction of colour; for instance, in photographing the spectrum.

Captain Abney said that the effect on the spectrum of chloride in emulsion was to lower the maximum of the red.

Mr. Golding then introduced the question, "To inquire the cause of scum-like markings on gelatine plates, which are visible before and after development?" He had not had much experience in making emulsions, but lately these marks appeared. He then showed two plates made from the same emulsion—one with, and the other without, the marks alluded to.

Captain Abney said that in the ammonia process scum was produced more so than with the boiling process; but he got rid of it by letting the emulsion set, and then cutting off the top.

Mr. Davis remarked that the plates exhibited seemed to have an excess of silver bromide in proportion to the gelatine.

Mr. Golding said that the proportions were 120 grs. to 5 oz. of emulsion, with very little alcohol: 1 dram to 5 ounces.

Various reasons were then advanced to account for these markings, but nothing definite was arrived it.

The Chairman said the next question to be discussed was "The hardening effect of time upon gelatine plates."

Captain Abney said that some time ago he had taken unsensitised carbon tissue to India, and left it there unopened for ten years; when it came back it was useless, totally insoluble.

Mr. Berkeley stated, with regard to gelatine plates, he had observed several years ago, that with plates after keeping twelve months or more, it was found necessary to use hot water to get the film off. He would be glad to know whether anyone present had observed a similar hardening of plain gelatine of the softer kind. In reference to protective coverings for gelatine negatives, he said that a good method for clearing solution of orange shellac was to shake it up with precipited chalk, afterwards allowing the latter to settle.

Mr. Bolas, as illustrating the subject, said, that some new plates frilled and would not yield to any cure; but such a plate being left for some time often became harder, and then did not frill at all.

The Chairman asked what effect would time have, when glycerine was mixed with the emulsion?

Captain Abney said that he had batches of plates made with glycerine which developed very well when fresh, but when kept in an alternate dry and damp atmosphere were useless.

Thursday Evenings for Photographers.

At the meeting held on the 20th inst. the chair was occupied by M. A. W. Hosmer.

Mr. Reimann showed a negative developed with the new formula, *i.e.*, common washing soda being used instead of ammonia; he found that with it the image took a much longer time to make its first appearance; but it then developed as quickly as with ammonia, and that it did not produce frilling or fog.

Mr. Brown had also experimented successfully with this developer; the formula he used was :—

Saturated solution of soda	½ ounce
Pyrogallic	1 grain
60-grain solution bromide	8 minims
Water	½ ounce

In his experience the image appeared very rapidly, and was much more dense than by any other development he had used; the film was of an olive colour; he found it caused frilling with some makes of plates; he had also experimented with caustic potash.

Mr. E. F. Goodwin exhibited an ingenious arrangement for drying paper in the dark room; it consisted of a number of wooden rods fastened to a bracket to a wall, and so arranged that when not in use they could be folded flat to the wall.

Mr. Brown passed round some negatives which had been intensified with mercury and ammonia, and had completely faded. He also produced a new shutter; it consisted of two pieces of ebonite with semi-circular openings crossing each other; they were so arranged that when pulled, by two pieces of cord attached to a hinged flap which was raised by the expansion of a small bladder by an ordinary pear-shaped ball, they opened from the centre of the lens, closing again directly the pressure was released.

Mr. Henderson showed an enamel print of a photograph of the moon taken by Grubb's great Melbourne telescope.

It was announced that there would be no meeting this week, in consequence of the Ball in aid of the P. B. A. Fund.

Talk in the Studio.

Muybridge's Photographs.—Messrs. Trübner have just issued a work entitled, "The Horse in Motion, as shown by Instantaneous Photography, with a Study in Animal Mechanics, founded on Anatomy and the Revelations of the Camera, in which is demonstrated the Theory of Quadrupedal Motion," by J. B. D. Stillman, A.M., M.D. The investigations were executed and published under the auspices of Mr. Leland Stanford, of Palo Alto Farm, California. He says, in the preface, "I have for a long time entertained the opinion that the accepted theory of the relative positions of the feet of horses in rapid motion was erroneous. I also believed that the camera could be utilized to demonstrate that fact, and, by instantaneous pictures, show the actual position of the limbs at each instant of the stride. Under this conviction I employed Mr. Muybridge, a very skilful photographer, to institute a series of experiments to that end. . . . When these experiments were made, it was not contemplated to publish the results; but the facts revealed seemed so important that I determined to have a careful analysis made of them. For this purpose it was necessary to review the whole subject of the locomotive machinery of the horse. I employed Dr. J. B. D. Stillman, whom I believed to be capable of the undertaking. The result has been that much instructive information on the mechanism of the horse has been revealed, which is believed to be new, and of sufficient importance to be preserved and published."

Drewton Tunnel.—Mr. W. Barry, of Hull, sends us a capital illustration of tunnel working, such as would create a sensation in any illustrated paper of the day, were it possible to publish widely an actual photograph. The photograph measures twelve inches, and shows us workmen with picks and boring instruments, steadily hewing their way through solid earth 220 feet below the surface. It is perhaps the best, because the most truthful, picture of work in a tunnel that has ever been presented to the public. The exposure, we are told, was ten seconds, the lighting up of the tunnel being effected by "Moule's Composition."

Mr. W. Cobb as a Poet.—Her Majesty the Queen has purchased a photographic copy (transparency) of Mr. Cobb's poem on the subject of the recent attempt on the Queen's life.

Lime Light Explosion at the Court Theatre.—On Friday evening last a sharp explosion took place at the Court Theatre, during the performance of the "Parvenu," and no little alarm was caused for an instant. Almost the whole of the audience, including the Prince of Wales, rose to their feet; but after Prince and people had mutually exhorted each other to "sit still," quiet was restored, and it was found that no mischief worth mentioning had been done.

Royal Institution.—The arrangements for the Friday evening meetings are as follows:—April 28: Prof. Abel, "Some Dangerous Properties of Dusts"; May 5: Prof. R. Grant, "The Proper Motions of the Stars"; May 12: A. G. Vernon Harcourt, "The Relative Value of Different Modes of Lighting;" May 19: Sir Frederick Bramwell; May 26: Sir Henry S. Maine, "Sacred Laws of the Hindus"; June 2: H. H. Statham, "The Intellectual Basis of Music"; June 9: Prof. Burdon Sanderson, "The Excitability of Plants."

Mr. J. D. Linton, Member of the Institute of Painters in Water-Colours, has received a commission from Her Majesty to paint a picture of yesterday's Royal Wedding.

Old London.—The present year's issue of the publications of the Society for Photographing Relics of Old London will contain six fine interior and exterior views of Ashburnham House, including the garden by the Westminster School and the old refectory of the Abbey. Besides these there will be views of that pleasant retirement—Little Dean's Yard, together with the Banqueting House, Whitehall, the old water-gate of York House, and three views of the fine old mansions on the west side of Lincoln's Inn Fields.

The Alexandra Palace Easter Monday Competition.—The Silver Medal was awarded to Mr. R. W. Whitehead, and the Bronze Medal to Mr. J. G. Horsey, but the Gold Medal has not been awarded. Mr. J. McWhirter, A.R.A., Mr. Arthur Lucas, and Mr. W. B. Bolton acted as Judges. Only six sets of pictures were sent in, and it is intended to organise another competition for Whit Monday.

Iridium and the Electric Light.—Mr. W. L. Dudley thus writes in the *Chemical News*:—"A short time ago, Mr. W. M. Thomas, of this city, called on Mr. Holland, requesting a piece of iridium to be used in connection with the arc light. Mr. Holland had a small piece prepared, which was substituted for the negative carbon of the lamp, the first experiment was tried for one-half hour, without any apparent effect on the metal. Since then more complete arrangements have been made, and the lamp containing the same piece of iridium has been in operation for over seventy hours without any appreciable loss of metal. The amount of electricity required to maintain it seems to be much less than for the ordinary lamp. The point of light is always in the same position, and, consequently, can be used in a reflector without the additional clock-work, which is employed to accomplish this result with the ordinary arc light. The light can be made very steady, since the lower carbon, which burns and crumbles away, is dispensed with. When the metal is used where it is subject to intense heat, the phosphorus is removed; but where hardness and non-corrosibility are required, the phosphorus does not offer any inconvenience."

To Correspondents.

All Communications connected with Advertisements and Business to be addressed to Messrs. Piper & Carter, "*Photographic News*" *Office, 5, Castle Street, Holborn, E.C. Advertisers are requested to make all Cheques payable to* Messrs. Piper & Carter, *and crossed* "*Union Bank, Photographic News Co. Account.*"

*** We cannot undertake to return rejected communications.

*** Newcastle-on-Tyne and Northern Counties Photographic Association.—We have to apologise to the members of the Newcastle Association for the non-appearance last week of any of their proceedings; the omission was due to no fault on our part, but to the circumstance that the account was not delivered at our office until Friday morning, several hours after the News was published.

E. E. W.—That is merely the opinion of the inventor; but we imagine a dealer or manufacturer would hardly take the same view. 2. No doubt a letter addressed to the place of meeting would reach the gentleman referred to.

J. Sanford.—The spots doubtless arise from splashings of hyposulphite solution, and if you exercise more care in manipulation, you will no longer be troubled.

Doctor.—After having placed it on a hard unyielding surface, rub the back with a smooth ivory paper knife.

E. E. P.—Energy, judgment, and ability are the principal factors in building up success, and it is probable that with these you will have a fair chance of success in a London suburb or in such a town as Brighton.

Hampshire.—It is a peculiarity possessed by some kinds of gelatine, and notably by certain qualities manufactured near Paris. A prolonged churning of the warm solution proves a partial remedy in some instances.

Nitrate.—You are wrong with respect to the action of light in this case, as organic or other reducing matter must be present.

Cambridge.—1. The parts in question of the spectrum of the electric arc are crowded with a large number of lines, many of which have been mapped. 2. If there is a moderate excess of free acid present, the precipitate will not be formed. 3. The apparatus in question is not manufactured at present, but second-hand ones can often be obtained.

Bichromate.—1. When absolutely dry, gelatine is extremely brittle, and flies to pieces at the slightest touch, like unannealed glass; but you may prevent your difficulty by adding a small proportion of glycerine. From one-thirtieth to one-fifteenth of its weight will suffice in ordinary cases. 2. Absolutely pure zinc is scarcely soluble in dilute sulphuric acid, but minute particles of carbon or of extraneous metals set up a galvanic action, and cause the commercial metal to dissolve readily, and the partial film of gold acts in a similar manner. 3. Quite a mistake, as the salt in question is insoluble in alcohol.

John T. Barnett.—The alcohol of the varnish is sufficiently strong to dissolve the collodion film, and it is probable that the addition of a small proportion of water to the varnish will prevent the mischief; if not, you should flood the negatives with weak gum-water, and dry them before varnishing.

THE PHOTOGRAPHIC NEWS.

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CONTENTS.

PHOTOGRAPHS IN VITRIFIED ENAMEL.

Last week we called attention to a manual of the magic lantern, issued by Dr. Liesegang, of Dusseldorf; and we have now to call the attention of our readers to an excellently-arranged and clearly-written hand-book which treats of the production of vitrified photographic pictures in enamel colours.*

The numerous methods which have been proposed for the production of the class of pictures under consideration are brought into review, and described in detail. From a practical point of view, however, the interest centres on two only, these being the dusting-on method, in which a film of deliquescent organic matter, charged with an alkaline bichromate, is used; and the substitution method, in which a silver image is so treated as to lead to the replacement of the silver by such metals as platinum, gold, or iridium. Of these two, the former is referred to as being of the most general applicability, as it will yield excellent results in ordinarily careful hands, while the substitution method, although capable of yielding results superior to the dusting method, requires so much care and experience as to keep the practical working of the process in very few hands. We therefore propose to abstract some details regarding the former method, and refer our readers to the book itself for particulars of the substitution process.

The six stages of the dusting method are as follows: 1. A glass plate is coated with the sensitive mixture of organic matter and bichromate. 2. The plate is, after drying, exposed under a positive. 3. After the shaded parts of the plate have absorbed sufficient moisture, it is dusted with a vitrifiable pigment in fine powder. The united action of the bichromate and light so modify the deliquescent organic matter that it loses its property of absorbing moisture from the air, and the exposed parts of the plate consequently refuse to hold the vitrifiable pigment. 4. The powder picture is coated with collodion, and then soaked in a slightly alkaline solution, in order to remove all traces of soluble materials. 5. The collodion film, bearing the image, is next floated off and laid on a tile or other suitable surface. 6. The image is vitrified or burned in.

The composition of the sensitive mixture may be varied considerably without any very material influence on the result, but the following composition gives very excellent results in ordinary cases:—

Water	100 parts
Moist sugar	10 "
Gum-arabic	10 "
Bichromate of ammonium... ...	4 "

This solution should be used within one or two days of its preparation, and ought to be filtered with the most scrupulous care, as any particle of dust or fibre is likely to cause a white spot on the finished work. The solution is poured on the glass plate after the manner of collodion, and after the plate has been held in a tolerably horizontal position for a few seconds, the excess of solution is quickly poured off, and the plate is set to dry on a kind of desk formed of a piece of sheet iron mounted at an angle of about 15° with the horizon, and kept warm by a spirit lamp placed underneath; but it is advisable to distribute the heat by means of a few layers of blotting-paper placed under the glass, and the heat should not rise above a temperature which the hand can easily bear. It is best to use patent plate glass, and the greatest care must be exercised in cleaning it thoroughly. It is necessary that the positive under which the exposure is made should be quite dry, or even slightly warm; and in ordinary cases an exposure of one minute in sunshine, or ten minutes in diffused daylight, will suffice; but an actinometer should be used as in carbon printing. As soon as the exposure is finished, the plate is taken into the dark room, placed on a white surface, and some of the enamel colour is sprinkled on and worked round and about with a long-haired camel's-hair pencil, both the powder and the brush being perfectly dry. The image now gradually develops, and it is often necessary to shake the powder from off the plate and allow the moisture of the air to act on the film for a short period, after which the treatment with the enamel pigment is resumed. Should the picture appear hard, only the extreme dark shades appearing, the exposure has been too long; but if the image is flat, and all the high-lights are veiled, under-exposure is indicated. Just as in ordinary silver printing, the image should appear a few shades over dark at this stage, as the enamel colours lose a little intensity when fired; but if there should be any difficulty experienced in attaining the required vigour, it is advisable to very gently breathe on the plate—previously freed from all loosely-adhering powder, and then to proceed with the development. When the development is finished, all non-adherent powder should be removed by means of the brush, and any required retouching can be performed either by breathing on the plate and cautiously applying the pigment on the part requiring it, or by removing the pigment by friction with a tuft of cotton wool or a stump. The plate is next coated with a collodion containing from $1\frac{1}{2}$ to 2 per cent. of pyroxyline and about $\frac{1}{3}$ per cent. of castor oil, and after the film has set, it is cleared away from the edges of the plate so as to leave a clear border of about $\frac{1}{8}$ of an inch. The collodionized plate is next soaked in a two per cent. solution of caustic potash until all traces of soluble chromium salts are removed from the film, and after a thorough rinsing in clean water, the plate is immersed in water containing enough nitric acid to make

* "Photographische Schmelzfarbenbilder auf Email Porzellan und Glas. Ed. Liesegang's Verlag. Dusseldorf, 1882.

it taste about as sour as weak vinegar, where it should remain for some hours. By now placing the glass bearing the film in a large vessel containing clean water, and gently manipulating the pellicle with the fingers, it becomes easy to detach the collodion film; which is then caught, collodion side downwards, on the enamel tablet or tile. Should it be necessary to vitrify the picture with the collodion side upwards, the final transfer must be made in a solution of sugar containing one-fifth of its weight of this material, as otherwise the collodion film would be liable to scale off. In this latter case, the collodion must be dissolved away before firing, but when the collodion film is mounted downwards on the enamel plate or tile, this proceeding is not necessary. The most convenient method of dissolving away the collodion film is by soaking the dried plate for a whole day in the following mixture:—

Alcohol	50	volumes
Ether	50	,,
Oil of lavender	100	,,
Oil of turpentine	3	,,

The plate having been again retouched, if necessary, all is ready for the final operation or the burning-in of the image.

For this purpose, some kind of a muffle furnace is required, and, in many cases, the portable muffle furnaces for coke, such as we figure in the subjoined diagram (fig. 1)

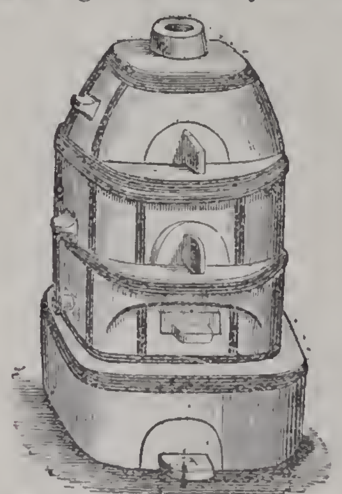


Fig. 1.

will be found convenient. These furnaces can be obtained without difficulty in London, most dealers in jewellers' materials keeping them in stock. It will often happen,

Fig. 2.

however, that the photographic enameller will prefer to avail himself of the superior advantages and convenience of gas as a fuel for heating the muffle, and, in this case the excellent furnaces manufactured by Mr. Fletcher, of Warrington, may be adopted. We subjoin drawings of two forms which we have in use at our own laboratory; the small one (fig. 2) taking a plate about two inches wide, and is well adapted for experimental work; while the larger furnace (fig. 3) will enable us to vitrify a tile

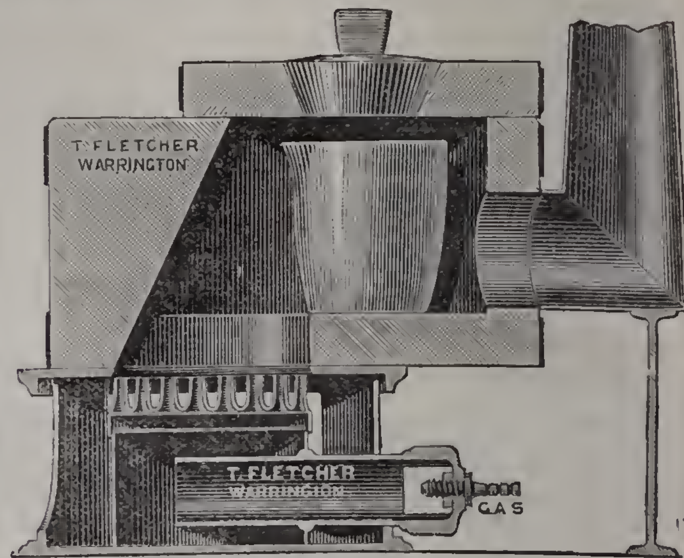


Fig 3.

four-and-a-half inches in width and nearly twice as long. The plates should be heated slowly, and occasionally turned round, so as to ensure equal action of the heat, and it is easy, after a little experience, to perceive the exact point when the enamel melts and unites with the surface of the tile. Although most will prefer to purchase the enamel colour already made, we subjoin a formula for the preparation of a black pigment:—

Oxide of copper	2	parts
Oxide of cobalt	1½	,,
Oxide of manganese...	2	,,
Flint-glass	12	,,

When fairly melted, add—

Oxide of copper	1½	parts
Oxide of manganese	1	part

The melted mixture must be poured into water, and then finely pulverised.

Numerous details and expedients necessary for overcoming difficulties will be learned by a perusal of Dr. Liesegang's excellent manual.

TWO MORE VISITS TO THE ELECTRICAL EXHIBITION.

(FROM OUR SPECIAL CORRESPONDENT.)

Hearing that since my last visit to the Palace* very considerable changes have been effected and notable additions have been made, it appeared to me desirable to make a second journey in search of information. An official programme bearing the date of this visit being obtained, the old announcement, "No extra charge to the exhibition," was found to be prominently printed on the first page. During the long walk through the covered way leading from the station to the Palace, I was gratified by seeing a very respectable installation of plant for producing lights by the Jablochkoff system and by the aid of the Brush machines. On entering the Palace, as nothing of electrical interest appeared to be close at hand, I concluded to go and examine Mr. Woodbury's exhibit illustrative of his method of balloon photography, but, long before reaching it, was stopped by a temporary barrier constructed of

* Photographic News, p. 16.

chairs, the one narrow opening being guarded by a servant of the Company, who held up his arm and said, "Oh, no; you ain't going in here without a concert ticket." A few words of explanation followed, and I found that, at certain times, all those parts of the Gallery which are even within remote earshot of the outside of the Concert Room are closed to all who do not pay the extra charge demanded. During the few seconds which were occupied in obtaining the information given above, no less than twenty-one persons applied at the barrier for admission, and six out of this number had, like myself, come with the view of examining special exhibits. It was, however, gratifying to note that no one out of these persons paid the extra charge, and one irascible old gentleman denounced the whole affair in by no means measured terms, expressing his determination to go at once, and never to visit the Palace again.

As the Gallery near the Concert Room appeared to contain a very large proportion of those exhibits calculated to be of special interest to the photographic fraternity, and it was impossible to view these without encouraging a most undesirable system of extra payment, I determined to reserve this portion of the exhibition for another visit.

In the West Corridor is a half horse-power Otto gas engine driving a small Siemen's dynamo machine, and a current of sufficient energy to keep no less than ten of the full-sized Swan lamps is developed. The arrangement is compact, and appears well suited to the requirements of the photographer, whether for portrait work or for copying. A tolerably heavy iron disc is mounted on the spindle of the dynamo machine, this serving to give that extreme equality of current which is so desirable when an incandescent lamp is worked.

A good show of electric lighting appliances is made by the Brush Company, a large dynamo-machine, for producing a single light of 150,000 candles, forming a prominent object, while several smaller machines as adapted for small arc lights, incandescent lamps, and electrotyping, are shown in action. A compact arrangement consisting of a portable engine on wheels, with a Siemen's machine bolted down on the same bed-plate, is shown by the Electric Light Engineering Company, of Queen Victoria Street, and such a combined engine and machine might in many cases serve well as a portable lighting arrangement for photographic work away from home, as there are few situations in which no standing place can be made available for working the machine within a sufficiently near distance. In the basement of the buildings no less than twelve of Edison's dynamo machines are in action, and in the machine department of the west corridor we noticed another Edison machine, which was being used for charging the modification of Planté's secondary battery which is being introduced into the market by the Faure Company. The Edison machine has very long and comparatively slender field magnets arranged so as not to give consequent poles, and an armature, which is somewhat between that of Siemens and that of Gramme as regards construction and proportion. The west corridor machine department also contains a considerable variety of dynamo machines and motor engines. Among the most promising of the more recently introduced dynamos may be mentioned the Bürgin and the Schuckert, while Elmore's present machine appears to be particularly well adapted for effecting the electrotypic deposition of metals. In very many cases steam engines are made use of as motors, several of the portable and semi-portable forms in which engine and boiler are mounted on wheels being admirably designed so as to ensure portability and efficiency, while direct action steam engines of the Brotherhood type are used in only a few cases. Hodson's rotary engine, driving a Gramme machine direct at a speed of 1,500 revolutions per minute, appeared to work satisfactorily, and was the subject of many comments from well known engineers. To stand continual working at such a speed is certainly a severe test of excellence of material and workmanship.

My subsequent visit was made in order to inspect those parts of the Electrical Exhibition which could not be seen on the former occasion without extra payment, and many objects of notable interest were found to be on view. Mr. Woodbury's electric camera is mounted over a table on the top of which an ordnance survey map of the district around the Palace is fastened; and on the table top is a model of the balloon transport car, carefully fitted up according to the designs recently elaborated by Mr. Woodbury. The actual camera with which Mr. Woodbury proposes shortly to actually carry his ideas into practice is of very considerable interest, and the modes of bringing the four plates successively into position, and making the exposure by the electric impulse, are extremely ingenious. Near to the model apparatus is a small framed picture, representing the apparatus as it might be in actual use for surveying purposes. Nearly opposite Mr. Woodbury's exhibit there are large coloured diagrams illustrative of Shippey's electric light balloon signalling system, which may prove of great practical value in military operations, as by arranging a cypher code on the principle of the Morse alhpabet, a correspondence could well be carried on at night between distant stations, even if no ordinary telegraphic communication existed.

Close by may be found the modified and self-charging Holtz electro-static induction machine as improved by Dr. Voss; this apparatus may be regarded as a continuously acting electrophorus; and as there is practically no friction to overcome, a considerable proportion of the small amount of force required to actuate it is transformed directly into electricity of an enormously high potential. These machines are not so susceptible to the influence of a trace of moisture as is the case with the old form of the Holtz machine, and on turning the handle of one as it stood, sparks of over four inches in length were almost immediately obtained. We see here a large stand of cabinet work for telegraphic instruments, and it is curious to observe how this, like photographic cabinet work, has become a distinct branch of trade. An enormous business has sprung up in telegraphic papers to suit recording instruments, such as Morse and printing telegraphs; and in this branch of manufacture the same kind of care is necessary as in preparing photographic papers. To study the numerous kinds of telegraphic paper shown by Max Sabel and Co. cannot fail to interest the readers of the Photographic News.

Close by the pyramid of telegraphic papers is an exhibit of low resistance galvanised iron telegraph wire, and as this is sold at a remarkably low price, it can often be used with advantage in connecting bells or telephones in houses, and in many cases may serve as battery conducting wires instead of copper, especially when the wires are fixed so that no inconvenience is occasioned by the extra thickness. Mr. Henry Wiggins, of Birmingham, shows a remarkable collection, illustrating the uses of nickel and cobalt, cast and rolled plates of the former over two feet square being exhibited. Nickel plating is far preferable to lacquering for lens mounts and most metal articles used by the photographer, while, when carried out on a moderately large scale, it is no more expensive than careful lacquering. Ebonite articles, as manufactured for electrical purposes, are shown by the Britannia Rubber and Kamptulicon Co., together with sheets ranging from the thickness of paper to one inch, and rod or tube of all ordinary sizes. No material is equal to ebonite for dark-slides or cameras, and it seems strange that no maker of cameras should have taken up the matter, and fairly put such articles in the market. Ebonite syringes, vessels, and other articles likely to be of service to the emulsion-maker, are also shown. A large collection of stoneware and porous vessels is exhibited by Messrs. Stiff and Sons, of Lambeth, and some large flat porous vessels, suited for the single-cell electrotype method, as recommended by Major Waterhouse, were noticeable.

Those readers of the Photographic News who did not visit the Electrical Exhibition in Paris would do well to see the show at the Crystal Palace before it closes; but, before finally fixing a time for the visit, it would be well to write to the Secretary of the Palace Company, to ascertain if, at the time proposed, there will be any extra charge for visiting the Gallery near the outside of the Concert Room, where objects of special interest to them are collected. Widely different accounts were given me by the servants of the Company as to the times at which the extra charge is demanded; but it is only fair to say that most of these persons appeared to be heartily ashamed of such a system of extra charges.

By-the-Bye.

ABOUT THE ROYAL ACADEMY.

We do not profess in these columns to pass criticism upon the annual gathering of new pictures and works of art exhibited at the Royal Academy; to do so, even cursorily, would require more space than we have at our disposal, while the circumstance that so many journals occupy themselves with the task, renders the same by us quite superfluous. As many as seventeen hundred pictures and statues are before the critic when he enters upon his labours, and, did he do his work well and conscientiously, the period for which the gathering remains open to the public would be none too long for his responsible duty.

Our task, fortunately, is a more manageable one. It is to examine the pictures from a photographic point of view, and to make note of such points as may interest our readers. The photographer, as a photographer, may learn in two ways from these annual gatherings—viz., what to adopt, and what to avoid; and we are not sure that the bad pictures he sees do not teach the more salutary lesson. There is always some very big and very bad picture to strike the visitor and set him wondering what could have possessed the hanging committee to receive it, and this year we should award the palm either to Mr. May, for "The Children's Hour" (231), or to Mr. Wells, R.A., for "Friends at Yewden (261). In the first of these ambitious pictures it is the figures that offend; in the second the landscape. "The Children's Hour" shows us a large lady on a large couch, engaged intently in looking at nothing, a child sitting beside her, also with a vacant eye, and a second girl crouching down near the sofa, endowed likewise with a staring, uncomfortable look. The effect is not even sad or lugubrious, it is simply meaningless; yet, if we remember Longfellow's lines aright, he speaks of bonnie girls, full of spirits, making "a sudden raid" upon him.

> "They climb up into my turret,
> O'er the arms and back of my chair.
> If I try to escape, they surround me;
> They seem to be everywhere.
>
> They almost devour me with kisses,
> Their arms about me entwine,
> Till I think of the Bishop of Bingen,
> In his Mouse Tower on the Rhine."

The Royal Academician's picture, which includes portraits of George Leslie, Calderon, and altogether half-a-dozen of the Academy magnates, is probably the worst landscape in the exhibition. The river and foliage is of the true "tea-tray" order, the verdure of a livid pea-green, contrasted with brick dust red, and covered over all with vulgar glaze. Let any photographer paint over one of his camera pictures in this greengrocer's style, and he would be denounced as a dauber of sign-boards.

Among the portraits, there is, as usual, much stiff and inelegant posing to be witnessed. The old conventional pose of a man busily writing, and suddenly startled in his work to find his portrait being painted, we meet in a picture by Mr. Lorimer (262), and elsewhere. Dr. W. Siemens (283), the well-known physicist and electrician, is shown with a pair of compasses in his hand, for some reason; it is a faithful portrait enough by Mr. Lehmann, for it shows Dr. Siemens' set smile, always the most unpleasant part of the doctor's presence, as any one who had seen him twice would know. Mr. Wollen, in a portrait of Mr. Eve (7), and Miss Brooks in one of Mrs. Sedgwick (14), show us again how pictures should not be painted; we should not wonder if these had been taken from bad photographs, they are so stiff and constrained. Mr. Alma Tadema (181) paints a face full of force and vigour, but the pose is best described as being "all of a heap." Another piece of portrait work that leaves much to be desired is Mr. Wells' painting of the Mayor of Newcastle (213), in which we have that dignitary not only sitting on his throne in solitary state, but apparently "left sitting," as the parliamentary reporter has it. The Mayor and his robes occupy the spacious chair in the centre, while right and left are more seats, which, for want of occupants, serve to rest mace and sword upon. Not only the Mayor, but a large portion of the empty Guildhall, is shown, giving the idea that the painter was paid by the square feet he covered.

Turning to the more pleasant features of the Exhibition, we may point to Mr. Norman's portrait (122) by Ouless, and that of Mr. Ralli (446) by the same painter. The first is a standing portrait, the latter sitting, and, in both, a chair-back is the only accessory, the portraits being little more than half-length. In the standing portrait it is a high-backed chair, and the model leans sideways against it, the chair giving a support under the arm-pit, the elbow dropped, and the hand resting on the top of the chair; the other arm is shown at full-length. The pose is simplicity and unaffectedness itself; nor is the other inferior. Here one arm is also thrown over the back of the chair, while the hand grasps the top, the other hand holding a book, which, for the moment, is lowered. "For Papa's Birthday" (64), by M. Munkacsy, we have a lady and children grouped in a manner very different to the "Children's Hour." The lady stands at a table, picking up blossoms and arranging them in a vase, as a surprise for papa, and two little girls, who have evidently been doing some of the picking, are looking on intently at mamma's important work. A third child—a mere baby—is on the floor, plucking a stray blossom to pieces. This is a charming group, and such a one as photographers might attempt with good chance of success. "Marriage Bells (221), by Mr. Hallyar, a group of men of all ages, from the village youth to the shrunken "oldest inhabitant," pulling away at ropes that move the sonorous bells overhead, is another study to be noted. Close to it is a lady's portrait (218), by Frith, which embodies a most easy and graceful pose; the lady stands sideways, her head turned towards the spectator, and her hands dropped at full length one over the other. Another delightful female pose is Mr G. Smith's "Gage d'Amour (424), a lady bending over a table, and examining a bracelet she has taken in her hand, her other toying with the necklet on her bosom. "Sally in our Alley" (316), by Miss Bowkett, is also worth studying. Sally stands on the doorstep, leaning negligently against the threshold; her trim feet peep from beneath her gown, one rounded arm is akimbo, and her expression leads one to think she is awaiting her swain. England is the country for quaint doorways and rustic porches, and photographers may here study how to make use of them to produce a camera picture.

"The Day of Rest" (469), by Lance Calkin, is another subject capable of photographic treatment. Upon a bench on the public highway is seated, at one end, an old lady in a state of somnolescence, having with her a little girl, who stands beside her, and is not only wide awake, but half terrified at the appearance of the occupant of the other end of the bench, who is a rough and morose navvy, but who, notwithstanding his ill-look, is perfectly harmless, since he, too, is fast asleep. "Nearly Bedtime" (481), by Miss Jenkins, reminds one of Mr. H. P. Robinson's Little Sunshine, except that in this case the light flooding the little girl's face and figure is due to a lamp, and not the sun. A little miss sits up in an arm-chair in the dining room, before a table upon which stands a shaded lamp; twilight still lights up the room partially, but illumination from under the lamp shade throws the little face and dress into strong light. "A Tempting Offer" (164), by Mr. J. Clark, is a cottage scene; a woman is sewing, and a little girl stands at her knee, while at a short distance in the doorway stands an old orange-man with straw hat and flowing white beard. He holds out an orange to the lassie, but she is too shy to advance towards it. It is altogether a quiet and successful composition. But the best *genre* picture to our mind is "The Letter-writer" (294), by Mr. Burgess, A.R.A., a bevy of olive-complexioned Spanish girls gathered round the table of a public letter writer, who is following the dictation of one of the maidens. It is a love-letter, of course, that is being penned, and while one girl earnestly advises one course, another, who has evidently suggested some levity, lays her merry face upon the table, and is fairly dying with laughter. A third, more matronly than the rest, quietly watches how matters are going, while a young man, a spectator of the scene at some distance, shows such annoyance at the behaviour of the laughing girl, that one cannot look into his face without laughing too.

There are many charming landscapes this year, Mr. Vicat Cole, R.A., showing one of the best; it is called, "Sylvan Solitude" (92). A placid river is the main feature, the foreground on the right being made up of yellow rushes, while to the left, across the limpid water, is a bushy willow, past which the river flows into the distance. There is very little colour, strange to say, in the picture, scarcely more than there would be in a photograph; yet the effect is delightful. Mr. Vicat Cole is well known as a skilled photographer, and we have little doubt that the picture is both true to art and true to nature. Another picture deserves yet more attention; we mean, "Sweetness and Light" (384), by Mr. F. B. Barwell. This, too, is a sylvan scene, a broad stretch of placid water in the foreground, and beyond, magnificent foliage towering to the sky. A boat and pollard willow break up the foreground, and in the middle distance is again a wealth of clustering foliage. But the point of the picture is that it is filled with soft haze; from the very front to the back it is clouded with blue vapour, and relief is given by slanting rays of golden sunlight—still subdued, be it understood—that struggle here and there through the boughs of the giant trees in the background. The picture is altogether of a low tone and without contrast, but the rays of sunlight seen through the veil of mist exert a most soft and sweet effect upon the sylvan scenery.

Autumn (250), by Mr. J. E. Grace, is another good picture, in composition not unlike some of the bits of nature that Mr. H. B. Berkeley has lately made us familiar with on a small scale. A group of three silver birch stems rise up beside a swamp, and these, together with some ragged tufts of rushes, constitute the foreground; water and picturesque marsh land occupy the middle distance, and beyond are clumps of trees and a range of blue hills. "When Evening's Twilight" (723) is also a delightful landscape that will well repay study. Mr. E. A. Waterlow's "Sheep-Washing" (738) should remind photographers of a picturesque scene within their powers, and the same may be said of "A Shady Lane" (785), by Miss M. Hickson, one of those deeply hollowed ways in red clay, with gnarled roots of beech on either side, and above the beechen leaves of bronze and gold, so dense that the sun's rays which dapple the ground at intervals have hard work to penetrate.

It is not a matter of much importance, but it is well, perhaps, to note how a little snobbishness sometimes mars a very good picture. In Mr. Horsley's "There is no God but God" (522), we have the deck of an Indian mail steamer, the time being sunset, and the "true believers," kneeling on mats spread upon deck, are engaged in devotion. Around them are various nationalities. The Levantine stares with indifference, two Turks are examining jewelry and estimating its value, a Frenchman is asleep and evidently snoring, but an Englishman who is by, stands bareheaded and with reverent demeanour. It is like the story of the three schoolboys who received cakes, one greedily eating it all himself, the second avariciously hoarding it up, and the third dividing it generously among his fellows. Which of these three boys do you like best? was wont to be the teacher's tag to the story; and Mr. Horsley's picture would ask us, of all men on earth, whose character is the most amiable and charitable? Well might the poet sing in H.M.S. *Pinafore*—

> For he himself has said it,
> And 'tis greatly to his credit,
> That he is an Englishman.

The "At Home" next week will be "Mr. J. E. Mayall's Electric Studio in Bond Street"; the following "By-the-Bye" will be "Paris and the Salon."

PHOTOGRAPHY IN AND OUT OF THE STUDIO.

Photography and Protoplasm—Photographic Popularity—Photography and the Royal College of Surgeons—Nervous Photographers.

Photography and Protoplasm.—It is curious to note how photography is constantly being brought in to elucidate scientific questions, and how unexpectedly it frequently throws light upon points at issue. A curious example of this occurred at the last meeting of the Royal Microscopical Society, when a member read a note received from Dr. Loew on the chemical difference between living and dead protoplasm, and exhibited a photograph illustrating Loew and Bokormy's statement as to the different reaction of dead and living protoplasm on silver salts. Messrs. Loew and Bokormy's theory appears to be that while living protoplasm reduces a silver reagent and becomes a blackened mass, dead protoplasm does not. If this theory could be substantiated by experiments, undoubtedly an important fact would be established; but the discussion showed that this was by no means the case, the photographic experience of some of the members furnishing the most powerful argument against its truth. The photograph exhibited represenced two filaments of *spirogyra nitida.* One of these had been subjected in a living condition to the silver reagent, with the effect that all the cell contents had been converted into a black opaque mass. The other filament had been killed by a 1 per cent. solution of citric acid before treatment with the silver solution, and in this case no reduction and consequent blackening was exhibited, the spiral arrangement of the chlorophyl bands being perfectly distinct. Now as the statement stands it would seem fairly conclusive; but, as several members pointed out, the use of citric acid would have an important influence on the result unless it were made clear that the acid had been perfectly eliminated, which had not been done. Every photographer knows that citric acid is one of the most energetic restraining agents which can be used, and unless Messrs. Loew and Bokormy can produce the same effect without the use of an acid of any kind, considerable doubt must be thrown on their theory. But without the experience gained in photography it is questionable whether this point would have been demonstrated.

Photographic Popularity.—Human nature, whether in England or on the Continent, is pretty much about the same. Some time ago we gave a few statistics showing the comparative popularity of notable persons by means of the number of photographs sold. These figures showed that in London and Paris the demand for any particular photograph was by no means in accordance with the merits of the person photographed. A Berlin philosopher has lately been engaged in a similar task, and the result of his labours is not more satisfactory. For instance, the picture of a female acrobat obtained last year 2,000 more purchasers than the latest photograph of Field-Marshal Moltke; Pauline Lucca and Patti have been eclipsed by Lurline, "the water queen;" while the greatest benefactor to photographic publishers who has ever appeared in Europe turns out to be the Shah of Persia, no less than 17,000 copies of his portrait having been sold during his stay in Berlin. Perhaps her Majesty will be gratified in knowing that, since the attempt upon her life at Windsor, her photograph "has become a leading article in the trade" in Berlin.

Photography and the Royal College of Surgeons.—In a recent visit we paid to the Royal College of Surgeons we were struck by the limited use which is made of the astonishing collection, compared with what might be done with it if photography were employed. Of course certain subjects, such as injected preparations, could scarcely be studied through the medium of photographs; but there are hosts of other specimens which could be as well seen in a photograph as in the glass case through which the student has to strain his eyes, and compare with his text-book as best he may. The specimens of bad surgery, for instance, in which the bone has been joined together unevenly, might well be photographed, and the photographs would give about as much information as the specimens themselves. Why should not Sir Erasmus Wilson's invaluable drawings of the various skin diseases be reproduced, instead of being kept shut up, to be looked at, perhaps, a dozen times in the year? It is more than likely that members of the medical profession only visit the Royal College of Surgeons when they are students, and are in process of "cramming." Once established in a practice, they think no more of the valuable hints to be gathered from the museum, and perhaps, if they did, could not avail themselves of its assistance. But a collection of photographs would be always at hand, and would be more accurate than many of the elaborate drawings which illustrate standard works on anatomy. Yet photography is not made use of in any possible way at Lincoln's Inn Fields. Is not the College somewhat behind the times?

Nervous Photographers.—There is more truth in Mr. Brownrigg's objection to Mr. Addenbrooke's ingenious "automatic adjustable exposer" exhibited at the last meeting of the Photographic Society, than some photographers would be willing to admit. Said Mr. Brownrigg: "There is always excitement when you come to the critical point," and this is so true that to have the thoughts fixed upon anything but the instantaneous picture you intend to secure must militate against success. In taking a street scene, or in photographing animals, there is always one moment which is the best for the picture, and the fear lest you should expose too soon or too late is always present in the mind until the shot is fired, and you know you have got your negative for better or for worse. Captain Abney observed that "we are not all such nervous subjects as Mr. Brownrigg," and this may be true, though it is highly probable that in the question of nerves there are more photographers like Mr. Brownrigg than are like Capt Abney. Nine photographers out of ten have the reverse of phlegmatic temperaments. Enthusiasm and concentration belong essentially to the nervous (in the physiological sense of the word) man, and without these two qualities the photographer would not endure the ills which attend the practice of the art either as a professional or as an amateur. In taking instantaneous pictures the photographer must be a philosopher, indeed, who is not anxious about the result, and therefore the less he has to worry him while waiting for the instant to expose, the better. Hence, in spite of the risk of vibration, preference, we fancy, will always be given to a shutter attached to the camera to be opened by means of the pneumatic tube. By the way, it was remarked at the meeting, of Mr. England's apparatus, that it was not everyone who had the advantage of possessing a camera and stand like his. Some curiosity has been expressed since as to what this stand is like, and what produces its extreme rigidity. Mr. England some time ago exhibited his camera and the shutter he uses, at one of the Society's meetings; has he ever shown or described the stand? If not, a few remarks would be opportune now that the season for out-door photography has commenced.

ON ETCHING FLUIDS.

BY MAJOR J. WATERHOUSE, B.S.C.
Assistant Surveyor-General of India.

II.—Mordants for Copper.

The most usual mordants for copper are nitric and nitrous acids, more or less diluted with water. Latterly, however, a mixture of chlorate of potash and hydrochloric acid, known as the "Dutch mordant," has come more into use. For some purposes, perchloride of iron in solution is a useful mordant, particularly in photographic work with gelatine films. These two latter mordants bite more quietly than the acids, so that the lines are not so much enlarged, and there is not the same risk of close lines running together and other inconviences caused by the evolution of bubbles of gas.

Acid Mordants.

1. *Lalanne.*
   Nitric acid at 40 ... ... 1 part
   Water ... ... 1 ,,

With a little old etching solution added, or pieces of scrap copper.

2. *Roret.*—Three strengths of nitric acid at 15°, 20°, and 25° of the *pèse acide*, commercial acid being 36° to 40°.

3. *Cooley.*
   Nitric acid ... ... 5 ounces
   Water ... ... 10 ,,

For fine work add—
   Verdigris ... ... 2 ounces
   Water ... ... 5 ,,

4. *Fielding.*
   Nitrous acid ... ... 1 part
   Water ... ... 5 parts

Add to the pint of mixed acids a piece of sal ammoniac, about the size of a hazel nut. The object of this addition is to give a more vertical bite.

5. *H. Gobin.*
   Nitric acid ... ... 30 parts
   Nitrate of copper ... ... 6 ,,
   Water ... ... 100 ,,

Or, weaker,

6.—Nitric acid ... ... 1 part
   Water ... ... 4 parts

Dilute acid of this strength was used by Dr. Donné, for etching Daguerreotypes.

7.—According to *Kruger*, chromic acid is an excellent mordant. It may be dissolved in water, according to the strength required. The following is similar:—

8. *Malaret.*
   Nitric or sulphuric acid ... ... 1 part
   Saturated solution of bichromate of potash ... ... 2 parts
   Water ... ... 5 ,,

Fizeau used for Daguerreotype etching, a mordant composed of nitric, nitrous, and hydrochloric acids.

Dutch Mordant.

Several formulæ are given for the preparation of this useful mordant. According to Roret's Manual it seems to have been proposed by Messrs. Schwarz and Boehme, whose formula is:—

9. Fuming muriatic acid (sp. g. 1·190) ... 10 parts
Water ... ... 70 ,,
To this is added a boiling solution of
Chlorate of potash... ... ... 2 parts
Water ... ... 20 ,,
This may be diluted with from 100 to 400 parts of water as required.

10. *Hammerton.*
Pure hydrochloric acid ... ... 100 parts
Chlorate of potash ... ... 20 ,,
Water ... ... 880 ,,
Dissolve the chlorate of potash in the water with heat, then add the acid.

11. *Smillie.*
Muriatic acid ... ... 5 ounces
Chlorate of potash ... ... 1 ounce
Water ... ... 25 ounces
made as last.

12. The following is used at the Berlin State Printing Office :—
Pure muriatic acid ... ... 8 parts
Ordinary do. ... ... 2 ,,
Chlorate of potash ... ... 1 part
Cold water ... ... 40 parts
Hot water ... ... 8 ,,
Dilute the pure acid with the cold water, then add the ordinary acid, and finally the chlorate of potash, dissolved in hot water.

13. *Kruger.*
Chlorate of potash ... ... 10 grammes
Water ... ... 100 ,,
Dissolve with heat, and, when cold, add—
Muriatic acid ... ... 75 grammes
Water ... ...200 ,,

14. Perchloride of iron, more or less diluted in water, is, according to Hamerton, an excellent mordant. It bites deep and clear, without enlarging the line much, and there is no ebullition, as with nitric acid. It is particularly useful in photographic etching through gelatine, as the latter is insoluble in it.

In most cases the mordant is flowed over the plate, or kept moving on it in the same way as a photographic developer. Such mordants are generally used for finishing off and deepening the light tints, and are called *eau fortis à couleur* or *à passer*. The following formulæ are given :—

15. *Roret.*—Abraham Rosse's
Strong white or distilled vinegar... 3 litres
Sal ammonia ... ... 180 grammes
Common salt ... ... 180 ,,
Pure verdigris ... ... 120 ,,
A little oxalic acid is sometimes added. The solids are ground up, and boiled in the vinegar. Acetic acid at 3°, or pyroligneous acid, may be used in place of vinegar, and, if too strong, more vinegar should be added.

16.—The following, used by Callot and Piranesi, is similar, and prepared in the same way :—
Strong vinegar ... ... 8 parts
Verdigris ... ... 4 ,,
Sal ammoniac ... ... 4 ,,
Salt ... ... 4 ,,
Alum... ... ... 1 part
Water ... ... 16 parts

17. *Roret.*—Dissolve in nitric acid as much copper as it will take up; also prepare a saturated solution of sal ammoniac in good vinegar; then mix three parts of the copper solution with one part of the sal ammoniac. The mixture may be strengthened by adding nitric acid drop by drop, till it bites well.

Relief Etching.

For etching copper in relief, the following glyphogen is recommended by Deleschamps :—

18.—Nitrous acid at 30° ... ... 2 ounces
Acetate of silver ... ... 6 drachms
Hydrated nitric ether ... ... 16 ounces

The nitric ether is prepared by mixing two ounces each of nitric acid and alcohol, and when the reaction commences, stopping it by adding eight ounces of distilled water.

19. *Roret.*
Silver ... ... 1 part
Dissolved in—
Nitric acid ... ... 1 part
Water... ... ... 2 parts

20. I have found a solution of nitrate of silver, about 20 grains to the ounce, bite very well, giving a good, clean bite quickly, and without any destructive evolution of gas. It does also for ordinary etching.

The formula No. 16 is said to be also good for relief etching; but it is then used stronger, only ten parts of water being added to the other ingredients. No. 12 is also a good mixture for the same purpose.

Tint Etching.

21. Flowers of sulphur mixed with oil forms a good composition for etching tints. It can be applied with a brush. For a flat tint, Hamerton says, "Oil the plate liberally with olive oil, and blow flour of sulphur upon this. The sulphur, if allowed to remain on the plate, will produce a flat tint, more or less deep, in proportion to the time it remains.

22. Roret gives the following formula for tint etching:—
Bay salt ... ... 2 parts
Sal ammonia... ... ... 2 ,,
Verdigris ... ... 1 ,,
These are pounded together, and the mixture kept in a bottle.

When required for use grind up a little in a glass with some syrup of old honey, so as to make a mixture which flows readily, and may be used with a brush like a colour. It is used after the first bitings of aquatint plates with acid, to give finish and vary the tints.

23. *Fielding* (for aquatint).
Nitrous acid ... ... 1 part
Water... ... ... 5 parts
For the strongest touches, nitrous acid and water equal parts, applied with a feather or brush. No. 19 may also be for this purpose, either with or without a little gum.

24. *Hamman.*—Dilute nitric acid at 12° (sp. g. 1·09), mixed with—
Distilled water ... ... 12 parts
Alcohol ... ... 3 ,,
This is said to give a grain in biting, so that the ordinary grained ground may be dispensed with.

Electric Etching.

It has frequently been proposed to etch by means of electricity, and in some cases it may be an advantage to do so.

The copper plate to be engraved is attached to the positive pole of a suitable battery and placed as anode in a solution of sulphate of copper or in water, acidulated with sulphuric acid.

If suitable cases different degrees of depth may be given, putting parts of the anode and cathode nearer together or farther apart.

Grove etched Daguerreotype plates with a single pair Grove or Bunsen cells, by inserting the plate to be etched, and a platinum plate of the same size, in a wooden frame having two grooves a quarter of an inch apart. The Daguerreotype having been attached to the battery as anode, and the platinum plates as cathode, the frame is immersed in a suitable vessel filled with
Hydrochloric acid ... ... 2 parts
Distilled water ... ... 1 part
Contact is made for about half a minute, after which the plate is removed from the acid, washed thoroughly with distilled water, then placed in a solution of hyposulphite of soda or ammonia, and the deposit removed from the surface with gentle rubbing with cotton. It is then again rinsed with distilled water, and dried.

(To be continued.)

Notes.

We are glad to see that a photographic society has been formed at Cambridge University. Members must belong to the Uuiversity, and their number is limited to thirty-five. Candidates, however, are eligible to be elected honorary members.

Professor Thorpe, F.R.S., one of the few chemists who make a study of photography, has been examining the action of zinc, magnesium, and iron as reducing agents with acidulated solutions of ferric salts. Zinc reduces most when the ferric salt is concentrated, and there is a small amount of free acid present, and the temperature is a high one. With iron, a rise of temperature seems to decrease the reducing action.

M. Marcy's gun-camera, with which he photographs the flight of birds, fires off ten shots a second, or, in other words, se cures ten pictures of a flying bird within a second; each exposure is reckoned at $\frac{1}{750}$ of a second.

The Swan lamp as fitted for dark room use was shown at the meeting of the Society of Arts last Wednesday; and we were rather surprised that a small Gramme machine, which stood on the table and was turned by one hand, served to keep no less than three of the medium size Swan lamps in action.

Our huge Indian troopships, each of which is capable of transportiug a couple of battalions at a time, are forthwith to be illuminated by electricity, so to minimise as much as possible the risk of fire.

Although many of our war-ships are capable of showing an electric light from the bridge or masthead, only one, the *Inflexible*, the so-called premier battle-ship of the British navy, by reason of its being the most heavily armed and armoured craft in commission, is illumined by electricity between decks. The *Inflexible* has Swan lamps fitted in her cabins, for the first time lighting up these dark recesses in a comfortable manner, and our Indian troopers are now, in similar fashion, to be lighted below by incandescent lamps.

The electric light was employed for siege purposes during the investment of Paris, when the garrisons occupying the outlying forts employed its vivid rays for sweeping the glacis around, so that no attacking party might approach unobserved in the darkness. M. Mangin now proposes to go further, and to do what Chevalier long ago held to be feasible—viz., to illuminate an enemy's works at night by electricity, so that the bombardment may go on uninterruptedly. Those who possess but little military knowledge know very well that at night-time it is customary to make good as much as possible any harm done by an enemy's fire during the day, and it is to prevent this that M. Mangin brings forward his siege electric apparatus.

One of the difficulties connected with the subject is to reflect the light, and direct the guns at the proper angle, and this, it may be remembered, M. Chevalier sought to solve by the aid of the camera—or rather, his photographic plane-table. In 1868, Chevalier carried out a series of experiments at Vincennes, and these proved so satisfactory, that, by direction of Napoleon III., he was ordered to make trial of his scheme under campaigning conditions. Unfortuuately, M. Chevalier's death put an end to the experiments, but not before he had shown that, by means of his photo-surveying instrument, he could fix and record the angles at which guns should be laid in order to carry on a bombardment against any part of an enemy's works when these are hidden in the darkness.

A silver laurel wreath has been presented to Frederick von Voigtländer, the present head of the firm of opticians in Brunswick. The occasion was to celebrate the making of the 250,000th photographic lens.

Dr. Huggins has written to our friend Dr. H. W. Vogel, of Berlin, that it was by means of a plate prepared with the latter's emulsion that the recent photograph of the spectrum of Orion was obtained; this is certainly the best testimony we have had as to the sensitiveness of the Vogel emulsion.

By the use of dilute sulphuric acid before and after the treatment with hydrofluoric acid, Mr. Plener has much improved his stripping process, the sulphuric acid hardening the film, and it becomes possible to make the film draw together, and thus somewhat reduce the scale of the negative. A final rinse with very weak ammonia is desirable.

Mr. W. D. Valentine, of Dundee, whose experience of out-door photography is naturally somewhat extensive, tells us that a "basket lined with tin" he prefers to any other package for transporting photographic paraphernalia.

The circumstance that the town of Lille possesses a comprehensive collection of early photographic specimens, so complete, in fact, as to form an epitome of photographic progress almost up to the present time, should encourage the South Kensington authorities to renew their efforts to form a national collection illustrative of the photographic art.

Silk-plating, or covering coarse fabrics with a film of silk, is the subject of a German patent. A solution of silk is made, and then the fabric dipped into it, and further treated with sulphuric acid. Persoz fils, our readers may remember, years ago suggested dissolving silk in chloride of zinc, and employing it as a substitute for collodion; and Spiller has shown that silk readily dissolves in hydrochloric acid. Unfortunately, the dissolved silk is very deliquescent, and not easy, therefore, of application as a photographic film either to glass or paper. In a word, it is still open to the experimentalist to produce a silk-plated material as a substitute for albumenized paper.

It is not all work and no play, apparently, with the Royal Commissioners on Technical Education. Mr. Woodall, M.P., Professor Roscoe, and Mr. P. Magnus have just left England for a tour of several weeks in Switzerland and Germany, beginning with Alsace. It is a fortunate coincidence that the time of the year is likely to render the tour a pleasant one.

Mr. Wight, of Berlin, has made some experiments upon the keeping qualities of gelatine plates after exposure. A film exposed in April, 1879, was developed last month, three years, therefore, elapsing between its withdrawal from the camera and the application of a developer. The result was an image, but a faulty negative. Another film, of Mr. Wight's own preparation, developed after an interval of two years and a-half from exposure, was more satisfactory, showing only a few white spots on its surface.

Our Belgian contemporary, the *Bulletin de l'Association Belge*, makes merry over a misprint in our columns, where the word *panache* has been substituted for *patache.* We have all the more pleasure in bearing testimony to the keen perspicacity of our friend, since Belgians, as a rule, are not credited with an acquaintance with classic French. We remember once meeting a youth who had just completed his education in Belgium, and who was assuring a Parisian acquaintance that he could now speak French perfectly. "*Pardon*," was the suave reply, "*M'sieur parle belgique.*"

Photography played an important part in a trial last week. Miss Genevieve Ward's representatives sued for an injunction to restrain a theatrical manager in Leicester from performing a play belonging to her. Taking advantage, seemingly, of Mr. Black's absence from this country, the manager in question had taken the title of his story, "That Beautiful Wretch," and adapted it to the play of "Forget-me-not," the owner of which also happened to be abroad. Miss Genevieve Ward was, in fact, in America, and, worse still, had with her the document in which the authors assigned to her the play. The absence of this latter was an important feature in the trial, as proof of ownership could not be made out; but in the end a photograph of the document was brought forward on behalf of the plaintiff, and the judge, having carefully examined the copy, gave judgment upon it.

This, we believe, is the first instance of a photographic copy of an attested document being admitted in a court of law to be of the same value as the original when the latter is not forthcoming. It will mark a precedent the importance of which cannot be rated too highly, for lawyers are likely, after this decision, to have all their more valuable instruments reproduced by the camera. In fact, the matter will, in all probability, lead to the establishment of a photographic studio specially constructed for copying, in the precincts and under the direction of the law courts.

We have received a circular from the Leipsic Retouching School, in which photographers from all parts are invited to attend classes for instruction in retouching in particular, and art in general. There is not the least doubt that retouching has now become a recognised art, and must be regarded in the same light as wood-engraving and other high-class skilled work. In several respects, in fact, retouching is very much like wood-engraving; the retoucher must possess considerable knowledge as a draughtsman, and must be able to make good deficiencies, as well as remedy defects. The work is of the same fine microscopic character, and the pay is similar, averaging from £2 to £5 a week, although it is rare to find either a retoucher or engraver receiving the maximum sum.

The Leipsic School has been established to give some sort of systematic instruction in retouching. A month's instruction is given for 100 marks, or shillings, two months for 150 marks, and three months for 250 marks. If the lessons are confined to one or two months, only negative and positive retouching and drawing are taught; if students tarry longer, they receive instruction in oil and water colouring. Board and lodging for the students can be obtained in Leipsic for from 60 to 90 marks per month. We have no personal knowledge of the *Leipziger Retoucheur Schule*, but we think many young photographers in this country might do worse than go abroad for a few months to view matters from the other side.

How to make leather in twenty-four hours is the subject of a German patent, which, since it is based upon the employment of bichromate of potash and gelatine, no doubt would scarcely hold good in this country. Mixtures of this kind have been proposed ere now for a hundred and one purposes, from the making of sausage skins to the production of waterproof walls. In the present case, the raw hides or skins are placed in a warm or cold solution of—

Water	1,500 parts
Gelatine...	50 „
Bichromate of potash	30 „

The skins are immersed for the space of a day, and then exposed to daylight to permit the bichromated gelatine, of which the hide is now composed, to become insoluble.

First aid to the wounded is a subject that has attracted much attention throughout Great Britain of late, the classes of instruction being, we believe, under the auspices of the Knights of St. John. Our volunteers, police, and public schools, are taught in a series of lectures the valuable lesson of attending on people suffering from accident, when no medical man is near. In France, M. Fournier has been working with the same laudable object, and has conceived the happy idea of illustrating by means of photography how wounds should be attended to in the battlefield or elsewhere, when no medical aid is at hand. M. Fournier has submitted his photographs, with simple instructions appended, to the Academy of Sciences.

Review.

Cours de Reproductions Industrielles, Exposé des principaux procédés de reproductions graphiques, héliographiques, plastiques, hélioplastiques, et galvanoplastiques. *(Par M. le Professeur Léon Vidal, Paris, Librarie Ch. Delagrave, 15, Rue Soufflot.)*

This manual from the pen of our talented Paris correspondent demands, both from the interesting matters of which it treats, and from its having no counterpart in this country, a somewhat extended notice. It is the text-book for the students in the National School of Decorative Arts, and, forming a supplement to what may be termed purely fine art teaching, is designed to give full instruction in the means of copying and multiplying commercially original works of art or their interpretations, indicating also the manner in which it is desirable that such works should be treated with a view to their reproduction.

Pointing out the immense advantage which its fidelity of copying gives to photography over manual processes like those of the engraver or lithographer, which furnish interpretations, more or less artistic, rather than facsimiles, M. Vidal takes *seriatim* examples of different kinds of works of art, and describes the most suitable means of reproducing them in large or small quantities, in many cases accompanying the description with an illustration produced by the process under consideration.

Much as has hitherto been accomplished by the Woodbury process, by heliogravure, collotype printing, &c., there can be no doubt that photography will play a yet more important part as an adjunct in the pictorial reproduction of works of art; and such a work as this, by attracting the attention of fresh minds, can scarcely fail to add to the perfecting of existing processes, or to the discovery of new methods. Invention, however, is not now idle, for M. Vidal has found himself obliged to take note of many fresh applications and inventions while compiling the present work.

Given a subject to be reproduced, the question arises what process will be best for the purpose. M. Vidal supplies the answer. If a limited number of copies only is required, it is evident that the production of a special plate, to be afterwards printed from by mechanical means, is not applicable, cost being usually an important factor in the matter, and one of the processes of printing direct from the negative by the agency of the light will here be more suitable. Ordinary silver printing finds scant favour with our author, but may be used if permanency need not be considered. He, however, advises recourse to the platinum or carbon processes, which yield proofs of assured durability. The cyanotype processes, too, yielding proofs either white on blue ground, or the reverse, will occasionally be found applicable.

If, however, a large number of impressions is required, then one of the mechanical processes becomes a necessity, and the choice must be determined by a consideration of which will best render the character of the subject; also, in the case of book illustrations, whether the copies are to be inserted in the text, or form separate plates. Enamels, oil paintings, portraits, and metallic objects will be best rendered by photoglypty, known generally here as the Woodbury process, which gives more solidity combined with transparency in the shades than other processes. Unfortunately, proofs cannot in this way be obtained with a clean margin, and consequently, where the separate mounting is objected to, recourse must be had to phototypic printing or to photo-engraving, though with some little loss in result. A comparison of the Woodburytype copy of Hugrel's beautiful painting at page 190, with Rousselon's photogravure rendering of the same at page 152, excellent as the latter is, will be instructive, and show the value of Prof. Vidal's dictum.

The Woodburytype process is not well adapted for subjects with large surfaces of white, which will be better treated by photography or by one of the photo-engraving processes. For drawings in general with charcoal, black lead, conté crayon, and body colour, the preference should be given to phototype, as the impressions can be pulled with or without margin, and veritable facsimiles produced by the use of suitably toned paper and ink; while with a polychrome, original chromo-lithography can be joined with the phototype printing. Similar results can be obtained by heliogravure, though at increased cost both for plate and printing, and the result, while having high artistic qualities, would not in most cases so closely resemble the original.

Where figures have to be inserted in the text and printed with the type, it becomes necessary to resort to typographic engraving—that is, to an engraved plate on which the lines receiving the ink from the roller are in relief, while in an ordinary copper plate they are sunk. The metal usually employed is zinc, and zincography can be applied to the reproduction of all line or stipple drawings with pen or pencil, provided that they are executed on a white or very clear ground. Its incapability of rendering half tone, which has hitherto restricted its use to this class of subjects alone, seems now likely to be removed, as will be found by reference to M. Vidal's article in the News of April 28.

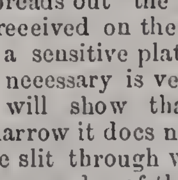
The comprehensive character of the treatise may be judged from the fact that, in addition to a full account of the photo-mechanical, the silver, carbon, platinum, and other printing processes, it embraces a condensed description of manual engraving and lithography, and of such auxiliaries to reproduction as the chromograph, papyrograph, &c., while chapters are devoted to enamels and vitrifactions, to mouldings and electro-metallurgy. The chief interest of the book will, to most, probably lie in the various methods of heliogravure; in the Woodbury process, and its modifications, by which the use of expensive plant is obviated; in the phototype process, which, under its various names of Albert-type, heliotype, collotype, &c., is the most universally employed of the photo-mechanical processes, and is suited to nearly every class of subject. But to some readers the most attractive chapters will be those devoted to the consideration of reproduction in colour, and we purpose returning shortly to this portion of M. Vidal's interesting work.

PHOTOGRAPHY AND THE ECLIPSE.

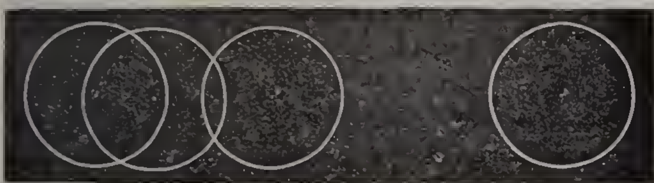
BY CAPTAIN W. DE W. ABNEY, R.E., F.R.S.

Second Article.

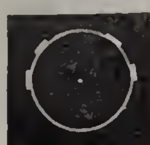
We next come to the spectroscopic photography which will be attempted at the eclipse on May 17th next. The ordinary idea of a spectroscope is that a beam of light passes through a narrow straight slit, impinges on a prism, and that a lens on the other side of the prism catches the rays dispersed, and spreads out the image of its slit into a spectrum, which is received on the eye by means of an eye-piece, or else on a sensitive plate. Now, the notion that a straight slit is necessary is very prevalent; but a little consideration will show that it is not so. As long as the slit is narrow it does not matter what form it takes. Suppose the slit through which the light is admitted to the spectroscope be of the form given below,



the Frauhoffer lines will range themselves side by side in that form, instead of being vertical, as we are accustomed to see them. Again, if we take a circle, the solar spectrum formed will be ring-shaped, and the only inconvenience that would arise would be that the various circles corresponding to the Fraunhoffer lines would over-lap. If, instead of using the sun as a source of illumination, we use incandescent hydrogen, this annoyance would not occur, for, in the first place, there would be no light background of coloured light, and the rings of the spectrum of hydrogen would come out as bright circles. There are four lines alone that are visible to the eye, though we now know, thanks to the researches of Dr. Vogel, that in the ultra-violet there are other lines. The spectrum of hydrogen seen when the ring is used would be thus—



This diagram shows that there will be no difficulty of recognizing circles so separated as these are. When the sun is eclipsed we have a natural ring of light formed round the moon's disc. This ring of light is made up of a narrow layer of hydrogen with some other matter, and beyond this is the corona; the narrow ring, however, is much more intense than the outer light. If a prism be placed in front of a telescope lens, and the image of this ring be caused to traverse it and fall on a sensitive plate, the hydrogen would give an effect as shown in above fig. Instead of being thin lines, however, they will have an appreciable thickness, and each one will present somewhat the following appearance,



the little protuberances being monochromatic images of the prominences. Such an instrument has been taken out to the eclipse. A prism of 60° of three-inch side is fixed in front of a Lerebour's photographic lens of four inches diameter and twenty-two inch focus, and it is mounted side by side with the camera for taking ordinary photographs of the corona (described in my last article), both of which are attached to an equatorial stand to which an accurate clockwork is attached for following the sun's motion. The camera for this was made by Meagher with his usual ability, and is so arranged that a plate can be placed at an angle of 45° with the axis of the lens. By this arrangement the spectrum will be approximately in focus throughout its whole length. The question arises, what advantage will this have over eye observations? The answer to this is, that it might not have much if usual photographic material were employed, but we hope to secure, or prove the absence of, another ring which lies far in the infra red region of the spectrum. Some recent researches have shown Colonel Festing and myself that certain dark and thick lines in the solar spectrum are in all probability due to a hydro-carbon of the benzene type, while others are probably due to a hydro-carbon of the alcohol type. Matter such as these cannot exist close into the sun, as it would be dissociated. They therefore probably exist beyond the hydrogen ring round the sun already alluded to. A plate which is sensitive to this region of the spectrum will therefore be exposed to this ring spectrum, and to give it any chance of success the exposure will last a minute. The first use of this method for photographic purposes was made by Dr. Schuster, in 1875, in Siam, but the dispersion used was small, a prism of 8° alone being used. With the above arrangement the total length of the spectrum will be 4½ inches before being enlarged. This, then, is a new departure in eclipse work, and if everything goes right it ought to tell us something about the outer layers of the sun's atmosphere. When totality is over, I believe photographs of the cusps of re-appearing sun will be taken with the same object in view; thus more chance than one will be available.

Another piece of apparatus adapted for photographic spectroscopic work is also taken out. It consists of a spectroscope having a slit which can be closed to less than the $\frac{1}{500}$ of an inch; there is a prism of 60° behind the collimator, and then a camera also by Meagher with a lens of eight inches focus. The apertures of the lenses of the collimator and the camera are as large as possible consistent with definition. A heliostat has been taken out which will throw the beam of light from the eclipsed sun on to a lens of three inches diameter, and form an image of the black disc and the

corona on the slit as in the figure, S being the slit. By this means the spectrum of the whole width of the corona will be attempted to be photographed, and if its light be anything at all approaching the former accounts of it, the gelatine plates (which contain iodide to lower the maximum position of sensitiveness) ought to receive a very developable image Some parts of the corona are too feeble to give the eye much information; it is hoped that the photographic plate will supply what is deficient. Experiment has shown that the spectrum of a dark cloud on a dull day is impressed on the plate with the same apparatus in less than a minute with vigour. Such being the case, the corona, at all events in its brighter parts, should offer no difficulty. With the same apparatus it is hoped by a few instantaneous exposures to secure traces of the bright lines which flash out for an instant just before totality. Such is a brief outline of what will probably be attempted. "Cui bono?" will most likely be asked. The direct good may not be apparent, but assuredly, as we advance in knowledge in regard to our life-sustaining orb, so do we get nearer to knowledge which will have a direct bearing on the welfare of the human race. If the 17th inst. may be propitious to the travellers in Egypt, and if photography is as trustworthy there as it is at home, one step in advance will assuredly have been made.

THE PREPARATION OF GELATINE EMULSION WITHOUT WASHING.

BY C. FABRE.*

If iodide, bromide, or chloride of silver be triturated with sulphate of potash or of ammonia in the presence of a small proportion of water, combination ultimately sets in, long crystalline needles of a double salt containing single molecules of each, together with two molecules of water, being the result. The double salt in question is immediately destroyed by a moderate excess of water, as one may readily see by the change of colour which is instantly effected by the action of the fluid, the greenish yellow tint of the granular bromide becoming immediately visible. The bromide thus formed is identical with that which is produced when a solution of bromide of silver in ammonia is precipitated by means of an acid.

As regards the preparation of emulsion, the following particulars may be given. One part of bromide of silver is triturated with two and a-quarter parts of crystallized sulphate of potassium, and when the mass is thoroughly homogeneous, distilled water is added a few drops at a

* *Bulletin de la Société Française de Photographie.*

time, care being taken only to add enough to ensure complete combination, about one-tenth of the weight of the bromide of silver being sufficient in ordinary cases. When the new double salt has set or solidified, a microscopic examination will show that it consists of minute crystalline needles. At this stage an excess of water is added to the contents of the mortar, and when the decomposition is complete, the bromide of silver is washed thoroughly, and incorporated with a solution of gelatine. Any known form of silver bromide will unite with sulphate of potassium, and react as above described. In ordinary cases, 5 grammes of bromide may be added to a solution containing from 3 to 5 grammes of gelatine to 100 grammes of water.

It will be remembered that a somewhat similar reaction between iodide of lead and sulphate of potassium has been discovered by Professor Filhol.

Selenates and chromates react in a somewhat similar manner with haloid salts, but trials with chromates proved unsatisfactory as regards the preparation of emulsion.

THE REPRODUCTION OF MAPS AND PLANS IN THE MILITARY GEOGRAPHICAL INSTITUTE OF VIENNA.

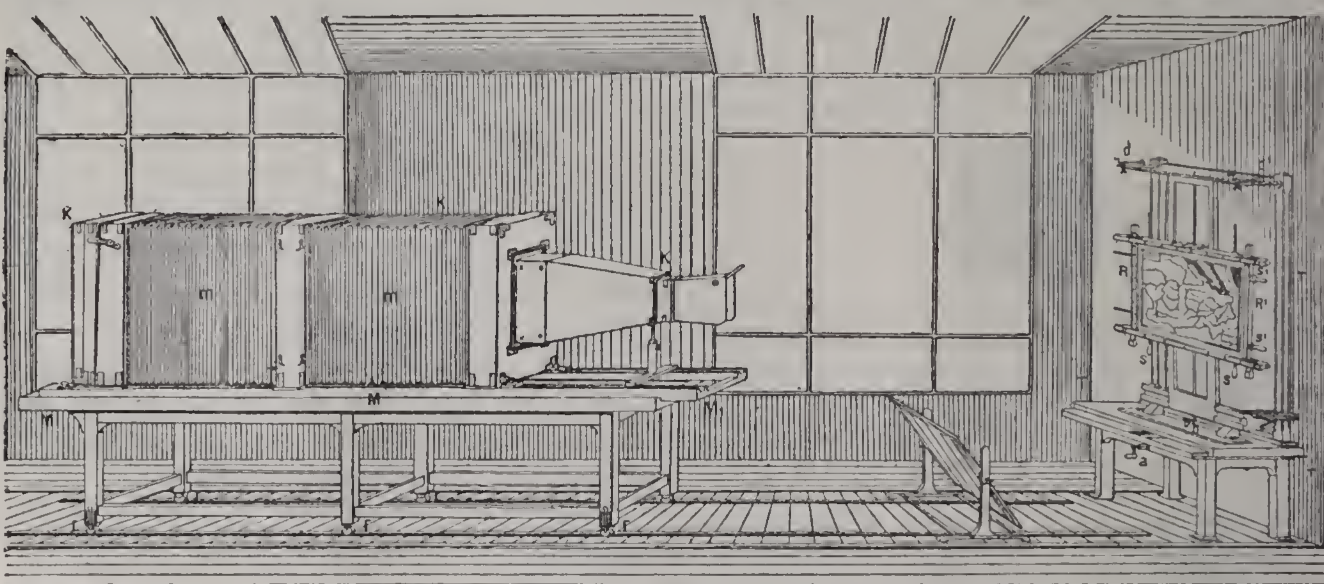
BY MAJOR VOLKMER.

We now lay before our readers an abstract of this comprehensive monograph.

Some decades ago the pantograph was the only instrument of reduction or enlargement in practical use, while copper-plate engraving and lithographic printing were almost exclusively employed for the multiplication of copies.

In the present day a variety of methods are in use for map reproduction, and among these may be specially mentioned photography in its simplest sense, lithography (including the autographic and anastatic process), photo-lithography, engraving on copper, electrotype methods, heliogravure, photo-zincography, and relief or deep etching on zinc. The selection of a process for any particular work depends entirely on the value of the original, and the time or pecuniary means which may be available for the production of copies; but in general it may be stated that important cartographic works, which are likely to possess a value during several generations, should be executed on copper-plates, while stone or zinc may well be rendered available in the case of less important reproductions.

The photographic work incident to map reproduction often presents notable difficulties in actual practice, as it but seldom happens that the original consists of clean and sharp black lines on a ground of satisfactory whiteness; but the production of a satisfactory negative is much facilitated by providing a convenient and well-designed copying camera and supports, so placed as to facilitate the proper lighting of the work; and the accompanying block



BLANSING & SONS. Photo. Process.

represents an arrangement which has been found excellent and well adapted for the rapid reproduction of negatives from originals of varying size. No further description of the engraving than the following reference notes is required:—

K K K. An ordinary camera, with body having two bellows, *m m*.

M M. Table stand for the camera, running on rails, so placed as to ensure absolute and constant parallelism of the sensitive plate with the design to be copied.

R R'. Frame on which the original is stretched equally in all directions by means of the screws, *s s'*.

a b d. Handles for controlling the forward, upward, and lateral motions respectively.

Either orthoscopic or rectilinear lenses are used, and the collodion process is employed in the production of the negatives, while the development is effected with an iron developer containing a considerable proportion of copper sulphate, the following formula being one in general use:

Sulphate of iron	2 parts
Sulphate of copper	1 part
Glacial acetic acid	2 parts
Water	64 ,,

Cyanide of potassium is used for fixing, and after fixation the image is intensified by means of a mixture of the following solution mixed at the time of using with a 1·6 per cent. solution of pyrogallic acid in water:—

Nitrate silver...	17·5 grammes
Water...	262·5 ,,

To this is added—

Nitric acid	35 grammes
Water	262·5 ,,

When the plate has been intensified, it is washed, and treated with a saturated solution of mercuric chloride in water until it is uniformly whitened, and after a renewed washing it is darkened by immersion in a hyposulphite and gold bath—

Sodium hyposulphite... ...	13 grammes
Water	350 ,,

To this add, as required, a little of the following:—

Double chloride of gold and sodium	4·37 grammes
Water	350 ,,

After mixture the solution should remain one or two hours before use, and it may then be preserved for a long time if kept in the dark. The film being then dried, is exposed to light through the glass plate until Vogel's photometer registers about 13 or 15, after which it is soaked for about a quarter of an hour in cold water, then in tepid water until a slight relief becomes visible. If the plate is once more dried, it may, after remoistening, be subjected to a fresh intensification by the method already described. The intensified plate is next flooded with a warm ten per cent. solution of gelatine, and dried horizontally after the excess has been poured off, the borders being then varnished to prevent the film separating from the glass.

Reversed negatives for heliographic processes are made by exposing through the glass plate, the film being turned away from the lens, and are best intensified by the uranium and ferrocyanide method, after which they are gelatinized by the process already described. In some cases, when reversed negatives are required, the films are stripped from the glass, and re-mounted on fresh plates.

Glass positives for etching methods are usually prepared by contact printing on an iodo-chloride emulsion, the image being printed to the full density when the light is good; but in other cases a gallic acid developer is used.

NOTE ON THE PRINCIPLE OF A NEW PHOTOGRAPHIC REVOLVER.

BY M. J. JANSSEN.*

The photographic revolver consists essentially of a rotating sensitive plate, on which are taken the images of some moving object in the successive positions it assumes during the motion. In this instrument the sensitive plate is stopped each time that an image is to be taken, and is moved on again for the purpose of impressing on the neighbouring part, which has not been exposed, the image of the next phase of the movement of the object. Such, in fact, was the arrangement adopted for the original revolver prepared for, and used on the occasion of, the observations of the Transit of Venus in 1874. While complying with this condition of arresting the motion of the plate during its exposure, it is always possible to take a certain number of photographs in the course of a second, and to this extent has M. Marey been successful in his investigation of the phenomena of the flight of birds, which he has recently communicated to the Academy. It will, however, be seen that this condition puts a limit to the number of images that can be taken in a second of time; in fact, that number can scarcely be made to exceed a dozen.

This is due to the excessive difficulty there is in arresting suddenly, and for a very short space of time, a body which is in rapid motion. For example, to obtain with sufficient fidelity a correct representation of the different stages of an insect's flight, a number of successive images must be taken at extremely short intervals, probably not exceeding in length the $\frac{1}{100}$th part a second, and it would be impossible by the arrangement above mentioned to cause a plate alternately to move and stop with such rapidity as this. The results obtained with the revolver, which are so interesting and promise to be so fertile in novel discoveries, would, owing to this circumstance, probably remain inoperative, unless the difficulty of ensuring sufficiently rapid stoppages and motions of the instrument could be surmounted.

It is now some years ago that I first entertained the idea of using the photographic revolver for investigating the conditions of animal movement, and it struck me that it might be possible to take images on a plate in motion. Analysing the question, it will be found that there is a relation, dependent on the degree of delicacy in the image, between the motion which may be impressed on the plate, and the time of the luminous action. M. Marey, having again called my attention to these investigations, I have attempted to obtain an experimental demonstration of this principle, and I have succeeded in carrying it out with images of the sun.

The granulation of the solar surface is well known to be one of the most difficult objects to detect with glasses, and only very recently has it been found possible to reproduce it by photography. To get, therefore, a perfectly reliable proof of the principle in question, I tried to obtain an impression of the granulation on a plate moving with a velocity of from 0·15 to 0·20 metre per second. The success of this experiment fully realised my expectation. I have now the pleasure of submitting to the notice of the members of the Academy a plate on which it will be seen are reproduced two images of the same portion of the sun's surface. One of these images was taken on the plate while it was at rest, the other while it was moving at the rate of about 0·15 metre per second. A comparison of the two images shows that the motion of the plates has not prevented the reproduction of the granulation—that is to say, of one of the most delicate phenomena of astronomical photography. As I desire only to demonstrate the principle, I need not at present enlarge further on this point.

Since the establishment of this fact releases us from the necessity of submitting the movement of this instrument to a series of successive pauses, it will be readily understood that nothing will now limit the number of images which the revolver may be made to furnish in a given time. It will only be necessary to discover the correct relation existing between the degree of detail in the image, the velocity of the sensitive plate, and the duration of the luminous action. In the arrangement which I have contrived, the frame on which the sensitive plate rests, and the shutter with slits, has each a continuous motion of rotation, and it is the magnitude of these movements and the relation between them that determine the rapidity with which the images are successively obtained, as well as the conditions of their formation. From a few simple calculations, I have been for some time certain that it will be easy to get images of any objects in motion, succeeding each other at intervals of $\frac{1}{100}$th of a second, and even less than that.

* Communicated to the *Academie des Sciences* at the meeting of the 3rd of April last.

LANDSCAPE LENSES FOR INSTANTANEOUS PHOTOGRAPHY.

BY G. A. KENYON, M.B.*

It is now twenty years since, wishing to make portraits with a landscape lens, I removed the small stop from the lens mount, and substituted a piece of cardboard with an opening twice the diameter of the original. With a little patience on the part of my sitters I was thus enabled to take portraits on wet collodion plates out of doors without difficulty. With the rapid plates of the present day, of course, results are far more easily attainable.

Last November I called upon Mr. George Smith, and he pointed out to me that landscape lenses such as those sent out with the scenograph camera, fitted with the small stop, gave pictures unnecessarily and, indeed, even disadvantageously sharp; also, which I well knew, that they covered a larger angle than could be profitably employed for portraiture. Further: that if a smaller angle of view only were employed, a very much larger stop could be used without loss of definition, and with great increase of rapidity in action; in fact, that precisely the same aperture of lens, with practically the same definition, and the same angle of view as is afforded by lenses of the rapid rectilinear and rapid symmetrical type when used to the best advantage, is thus attainable, and the only deficiency on the part of the single lens, namely, not giving straight lines correctly, is not appreciable in a small angle of view, and certainly not in portraiture. A scenograph lens of six and five-eighths inches focal length, and aperture enlarged by Mr. Smith to three-quarters in $\frac{f}{9}$, covers perfectly a quarter plate, and gives an image so sharp as to be capable of enlargement to the extent of at least four diameters; and with this lens in bright sunshine I have taken portraits instantaneously.

The other lenses I show are a ten and a-half inch focus lens and a seventeen inches focus lens by Lancaster. With the former aperture about one-tenth of the pictures sent round were

* A communication to the Liverpool Amateur Photographic Association.

taken—those who are accustomed to work with rapid symmetrical or rectilinear lenses will be able to judge how far successfully. A comparatively small angle, such as is thus utilised, is often necessary, and not inconvenient in instantaneous photography; for it is desirable to be at a fair distance from the object photographed for several reasons, and in many cases the object is so distant that unless a tolerably long-focus lens be used the image will be too small.

If instantaneous pictures are to be taken with a wide angle of view, there is nothing for it but to follow Mr. Williams, and look for increased rapidity of plate to work with a portable symmetrical lens. Of course, this lens is easily rapid enough for sea and river views; but for ordinary views and portraiture to be taken instantaneously the utmost amount of focal aperture and the most brilliant light are essential with commercial rapid plates.

The shutter shown with the scenograph lens, made by Mr. George Smith, is on Mr. Noton's principle, and commends itself for its extreme portability.

Correspondence.

DARK-ROOM DISEASE.

SIR,—Permit me to add my evidence of the venomous nature of pyrogallic acid. I am an amateur photographer in a small way, but a sufferer from pyrogallic poisoning in a large way. I am troubled with a patch of exczema on the leg, of many years' standing, and which is sometimes quite unbearable with itching. Last November, when packing up my traps for the winter, I applied with a brush some pyrogallic dissolved in spirit to the skin disease, thinking that the evaporation of the spirit would give me temporary relief, and was so pleased with the result that I continued using the solution until the end of the year. During this time I got completely out of sorts, and was in a low way. On New Year's day I found a rose-coloured patch on my leg just above the skin disease, which also itched, and to which I applied the pyrogallic solution also. During the night inflammation struck in my elbow joint, which had been previously hurt by a fall on the ice-covered street, and from appearances I feared it was erysipelas, and so hurried off to a doctor. He was puzzled with the elbow, and, from the fluid which exuded, he thought that the joint lubricant was escaping.

Becoming suspicious of the pyrogallic, I now discontinued its use, but the doctor had much trouble with the elbow, and during his treatment the arm had an outbreak of pimples large and small. The rose-coloured patch on the leg became very sore meanwhile, and finally a boil formed under it, but from which very little matter was thrown out, and the hole grew larger and larger until there was a very sore ulcer the size of a shilling. This ulcer had its peculiarites, and objected to any sort of treatment beyond being covered with a rag smeared with lard or vaseline. The doctor attended to the elbow, and the leg was left to nature, but neither sore was healed under about six weeks, during which time I slowly became more like my accustomed self. I suppose nature took this time to eliminate the pyrogallol from my system, and to throw out the oxidised blood corpuscles which had accumulated during the time I had applied the pyrogallol. I am about beginning photography again, but I shall be very careful with this compound.—Yours, A SUFFERER.

SIR,—Seeing so many complaints of injury supposed to be caused to photographers by contact with pyrogallic acid, I beg to suggest a simple plan by which such contact may be almost entirely avoided, *i.e.*, by lifting the plates out of the developing-dish by means of a small piece of wood, the end of which is cut into the shape of a wedge, the whole shaped like a chisel. By slipping this under the plate, it may be raised out of the developer without immersing the fingers. The blade of an old penknife would answer the purpose as well. Staining the fingers is also avoided by this method. AN AMATEUR.

DEAR SIR,—Referring to the remarks in your journal as to the injuriousness to health and sight of the deep ruby light with which it is theoretically necessary to work in the dark-room, I enclose you a print from a rapid gelatine negative which was developed by the light of a candle without the intervention of any glass or paper. The candle was, in fact, placed behind a plate-box, and the light reflected from the walls, &c., sufficed for watching the development.

Formerly, I was most careful to procure good ruby glass, always selecting it by the aid of the spectroscope; but now I have found this extreme caution unnecessary, and believe that it is the *direct* rays of light only of which we need be afraid, reflected rays being almost harmless.—Yours truly, WILLIAM J. ALLSUP.

HYDROFLUORIC ACID FOR CLEANING PLATES.

SIR,—Seeing in the NEWS a suggestion of Mr. Plener, that hydrofluoric acid might be used for cleaning glass, I wish to state, for the benefit of your readers, that I have used it for some time, and it answers the purpose exceedingly well if used in a proper state of dilution; the proper and safe proportions are 20 parts of water to 1 of acid. This will also remove metalic oxides and carbonate formed in glass bottles as if by magic, when all other means would be found useless. Hydrofluoric acid is usually kept in gutta-percha bottles; but a glass bottle warmed and coated with paraffin wax will answer the purpose. The acid fumes should be kept away from all other chemicals, and in a place by itself.—Yours truly, J. MOULE.

EXPRESSION OF THE EMOTIONS.

SIR,—I am sure you would wish to give "honour to whom honour is due," and therefore I venture to inform you that at least one of the photographs reproduced in your last issue from Darwin's "Expressions of the Emotions" was not by Rejlander. The "Laughing Child" (No. 4) was by Dr. Wallich, himself a personal friend of Mr. Darwin. It was a portrait of one of his own children, and I still have in my album a print of it, which he gave me himself. In those ante-gelatine days, he was naturally proud of a portrait that evidently had been all but instantaneous. In looking at the original print to make sure before writing, I could not but regret the inability of a woodcut to give any adequate idea of its delicate lines, and of the natural grace of the child's unforced laugh. HENRY GEARY.

THE NEW COPYRIGHT ACT.

DEAR SIR,—I am very surprised that no notice seems to be taken of the proposed Copyright Act, either in your columns, or in those of any other journal that I have seen, in respect to its dealings with photographs and photographers.

As far as I can understand it, it simply means ruin to every photographer in the kingdom, as it prohibits them using any specimen pictures whatsoever without the consent in writing of the person photographed, a thing impossible to obtain; and if you do use one, you have to give it up, negative and all, for the person's own benefit. Why, we should have our places full all day of people demanding their negatives (as I see by Clause 9 that the Act is to be retrospective); we should have to take large quantities of specimen pictures, and pay heavily for doing so; and have to put away all our best work, or else give up the negatives. I consider the proposed clauses so fatal to photography as a business, that I think all photographers ought to band together and present a petition, or get the clauses altered or amended in some way. As they stand at present, they are very unfair and unjust, and far more strict than is required for the due protection of the public.

I do not advocate selling photographs without permission; but as to not being allowed to use them as specimens, I think it monstrous and unjust, as the very person who would not let you show his own or child's picture, is just the one who would want to see a large number of specimens.

Hoping to see this matter taken up with spirit and energy, I remain, yours faithfully, ED. W. H. COX.

[All the clauses bearing either directly or indirectly on photography were reproduced in our issue of April 21st last.—ED. P. N.]

SMALL STOPS.

SIR,—In Mr. Addenbrooke's paper on a new instantaneous shutter, printed in your last, a doctrine is broached new to me, and which I venture to think erroneous, on the use of small stops. He says (p. 236), "By using small stops we greatly increase the proportionate difference between the amount of light which falls on the central and marginal portions of the picture."

Three causes of this difference are well known, which are independent of the size of the stop. First, the distance from stop to plate increases with the obliquity of the pencils, as they approach the margin of a picture. Secondly, the stop which is circular to the direct pencil, presents an elliptic aperture to oblique ones; its major axis being the diameter of the stop, while its minor axis diminishes with the increasing obliquity, thus reducing the effective area. Thirdly, the loss of light by reflection from the surfaces of the lenses increases also with the obliquity of incidence. This difference is minimised with ordinary doublets, but of more importance when the back combinations are on the Petzval principle. I assume, of course, that the stops are properly made, their inner edge having no appreciable thickness. There is also a fourth difference, where the full aperture is used, or a stop so large in proportion to the diameter of the lens that the margins of the plate are only illuminated by partial pencils. But this fault is cured, not aggravated, by using a small stop. I must confess my ignorance of any reason which will support the new doctrine. If not merely a misconception, I trust Mr. Addenbrooke will favour your readers with an explanation of his theory.

While on the subject of small stops, permit me to add a few words on what I venture to think an error, long more or less pervalent—that the physical effect of diffraction is practically injurious to definition, even with stops no smaller than any usually supplied.

Our knowledge of this injurious effect is obtained from astronomical observation. It is found practically that one inch is the smallest aperture which will separate double stars 5″ apart, with any magnifying power; while to divide stars only one 1″ apart requires 5 inches. Thus a stop $\frac{1}{10}$ inch diameter would not divide more closely than 50″. But it must be remembered that with points of intense light seen on a black ground, this error is at its maximum. In circumstances more resembling an ordinary photographic image, it is much less sensibly injurious. To derive a formula for photographic use would be easy, had we an accepted coefficient of satisfactory definition. For my own part, theory and practice alike lead me to the conclusion that if we can keep out stray light from the camera, secure it from tremor, and have time for adequate exposure, we need not fear diffraction, even with far smaller stops than those commonly supplied. I should place the practical limit at about $\frac{1}{200}$ of the focal length. With a lens of 20 inches focus, and a stop of $\frac{1}{10}$ inch, the limit of diffraction ($=50''$ with $r=20$ inches) would be $\frac{1}{200}$ of an inch. It should be remembered that if any part of the image is sharp, diffraction can have done no harm. On the other hand, a blurring of the whole image may be caused by tremor.—I am, sir, yours truly, W. S. WHEELER.

Proceedings of Societies.

CAMBRIDGE UNIVERSITY PHOTOGRAPHIC SOCIETY.

THIS Society, which was formed last term, held its first meeting this term in Mr. Scott's rooms, Trinity College, on April 28th.

The SECRETARY made a statement of the accounts, and also informed the Society what had been done in the way of fitting up the necessary dark rooms, &c., in connection with the studio.

Mr. SCOTT, the President of the Society, then read a very interesting paper on the discovery and progress of photography. The Society's premises (26, Park Street) are expected to be in working order this week, and to be found very convenient for all its members.

The officers for the term are—

President—M. Scott, M.A. (Trinity).
Vice-President—W. S. Frost (Caius).
Secretary and Treasurer—F. S. Willie (Pembroke).
Committee—Brogden, Downing, J. S. Cox Downing, F. W. Hilliard (Jesus), M. Miley (Trinity).

GLASGOW PHOTOGRAPHIC ASSOCIATION.

THE last general meeting of the session was held on Thursday, the 27th prox., in the Religious Institution Rooms, Mr. JOHN URIE in the chair.

The minutes of last meeting were read and approved of, after which the election of office-bearers for the ensuing session took place, resulting as follows:—

President—Mr. John Parker.
Vice-President—Messrs. Robertson and A. Mactear.
Treasurer—Mr. Geo. Bell. *Secretary*—Mr. W. Craig Ramsay.
Assistant Secretary—Mr. John Y. McLellan.
Council—Messrs. Skinner, Paton, Reid, Moran, Urie, and Dodd.

It was then decided that the next out-door meeting should be held on the 19th inst. at Finnech Glen.

LIVERPOOL AMATEUR PHOTOGRAPHIC ASSOCIATION.

THE monthly meeting of this Association was held at the Free Library, on Thursday evening, the 27th ult., Mr. E. ROBERTS, President, in the chair.

The minutes of the March meeting having been read and confirmed, Messrs. P. W. Baker and T. Crooks were elected members of the Association.

The HON. SECRETARY presented his report of the Society's excursion on April 19th. The first party of members met at the "Oak," at Bettws-y-Coed, on the 18th ult., and, on the following morning, in spite of difficulties of wind and weather, were early afield at Pandy Mill and Lledr Bridge. The noon train brought a further addition to the party, and a pleasant drive to Dolgarrog followed. The falls were certainly exceedingly fine, but they are so shut in by big trees that a good picture of them proved to be an impossibility. After several negatives had been secured the drive was continued to Tal-y-Cafn Ferry, where Mr. Bruce took an instantaneous picture of the party in the boat.

The CHAIRMAN called the attention of the members present to the apparatus book—a useful institution at the meetings which had fallen into disuse of late.

The Rev. H. J. PALMER passed round some negatives taken in Enloe Glen, near Hawarden, and offered to pilot thither any of the members who desired a short excursion to good and accessible subjects.

Dr. KENYON read a paper on "Landscape Lenses for Instantaneous Photography" (see page 253).

Mr. T. W. BRUCE complained of flare and blurring from a landscape lens he had used.

Mr. W. H. WILSON said that the want of coincidence between chemical and optical foci was an evil to which landscape lenses were specially subject.

Dr. KENYON had obtained no better results with rapid symmetrical doublets of large size and aperture than with the single landscape lenses before the meeting.

Mr. H. N. ATKINS exhibited a home-made instantaneous shutter of simplest construction, which could be adjusted to any length of exposure—from a fraction of a second upwards.

Mr. W. H. KIRKBY showed a photograph taken with his shutter from a train in motion at the rate of fifteen miles an hour. The picture was a seascape, and the ripple of the waves was well defined.

Mr. A. K. BEAN exhibited some prints presented to the Society's album by Mr. J. Meyer.

Mr. J. H. T. Ellerbeck passed round a gelatine negative, of which a portion had received very decided intensification by being accidentally placed near a fire before desiccation had been completed.

Mr. H. Houlgrave showed a print from a negative, taken and developed in Ceylon, on an emulsion which had been made in the island.

Mr. J. H. Day exhibited a shutter made in wood, on the principle of the Rev. H. J. Palmer's cardboard exposer.

The Rev. H. J. Palmer gave a demonstration of the intensification of a gelatine negative. The plate in question was cut into four parts—one portion being treated with Moryson's intensifier, a second with Houlgrave's silver method, and a third with Edwards' mercury intensifier. It was thought that the Moryson portion was the most successful. Not only was the density of a very weak negative rendered satisfactory, but a slight fog which was noticeable on the original negative was cleared off in the operation of intensifying.

Mr. Blanchard exhibited a picture taken in Old Calabar, but developed and printed in England.

Mr. E. Phipps asked if anyone present could report on the advantage or disadvantage of sulphite of soda in the developer.

The Chairman said he he had used it with considerable success. Mr. Kirkby also gave his verdict in its favour.

Messrs. Bruce, Gorst, and Palmer exhibited a number of negatives and prints taken at Bettws and Dolgarrog at the last excursion.

Mr. Kirkby showed a very perfect instantaneous picture of a hen and chickens; Mr. Ellerbeck some fine prints from negatives taken at the lakes; and the Rev. H. J. Palmer some good 9 by 7 prints from negatives of Dolgelly, and some pictures printed by the Autotype Company from negatives of Swiss subjects.

The Chairman anounced that Tuesday next, the 9th inst., would be the last of Mr. Ellerbeck's "at homes" for the present.

A vote of thanks to Dr. Kenyon was carried unanimously, and the meeting adjourned to the last Thursday in May.

Bolton Photographic Society.

An extra-ordinary meeting of this Society was held on Thursday, 20th April, Mr. R. Harwood in the chair.

After the minutes of committee meetings with reference to recent open meeting had been passed, and Treasurer's statement of expenses had been passed, Mr. J. H. Wright was elected a member of the Society.

On the motion of the Hon. Secretary, it was resolved to hold the open meeting annually, about March or April.

It was also resolved that the best thanks of the Society be tendered to Mr. Perry and his glee party, for their services, it being remarked "that their performances enhanced the pleasures of the evening very much."

The Hon. Secretary read a letter from Mr. Carvalho, of N.Y., referring to the formation of an International Society. It was proposed that this be laid on the table until information be obtained.

Talk in the Studio.

Photographic Society of Great Britain.—The next meeting of this Society will take place on Tuesday next, May 9th, at 8 p.m., in the Gallery, 5A, Pall Mall East, when a paper will be read by Captain Abney, R.E., F.R.S. Some tents will be shown for developing any plates in, and methods of artificial light for developing shown and discussed.

Cantor Lectures.—Mr. J. Comyns Carr will deliver the last Course of Cantor Lectures for the present session at the Society of Arts, on Mondays, May 8, 15, and 22, the subject being "Book Illustration, Old and New." In the first lecture Mr. Carr will treat of the proper relations of printed text and illustrated design, and of the history of early wood engraving. The second lecture will be devoted to the consideration of the various modes of book illustration, and the modern development of wood engraving. Modern processes of illustration, and the influeuce of photography upon the art, will be considered in the last lecture.

A Photographers' Ball.—On Thursday, the 27th instant, a ball was held at Seyd's Hotel, Finsbury Square, about 100 persons being present. An agreeable evening was passed, but the cordial cheerfulness which characterised a similar assembly held last year under the auspices of the Photographic Club was absent—a circumstance which may have partly arisen from the fact that many of those present were strange to each other, as only a few of those gentlemen who are regularly seen at the ordinary photographic meetings attended. Numerous songs were sung, and one of Mr. Cobb's characteristic topical effusions was received with a genuine expression of approval. It is understood that any profits which may result will be handed over to the Photographers' Benevolent Association.

A Non-Electric Incandescent Lamp.—A new incandescent lamp has been recently invented by Dr. Regnard, and is suitable for projections where electricity or limelight cannot be had, as well as for other purposes. In it a mixture of air and petroleum vapour is burnt on a piece of platinum net, which is thus raised to a white heat. The lamp consists of a Bunsen burner, the mouth of which is closed by a small cage of platinum wire. The burner is connected below by means of caoutchouc tubing with a stoppered jar holding petroleum; the stopper supports a longer and a shorter glass tube, the former dipping in the liquid, and being connected with bellows or other blowing apparatus; the other connected with the lamp. With a continuous air-current, several of the lamps may be kept in action at once, to light halls, &c., and the aspect resembles that of a Swan lamp.

Violent Hailstorm.—The severe hail and thunderstorm which broke over Hereford and the district on Wednesday afternoon has done much damage to several photographic studios, and we receive similar accounts from Wolverhampton. The German system of insurance against hail is not urgently required in this country, as severe storms are not nearly so frequent in our island as in Germany; but, considering that a small premium only would be required to cover the risk, it might be desirable for some such system to be introduced here.

To Correspondents.

*** Mr. Plener's Method of Isolating the Sensitive Constituent of Emulsion.—We have received a letter from Captain Abney in which he is good enough to give some interesting details of Mr. Plener's method as seen by him at the house of a mutual friend, in whose hands Mr. Plener had placed one of his apparatus. Captain Abney does not appear to gather from our leader of last week that we had repeatedly seen Mr. Plener's process carried out, and that we delayed the publication of the method at Mr. Plener's request, as the publication of a process prior to the application for certain foreign patents may render these of doubtful validity. We must therefore allow Captain Abney's interesting communication to stand over for a short time.

P. D. R.—It is probable that you might hear of what you require through the medium of an advertisement.

Chemical.—1. A rinse in the benzoline used for lighting purposes will be found useful as a finish after the turpentine. 2. The paper should be sized with a weak and warm solution of gelatine in order to prevent the penetration of the oil mediums. 3. There is no book which comprehends them all, but a moderate acquaintance with chemistry would render such a work unnecessary.

Beta.—1. Yes, if kept clean. 2. We do not know if any are in the market; but if prepared according to Dr. Eder's directions no difficulty is likely to arise. 3. You might try Dr. Vogel's emulsion, which is, we believe, obtainable from Messrs. Rouch and Co. 4. Probably before long.

A. F.—It should doubtless read thus:—4 parts chloride of potassium, 1 part chloride of cadmium, 240 parts of water.

I. A. N.—You will find it decidedly better to purchase the higher priced article in this case; as when a second-rate objective is used every picture suffers, and you can never rise above the limit imposed on you by the quality of your lens. Another matter is that instruments by the best makers always have a certain second-hand value, perhaps a trifle over half the original cost.

X. Y. Z.—Prussian blue as prepared for the use of water colour painters is the best material. You will require a sable brush of good quality, so that the tip can be worked up to a fine point.

Alpha.—See Notes in Photographic News of Nov. 18 last.

T. L. M. C.—The proportions are quite right; but the weak solution of hyposulphite is best used fresh.

Henry Turner.—1. The Autotype Manual will probably answer your purpose very well. 2. With a small stop it will answer fairly well, provided you can place the camera a fair distance from the objects, and in this case you should work on a plate one size smaller than the lens is supposed to cover.

Charles Belton.—The picture was exhibited the year before last, and we believe that a considerable number of copies were sold, 2. The address as you have it is correct.

M. T. M.—Although it contains a large proportion of sulphur, there is no danger as long the surface is good and uncorroded.

THE PHOTOGRAPHIC NEWS.

Vol. XXVI. No. 1236.—*May* 12, 1882.

CONTENTS.

MR. PLENER'S METHOD OF ISOLATING THE SENSITIVE CONSTITUENT OF GELATINO-BROMIDE EMULSION.

A fortnight ago we intimated to our readers that Mr. Plener had, by a remarkable and rapidly executed mechanical process, succeeded in isolating the sensitive constituent of gelatino-bromide emulsion, and we are now in a position to give detailed particulars.

A strong circular metal bottle, having a flat bottom, and sides which gradually slope inwards towards the centre, where they merge into a neck, is fixed on a vertical spindle which can be rotated with enormous velocity. Under these circumstances, any emulsion which may be contained in the rotating vessel rapidly becomes separated mechanically, the solid particles being driven to the extreme outer edge of the centrifugal separator, where they agglomerate into a tolerably compact mass, which may, in its turn, be broken up and washed several times with water or other fluid, the separation being each time effected by the same method.

The centrifugal tendencies of rapidly rotating bodies have proved of great value in many industrial operations, and our readers are doubtless aware that crystals of sugar are separated from the syrup in which they are formed by rapid rotation in a cage of wire work; the crystals being retained, while the syrup is driven through the meshes of the wire-work. The centrifugal machine, or hydro-extractor, is also largely used for partially drying various other chemical products, and also textile fabrics; while the process of manufacturing crown glass is a further illustration of the principle. Assuming Mr. Plener's centrifugal separator to be one foot in diameter, the speed of revolution required in ordinary cases would be no less than 4,000 revolutions per second, while in the case of a vessel eight inches across it would be necessary to increase the rate to 6,000. It is scarcely necessary to remark that continued rotation at such a velocity necessitates the highest quality of work as regards the mandril and bearings; while the tendency of the heavy metal vessel to fly to pieces becomes so considerable under the enormous centrifugal force developed, that any unequal disposition of the weight must be most carefully avoided. The most important aspect of Mr. Plener's process is that it enables one to put fresh and undeteriorated gelatine in the place of that which has been partially decomposed by heat or other agencies, the tendency to green fog and frilling being therefore practically eliminated; it is also likely to prove very valuable as allowing the sensitive compound to be prepared on a manufacturing scale, so that the process of emulsion making may be simplified and made more certain for amateurs and plate makers.

We subjoin Mr. Plener's final specification, and hope before long to return to the subject.

My invention consists substantially of the following particulars:—

According to the first part of my invention, given an emulsion of chloride, iodide, or bromide of silver prepared in the usual way with gelatine, gum, or any colloidal body, or any mixture of some of these emulsions, I operate upon some preferably just after it has been made sensitive by any known means, and before any further operation has been proceeded with, I melt this emulsion by heating, if it is set, and place it in a metallic vessel, preferably having the form of a truncated cone (although the shape may be different), silver-plated inside, which I make to rotate with the speed of about four thousand revolutions per minute, if the vessel is one foot in diameter; but should the diameter be larger, then the number of revolutions must be in inverse ratio of the diameter. During the rotation of the vessel I heat it with a flame of gas or a lamp to prevent setting of emulsion, should it have a tendency to it. By the effect of centrifugal force the heavy salts are driven to and deposited on the circumference of the bottom of the vessel, and in about ten minutes the separation of powder and liquid is effected. The time varies with the quantity and the state of decomposition of gelatine in the emulsion, also with the size of the grains of silver salts. I then slowly stop the rotation, draw out the solution by means of a syphon, pour into the vessel some warm water, and with a brush mix the powder with water, make the vessel rotate again, and so on. I repeat this operation till all traces of gelatine and soluble salts are eliminated. The remaining powder of sensitive silver salts to make emulsion of I mix with fresh gelatine, collodion, or any substance destined to serve as vehicle for it in subsequent operations. To prepare the collodion emulsion I mix well the powder isolated from gelatine with about half of its weight of glycerine, and emulsify the mixture in a large quantity of alcohol, allow the powder to settle, pour off the supernatant liquid, repeat the operation with fresh quantity of alcohol, and the dry powder so obtained I mix with plain collodion.

According to the second part of my invention, if the emulsion to be worked upon gives through over-boiling or over-digesting foggy plates, then I proceed thus:—I place it in the said vessel and cause the latter to rotate for (say) about fifteen minutes, at a speed of between two and three thousand revolutions per minute, more or less. In this case only the largest grains of silver salts, those which are more sensitive to developer than to the light, and which produce fog, are deposited as before described. Having stopped the vessel I draw out the emulsion, which I treat afterwards as described in the first part of this specification.

According to third part of my invention, in cases where the sensitiveness of the washed emulsion is insufficient, be it through faulty preparation or action upon it by some oxidising solutions known in photography as fog destroyers, then I add about five grains of ammonium bromide to each ounce of emulsion, and digest or boil it in the usual way, till the desired degree of sensitiveness is reached. After this I treat it as described in the first part of this specification.

Having now particularly described and ascertained the nature and object of the said invention, and in what manner the same is to be performed or put in practice, I hereby declare that I claim the invention of improvements in the preparation of photographic emulsions, wherein the following are particular and important points or features :—

1. The application of centrifugal force for the isolation of silver salts from an emulsion as described in the first part of this specification.

2. The application of the same force for the division of an emulsion into several parts, according to the different size of the grains of silver salts as described in the second part of this specification.

3. The emulsion may be made to contain during the boiling or digesting unlimited quantity of water and gelatine, and thus is obtained the fine granular state of the silver salts in emulsion.

4. By eliminating the decomposed gelatine, and replacing it by fresh gelatine, all the defects in dry plates caused by the decomposition of gelatine, viz., frilling, weakness of images, &c., are got rid of.

5. The silver salts eliminated from emulsion so as not to be liable to change under long keeping, whereby the storing of same, and mixing up in great quantity, become possible, and thus uniformity of dry plates may be secured.

6. When the emulsion gives foggy plates, the same may be restored to good quality, as described in the second part of this specification.

7. To increase the sensitiveness by boiling or digesting, which may be repeated as described in the third part of this specification.

8. The silver salts once isolated from gelatine, so as to serve for the preparation of collodion emulsion, as described in the first part of this specification.

In witness whereof I, the said Joseph Plener, have hereunto set my hand and seal, this fifth day of May, in the year of our Lord one thousand eight hundred and eighty-two,

(Signed) Joseph Plener.

A NEW METHOD OF PREPARING IODIDE AND BROMIDE EMULSION.

In a recent number of the *Archiv*, Dr. Liesegang makes some interesting remarks upon the preparation of a sensitive emulsion in the old-fashioned manner with collodion, and he points out how a similar proceeding may be applied to the modern gelatine process. He says :—Eighteen years ago I referred to the circumstance that a collodion capable of being used without a silver bath might be prepared by mixing a plain collodion with a saturated solution of iodide of potassium, in which as much iodide of silver had been dissolved as the liquid was capable of taking up. Under these circumstances, the collodion becomes milky or turbid, and it is scarcely necessary to remark that plates coated with it must be soaked in water, to remove the alkaline iodide ; and the use of a tannin preservative was recommended. The above-described process may be very much simplified by the modern proceeding of precipitation of the emulsion with water, and re-solution in a mixture of alcohol and ether, the following details being recommended to the notice of those who desire to try the process practically.

The ordinary iodizing solution for a litre of collodion, as ordinarily employed for the wet process, is precipitated with a moderate excess of aqueous silver nitrate solution, and the mixed iodide and bromide of silver is thoroughly washed by decantation, the last wash water being poured off as completely as possible. Powdered iodide of lithium is then added, with constant stirring, until the precipitate dissolves ; when the solution is mixed with a litre of plain collodion, or, rather, half a litre of collodion made up with a double quantity of pyroxyline ; as by this latter modification the amount of alcohol and ether wasted is reduced to one-half. Contrary to expectation, the collodion remains clear ; but the next step, which consists in pouring it into a considerable excess of water with constant stirring, serves to precipitate all solid constituents, except the soluble iodide of lithium. After the precipitate of the flocculent matter has been thoroughly washed and dried, it is dissolved in a mixture of half a litre of alcohol and half a litre of ether ; the resulting emulsion being used in the ordinary way, and ferrous oxalate being well adapted for development. The pictures may be easily intensified, after fixation, with the usual pyrogallic acid and silver intensifier.

Gelatino-bromide emulsion may be prepared in a similar manner, the details being as follows :—Twenty grammes of bromide of potassium and twenty-eight grammes of silver nitrate are separately dissolved in water and mixed. After thorough washing, the last water is poured off until 140 cubic centimetres remain, and then eighty grammes of powdered bromide of potassium is added. When the whole has dissolved, 28 grammes of gelatine is soaked in the liquid until well softened, after which the heat of a water-bath is applied. A clear gelatino-bromide mixture is obtained ; but, when it is washed in the usual way, it becomes milky ; and, after being once more melted, it is ready for use.

A PHOTOGRAPHIC LAWSUIT IN FRANCE.

The French legal organ "La Loi" of the 4th instant gives the decision of the Tribunal of the Seine as to an alleged infraction of Pellet's Cyanofer Patent by M. Ad. Joltrain, who recently patented and worked commercially a process in which a mixture of ferric salts and gum formed the sensitive material, as is the case of Pellet's method. A second indictment was made against the defendant, namely, that of perfidious competition (concurrence déroyale), an offence unknown in English law courts.

It appears that Miss Joltrain, a sister of the defendant, was the proprietor of the business founded for the commercial working of Pellet's process, and that the defendant had acted as her manager or as director of the factory. Not long ago the business of Miss Joltrain was removed to fresh premises, and the defendant, who left her service about this time, took the original works, engaged some of the old hands, and commenced the manufacture of the prepared paper which formed the subject of this action ; the new business being also carried on under the name of Joltrain.

It is impossible to look over the evidence and the pleadings without being struck by the greater facility which is afforded in France for arriving at a conclusion in such a case ; and the finding of the Court is in reality a complete history or abstract of the case. The judgment enters minutely into the photographic principles involved in most copying processes of an analogous nature, points out that the method patented by Joltrain is essentially identical with that of Pellet, and briefly reviews the earliest contact printing methods, at the same time pointing out in what respects Pellet's method differs from them. The defendant is then ordered to pay to his sister compensation for the losses occasioned by his infringement ; and the confiscation of all appliances used by him in his manufacturing operations is decreed. The defendant was also ordered to pay for advertising the decision in three journals to be chosen by Miss Joltrain ; but the accusation of perfidious competition was not considered to be sufficiently proved, as there was no evidence that the defendant had personally endeavoured to do business with the plaintiff's customers.

At Home.

MR. J. E. MAYALL'S ELECTRIC STUDIO IN BOND STREET.

Electric studios are increasing apace. London now counts four such studios, if we include that of Messrs. Negretti and Zambra at the Crystal Palace, while in Paris, St. Petersburgh, Brussels, and Vienna, studios lighted by electricity are to be found. It is a sign of the times none should fail to note, and he would be a bold man indeed who expressed an opinion against the likelihood of electric studios not becoming general in a year or two. If we are to have electric lighting everywhere in our houses, instead of gas-jets, as seems pretty certain, then photographic studios incapable of illumination by electricity will certainly be the exception, and not the rule. Mr. Van der Weyde, as everybody knows, was the first to show how well electricity could be used for lighting the sitter, and it is only just and fair to state that the simple arrangements he contrived some six years ago, are now, with some slight modification, universally adopted.

Mr. Mayall's fine studio in Bond Street marks a new departure in many ways, and may be taken as a model of what we may expect, in the future, a first-class photographic studio to be. That neither expense nor trouble have been spared in its installation and decoration is to say but little; and when we add that only a few months ago the studio was fitted for the taking of daylight portraits, with reception rooms on the upper floors, not far removed from the glass-rooms on the roof, all of which arrangements are now thrown out of gear and demolished, to make way for the new order of things, the costliness of the undertaking may well be imagined. The well-lighted glass-rooms have been given over to artists and retouchers, and the handsome drawing room on the first floor, its decorations hardly complete, has been dismantled and cut up into laboratories.

Mr. Mayall's studio now occupies the whole building in Bond Street from floor to basement, the premises previously occupied by Messrs. Ross and Co., the well-known opticians, serving as a handsome bureau. Mr. Mayall takes portraits by electricity, and by electricity alone, for his experiments at once proved how suitable was this artificial illumination for the purpose. He has taken the cabinet portrait as his standard picture. and so thoroughly effective is his lighting, that the pose rarely exceeds three or four seconds. But he does not confine himself to cabinet pictures. Here are groups and figures larger than any we have yet seen produced in an electric studio. This group picture of Mr. and Mrs. Kendal, both at full length, measures twelve inches by eight, and whether for softness or brilliancy, is not to be surpassed. Really, until we actually pay a visit to the electric studios, and find no other locale available for portrait taking in the building, we have our doubts whether so large a surface can be equally and harmoniously lighted for camera work by the electric light, as this and other pictures prove to be. Here is a large head—four inch—of Dean Bradley, taken direct by the electric light, to show another phase of the process, and here theatrical scenes from "The Lights o' London," "The Squire," &c. So that electric photography is no longer in its infancy, but has been tried in well-nigh every branch of the art already.

Before leaving the bureau—in which, by the way, we notice the first medal given in this country for portraits by electricity, awarded to Mr. Mayall at the Exhibition of the Brighton Health Congress—we enquire the terms of the new studio. For cabinet pictures, the charge is three guineas a dozen enamelled, or, if unenamelled, two guineas, while cartes-de-visite are a guinea and a half and one guinea respectively. The glazing is most exquisitely done, reminding one of the best Russian work, and it would be impossible to give higher praise. There is glazing and glazing, as all photographers know, and it is only when the translucent surface is highly brilliant and perfectly colourless, that all trace of vulgarity disappears.

We proceed to the studios in company with Mr. Mayall's amiable manager, M. Rémandas. We have not far to go. In fact, by simply crossing the bureau or reception room, and without ascending a single stair, we arrive at our first destination. Our guide opens a mirrored door, and we step in. "This is our invalid studio," M. Rémandas remarks. It is a small apartment, not seventeen feet long, we should think, with sombre walls and without any direct daylight at all. There is no pretence about the electric light helping to eke out the daylight here; what light is employed must come from the umbrella-like apparatus that is swinging aloft. This umbrella is the reflector; it is lined on the inside with white glazed paper, and measures, perhaps, four feet across, or a little more. Where the handle of the umbrella would be, if it were a rain-defier, is a four-inch metal cup—not a semi-transparent saucer—and in this cup the carbon points are brought together to produce the light. The cup has a two-fold object; it prevents fragments of hot carbon falling, and it does not permit the sitter to see the carbon points at all, and saves him all inconvenience of glare.

Mr. Mayall makes use of very powerful illumination. The light of his electric arc is equal to no less than 12,000 candles, and it may be worthy of note that the gas engine in the basement employed to develop sufficient force to grind out this amount of electricity from the magneto-electric machine moves with so little vibration that one has no idea of its existence. A delicate violet tint suffuses itself over the interior of the reflector during the illumination, and makes it appear as if coloured paper, and not white, is being employed for reflection. This effect, we cannot help thinking, subdues in a measure the light to the eyes of the sitter.

We proceed to the first floor—up a circular staircase handsomely decorated in Japanese style of art—to a second studio. This also is nothing more than an ordinary room, except that it is a very sombre one. This apartment is pretty long, but probably not more than ten feet wide; its narrowness gives the idea that it has been sought to keep the light concentrated by confining it. M. Rémandas proposes we shall go through the ordeal of having a portrait taken, that we may be the better able to judge of the lighting. To this we readily consent—for the sake of our readers. Some white screens, made simply of white paper, are employed for reflecting the light, which is cast from the umbrella apparatus, this being suspended to the right and in front of the sitter. This primary reflector, as we have said, swings from the ceiling, and an assistant taking it in his hand can move it about, heighten or lower it, as he pleases. Thus, it is not rigidly fixed during the exposure, and all hard shadows are avoided. At the time of exposure, the reflector is probably about three feet above the sitter's head and two yards off; on his left, also somewhat to his front, is placed the principal paper screen.

In our own case, an exposure of but three seconds was given for a cabinet bust portrait. "We like to over-expose slightly," says M. Rémandas, "as thereby we obtain softness and delicacy to a degree, while to strengthen our negative I use tannic acid and silver, the details of which I will give you presently." We enquired if gelatine plates of his own make were being used. "Oh, no; the plates of all makers in the market have answered our purpose very well; this present one is a Paget."

The posing and exposing is very quickly over, for the simple reason that the work is admirably subdivided. One assistant attends to the reflector, and another to the focussing of the image and to the introduction of the plate, so that M. Rémandas can give his whole attention to posing and judging the effect of lighting; beyond that, he simply takes off the cap and replaces it. The light of the room is so subdued behind the camera, that there is no need of a cloth either to focus or to cover up the dark slide.

We make a journey to the top of the house, where, by reason of the new arrangements, artists and retouchers may revel in plenty of light. Some magnificent carbon enlargements—from negatives taken by the electric light—are here in course of finishing; as enlargements err usually in being a little too vigorous and hard, the exquisitely soft electric negatives are found to be decidedly advantageous in amplifying. For retouching the film, a little "medium" is used, and a finely pointed HB pencil.

Finally, we pay a visit to the basement to make a call upon the electric engineer, and to visit some dark-rooms which M. Rémaudas has just constructed. It is not until one reaches the basement and sees the energetic little engine spinning round, that its presence is revealed, and even here there is no vibration of any moment. Farther on in these cool cellar-like quarters are the laboratories, which could not be more advantageously located. We enter one of the little rooms; it is light enough now, for daylight enters through a hole a foot square, that looks into the passage. By simply bringing across a frame glazed with ruby glass —the rabbett of which is inside the dark room—every ray of white light is at once shut off. There is no artificial light inside the room to heat it and fill it with noxious vapour; if a lamp is necessary, this is at once provided by a gas bracket outside the window, and when ruby light is no longer imperative, the window is slipped on one side, and the flaming gas bracket pulled within, if its presence in the room is desirable. A more simple and effective plan of illuminating a dark room could not be devised.

The formula for strengthening gelatine negatives in use in Mr. Mayall's studio is as follows:—

Solution A.—Tannic acid...	... ...	2 drams
Water	... ...	10 ounces
Solution B.—Nitrate of silver	... ...	15 grains
Water	... ...	1 ounce

A few drops of the tannic acid solution are mixed with the silver and applied to the fixed, washed, and alumed plate.

The "By-the-Bye" next week will be "Paris and the Salon."

FRENCH CORRESPONDENCE.

PRINTING IN HALF-TONES WITH BITUMEN OF JUDÆA—PHOTOGRAPHIC REVOLVER—REMEDY FOR DISCOLOURATION OF NEGATIVES DEVELOPED BY PYROGALLIC—ACCIDENTS AND DISEASES TO WHICH PHOTOGRAPHERS ARE LIABLE—COMMITTEE FOR THE POITEVIN MONUMENT.

Application of the Process of Printing in Half-tones with Bitumen of Judæa.—In my last letter I described Captain Biny's interesting process for taking a positive in bitumen, in which the modelling was absolutely perfect, and similar in effect to that obtained with salts of silver, so far, at least, as the printing and continuity of the half-tones are concerned. At the meeting of the Photographic Society of France I had the opportunity of exhibiting a whole series of these remarkable prints. It stands to reason that if, instead of using a negative, we were to start with a positive in gelatino-bromide, we should have a negative counter-proof in bitumen of Judæa. At first, no doubt, it is difficult to appreciate all the applications of which this new process is capable, and at the meeting in question several persons who happened to be standing near me were asking what could be done with prints in bitumen. I do not pretend to be able to give precise information on this subject, but I think I could point out several important methods in which the process might be advantageously utilised. It is well known that bitumen of Judæa has a much greater power of resistance to the action of acids than any of the bichromatised mucilages (such as gelatine and albumen) after being acted on by light; it is for this reason that bitumen holds a high place among the substances used in chemical photo-engraving. But up to the present, prints in which bitumen forms the protecting agent against the etching liquid can only be used in copying subjects in line or hatching; it remains, therefore, to be seen whether we cannot improve photo-typography by the employment of plates in bitumen in which the images are expressed in half-tones. I have full hope that this may ultimately be the case. The image in bitumen would be the result of direct transformation, either from a negative or from a positive on collodion (not in gelatine), according to circumstances, and previous to flowing the collodion over the plate the latter should be coated with some insulating substance, such as tallow or one of the resins. When the transformation is quite complete, the film of collodion supporting the image in bitumen above the glass plate should be removed, and the transfer to the zinc or copper plate should be effected by heating the latter sufficiently to soften the layer of bitumen, and cause it to adhere completely. After this has been done, the collodion pellicle should be destroyed in the same way as this is effected in the process of photographic enamels, by dipping it in a mixture of equal parts of alcohol and ether; and finally the plate should be exposed to the action of dilute acid, which would penetrate the bitumen in proportion to the depth of tone—that is to say, not at all in the thick parts, and, in the other parts, more or less in proportion to the thicknesses of the bitumen. There appears to be no reason why a slight resinous grain should not be impressed on the print to be transformed before printing on the layer of bitumen, and the result would be a regular granulation, which would have scarcely any injurious consequence on the continuity of the modelling, but would be quite sufficient to heighten the typographic effect. A curious point in this process is that the action of copper bichloride and of sodium hyposulphite are produced through the layer of bitumen; these substances must, therefore, penetrate through the bitumen, and this confirms me in the opinion that there is a highly favourable prospect for the introduction of these half-tone prints into the photo-engraving process. It might be possible to mix with the bitumen varnish a small quantity of some inert powder of a suitable degree of density, and this would contribute directly to the required amount of graining. The powder would remain imprisoned in the bitumen in greater or less quantity according as the action of light should have been more or less intense. By transfer of the bitumen image to glass, or enamel, or glazed porcelain, the subjects might be etched in with hydrofluoric acid, and this would afford an easy means of obtaining a result which in other ways costs a deal of labour and trouble. From the above indications the numerous applications of which Captain Biny's process seems to be capable will readily be understood.*

Photographic Revolver.—Dr. Marey has just shown me his photographic revolver, by means of which he is able to take photographs of a bird in its flight, and so to produce means for the investigation of its movements. The specimens produced with this instrument by M. Marey have, up to the present, only a rudimentary value, but hopes may be entertained that more successful results will soon follow.

Remedy for the Discolouration of Negatives which have been developed with Pyrogallic Acid.—The method employed by M. Alfred Chardon for curing the discolouration produced by the use of pyrogallic acid in developing negatives would seem to promise very highly. His first rule is that it is absolutely necessary to fix and wash the negative in a place where no white light can penetrate. After the last washing he plunges the plate into a bath of 25 grammes of citrate of ammonia dissolved in 500 grammes of water. In a few minutes the greenish tint of the image disappears, and its place is taken by the neutral tint of wet collodion plates. He then washes again thoroughly in water, and he is able to guarantee perfect permanence.

Investigation of the Accidents and Diseases to which Photographers are Liable.—Dr. Duchesne has undertaken an inquiry into the causes and treatment of those special complaints from which photographers so often suffer, and he hopes to be able to publish a work on this interesting branch of pathology. Any having made a study of the action on the human subject of the chemicals most used in the laboratory are asked to submit their observations

* We remember seeing a number of bitumen prints in half-tone, which were exhibited on the occasion of a lecture on "Photo-Engraving" which was delivered at the Society of Arts some three or four years ago. The bitumen film was spread on a pellicle through which the exposure was made; and development was effected by a mixture of turpentine and benzole.

to the learned doctor, who will include them in his valuable work. I am quite at the service of the readers of the Photographic News to transmit to Dr. Duchesne any communication on the subject which may be addressed to me.

Nomination of the Committee for the Poitevin Memorial.—The committee to raise a subscription in aid of a monument commemorative of Poitevin has been nominated, and will shortly be appointed. Half of the number are nominated by the Photographic Society, and half by the *Chambre Syndicale.* The former consist of Messrs. Davanne, Franck, Tourand, Stebbing, and Londe; the latter, of Messrs. Lévy, Léon Vidal, Guilleminot, Berthaud, and Audouin. A considerable sum has already been raised, and so soon as the committee is regularly appointed, subscriptions may be expected to flow in freely as well from France as from foreign countries, and it is hoped that a sufficient amount will be realised to render the monument worthy of Poitevin's reputation. To honour our great men is to honour ourselves! Leon Vidal.

COLOURED TRANSPARENCIES FROM SILVER IMAGES.

BY C. R. WOODS.*

(Second Paper).

A few months since I had the honour of calling your attention to certain methods of toning or colouring transparencies by replacing the silver, wholly or in part, by other substances. The results of a few additional experiments in the same direction may, perhaps, be of sufficient interest to warrant my placing them before you.

The substances that most easily lend themselves to this purpose are the compounds of the metals with the double cyanides of iron and potassium; of these, those metals whose ferrocyanides are insoluble in water and dilute acids, and whose ferricyanides are soluble, are most easy to manipulate. These are iron, uranium, lead, aluminium, antimony, mercury, tin (stannicum), and zinc. The pictures obtained by pouring solutions of the ferricyanides of these metals over a silver image may be further modified by the use of other suitable reagents.

The first three, iron, uranium, and lead, are the only ones that seem hitherto to have received any attention; the last mentioned of these three having been utilized by Eder and Tóth to intensify negatives. A solution of nitrate of lead and ferricyanide of potassium—

Plumbic nitrate	... ...	20 grains
Potassic ferricyande	... ...	30 ,,
Water	... ...	1 ounce

are poured over a plate, and the white image thus produced is treated with sulphide of ammonium. Instead of ammonic sulphide, if a solution of potassic chromate, preferably slightly acidulated with acetic acid, be used, a brilliant yellow image may be obtained. It has recently been stated (Leon Vidal, Photographic News, vol. xxvi, p. 107), that if a solution of potassic chromate, rendered strongly alkaline with ammonia, be used, a red image is produced. By this formula, however, I have only succeeded in obtaining yellow, and not red, pictures; and if it be the red subchromate of lead that is desired, I have been unable to obtain it even with somewhat violent means. If the plumbic ferricyanide solution and the ferric ferricyanide solution be used alternately, and then potassic chromate, a green picture may be obtained, but it is exceedingly dark and dense, and the original picture must be somewhat weak. Yellow pictures may also be produced by treating the white image, formed by Eder and Tóth's formula, with a solution of potassic iodide.

The image formed by treating a picture with potassic ferricyanide and an aluminium salt is white; and as all the insoluble compounds of aluminium produced by wet methods are white, nothing is to be gained by the use of salts of this metal.

The image produced by a solution of potassic ferricyanide and a salt of antimony is also white, but a red picture may be produced by converting this white image into red sulphide of antimony by a solution of sulphuretted hydrogen slightly acidulated with hydrochloric acid. A readier method of obtaining these red pictures, however, is that already known, viz., by the use of Schlippe's salts (sodic sulphantimoniate).

* Read before the Photographic Society of Great Britain.

Mercuric salts give no precipitate with potassic ferricyanide, but a white precipitate with potassic ferricyanide; this precipitate, after a time, turns blue. Mercurous salts give a brown precipitate with potassic ferricyanide, which after a time turns white. If a solution of mercuric chloride and potassic ferricyanide be poured over a silver image, both these compounds are produced, the second preponderating; and a brown picture is obtained, which, as might be expected, turns a bluish grey. I hoped to obtain a colour suitable for cloud-pictures by this means, but the colour is far too dense. It might be used as an intensifier; but as it would possess no advantages over the mercury intensifiers now in use, no formula need be given. A solution of iodine poured over this film gives an orange picture in mercuric iodide. An orange picture may also be produced by treating a picture produced by mercuric chloride and potassic ferricyanide with chromic acid, after it has turned to the bluish grey referred to. The orange picture is due to a mixture of ferric and mercuric chromates. If the brown image be treated with chromic acid or potassic chromate before its colour has changed, a yellow picture is obtained.

The pictures produced by zinc and stannic salts, with ferricyanide of potassium, are also white. Salts of the former metal are of no use for obtaining coloured pictures, for the same reasons for which aluminic salts may be discarded. Yellow transparencies might be obtained by converting a white image of stannous ferrocyanide into a yellow one of stannous sulphide by a solution of sulphuretted hydrogen, but yellow pictures are easily obtained by readier processes.

There are various other metals whose compounds with potassic ferricyanide are of suitable colours, but owing to the insolubility of their compounds with potassic ferro-cyanide they cannot be readily utilised, and somewhat roundabout methods have to be resorted to.

Copper gives a reddish-brown precipitate with potassic ferrocyanide, and a dirty green precipitate with potassic ferricyanide. If the green precipitate with a cupric salt in excess comes into contact with silver immediately on precipitation, the brown cupric ferrocyanide is produced. A convenient method of obtaining chocolate-red pictures with copper salts is the following:—30 grains of cupric sulphate are dissolved in 1 ounce of water, and enough ammonia is added to nearly, but not quite, re-dissolve the precipitate produced. A second solution is made, containing 30 grains of potassic ferricyanide to the ounce. Three parts of the first to one of the second solution should be mixed just before flowing over the image; the solution should be just slightly turbid. Another method of producing these chocolate-brown pictures is to bleach a picture by cupric bromide by the usual formula:—

Sulphate of copper	... ...	50 grains
Bromide of potassium	... ...	30 ,,
Water	... ...	2 ounces

by which means sub-bromide of silver and cuprous bromide are formed, and, after washing the plate, to immerse it in a solution of potassic ferricyanide of 30 grains to the ounce. The picture subsequently darkens by the reduction of the bromide of silver. Iodide of potassium is to be preferred to bromide, both on account of the greater insolubility of the cuprous salt formed, and the less liability to darken in the light. The former method, however, in which no haloid salt of silver need be left in the film, gives a more transparent chocolate-red; but both methods may find their applications, as neither colour is identical with that produced by uranium. These methods of obtaining pictures in salts of copper may, perhaps, be turned to account by burning the pictures into the glass, the metal being suitable for the purpose.

Another brown colour may be produced by the use of salts of molybdenum, the colour possessing a rather olive tone. Both molybdous and molybdic salts produce a brown precipitate with potassic ferricyanide; but we have higher salts still in the form of molybdates. Ten grains of ammonic molybdate are dissolved in about half-an-ounce of water, and a drop of nitric acid added. Four parts of this are mixed with one part of a solution of potassic ferricyanide, 30 grains to an ounce, just before pouring over the film.

Ferricyanide of silver may be obtained in a film by treating a blue picture obtained with ferric chloride and potassic ferricyanide with a solution of nitrate of silver (50 grains to 1 ounce of water), and, after the blue colour has disappeared, and the plate has been washed, treating it with nitric acid, or some other suitable oxidizing agent. Chromic acid produces a mixed image of silver chromate and silver ferricyanide. Red and orange pictures are thus obtained with a little trouble. Chromate of silver may also be obtained in a film by pouring a weak solution of chromic acid over a silver image in collodion, if the latter has been permitted to dry, and is wetted only just before the acid is applied, so that it is not very porous; otherwise, the image is simply carried away by the chromic acid. A picture in argentic chromate alone, however, is disappointing. Tones ranging from bronze to purple may be obtained in a mixed image of sulphide and chromate of silver. These may be obtained by first treating a silver image with ammonic sulphide, and then with a dilute solution of chromic acid; in this case, the sulphide of silver forming a protective coating, preventing the silver being dissolved out. The resulting tone depends on the length of time the picture has been subjected to the ammonic sulphide.

The reactions of other double cyanides offer very few facilities for obtaining coloured transparencies. The alkaline cobalticyanides give no precipitate with ferric and mercuric salts, but with either of these salts, when poured on a film, a white image is produced; as subsequent treatment of these white images can only result in the formation of salts of the two metals that can be easily produced by the ferricyanides, no advantage ensues from the use of cobalticyanides. The double cyanides of potassium with copper, nickel, gold, and silver offer no useful reactions. Chromi-cyanide of potassium and ferric chloride give a brick-red picture when poured over a film, but the chromicyanide of potassium is difficult to prepare, and similar colours are easily obtained by other means.

In all these methods, the picture may only be lightly toned, or completely coloured. By carefully suiting the colour and treatment to the nature of the subject, a considerable range of tone may be obtained.

ON REALISM AND IDEALISM IN PHOTOGRAPHY.

BY REV. F. F. STATHAM, M.A.*

We hear a great deal now-a-days of "realism" as it affects architecture, the drama, painting, and other of the fine arts, to say nothing of its application in a moral sense; and some writers have gone so far as to define this as a "realistic age" in which no shams or make-believes are to be allowed any more, and in which all is to be ultimately genuine and true to nature or to natural law.

Now, I am not going to "run-a-tilt" against this school of thought, although I think it has some absurdities as well as some advantages connected with its teaching. Mr. John Ruskin did a good work when he showed the thoroughness and fidelity to art principles of the mediæval and early ecclesiastical architects; when he pointed out that every flying buttress or gurgoyle had not only its ornamental, but its practical value; when he demonstrated that our domestic abodes might be just as homely and as comfortable without being quite so ugly and so commonplace as they had lately been. But, then, he rode his hobby too hard, I imagine, when he insisted that *everything* about a building should be genuine; when he inveighed against imitation-grained woods as a deception, veneering as a snare, and the gilding even of organ pipes as a delusion and a covert artifice.

And so, again, with regard to the drama. Let us by all means have correct views of the actual scenes depicted (as of Elsinore Castle in "Hamlet," for example), if they are to be procured, dresses and accoutrements in accordance with historic precedent, and even, if you will, a real cab and a real live horse (as in some recent performances) to aid the illusion of the stage. But, at the same time, let us remember that the line of demarcation between the real and the ideal must, after all, be drawn somewhere, otherwise we shall have the "supers" clamouring for genuine fowls and joints at their fictitious banquets instead of the sawdust-stuffed dummies or the pasteboard imitations now in use, or crying out for the real juice of the grape in their goblets instead of the toast-and-water or airy nothingness with which they are now filled when they sing—

"Libiamo ne lieti calici."

And in like manner with respect to painting and photography (which I take to be only another form of painting, in which we make use of a pencil of light for our delineator instead of one of a more material character): let us have as much reality as we can; let us come as near to nature as the conditions under which the several artists contend will allow, but do not let us be misled by the idea that, because absolute reality cannot at all times be secured, therefore little merit attaches to our work, or that it is not so earnest and so thoughtful as it ought to be.

For my own part, I have always thought that art generally has been very much advanced by the original discovery and the gradual improvement of the photographic process. Whilst, on the one hand, no one will deny that it lacks many of those advantages which the sister arts of painting and sculpture possess in bringing before the eye the presentment of natural objects, photography —by the minuteness of the detail which it ensures, by the correct representation *on the same scale* of all the component parts of an object or scene, and by the truthfulness of its perspective as a general rule—has habituated the eyes of artists to look more carefully to the truthful rendering of their several compositions. A conventional tree—such as we meet with in the paintings of Poussin or of Gainsborough—would scarcely pass muster in the present day. Our photographers have multiplied copies of all the treasures of our woods and forests—even to the fern brakes and thickets and dells—to so marvellous an extent that now you can generally tell in a painting what a tree is intended for, instead of, as formerly, having a kind of prettily-tinted outline to do duty, with a slight variation in the anatomy of the trunk and limbs, for an elm, an oak, a sycamore, or a lime. So, again, the steady labours of the photographer upon the sea-shore have borne their fruit, and his correct sun-pictures of the stormy beach or the rolling waves, or the dashing spray or the passing storm, have given hints to the painter how things should look; and, as the result, they do look, on the canvas of our modern artists, very differently from scenes of a similar nature attempted by painters of a bygone age.

Rendering, however, every homage to the efforts of photography in the past to the correct delineation of natural objects, and believing, as I do, that its services have been invaluable in bringing about a more realistic mode of treatment in all the sister arts, I cannot help thinking that we are in some danger of falling from the high standard which ought to be the object of our attainment, and of yielding to a temptation which the very facilities of the photographic process place in our way. I refer to the readiness with which the *true* and the *false* can be so easily blended, by a little skilful manipulation, as to present in the photographic result a picture which is anything but true to nature.

What is more common, for instance, than a painted background to a carte-de-visite, with a diminished distant doorway and a pretty perspective of country or garden beyond, which, having been placed almost immediately behind the sitter at the time of focussing, makes him look, in the outcome, like a giant in a dwarf's house, with an entrance through which he could neither go out nor come in? Why is it that we see so many stuffed cats and dogs, whose painfully-staring glass eyes betray their unnaturalness, introduced as accessories by our photographic artists? Why does that perpetual basket of shabby artificial flowers do duty so frequently for the real thing, which, after all, would not be so very expensive?

For many years I could never make out why all my friends were holding tight by a chair, as though they had had "just a wee droppie in their e'e," and were anxious to steady themselves while they were being photographed, until I found out that this was an artifice to do away with the use of the head-rest. But they didn't look natural when "taking the chair," and so I told them. Then they fell into the opposite extreme, and determined to look free and easy by throwing themselves into all manner of unnatural postures. One presented me with his carte, representing him seated upon a marble balustrade. It was a most awkward and ungainly pose, and to (say nothing of the marble balustrade, which was manifestly a "sham") my friend never before or after his visit to the artist's studio did sit upon such an uncomfortable seat.

I was looking through my friend Jones's album the other day; but, although I knew most of the family pretty well by sight in their ordinary apparel, they were so disguised and "transmogrified" in the photographic likenesses that I could scarcely recognize one of them. Jones himself had had his hair curled, and was evidently "got up regardless of expense" (as the saying is) before going to visit the operator. Then he had selected a pose with his thumbs in his waistcoat pocket holes, which was quite unusual with him; and putting on, as he imagined, at the critical moment, what he considered a smiling face, he came out in the carte such a caricature of himself that I really did not know him. His eldest son had been to a fancy ball, and had

* A communication to the South London Photographic Society.

taken the whim of being dressed up as a bandit; and there he was in the album in most correct bandit costume (at least, so far as the theatrical costumier could imitate it), but looking no more like a genuine robber than myself. "Does your idea of a bandit," said I, jokingly, "coincide with a clean, smooth-faced, rather good-looking individual (you see I did not want to offend him), with his hair parted neatly down the middle?" for he had got his bandit's hat in one hand, for effect, and was holding a braud new Martini-Henri as tightly as his kid glove would let him in the other. "No, my dear sir, there is no realism in that. You couldn't look like a bandit if you tried. Your face says as plainly as can be, by its quiet, good-natured smile, 'I couldn't cut a throat for a thousand pounds,' while a bandit's features would say as plainly, 'I'd do the job for a hundredth part of the money.' Why, then, should you seek to be unreal? Why not adopt the everyday dress, the easy manner, and, if you will, the familiar surroundings of daily life when you go to be photographed? Your friends would recognize you more easily; you would recognize yourself; and if you live to have a family and to transmit your likeness to your descendants, they will be able to form some idea of how you looked, and not of how you dressed yourself or made yourself up for a solitary occasion."

But I can imagine the ready reply of my photographic friends to these modest strictures of mine. They will say, "What can we do? The public *will* have their taste gratified. We must comply with their passing whims and fancies, and photograph them according to their desire, or else put up our shutters at once, and say 'good-bye' to business." I am not quite so sure that that would be the result. To a certain extent the photographer, like the painter, is dependent upon the caprice or the taste of his employer; but a skilful artist will soon find out how to direct and encourage a higher standard of excellence. I look forward to the time, if it should not already have arrived (and you will be better judges of this than myself), when the patron will not necessarily have to resort to the studio to be photographed, but the artist will be invited to bring his camera and operate at the patron's own home and amidst his own surroundings.

I think of some of those domestic groups of the Dutch painters, in which all the members of a family have been taken in the midst of their daily occupations.

The members of that household have long since gone to their rest, but the lineaments of their features and the calm employment of their peaceful hours is still visibly before us, creating as much interest in our minds, as strangers living years afterwards, as the picture originally did when it was first painted and presented to its living prototypes. And why is this? *Because the whole thing was genuine.* The people were dressed as they usually dressed; they were occupied in their usual occupations; they were taken with their ordinary implements in their hands, and with the natural surroundings of their ordinary homes.

I have seen photographs of a similar character, but not in any great number, in modern days—perhaps some prince, or some warrior or statesman, in his palace, camp, or study, as the case may be—but not frequently in humbler life. What I would contend for is that the surroundings should, as a general rule, be real, as well as the individual posed; that no shams should be used where the genuine articles can be procured; and that, as a leading principle, the public should be trained to prefer that which is natural to them to that which is artificial—that which sets most easily upon them from constant use, to that which, being used only for the occasion, sits stiffly, and gives them a constrained and unnatural look.

Not that I would altogether exclude the *ideal* from the province of photography. On the contrary, I think that, with certain limitations as to space and colour, the photographic artist has almost as wide a scope before him as his brother of the pencil or brush. What is to prevent the master of landscape photography from idealising his work by introducing some appropriate animate or inanimate objects? Some of Claude's most famous pictures have been dignified and immortalised in this way. They were originally only simple pastoral scenes, but by the introduction of a small group of figures—perhaps representative of some Scriptural event—life was given to the picture, interest was concentrated upon it, and the landscape, which otherwise might have seemed dull and monotonous, at once attained vigour and grace, and gave rise to thought and interest on the part of the beholders.

I know that our brethren of the camera are becoming more and more alive to the necessity of giving life and incident to their pictures by the introduction of living forms. But surely what is worth doing at all is worth doing well; and it would cost little additional trouble to carry a few suitable articles of costume in the portmanteau to be utilised in dressing up some assistant or some stray passer-by in a fashion suitable for introduction in the scene selected for exposure.

How many dozens of excellent photographic views have I seen spoiled by the intrusion of the operator himself—or sometimes of only a bit of him—by way of pretence of giving life to the scene depicted!

Sometimes you may see him standing with his back towards you, evidently counting the seconds necessary for the exposure, and ready to give the signal to his assistant to put the cap over the lens, or, with the improved modern apparatus, to give the necessary squeeze of the air vessel which is to liberate the falling shutter. Sometimes he is to be recognised sitting—still with his back towards the spectator—upon a stone or some projecting stump of a tree; and not unfrequently I have "spotted" him lying upon his stomach, as though knowing he had no business in the view at all, and, like the ostrich, imagining that he couldn't be seen if he only covered his own eyes in the earth, so that he could see nobody. That some more genuine and artistic effects may be produced by a little care I shall now be able to show by passing round a few examples—all furnished by members of our Society, but several of them notably by Mr. Henry Cooper, of Torquay, and the late lamented Mr. O. G. Rejlander. (Several clever sketches by these and other artists were then exhibited by the reader of the paper.)

Idealism has abundant scope in photography in the hands of anyone with real artistic feeling in the selection of some suitable model for definite pictorial effect. Take, for example, the works of our friend Mr. Valentine Blanchard—one instance of which, "The Zealot," by his kindness, was given as the presentation plate of our Society for the year 1866, and a copy of which I now pass round. Why is it that this clever artist gives us such scant opportunities of testing his improvement in his profession? No one who looked with admiration upon his admirable "Rachel at the Well," in one of the past exhibitions of the Photographic Society of Great Britain, can do otherwise than regret that his name is so seldom seen attached to the frames annually suspended at the Suffolk Street Gallery, in honourable competition for the suffrages of an enlightened public. "The First Night at a Pantomime," by the late Mr. Henry Cooper; "The Idle Girl," by Rejlander; and "Will He Care for Me, too?" by the latter talented artist, will fully explain what I wish to convey. I pass round at the same time examples of successful grappling with costumed models, chiefly by the same gentlemen, to show how readily, in the hands of skilful manipulators, the ideal blends into the real, till it is difficult to decide to which class of production the specimen offered for inspection may belong.

I should like to have said a few words before closing upon natural and unnatural modes of lighting—or, rather, of throwing the light upon—objects designed for photographic treatment; but I fear to weary you with any longer trespass upon your patient attention. I feel persuaded, nevertheless, that very great stress ought to be laid on this point if we wish to approach to the reality of life in our facial presentments. Light affects the eyes in so sensitive a manner that any strain upon the optic nerves by an undue or unnatural glare discomposes the features generally, and gives an auxious or a distressed look to the countenance which is subjected to it. Further: the placing of a visage (as is so common) with one side facing a strong light, and the other turned to the shade, is apt to cause a shadow along every furrow or wrinkle or even minute line in the features, so that the lens, which renders every little effect faithfully, will frequently give to a young person's countenance so treated all the lines and markings which only belong to a more mature period of life. Nay, I have heard it asserted by some very charming young ladies of my acquaintance, that even their dimples have thus been turned to their natural disadvantage, and have presented in their cartes-de-visite more the appearance of moles or warts than of the ripples with which good temper or good living—(I won't be sure which)—had fortunately endowed them. The proper management of light may, moreover, be made a most happy medium in giving character and vivacity to a picture; and I cannot do better, therefore, than conclude my paper by handing round a few examples of what I consider successful treatment from this point of view, including one small but very pretty copy of Mr. H. P. Robinson's "Little Sunshine," consisting of a young maiden plaiting straw in a strong light, and apparently languid or a little exhausted with what we are almost made to realise as the excessive heat of the day.

Notes.

The Russian Government is considering the question of appending photographic portraits to all passports it issues.

We publish this week Mr. Plener's specification relating to the separation of the sensitive constituents from gelatine emulsion, to which we referred a fortnight since.

Dr. Schuster, Mr. Norman Lockyer, and Mr. C. R. Woods, together with Mr. Black, the novelist, have arrived at their camping ground in Egypt, whence they propose to observe the Eclipse next Tuesday. Mr. Woods, whose paper on "Transparencies" appears in another column, is the photographer to the expedition.

There was a discussion on tents on Tuesday evening at the Photographic Society's meeting. Mr. Maxwell Lyte's idea is to make the tent so large and comfortable, that some one else to carry it becomes a necessity; and he covers the outside with white calico, damp fern or other leaves being also used as a set-off against undue heat.

Next week we shall publish a new process of Dr. J. M. Eder's, for intensifying gelatine plates.

Those who can realise the circumstance that truly artistic work is almost impossible unless the mind and body are at ease, would do well to take a hint.

Any plates up to 12 by 10 I can easily change in absolute darkness, says Mr. Cowan; but in order to work in comfort it is necessary to keep the eyes shut, as otherwise some inconvenience is caused by the involuntary and ineffectual efforts of the visual system to help in the work.

Work in absolute darkness is, however, much facilitated by knowing that one has a sufficient area of clear space before one; but even in the dirtiest cellar this can generally be provided for by spreading an open newspaper on the floor.

Our esteemed Paris correspondent, M. Léon Vidal, has been nominated to a professorship at Limoges, for the especial purpose of teaching the application of photography to the decoration of porcelain. Limoges enamels have been famous all the world over for centuries past, and we may well hope that an impetus will be given to modern Limoges work by this well chosen appointment.

We had an opportunity, by-the-way, of seeing M. Vidal's clever little selenium photometer in action on Monday last at his laboratory in Passy. It has been described more than once in these columns, but only those who have witnessed its delicate action can realise how readily it records the amount of light falling upon its face. A very delicate galvanometer points to 0°; allow subdued daylight to strike the selenium, and immediately the needle goes to 5°, while a piece of magnesium burnt in the immediate vicinity causes the needle to point to 22°.

Our readers will remember its action. A current of electricity, on its way to the galvanometer, is stopped by reason of a piece of selenium placed in the circuit. Selenium, under ordinary circumstances, is a non-conductor, or nearly so; but permit light to shine upon it, and it becomes a conductor—the more light at hand, the greater being its conductivity. Hence, the greater the amount of light shining upon the selenium, the more the needle of the galvanometer moves. As in the case of Crookes' radiometer, or light-mill, it is the calorific rays, and not the actinic rays, that cause the change in the selenium; but as a certain relation is doubtless to be established between these two kinds of rays, the photographer is likely to benefit by M. Vidal's instrument. Its delicacy is such, that light insufficient to set the radiometer in motion marks 3° on the Vidal photometer. Sunshine marks 60° on the galvanometer.

The other day, when we published some "Expressions" from Darwin's work on the subject, we pointed out that photographers would do well to pay more attention to the why and wherefore—anatomically—of the changes that come over their sitters' faces. It was shown in one of the sketches how the mere fall of the lower lip induces a look of care and pain, while the drawing up or down of the lines of the mouth suffices to proclaim good or bad humour.

In fact, it is the mouth more than anything else that dominates the "expression." And for this reason: there are more muscles connected with it than with any other feature of the face. The late Professor Partridge, when he occupied the anatomical chair at the Royal Academy, used to make a great point of this when lecturing to the art students. He had a composite picture to prove that the "saintly look about the eyes" that many people believe in, does not exist, and that when the mouth, and consequently lower portion of a face, however devout, is made to laugh, the eyes seem to laugh also.

Eyes have very little to do with "expression," while the play of the mouth, since this controls so many muscles, exercises a wide influence. Many people have a difficulty in breathing through their noses, and hence it happens, after a while, that the mouth opens slightly. Fritz Luckardt complains that English sitters generally show too much of their front teeth, but, unfortunately, when the lips are pressed firm, a glum and determined expression ensues. Most of us, again, have a way of drooping our heads slightly on one side or the other, especially after sitting a while. All these are points that a little anatomical study would help us to understand better.

Explosions arising from dust are not unknown in the photographic world, as when an ordinary india-rubber gas bag has long been in use for holding oxygen the interior becomes corroded, and an inflammable and friable resinous product is then formed in abundance. This resinous substance, becoming diffused through the oxygen, often causes dangerous explosions. We believe that the only way to make a dusty gas-bag safe is to moisten the interior with glycerine. The resinous oxidation product of rubber has been analysed and studied from a chemical point of view by Mr. Spiller, and we think it proved to contain about one-fourth of its weight of oxygen, while pure rubber contains none.

A photographer of our acquaintance who recently published a portrait of the Prince of Wales, and now wants to make a stir in the world, thinks of advertising pictures at ten shillings a dozen, "fixed in the same hyposulphite as that employed for His Royal Highness."

"Studies from the Sunday-Camera of an Amateur," is the title of a delightful series of thirty stereoscopic views executed in Eder's gelatino-chloride process by Mr. Rudolf Hamsa, of Vienna; a silver Voigtländer medal has been awarded to Mr. Hamsa for these pictures.

We hear that the atelier appurtenances, negatives, costumes, &c., of the late M. Adam-Salomon, are valued at 100,000 francs, or four thousand pounds, a somewhat extravagant estimate, we suspect.

To make comparison of the sensitiveness of gelatine plates by noting the time they take to develop when put side by side in the developing dish is a method open to objection, if only on account of the hardness of the gelatine itself. We recently placed two samples of film gelatine in cold water, and weighed them carefully at the end of three minutes to ascertain the amount of water absorbed. The one sample had absorbed in this period one-third more water than the other. Doubtless, if the time of immersion had been extended to three hours, there would have been less difference in the amount of water they contained, one of our samples, an old and horny air-dried film, being very repellent of water to begin with. This mechanical quality of gelatine plates is one that has never yet received proper consideration.

Writes a correspondent:—"Has any one tried the old-fashioned coffee-pot as a ready means of filtering gelatine emulsion? The warm liquid could be put into the flannel bag at the bottom of the pot—where the coffee and hot water are placed—and the bag then raised gradually by turning the handle at the top, when the gelatine would be sucked through by atmospheric action. If the flannel bag were made to fit, and the vessel itself were clean and new—the interior might be plated—a coffee pot of this description would be handy just now in a photographic laboratory. We made the suggestion a twelvemonth ago, but it will well bear repeating.

Painters paint their pictures from models, and it is not singular, therefore, that novelists should employ them in constructing stories. No doubt the character given by a novelist to his hero or heroine is very different to that actually possessed by the model, but then in a painting we have the same lack of truth; the strapping butcher who sat for Hercules, and the scullery maid who has represented Cleopatra, have little else than a fancied resemblance in common with the personages. The novelist, fortunately for himself, need not come into contact with the butcher or the scullery maid; photography helps him to secure his models without all those difficulties that attend the painter.

Indeed, for the novelist's purpose, a photograph is often better than the original. The heroine may be all his fancy paints her, so long as he has but her picture before him; he can look into her witching eyes, note her roguish dimples, and read her thoughts, without fear that she may open her mouth and dispel in a moment the thread he is weaving of her hopes and fears. She is real enough to give breath and life to the story he reads in her face, and yet her silence is a guarantee she will never deny a single conjecture he makes. Whenever in doubt as to the steps his heroine shall take in his story, he can always bring her face before him and question it.

Before a photographer's show-case. *Charles (loq.)*: "Charming girl that, and what a delightful expression!" *His Friend*: "Yes, very nice, but perhaps it is only put on; you never can tell." Was it the young lady or the photographer who put it on, we wonder?

TWELVE ELEMENTARY LESSONS IN DRY-PLATE PHOTOGRAPHY.

No. IX.—Defects and Remedies.

The photographer is sure not to practise the gelatine dry plate process very long before he comes across some of the defects which are peculiar to it. We intend, therefore, to describe these as accurately as we can, and, where possible, to give a means of either preventing the occurrence of the objectionable phenomenon, or of curing it when it has made its appearance. Where the error is of a kind due to the *preparation* of the plates, we shall not enter into the cause of it, but merely indicate the cure.

General Fog.—This is probably the commonest of all faults with gelatine negatives. It consists of a veil over the whole plate, showing itself by want of transparency in the shadows. It may be so slight as to be imperceptible, except when the negative is laid face downwards on a sheet of white paper, or may be so dense as to make the time necessary to get a print be measured by days. It is due to one of two causes, which are usually indicated by the names, *chemical fog*, and *light fog*.

The first arises from error in the preparation of the plate. By it is meant that the sensitive film is in such a condition that the silver salt is reduced by the developer without light having acted upon it. In certain cases it may be cured by soaking the plates before exposure in a solution of three grains of bichromate of potash to each ounce of water, afterwards thoroughly washing the plates, and then drying them.

To distinguish chemical fog from light fog, the best way is to develop an un-exposed plate, performing all the operations in total darkness. This is not difficult. If the plate be found to have darkened, the fog will be chemical fog, or, what is practically the same thing to the photographer, light fog, brought about by the action of light on the emulsion whilst in the hands of the manufacturer.

With the well-restrained developer which we gave in the last chapter, chemical fog is less likely to make its appearance than in the case of the feebly-restrained developers usually recommended. The bromide in the developer may even be increased beyond that which we give, but this will necessitate a somewhat longer exposure. We may state that bromide of ammonia in the developer begins to have an appreciable actual slowing effect on the plate when it is used in the proportion of $\frac{2}{3}$ or $\frac{3}{4}$ the quantity of strong ammonia used. When the bromide equals the ammonia, the slowing effect becomes very great.

Light Fog is due to the action of light generally in one of three ways: first, on account of an unsafe light in the dark room; secondly, on account of a defect in the camera or dark slide admitting light; and thirdly, on account of over-exposure.

When the fog is due to light in the camera, this will be recognised by the fact that the portions of the plates covered by the wires or rebates of the dark slides remain free from fog. When this is the case, the camera must be carefully examined by removing the focussing screen, and looking for any the smallest defects which might admit light, the head of the observer being covered with the focussing-cloth. Light finding its way through defects in the slides generally shows itself in the form of streaks or lines. Should no defect be detected, the exposure must be reduced.

If fog from unsafe light in the dark-room be suspected, place a plate in the dark slide, draw out one of the shutters half-way, and then lay the slide for five minutes on the table where the plates are changed and developed; then develop the plate. If one-half darkens, it shows that the light is not safe, and steps must be taken to render it so.

Green Fog.—This defect is always due to error in the manufacture of the plates. It makes its appearance only in the shadows of the negative. If the negative be looked at by reflected light, a black object being laid under it, the shadows will be seen to be bright green. On looking through the negative they will appear somewhat pink, or sometimes a sort of "muddy" colour. Green fog makes its appearance only with alkaline pyrogallic development, and then chiefly when the plate has been under-exposed and development "forced."

A slight amount of green fog is not detrimental to the printing qualities of a negative; but if the defect shows itself in an aggravated form, the best means of preventing it is to resort to ferrous oxalate development. Captain Abney has recently given a means of curing plates afflicted with green fog after development. It consists of bleaching the negative with a solution of ferric bromide, oxalate, or chloride, and afterwards applying the ferrous oxalate developer. Full particulars of the method will be found in the Photographic News for April 28, 1882.

Red Fog seems to be an aggravated form of the last-mentioned disease. In appearance it is a deep red deposit showing itself by transmitted light in the shadows of the negative. It is rarely met with at the present time, although it was common in the early days of gelatine plates. It does not make its appearance in plates developed with ferrous oxalate. Probably Captain Abney's cure for green fog would correct this defect also.

Frilling consists in an expansion of the film to such an amount that it loses its adhesion to the glass, and "frills" off. The phenomenon begins at the edge of the plate, and spreads towards the centre. When it begins at the centre it is termed blistering. It is due to an error in the manufacture of the plate, but is much aggravated by a developer strong in ammonia, by the use of warm solutions, by the use of too strong a fixing bath, or by the use of very soft water for washing. When it makes its appearance only in the fixing bath or during washing, it may be prevented with certainty by placing the plate, immediately after development, in a saturated solution of alum for five minutes. This we advise in all cases; but where there is no fear of frilling, the plate should be thoroughly rinsed before it is placed in the alum solution.

If the frilling be of so aggravated a form as to show itself during development, it is more difficult to prevent its occurrence. Captain Abney states that coating the plates with plain collodion before development is a perfect cure.

Plates which, when newly prepared, frill frequently, after keeping for some weeks or months in a dry place, show no tendency to the defect. In fact, we have found that the keeping of the gelatine plates for some time improves them in every way.

Want of Density or Flatness of Image is usually due to under-development, or to the use of too weak a developer. A consideration of our remarks in the last chapter on development will show how sufficient density may be gained in almost any case; and we may here say that a very common cause of want of vigour is to be found in the fact that the ammonia is not so strong as is supposed. In the case of liquid ammonia of specific gravity ·880 a very short exposure to the air weakens it, by allowing ammonia gas to escape. It will be generally found that the last of the ammonia in a bottle is considerably below the standard strength, simply from the escape of the gas every time the bottle is opened. It is for this reason that we recommended the dilution of the ammonia with an equal bulk of water immediately after purchasing it. Pouring the strongest ammonia from one bottle to another will perceptibily weaken it.

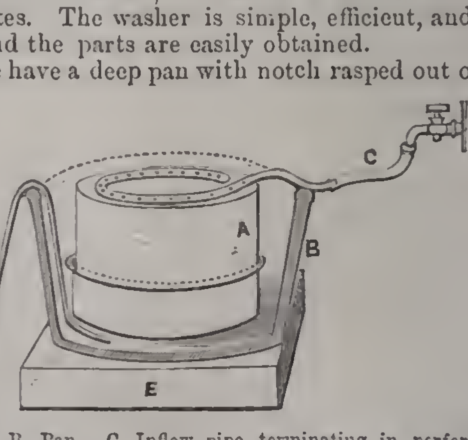
There are some plates which will not give a vigorous negative, however they be developed. This is the case with plates on which the emulsion has been too thinly spread. If such plates are to be used at all, an after-process of intensification must be resorted to. This we propose to treat of in the next chapter. It will occasionally happen, too, with the best of plates, that an error of judgment will be made in development, and the process stopped before density is sufficient. This is another case for intensification.

AN EMULSION WASHER AND A DRYING RACK.

BY HENRY SPINK.

I now give a description of the two following articles which I believe will be found useful to any photographers who may make their own emulsion and plates. The first is an emulsion washer; the second is a rack for drying coated plates. The washer is simple, efficient, and inexpensive, and the parts are easily obtained.

First, we have a deep pan with notch rasped out of edge,



A. Sieve. B. Pan. C. Inflow pipe terminating in perforated ring. D. Exit syphon made out of a piece of bent metal gas pipe. E. Wooden block to raise the apparatus a little above the level of the sink.

and a small syphon of $\frac{3}{8}$ gas pipe, which passes to the bottom and is bent so that the short end shall terminate near the centre of the pan. In the next place there is a sieve having a black varnished copper-wire bottom, to stand in pan so that the edge of the sieve comes just above the top rim of pan, a notch being cut out of bottom rim of sieve to allow the syphon to pass below it in the pan, and over the sieve is a ring of $\frac{3}{8}$ gas pipe, perforated with holes, and connected with the water supply. The emulsion is placed in the sieve, the ring is connected with the tap by a flexible tube, and the dissolved salts are drawn off from underneath by the syphon; the ring lies just within the top of the sieve, and the whole can be covered over with a loose cover, while the flow of water can be regulated so that the in and out flow just balance each other.

The rack consists essentially of two parallel bars of hard wood, these being deeply notched at intervals of two inches apart; but in order to keep the plates steady I provide a third bar, which swings on two arms so that it can be brought down on the plates so as to grip or steady them

The movable arm is triangular in section, and is, of course, notched so as to correspond with the two fixed bars. The wet plates are placed in two's, back to back, in the notches. A rack made 11 in. high by 4½ in. wide will take any size from half-plates up to 10 by 12. They are best made of hard wood, but any one can make them for himself at the cost of a few pence. The arm on which the movable bar swings should be about two inches and a half long, and if the notches are V-shape they do not spoil the edges of the plates, and can be moderately deep. They are best placed not less than two inches apart, or else the plates *sweat* and spoil one another if there is not a good draught. A very few racks hold a good many plates, and the racks can be safely piled one a-top of another in the drying cupboard, and there is free ventilation all through them and between the plates.

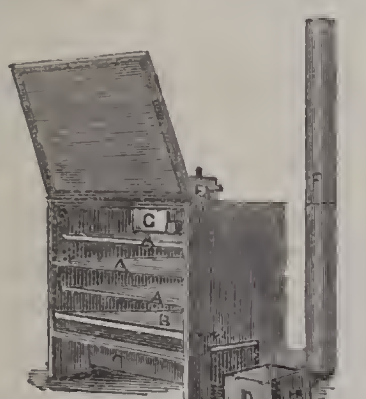
AN AMATEUR'S DRYING CUPBOARD.

BY VERO C. DRIFFIELD.

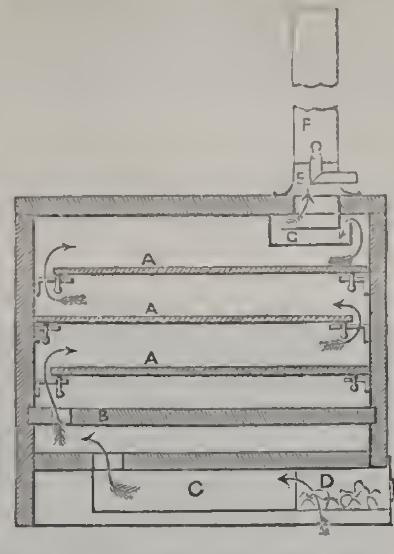
One difficulty I soon found I had to contend with in making my own plates was in drying them; and having just devised and constructed a drying cupboard which has entirely overcome every difficulty I previously experienced, I felt that a description of it might interest many of my brother amateurs.

I originally dried my plates by passing a current of warm air over them, the air being warmed by the same gas flame which created the necessary draught, and though I succeeded in drying the plates without difficulty, they were frequently unevenly dried, marks being produced on them which showed both before and after development. The worst fault, however, was that I could not obtain absolute immunity from frilling. Upon investigation I discovered that the plates which frilled most were invariably those dried nearest the source of heat, and this led me to conclude that the most satisfactory method of drying would be by means of cold dry air.

I then constructed a cupboard, of which I annex a photograph, and to which I will now refer. *a a a* are

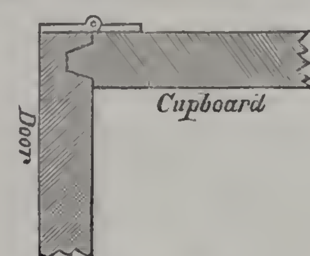


three sheets of plate glass resting upon screws, for the purpose of levelling them. These screws may be omitted, of course, if the emulsion is allowed to set on the plates before placing them in the cupboard. B is a false bottom, which is removed to allow room for the hand when levelling the bottom plate. This false bottom is perforated with holes at one end, and acts as a light-trap, preventing any possible admission of light into the cupboard from the air inlet. C is a tin chamber communicating with the inside of the cupboard. D is a tin drawer, the bottom and one end being of perforated zinc. The bottom of this



Vertical section through centre of cupboard.

drawer is covered with small lumps of calcium chloride. The draw is then inserted into the end of the chamber C, the bottom of which is, of course, cut away for an area corresponding with that of the bottom of the drawer. E is a tin socket, also communicating with the inside of the



Light-tight joint for door.

cupboard, and into which is fixed a gas elbow with a burner perforated with a single fine hole. When the gas is lighted, the chimney, F, is placed on the socket in order to produce the requisite draught. G is a light-trap, to prevent any admission of light into the cupboard from the gas-burner.

My cupboard is capable of drying at one operation twenty-four quarter, twelve half, or six whole plates, and I find them absolutely dry in from twelve to eighteen hours. As soon as the plates are dry, I empty the calcium into a tin dish, and place it in the oven to dry. I use the calcium over and over again, and have been surprised at the small quantity required. I need hardly say that the efficiency of the cupboard depends largely upon the tightness of the door and all connections. No air should be admitted excepting through the calcium drawer. Since I adopted this method of drying, I have seen absolutely nothing whatever of frilling or of marks on the plates.

ON THE EFFECT OF THE SPECTRUM ON THE HALOID SALTS OF SILVER, AND ON MIXTURES OF THE SAME.

BY CAPTAIN W. DE W. ABNEY, R.E., F.R.S.*

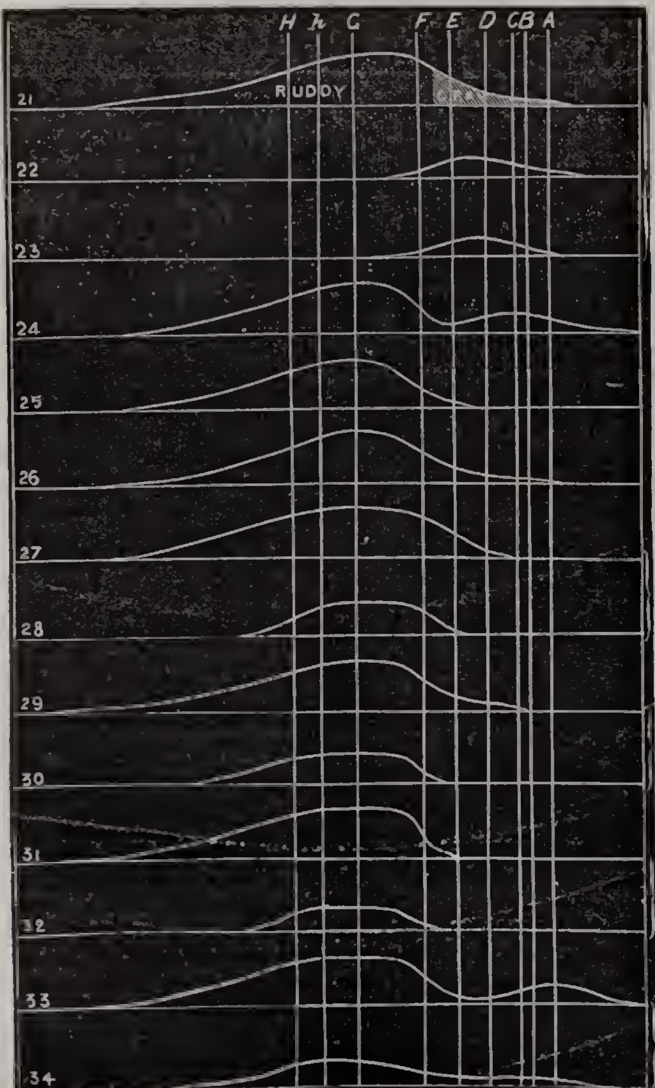
Silver Bromide.

When paper is immersed in a 10 per cent. solution of potassium bromide, then dried and floated on a 10 per cent. solution of silver nitrate, and exposed to the action of the spectrum, the visible effect will be observed as shown in fig. 21. Figs. 22 and 23 show the action of the spectrum after filtration through potassium chromate, the former being what is observed after a preliminary exposure to diffused white light, and the latter when the paper has only seen the yellow light. It is needless to go into all the details

* Continued from page 205.

which were described when silver iodide paper was under examination. The same causes exist for the shape of the curve as they do with the latter paper. It may be interesting to remark that the spectrum observed on paper which has been washed and treated with potassium bromide after sensitising is the same as that shown in fig. 26, whilst when only washed, and not treated with the soluble bromide, it takes the form of fig. 29. The reason of these differences in shape of curve is apparent when it is remembered how the effects on silver iodide paper were traced to their source.

It must be noted that there are several molecular modifications of silver bromide. The first is that form in which it exists in the paper and also in collodio-bromide emulsions when prepared in the ordinary way; also when prepared in collodion by the bath. This form transmits a yellow-orange tint when white light traverses it. Another form is one which I described in the Bakerian Lecture for 1880, viz., a form which transmits a blue-green tint; and a large form which transmits a grey tint, which is found in gelatine emulsions which have been boiled, or treated with ammonia in the manner which is common at the present day. These three varieties were examined both for the visible action of light, and also for development. A plate was coated with the first emulsion named, with the result that the direct action of light gave fig. 25. The blue-green transmitting form gave fig. 24. This form is one which is sensitive to the infra-red rays of the spectrum on development, and it will be seen that the printing action also extended to that region. The printing action on the grey form (which was submitted to the spectrum in a film of gelatine) is shown in fig. 26. On comparing these together, it will be seen that the maximum action commences between G and F (nearer F than G), and that the main difference in their impressed spectra lies in the tails on the least refrangible side. When the colour transmitted by these three forms is taken into account, these differences are to be expected. Whether the silver



21. $AgBr+AgNO_3$ on Paper	*Print.*
22. ,, ,, ...	*Print.*
23. ,, ,, ...	*Print.*
24. Green AgBr in collodion with or without AgNO ...	*Print.*
25. Orange AgBr in collodion gelatine with or without $AgNO_3$	*Print.*
26. Grey AgBr in gelatine	*Print.*
27. AgBr on paper washed from $AgNO_3$, developed with acid or ferrous citro-oxalate developer.	*Developed.* (long exposure).
28. Ditto ditto	(short exposure).
29. Grey AgBr in gelatine, developed alkaline or ferrous oxalate.	*Developed* (long exposure).
30. Ditto ditto	(short exposure).
31. Orange AgBr in collodion or gelatine, developed alkaline ferrous oxalate or acid developer.	*Developed* (long exposure).
32. Ditto ditto	(short exposure).
33. Green AgBr in collodion, developed ferrous oxalate	*Developed* (long exposure).
34. Ditto ditto	(short exposure).

bromides were exposed with a slight excess of silver nitrate, or with a slight excess of soluble bromide, no difference in the spectra resulted.

We next come to spectra developed on the different preparations of silver bromide. Fig. 27 represents the action of the spectrum on silver bromide paper, prepared as above, which has been washed. Whether development took place by acid developer or by ferrous citro-oxalate, no difference was observable. Fig. 28 shows the same with a short exposure. When the paper was washed and treated with potassium bromide and then exposed, we have as a result figs. 31 and 32. The slight difference in the pairs of figures results from the presence in one case of inorganic matter combined with silver, and in the other case its absence.

When a plate is coated with collodion containing cadmium bromide, zinc bromide, or potassium bromide, and placed in a strong silver nitrate bath, and developed with either acid developer or with ferrous citro-oxalate, we get curves similar to figs. 31 and 32. The same figures also represent the action of the spectrum on collodio-bromide emulsions transmitting orange light by any kind of development. This applies equally whether the plate be exposed wet or dry, or whether exposed in the presence of silver nitrate or other inorganic sensitisers.

Figs. 29 and 30 show the results obtained when using gelatine bromide plates with the silver bromide in the grey molecular state, whether exposed with an inorganic sensitiser, or without, and whether developed with an acid, alkaline, or organic iron developer.

Figs. 33 and 34 represent the action on the blue-green molecular form of silver bromide in collodion, when developed and exposed under similar circumstances to the preceding case.

It will be remarked that the direct visible action of the spectrum and the developed image coincide.

The effect of impurity in the bromide is not so marked as it is in the iodide. The presence of iodide, except in minute quantities, is rare; the haloid most frequently present as an impurity being the chloride. When the spectrum on the chloride is considered, it will be seen that such an impurity is hardly possible to be detected, as the spectra impressed on it are somewhat similar in general character to those on the bromide.

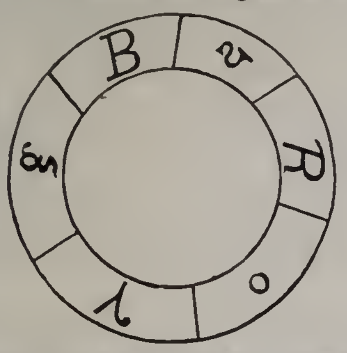
(*To be continued.*)

DARK-ROOM LIGHT.

A consideration of the theory of colours and their relation to actinism, long ago made me question the necessity of any change in the colour of dark-room lights for the better protection of extra sensitive dry-plates; but in the establishment we followed the directions of the plate manufacturers, and, at first, adopted the ruby light. The obscurity of our work-room, however, and still more, the painful effect of the red light on our eyes, induced me to test by actual experiments the value of the new light in comparison with the old. The result showed that our fathers knew what they were about when they settled on the orange tint as the true non-actinic colour. We found, while it admitted three times the working light, it had less effect on the plates, in extreme tests, than the ruby.

As some of your readers may not have thought much about the method of determining complemental or opposite colours, a word on this subject may suggest other applications of theory to our art.

Notwithstanding the old writers, there are but three primary colours—red, yellow, and blue. We know that these, and these only, are primary, because no admixture of any other colours will produce them, which is not the case with the rest; for orange is only a mixture of red and yellow, green is only the shading of yellow into blue, and purple is only blue blending into red. Now, as the last primary colour in the spectrum is seen to join with the first in the production of the intermediate shade of purple, or violet, as it is usually called, we may with propriety curl the spectrum into a circle, in order to represent to the eye the inter-relation of the triad of colour. In the annexed diagram let the capital letters



R, Y, B, represent the primary colours, and the small letters, o, g, v, the compound colours. Now it is natural to infer that if we establish a certain quality as belonging to a certain colour, when we seek for the direct opposite of this quality we should look for it not in any near colour, but in the opposite side of the spectrum, thus returning into itself. It would take too much space to illustrate this at length, but a very pleasing method of testing the complemental colours is to fill the eye for some minutes with some strongly marked coloured light, and then retire into the dark and observe the tint of the image presented to the optic nerves. If we have been looking at a pure red light we shall in the dark see a green image; if at yellow, we shall see violet, &c.; these colours, respectively, being on opposite sides of the spectrum as drawn in our diagram.

Pure blue, or, possibly, blue slightly tending to violet, is known to embrace most of the chemical rays. Hence, to find what rays will operate the least on our plates, we look to the opposite or complemental colour, orange, and are not disappointed. But, whatever may be thought of the theory, the fact is, briefly, we are now developing our dry-plates in front of nine 8 by 10 orange lights, set back about eight feet from a good-size outside window, and admitting light enough for one to read the finest newspaper type on a dark day. It must be understood that the darker shade of photographers' yellow glass is to be selected, not the canary, nor yet the very brown. Strictly speaking, very little of this glass is orange—as it should be—but it is near enough to that colour.

The pleasure of working in an agreeable light, and plenty of it, will, we are sure, be appreciated by all our readers, and we urge them, after they have satisfied themselves, cautiously, that we are right, to save their eyes.—*Philadelphia Photographer.*

Correspondence.

THE "NEW" SODA DEVELOPER.

Sir,—At one of the recent Thursday Evening Meetings, Mr. Reimann is reported to have shown a negative developed with the new formula, viz., washing soda instead of ammonia. This seems to be one of those wonderful and original discoveries which some photographers seem to delight in springing upon the world. I find a formula of this supposed new discovery copied into my note-book, in accordance with which I developed a plate about three years ago.

With regard to the fading of gelatine negatives, I fear there is too much reason to fear that such is the case. It is certainly the case with those developed by means of ferrous oxalate. I have some negatives which are decidedly less dense now than they were two or three years ago.—Yours obediently, A. T.

DEFECTIVE DARK SLIDES.

Dear Sir,—I think some of your readers may find the following dodge useful when their dark slides close so imperfectly as to admit light. Some of my double dark slides let in light where they open in the middle, there being a bead which, when the slide is shut, should fit tight into a groove, and so keep all light out. Mine got warped, and light got round the bead. I cured this most effectively by sticking over the groove a narrow strip of tracing paper, and then shutting the slide up while wet; and when the slide was opened, it was found that the paper had become pressed into the groove, making a most perfect fit. As this is such a simple method, I venture to send it to your valuable paper.—I am yours faithfully, F. K. Barclay.

DETERIORATION OF GELATINE NEGATIVES.

Sir,—Some time ago I had just the same experience as your recent correspondent, "Provincial," as regards the gradual deterioration of gelatine negatives when kept for some time; but my recent experience points to imperfect removal of the hyposulphite as the cause. Some films are so hard that several hours' soaking is required, and treatment with a saturated solution of alum after that. Since I have thoroughly soaked out the hyposulphite and treated with alum, my trouble has quite disappeared.

Bristol, May 10th, 1882. Thomas Thirlow.

ABNEY'S PROCESS FOR REMOVING GREEN FOG.

Sir,—It is, perhaps, but a poor compliment to Captain Abney to say that his process for the elimination of green fog is really what it professes to be, as most of the Captain's inventions have this characteristic. Still, at the risk of confirming what needs no confirmation, I venture to relate my own experience of the ferrous bromide application to this purpose. It happens that when I read Captain Abney's article, I had in my possession two of what I believe were then the finest existing specimens of green fog. The plates were covered in parts with a thick metallic layer, which glistened splendidly in reflected light, while the amount of light transmitted was of the smallest. These excellent specimens had been produced by the abominable practice of developing a lot of plates in the same developer. These, too, were of a costly make of plate, and were evidently of a weaker constitution as regards the application of ammonia, for they would not stand the reckless manner in which I drenched those of my own make which were being developed at the same time. Such, at least, I suppose to have been the reason. But, anyhow, there was the result—the usual dichroic deposit, supplemented by a thick, glossy, golden layer.

These two plates, then, I treated first with the ferrous bromide solution, and afterwards with ferrous oxalate. As the plates re-developed there was on one of them no sign of any deposit whatever, while the other was clear except in one obstinate corner.

One ought not to get green fog, I admit, but still one does, and so I, for one, wish to lift up my voice in gratitude for this new and certain cure.

A Befogged Beginner.

Proceedings of Societies.

Photographic Society of Great Britain.

The ordinary monthly meeting of this Society was held Tuesday evening, the 9th instant, at 5a, Pall Mall East—James Glaisher, Esq., President, in the chair.

The minutes of the previous meeting having been read and confirmed, and three new members elected, the Chairman called upon Captain Abney to read a communication.

Captain Abney opened his remarks by saying that it was hard upon him to have to contribute so many papers, and this evening he only came in as a "stop-gap." He said that during the last four years he had contributed one-third of the papers read, and that those who were interested in the Society ought to bring forward any matters they might have, and not leave all to one individual. He proposed to speak of one or two points first, which, perhaps, he might have spoken about in his Cantor lectures. First, with regard to the comparative sensitiveness of carbon tissue and chloride of silver paper in summer and winter, certain differences were traceable to the position in the spectrum of their respective points of maximum sensitiveness. He had investigated this matter, and had arrived at conclusions different from those of other experimenters, who generally placed the maximum between G and F in the blue, whereas he had found it to be lower down, and the sensitiveness to extend much nearer to the yellow than most people imagine. He did not find that the pigment contained in the tissue had any effect in altering its sensitiveness, and passed round examples of the specimens impressed upon different tissues. Referring to the platinotype process, though the maximum was not so low down in the spectrum as with bichromated gelatine, the sensitiveness extended far lower than with silver chloride, and this would explain the marked advantage which was observed in winter in employing the platinum process. Some albumenized papers were found to print more equably in winter than others, and this he was inclined to think was due to the presence of an organic salt of silver, notably in Mr. Bedford's method of sensitizing, in which citric acid was employed. This brought him to a consideration of the behaviour of different salts of silver when exposed to light. If a film of gelatine containing chloride of silver is exposed to the direct action of light, an image is formed which is practically useless, being almost entirely removed by the fixing solution. By combining an organic salt of silver with the chloride, however, a more vigorous image was obtained, and one which will bear the fixing operation. Specimen prints on glass, fixed and unfixed, were passed round, showing strong, rich images which suffered but little degradation in fixing. These were obtained by mixing with the chloride half the proportion of citrate of silver, and washing the emulsion in the ordinary way; this effect was obtained without the aid of an excess of silver nitrate, and the results were particularly suitable for transparencies, the image being susceptible of toning to any desired extent in the ordinary manner. Alluding to statements that had been made to the effect that gelatine films containing chloride of silver in even the smallest proportion could be detected by their darkening under the direct action of light, Captain Abney passed round a number of plates made from emulsions containing the different haloids separated, and in different combinations, all of which showed more or less colouration, and the deduction he arrived at from his experiments was that iodide and bromide together darkened as readily as a mixture containing chloride.

Mr. W. Bedford asked Captain Abney if all the specimens shown had been exposed for the same length of time. In his own experience he found that chloride mixed with bromide darkened more rapidly than bromide alone.

Capt. Abney replied that similar exposures had been given. With regard to chloride alone, it darkened to a chocolate brown without any of the blue tint which mixtures of bromide and iodide gave.

Mr. T. Sebastian Davis had found that a mixture of bromide and chloride darkened much more rapidly and deeply than a simple iodide plate. He said that *apropos* of Captain Abney's experiments with citrate of silver, he had some time ago produced satisfactory prints by means of phosphate of silver paper.

Mr. Maxwell Lyte said that he had had some experience of a kindred nature, and which confirmed Captain Abney's statement with regard to the darkening of the film. He had employed plates prepared with bromised collodion, sensitised in the usual way, and, after washing, soaked in salt and water, these giving films perfectly free from nitrate, and containing a slight trace of silver chloride. These were then flooded with a mixture of albumen and water in equal parts, to each ounce of which was added one drachm of a saturated solution of chloride of silver in ammonia. The plates, after drying over sulphuric acid and caustic lime, proved highly sensitive; but these experiments were not completed at the time he had been compelled to relinquish his photographic work, though he hoped soon to resume them.

Capt. Abney was not sure whether he had fully understood Mr. Bedford. What he wished to state was that as great a colouration could be obtained with a film containing no chloride, as with a chloride plate—not a pure chloride plate, but one containing a small proportion of chloride. With regard to citrate of silver alone, he had employed it for printing, but found it much slower than chloride. He did not like the so-called collodio-chloride, which should really be called collodio-citro-chloride. He would like to ask Mr. Davis if he had ever tried phosphate of silver in combination with gelatine.

Mr. Davis said he had added phosphate of soda to the emulsion, using the equivalent of silver nitrate.

Captain Abney understood that Mr. Davis employed, instead of the citrate of silver, the phosphate.

Mr. Maxwell Lyte asked if Mr. Davis had not found phosphate of silver very insensitive. Such was his experience. He found it necessary to use sodium carbonate to neutralize half an equivalent of nitric acid liberated by the phosphate of soda, in order to obtain a perfectly neutral paper.

Mr. Davis said, if he remembered rightly, the phosphate paper was much inferior to chloride in sensitiveness.

A vote of thanks was passed to Captain Abney for his communication.

A description was then read of Mr. William England's tent and stand, which were exhibited. The tent, which had originally been constructed for wet-plate work, was now used for developing and changing dry plates, the only alterations made being in the addition of a deeper ruby window, and the replacement of the silver bath by one for hyposulphite. The stand was constructed of bamboo, and was particularly light, and, at the same time, quite rigid.

Captain Abney also exhibited a sleeve-tent, constructed by Major Browne Constable, for wet or dry-plate work.

Mr. Maxwell Lyte said he had had considerable experience with tents, especially in hot climates, and had never sought special portability. The tent he preferred consisted of a tripod about six feet high, with a triangular top. The legs of the tripod were jointed in the centre, and, when folded, the points of the legs passed into an aperture in the triangular top, and were thus kept in position. From the centre of each leg to the next one extended a strip of wood, and these formed a support for a table, which was constructed on the principle of the Tunbridge ware chess-boards, so as to fold into a small space. The covering of the tent, which reached only as far as the table, was made of three thicknesses of calico—one of black, one yellow, and the outer one of white, in order to throw off the heat. The back portion was made with pleats, in order to allow standing-room. A sleeve ventilator was fixed in the top, and this, when in use, was packed lightly with grass or ferns, to keep it open; while, by placing upon the outside of the tent ferns or heather sprinkled with water, he managed to keep it cool in the hottest weather.

Major Brownrigg objected to having his head inside the tent. He had worked 12 by 10 plates in a box tent with sleeves, and found it answered perfectly.

Captain Abney thought Howard's tent admirable for wet plates, but considered it impracticable for dry plates.

Mr. England thought everybody travelling should be provided with a tent, as in the event of wet weather setting in, the time could be occupied in developing.

Mr. W. B. Bolton said Mr. England had mentioned that he had replaced the silver bath by one for fixing. He would like to ask if Mr. England did not find a difficulty in washing the negatives free from hyposulphite when travelling.

Mr. England replied that he had not found the slightest difficulty.

Mr. Bolas asked Mr. England if he had tried the plan of putting the plates into the fixing bath without first washing off the developer.

Mr. England said he had not.

Votes of thanks were then passed to Mr. England and Major Browne Constable for the loan of their tents.

It was announced that the next technical meeting would be held on the 23rd inst.; also that the exhibition would be opened by the usual soirée on the 7th October. The last day for receiving pictures would be the 29th September, and to this rule the committee would adhere most stringently.

The meeting was then adjourned to the 13th June.

South London Photographic Society.

The ordinary monthly meeting of this Society was held at the House of the Society of Arts, John Street, Adelphi, on Thursday evening, the 4th inst., the Rev. F. F. Statham, M.A., President, in the chair.

The minutes of the previous meeting having been read and confirmed,

The Chairman drew attention to the fact that the particulars of the artistic competition had not been sent to the journals last month. The subjects for competition during the next year were "A Country Lane," "Water and Trees," "Playmates," and "The Pet of the Family." He also informed the members that Rule VI. of the competition had been rescinded, and competitors had the privilege of exhibiting their pictures elsewhere. It was announced that the committee had decided that the presentation print of 1881 should consist of Mr. E. Dunmore's prize picture.

Mr. P. Mawdsley then took the chair, and the President proceeded to read a paper on "Realism and Idealism in Photography" (see page 262), in the course of which he handed round some prints illustrative of the manner of introducing appropriate figures and objects into landscape pictures—amongst others, "The Zealot," by Mr. Valentine Blanchard; "The First Night at the Pantomime," by the late Mr. H. Cooper; "The Idle Girl," by the late Mr. O. G. Rejlander; and some examples of successful grappling with costume models, by the same artists and others; also, as an illustration of the effects of lighting, he showed Mr. H. P. Robinson's "Little Sunshine." At the conclusion of the paper,

The Chairman suggested that the best way in which they could treat the very able paper which the President had read before the members would be by having a good discussion, and called upon some of the members to offer remarks upon the paper.

Mr. J. Nesbit said he had been very much interested in listening to Mr. Statham's paper. He had frequently tried to introduce figures into his landscapes, but found they always struck attitudes very different from what were natural. His experience was that it was very difficult to make them assume such a pose as the artist would like to see in his picture. He had frequently tried to reproduce the poses he had seen in Birket Foster's and other pictures, but had found it impossible to make his figures assume the right positions. No doubt others had been more successful, and he would like to hear their views on the subject.

Mr. E. Dunmore agreed with Mr. Nesbit with regard to the difficulty experienced in getting people to pose themselves properly, and remarked that one did not care to risk spoiling a picture by introducing figures which would not pose as they were required to do.

Mr. T. J. Pearsall thought, from his recollection of many pictures he had seen, that if the artist were on the look-out, the right people would present themselves to be made use of as figures, and that the introduction of these elements of life into works of art was a very important matter. He went on to say that students of "still life" found especial difficulty with this deficiency of life in their pictures.

Mr. W. E. Foxlee, referring to an allusion in Mr. Statham's paper to people "getting themselves up" preparatory to sitting for their portrait, said he was of opinion that photographers very often failed in getting good portraits on account of the sitter having just left the hair-dresser's before coming to the studio, and that this was more especially the case with children, who were often brought with their hair arranged as they never had it before or after.

Mr. F. Bridge cited the case of a lady who had her hair curled specially for the purpose of having her portrait taken, and sending it to her husband. He brought the picture home without having recognised it, and showed her that "some woman had been sending him her picture."

Mr. Statham thought they did not sufficiently appreciate the difficulties of photographers. They could do a great deal more if they made the same efforts, and had at the same time received the same remuneration as painters. The public ought to be taught that if they wanted a good artistic photograph they must pay for it, as they would for a good painting. He would like to bring to the notice of the members what he had seen, in visiting one or two galleries, of the remarkable pains celebrated artists have taken over the details of their pictures. Raffaelle, when desirous of introducing a camel into one of his pictures, sketched it in every conceivable position in order to see which was the best; and Birkett Foster was continually making little sketches in his note-book, to be made use of as occasion offered. He thought that when a photographer found a suitable scene he should have no very great difficulty in taking some persons with him and introducing them as figures into his picture. He related an anecdote of an artist in the south of London, some few years ago, who was engaged to paint a family picture. The artist suggested to his patron that he should pose them at the table, and painted them with the governess holding one of the children with her hands clasped, saying grace. The geneteman did not like the picture, and the artist, having it thrown on his hands, exhibited and sold it at the Royal Academy for a high price on account of its artistic merits.

Mr. Foxlee said an artist, some years ago, wishing to represent a man raising a stone with a crowbar, came to him (Mr. Foxlee) himself to be photographed in the desired position. He was taken in several positions with the crowbar, but none of them suited him. A balk of timber was then obtained, and he was set to work to try and force out the side of the studio. In this position he was photographed, and a picture produced just as he required.

Mr. Statham said that an interesting topic for discussion presented itself as to what was the proper method of delineating the body in rapid motion, and referred to the examples of this nature produced by Mr. Muybridge. He instanced that the horse, while trotting, never exhibited its real movements to the eye.

Mr. Pearsall said that Mr. Muybridge had declared that Mrs. Butler was ahead of all painters in portraying animals in motion, and that her pictures were more correct in this respect than even Rosa Bonheur's. He knew that whole regiments of the Guards had been ransacked by her in order to obtain suitable faces for some of her pictures.

Mr. Statham observed that those remarks confirmed what he had said about the pain and trouble taken by some artists.

Mr. W. Brooks said, with regard to taking pains, that some of his pictures had taken him months to get. Painters, he remarked, paint for one person, their patron; photographers work for the middleman or shopkeeper, and as soon as they succeeded in bringing out a good picture the itinerant photographers get up cheap copies of it, selling them for one-half or one-quarter of what the original artist could afford to sell his picture for. He thought the pains and trouble of getting suitable figures and adjuncts for a picture would have to be left for the amateur, as it did not pay professional photographers to do it.

Mr. Statham thought the time would come when thoroughly artistic photographs would command as high prices as good paintings—such productions, for instance, as Rejlander's, who, though dead, still lived in the hearts of many of those present by his works.

The Chairman called for a very hearty vote of thanks to the President for his most able paper, which was heartily responded to.

The President having resumed the chair, and some discussion having taken place relative to a paper for next meeting,

The Chairman thought they required a special committee to arrange papers for the monthly meetings, so as not to be dependent upon chance. He suggested that, failing a paper for the next meeting, some topic for discussion might be acceptable.

The meeting was then adjourned.

Thursday Evenings for Photographers.

At the meeting held on the 4th inst., Mr. A. Cowan occupied the chair.

Mr. A. J. Brown produced some gelatine negatives which, although developed with ferrous-oxalate, showed green fog; and he stated that he found to produce this result it was not necessary to use an alkaline developer. He also exhibited some negatives on gelatine supports; he found it difficult to develop the films sent out by one maker, owing to their curling up in the dish.

The Chairman said if they were squeegeed on the bottom of the dish, when developing or as the development first commenced, they would remain flat throughout the operation.

Mr. W. Cobb said a friend of his had experienced great difficulty in eliminating the hyposulphite from film negatives; negatives that had received what was thought to be a good washing, showing traces of hyposulphite after being kept a few months.

Mr. Reimann suggested that if, when most of the hyposulphite was removed, the negatives were treated with a solution of alum, it would decompose any that was remaining.

Bocas' exposing shutter was then exhibited and tested by setting to various exposures and timing by a watch, the results being apparently correct.

Several photographs by Professor Stebbing of the students at a School of Design in Paris were shown.

The Chairman passed round some negatives on plates coated with an emulsion handed to him by Mr. Henderson. He found them much more sensitive than any to be obtained commercially; but as they were much fogged they could only be considered specimens of rapidity.

Mr. Henderson was of opinion that the emulsion was not foggy, but that it was of such extreme rapidity that it required great care to keep the plates from light. He had produced a distinct impression upon one of these plates by ten seconds' exposure to the light of a lamp covered with deep ruby glass and orange paper.

Photographers' Benevolent Association.

The Board of Management held its usual monthly meeting on Wednesday eveniug, 3rd inst.

The minutes of the previous meeting having been read and confirmed, Messrs. E. Squire and Geo. Higgs were duly elected members of the Association.

The following vote of thanks was carried unanimously:—"The Board of Management tender their most sincere thanks to all those ladies and gentlemen who so kindly gave their services at the soirée on Thursday, the 27th ultimo, to benefit the funds of the Association."

Sheffield Photographic Society.

The ordinary meeting of this Society was held at Freemason's Hall on Tuesday evening, May 2nd. Thos. H. Morton, M.D., presided. The minutes were read and confirmed.

Mr. Taylor (Secretary) reported on the late excursion to Haddon Hall, April 27th, which was numerously attended by members, friends, and ladies, who were also specially invited. The weather was most favourable, and, through the courtesy of the steward, Mr. Nesfield, every facility was afforded the Society to make a photographic survey of this noted baronial mansion.

Mr. Rawson said it was one of the most agreeable excursions he had attended, and proposed a vote of thanks to Mr. Nesfield.

Mr. T. Firth seconded it.

The Chairman remarked that the success was also attributable to able management, and he had pleasure in proposing a vote of thanks to Messrs. T. Firth and G. V. Yates, for making the necessary arrangements.

A large number of negatives and prints from 12 by 10 to 5 by 4 were passed round, Messrs. Taylor, Hadfield, Firth, Rawson, Dickinson, and others contributing.

One able member, however, had a mishap in the field, not to himself, but to his plates, which, when changing, prematurely saw the light, and were hopelessly fogged. The photographic result otherwise was satisfactory.

Mr. Ainley exhibited a holder for negatives, when developing. It consisted of a metallic silvered plate, bent so as to form a V wedge-shaped groove in which the negative was placed, and a handle or arm of the same material soldered to the centre. The instrument would fit almost any plate.

Mr. Rawson suggested that the handle should be curved downwards, so that the end might rest on the table, and not tilt up. This appeared advantageous.

Dr. Morton said he thought that the injurious action of pyrogallic on the skin had been somewhat over-rated; but it was very desirable to have a reliable holder, or some means of raising the negative for inspection and transferring from one dish to another.

Respecting the rapid drying of negatives, suggested by the Rev. J. J. Bird,

Mr. Rawson said he found blotting-paper, to remove free moisture, and careful drying before the fire, a very efficient plan.

Mr. Taylor (Secretary) brought a spring rapid shutter of his construction, the aperture being closed by revolving discs. Portraits shown taken by it were good.

On the proposition of Mr. Leader, F.S.A., seconded by Mr. Dakin, the next excursion of the Society will be to Welbeck, May 25th.

Talk in the Studio.

South London Photographic Society.—We are requested to state that all communications with regard to the Society should be addressed to the Hon. Sec., 9, Norfolk Road, Dalston Lane, London.

The Stannotype Process.—We have received from Mr. Woodbury a little pamphlet describing in clear and succinct language his latest and best simplification of the Woodbury process.

To Correspondents.

All Communications connected with Advertisements and Business to be addressed to Messrs. Piper & Carter, "*Photographic News*" *Office, 5, Castle Street, Holborn, E.C. Advertisers are requested to make all Cheques payable to* Messrs. Piper & Carter, *and crossed* "*Union Bank, Photographic News Co. Account.*"

*** We cannot undertake to return rejected communications.

*** We have received an interesting series of instantaneous pictures of the recent State procession at Windsor, taken under specially unfavourable circumstances by Mr. C. Wyrall, of Messrs. Hills and Saunders.

Major Gordon.—We have received the prints, and quite agree with you as to their clearness, purity, and brilliancy. You have evidently controlled the development to perfection. The interior is particularly good.

W. W. W.—1. Certainly not. 2. Chloride of gold is usually a little acid, and it is to neutralize this acidity that the addition is made.

Christian.—Write to Klic direct.

Eton.—1. In England, pyrogallic development is more in favour; on the Continent, on the contrary, we should think oxalate development is mostly used. 2. Eder's "Modern Dry Plates."

A. d'E.—Thank you very much, but we are quite ready to stand or fall by our own.

G. F.—Very much depends on circumstances, but the matter was fully discussed in the News some months back.

D. A.—He uses a kind of drop shutter, to which are attached numerous powerful india-rubber springs; but it has been doubted whether the exposure is in reality so short as the estimate which he makes.

Samuel Johns.—Not only practicable, but tolerably easy in bright summer weather; still success naturally requires that the worker has sufficient knowledge and experience to take advantage of all circumstances tending to make results more certain. To give you all the information you require would involve writing a comprehensive treatise on the subject.

C. C.—Alcohol, 5 ounces; cadmium iodide, 85 grains; or if for large plates, alcohol, 5 ounces; cadmium iodide, 42½ grains; potassium iodide, 34 grains. It is not desirable that any bromide should be used.

John Cannon.—The colouring matter you mention is one of the most fugitive of reds. Alizarine lake is as permanent a pigment as you will obtain.

H. Spink.—The MS. is to hand. Thanks.

Dark Room.—1. As cold water will only dissolve one-fifth of its weight, such a solution is obviously impossible. 2. Add it drop by drop until the turbidity disappears. 3. The excess is very soon got rid of by washing. 4. Only when freshly prepared.

James Phillips.—French chalk has always answered well in our hands, but care should be taken not to apply it with too heavy a pressure.

A Beginner.—The markings are due to the use of over-iodised collodion; and the remedy is to add more plain collodion, or to increase the strength of the silver bath.

Sunlight.—The proceeding is of but little practical value, unless the bath be made slightly alkaline first. 2. Next month. 3. Write to the Manager of No. 2 department. 4. The gentleman referred to is still managing the concern.

THE PHOTOGRAPHIC NEWS.

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CONTENTS.

REVERSED NEGATIVES.

Although several good methods exist for the productiou of reversed negatives, or for the reversal of those already existing, it is a matter of notoriety that most of these processes are subject to drawbacks and disadvantages which prevent their use in many cases; and as the practical outcome, none of those printing methods which require reversed negatives have come into general use.

The use of a reversing prism or of a silvered glass reflector involves considerably increased trouble and care in placing and adjusting the camera; in the former case there is always a considerable loss of light, and generally a notable falling-off as regards definition; while in the latter case the careful polishing of the silver surface after it has been put away for any great length of time involves so considerable a loss of time as to prevent its use by any excepting those who have frequent occasion to produce reversed negatives. It is quite easy, as we have frequently pointed out, to ensure the easy separation of either a collodion or a gelatine negative film from the glass, provided that the plate has been suitably prepared before being coated; but this does not in any way meet the wants of those who may wish to reverse an old or existing negative. As a matter of fact, almost the only available course in such a case was to make a reversed copy of the negative, the risk of attempting to strip it being too considerable in ordinary cases.

Mr. Plener's method of employing hydrofluoric acid to loosen the film will serve to altogether change this condition of affairs—as regards gelatine negatives, at any rate—and it now becomes easy and safe to strip any gelatine negative which we may desire to possess in the form of a film or pellicle.

Mr. Plener's method, as published by us a short time ago, consists in immersing the plate in very dilute hydrofluoric acid, the film having been previously thickened up by a little plain gelatine; but under these circumstances the film possesses a considerable tendency to expand under the influence of the water, and a considerable enlargement of the picture takes place. When, however, the film is treated with dilute sulphuric acid before and after the immersion in the hydrofluoric acid, this does not happen, and it is even possible to somewhat reduce the scale of the stripped negative.

We now propose to give working details for carrying out Mr. Plener's method of stripping, and a considerable improvement has been made by using the solid and easily handled fluoride of sodium instead of the corrosive and somewhat dangerous hydrofluoric acid; the sodium salt being dissolved, diluted, and decomposed by sulphuric acid just as it is required for use.

Should the negative to be operated upon have been varnished, the first step is to dissolve away the resinous film by repeated ablutions with methylated spirit, and if a collodion film exist between the varnish and the gelatine, this must also be removed; a mixture of equal parts of alcohol and ether serving for this purpose. The next step is to prepare a solutiou of a tolerably hard quality of gelatine in about eight times its volume of water, and after the plate has been slightly warmed and levelled, this preparation is poured on until a layer about as thick as an ordinary cabinet mount is obtained, strips of cardboard being placed round the edges of the plate if required. When the gelatinous mixture has set, the plate is either set on edge until it is nearly dry, or it is immersed in strong methylated alcohol for a few minutes. The next step is to allow the plate to remain for five or six minutes in a cold mixture of one part of sulphuric acid with twelve parts of water, and in the mean time one or two parts of sodium fluoride are dissolved in one hundred parts of water, a gutta-percha or ebonite tray being used. A volume of the dilute sulphuric acid equal to about one-fourth of the fluoride solution is next added from the first dish, and the plate is then transferred to the second dish. The film soon become loosened by the action of the liberated hydrofluoric acid; and when complete separation has been effected, it is once more transferred to the sulphuric acid bath. In the meanwhile, a sheet of glass, which should not be smaller than the film, is warmed and slightly waxed on the surface; all excess of wax being well polished off with a piece of flanuel. The film is next immersed in cold water, where it is allowed to remain for about a minute, so that the greater part of the sulphuric acid may be removed. It is next laid on the glass plate and covered by a sheet of wet paper, after which a squeegee is employed to expel the redundant water, and make a close contact between the film and the glass. The paper is next removed, and the edges of the film are clamped to the glass by means of thin strips of wood and American clips. The plate bearing the film negative is now placed iu a warm locality, under which circumstances a few hours will suffice for the complete drying of the film; after which it can be detached from the waxed glass with the greatest ease, it being merely necessary to run the point of a penknife under the edges. During the drying it is necessary that the atmosphere of the apartment should be charged with ammonia, iu order that the trace of sulphuric remaining in the film may become neutralised; or it is better still to place a few drachms of ammonia in a flat dish, and fume the film for a few minutes. Under any circumstances it is well to place a small strip of litmus paper between the film and the glass, so as to indicate when the acid is thoroughly neutralised. The trace of ammonia sulphate formed is not in any sense detrimental; but if a thicker film of gelatine than that recommended be used, it may be necessary to soak the pellicle a little longer in the water, in order to sufficiently remove the sulphuric acid.

ON THE ACTION OF ORGANIC MATTER ON SILVER SALTS.

The action of organic matter upon silver salts is well known, and photographers who suspect organic impurities in their silver baths take the precaution of "sunning" and filtering the solution in order to get rid of them. Dr. Henry Leffmann, the microscopist to the Pennsylvania State Board of Agriculture, has essayed to apply this action of the salts of silver and sunshine to determine organic impurities in ordinary waters, and the following experiments, published in the *Analyst*, were undertaken as a sort of preliminary investigation. The subject of water analysis is so important, not less to the photographer than to others, that every observation of the kind must have some value; and as the reaction is one familiar in the photographic laboratory, our readers are likely to feel particular interest in Dr. Leffmann's investigation.

If we add a salt of silver to ordinary water, says the doctor, the precipitated chloride interferes with the test, and, to prevent this, I used a solution containing marked excess of ammonia. In the following experiments, the proportion used was 2 c.c. of ammonio nitrate of silver to 100 c.c. of the water. The silver solution contained only a few grains to the ounce. When not otherwise mentioned, the water was exposed to the sunlight for two hours.

1. Distilled water... ... ...No colour
2. Schuylkill ,, ... ,,
3. Ditto ,, with 0·1 c. c. urine ...Brown colour.
4. Ditto ,, with 0·5 c. c. urine ...Deep brown.
5. Ditto ,, with 0·02 c. c. urine ...Red brown
6. Ditto ,, with 4 grs. raw sugar.. No colour.
7. Ditto ,, with 2 grs. stale mash...Yellowish.
8. Well water, not perfectly pure, but not unfit to drink ... ...Faint black.
9. Ditto ,, markedly contaminated...Black precipitate almost immediately.
10. Water from a small stream, quite pure...No colour.

Waters containing small amounts of milk, glucose, and albumen gave no distinct effects. Solution of glue produced a faint brown. All the experiments tended to show that the test was very sensitive to the presence of urine. Some experiments were made with highly dilute solutions of the common active principles.

Quinidia, strychnia, and cinchonidia gave no result. Picrotoxin gave light yellow. Caffeine gave light yellow. Quinidine sulphate gave faint brown. Morphia gave immediate precipitate. By calculating the amount of metallic silver reduced, a pretty correct estimate of the organic matter in the water could be formed.

THE PREPARATION OF GELATINO-BROMIDE PLATES IN DAYLIGHT.

Mr. Ernest Edwards, who is well known to our readers in connection with the heliotype process, has made an ingenious application of the de-sensitizing properties of potassium bichromate, the plates being prepared in the full daylight, and sensitized, when required, by mere soaking in water. If Mr. Edwards's process is as successful in actual practice as it appeared to be when he recently demonstrated his method before the Boston Society of Amateur Photographers, it will prove of especial value to the photographic tourist.

Mr. Edwards dissolves twenty-four grains of bromide of potassium and thirty grains of gelatine in one half-ounce of water, raised to and maintained at a temperature of 100° Fahr. Next he dissolves thirty grains of nitrate of silver in two drachms of water, adding liquor ammonia until the black precipitate formed is re-dissolved, the amount of liquor ammonia added being thirty-five drops. This ammonia nitrate solution is then added to the bromized gelatine solution first named, and the two are thoroughly mixed by agitation. To this is added a solution of twenty grains of bichromate of potash in one half-ounce of water, and, finally, two drachms of alcohol, raised to a temperature of 100° Fahr., are added to the mixture.

All these operations may be conducted by daylight.

Next, still working by daylight, the plates are coated by pouring, and laid aside to set and dry. When dry, one of them is taken into a dark closet, soaked in cold water, face downward, for about an hour, the water being changed several times, and then removed from the water and dried in the dark. It is then exposed and developed. The action of the bichromate is to render the bromide of silver insensitive while it is present. The washing removes not only this bichromate, but also takes out the free nitrate and the nitrate of potash, the thin film being the best possible form in which the gelatine can be presented for washing. All necessity for "cooking" the gelatine is done away with by the use of the ammonia-nitrate.

Mr. Edwards recommends that in making plates by this process they be washed as soon as they are "set," without allowing them to dry, as in this way any effect that the light might have on the bichromated gelatine is avoided. The importance of this new departure in the method of preparing dry plates can only be appreciated by those who have made them by the old method, which requires all the operations of mixing, "cooking," washing, coating, and drying to be carried on in a room so dark that it is impossible for the operator to clearly see what he is doing. With properly constructed washing and drying boxes plates may, by Mr. Edwards's method, be made in large quantities much more rapidly and at much less cost than by the method now in vogue. It is hoped that others will experiment upon it, and make public the results of their investigations.

A NEW MERCURO-CYANIDE INTENSIFYING PROCESS FOR GELATINO-BROMIDE PLATES.

BY DR. J. M. EDER.

The negative it is desired to intensify is, after fixing and thorough washing, placed in a solution of bichloride of mercury, just in the same way as in the old process.

The negative is next well rinsed with water and put into a second bath. This is made up by dissolving in 1,000 parts of water—

Cyanide of potassium	5 parts
Iodide of potassium...	2½ ,,
Bichloride of mercury	2½ ,,

The negative will then pass through three stages of change.

1st Stage.—The negative grows more dense and becomes yellowish. This is by reason of the action of the iodine salts upon the mercury. Remaining still in the bath, the negative reaches—

2nd Stage.—The film becomes dark brown; the negative gains enormously in vigour, and the contrasts are heightened. The reason for this is the gradual metamorphosis of the sub-iodide of mercury by the cyanide of potassium. In this condition the image is very vigorous. Flat negatives are by this means rendered quite brilliant, but those of normal character become, as a rule, too vigorous and too hard.

3rd Stage.—If the negative is too dense, it is allowed to remain still longer in the bath. The intensity gradually diminishes, the colour of the negative becomes a lighter brown, and the image is more transparent, *while at the same time none of the detail is eaten away.* The vigour slowly decreases, until at last the negative has no more density than it possessed previous to its treatment.

The changes I have detailed follow slowly. The stages remain for some minutes, and for this reason the process is easily watched and controlled. Owing to the nature of the changes, moreover, this process of intensifying may be adopted for negatives of different kinds.

This mixture of cyanide of potassium, iodide of potassium, and chloride of mercury, may also be employed as a means of reducing density. If very dense negatives (after fixing and washing) are put into it, the image becomes gradually thinner, its harmony being preserved the while. In half an hour or an hour the change will most likely have taken place. Still, although the weakening of the negative proceeds very slowly, it is better to dilute the cyanide solution with an equal volume of water.

The method I have described is a very comprehensive one; that is to say, it may be employed for improving flat negatives and hard negatives. It is more advantageous than the cyanide of silver and cyanide of potassium process, because the brown colour has a more favourable result. Moreover, of this last process it is said that the negative, after much printing, becomes of a rose-red colour, due to the decomposition of the residual cyanide of silver.

Finally, I may say that in the interval between the mercury bath and the cyanide bath, even when the negative is insufficiently washed, there is no chance of any spots forming on the film.

By-the-Bye.

PARIS AND THE SALON.

Paris in May. To the stranger, whether he dwells in town or country, Paris is ever hospitable—ever attractive; but in the sunny days of May, when greenness and freshness prevail in the boulevards and parcs, when the golden rays overhead are scarce screened by the translucent greenery, when it is pleasantly warm and not sultry, when the smart little Victorias begin to crowd the streets, and the Paris *cocher* sports his new hat of shining white or shining black, when the smiling heralds of summer on every side tell us the chill days are gone, then is the French capital indeed delightful. The cafés and restaurants of white and gold are opened up into the street, and long-aproned garçons issue forth with chairs and tables to take possession of half the pavement; flowers and green shrubs are posed under the sun-awnings, and roads and *trottoirs* are sprinkled to allay the dust. Monsieur appears in white waistcoat and straw hat to sip absinthe and read the impaled newspapers at the little marble tables, and *bonnes* put on their summer finery and long ribbons to parade youngsters yet more fine and be-ribboned. Roundabouts and *cafés chantants* in the Champs Elysées and in the Bois are in full swing, gaily-flagged boats are to be seen on the sun-lit lake, and so intent are Monsieur, Madame, et Bébé on amusement, that the crowded cabs and omnibuses leave the stranger without means of locomotion.

It is the Salon, of course, opening, like our Royal Academy, early in May, that increases the number of visitors just now in Paris. There is this marked difference between the annual art collections of England and France: with us, the pictures are to be seen at the Academy, and at the Academy alone; while in Paris, so widespread is the influence of the Salon, that one sees the reproductions of the principal pictures of the year in the windows of print-sellers and photographers. It is true our painters at home are gradually becoming more alive to their interests. It is not so long ago that they would consent on no account to the reproduction of their paintings by the camera, so we shall not be surprised if the time does not shortly come when, as in Paris, reproductions are to be met with on every hand at the same time that the originals are on exhibition at the yearly gathering. These reproductions not only bring profit to the painter, but increase also the prestige of his original work, for this becomes familiar before it has actually been seen. It strikes the eye at once, if the latter has seen anything like it before, and thus all those paintings that have been copied, become at once famous to the public.

In regard to reproductions, we may mention a new class of picture that seems to be causing some attraction in the streets. We allude to tiny paintings in oil, many of them very well executed indeed, and presenting a *fac simile* in miniature to the original painting. They are some of them no bigger than a cabinet card, and rarely measure more than ten inches. Although apparently on canvas, they are executed upon wood, and are really paintings, the outline and detail being in the first place produced by means of photography. The price is from ten to thirty francs, some of them being exquisitely finished, and entailing much work. No doubt a large number are painted at the same time, and in this way they are produced at a reasonable figure.

Coming to the Salon itself, we may at once say, for the information of the uninitiated, that the wall space covered by paintings is probably four or five times that available at the Royal Academy. From the circumstance that France has a much greater population than Great Britain, it is not surprising that she should have more capable painters. After the number of paintings, the next thing that strikes an English visitor is a difference in style. The French paint stronger and more vigorously than with us at home, and also, we think, there is more attempt at classic work. The French speak of our Academy this year in depreciating tones, admitting, however, that there are some nice little works. We would in reply say that, while their pictures undoubtedly display much force, there are many very nasty ones in the collection. Imagine a large picture in the main Salon which has for its subject the dragging of a drowned corpse to the surface of a weed-grown pond! A boat-full of men have grappled the livid body of a drowned man, and this they are pulling out of the water, entangled with weed and slime. The picture is most graphic, and exceedingly well painted: but the subject is horrible to a degree. In the same way, we are treated to an allegorical picture of "Remorse"—a brown-clad monk, with terrible visage, tearing a wound in his breast, from which the dark-red blood flows, causing a clotted pool beside him. "A Reverie on Death"—a man sitting down contemplating a dead body, from the head of which issues a stream of dark blood—is another unpleasant picture, to use a mild phrase; and so is the "Last Visit at the Hospital," where friends gather round an open coffin in which the rigid features of death are visible.

Another phase of the Salon to which we take exception is the battle and military scenes, of which, fortunately, there are but few. These are of the old conventional type. Charpentier's "En Avant" is a very good example, a score of horsemen, fighting and rushing forward to the attack. There is the same cavalier sabreing some unfortunate on the ground, the same horseman raising his sword on high to encourage his fellows, the same riderless horse always shown in a battle on canvas. An attack on Sfax suffices to introduce the naval element, and we have steam launches conveying soldiers and sailors on shore to take part in the contest that we see raging in the smoke and fire.

As usual, the Salon is very strong in pictures from the nude, studies which, if too frequent here, are decidedly too rare with us. The portrait poses are certainly in advance of those we show, and there is a greater number of character sketches. A "Columbine," a delightful creature with laughing mouth and merry eyes, holding a champagne glass aloft, which she has just emptied, is the embodiment of brightness and go. M. Moreau's husbandman, standing leisurely with his scythe beside him, one leg across the other, while he lights his pipe, is most easy and graceful. A touching little scene—without a dead body—is "The Gardener's Daughter," in which we see a coffin covered with pall in a garden amid fresh blooms and growing flowers.

We have a good many pictures of funerals and religious ceremonies in which mourning women are shown us in sackcloth and ashes; but the sackcloth is always cut to the latest fashion, fitting most exquisitely the slender waists, and, if anything, a trifle décolleté. Somehow, one never feels much sympathy for lovely woman, however bowed down with grief, when we see a lace-trimmed corsage and finely clocked stockings; we see she is in mourning, and only think how nicely it becomes her. Several of the French artists have missed the pathos of their subject by paying too much attention to costume.

Van Beers shows us the Syren once more, the little puss that captivates every one at the Academy. Here the Syren is steering a skiff, and facing a manly form, whose features are cleverly covered by a soft felt hat. She sits in the little boat enveloped in furs, her bright eyes and ruby lips as ravishing as ever. She has the same bewitching costume, and draws admirers round her the whole day long.

M. Michelet shows us a "Public Letter-writer," which is not to be compared with Mr. Burgess' painting of the same subject in our Academy. Nor are the landscape pictures more successful than those to be seen at Burlington House, with the exception, perhaps, of some coast scenes, which our French neighbours manage very well. One of the finest paintings in the Salon is a fisher scene; the boat has just touched shore, and the little one of the family is handed in to the father, who holds the urchin fondly aloft prior to embracing it. Mother stands on a jutting rock just in front of the boat, looking fondly at the chubby limbs of her darling. "The Kiss of the Syren," by Wertheimer, is another fine picture, the syren in her embrace drawing a sailor from his boat down with her into the deep waves.

A quaint subject for a *genre* picture is a dentist's room, the patient ready in the arm-chair with her head thrown back, and the dentist taking up the forceps from the table in front. It is by Rasel, and called "Un moment difficile," a disagreeable picture at best, and in our experience scarcely true to nature, for dentists, as a rule, do not have their implements in front of the patient. "Every Age has its Pleasures" is more pleasant. It is an artist's studio, and a fly has settled upon a statue—the Venus of Milo. An urchin has mounted upon a damask settee, and, oblivious of the costly furniture and more costly statue, is in the act of catching the insect. The picture is all the more attractive, since there is a singular absence of humour and brightness among the Salon pictures this year. The impression they convey is for the most part lugubrious, and in some cases, as we have shown, the sentiment verges upon the horrible.

The "At Home" next week will be "Mr. W. J. A. Grant on board the Arctic yacht *Kara*"; the following "By-the-Bye" will be "A Unit of Light."

PHOTOGRAPHY IN AND OUT OF THE STUDIO.

Photographs on Moving Sensitized Plates—The Discussions at the Photographic Society—Freckled Sitters—Photography as a Profession.

Photographs on Moving Sensitized Plates.—The researches of Mr. Muybridge have revolutionised one's ideas as to "instantaneous" photography. It should not, however, be forgotten that as far back as 1874 M. Janssen's "photographic revolver" employed in connection with the Transit of Venus was successfully used to produce successive photographs of the moving planet, photographs which even in these days of gelatine plates would be considered as nothing short of marvellous. The extreme sensitiveness of modern plates has turned the attention of photographers to the question of exposure; but it can scarcely be said, in spite of the multitude of instantaneous shutters, that perfection in mechanical means has yet been arrived at. As there is no reason to believe we have got to the *Ultima Thule* of sensitivenes, this question becomes day after day of more importance, and it is interesting, therefore, to learn what has been the experience of M. Janssen on the subject. In the "photographic revolver," the method of exposure adopted was the rotatory movement of the plate, which was stopped mechanically each time an image was taken. This plan succeeded well up to about a dozen images in a second, but failed when a greater rapidity was sought, by reason of the practical difficulty which the stopping and moving of the plate presented. This difficulty is indeed self-evident, and it occurred to M. Janssen to consider whether the stoppages could not be done away with, and successive pictures taken on a moving sensitive plate. His supposition has turned out to be correct, and he has exhibited to the French Academy photographs on which identical portions of the solar surface were represented, and these photographs have demonstrated the perfect success of his theory. One of these portions was taken on the plate while the latter was at rest, and the other while the plate was moving about six inches in a second, and a close comparison showed that no difference between the two could be detected. The possibility once admitted, it became simply a matter of calculation as to how many successive photographs could be obtained in a given time—the calculation being based on the known sensitiveness of the plate, its velocity, and also the nature of the object to be photographed. M. Janssen has satisfied himself that images following one another at intervals of $\frac{1}{100}$ of a second may be readily obtained by this means, and that even this number may be exceeded. The relations between astronomical and every-day photography are not so close as to make it plain what influence M. Janssen's discovery may have upon the general work of photography; but the fact that an image can be impressed upon a moving plate is an interesting one, and may lead to further important results.

The Discussions at the Photographic Society.—It sounds rather oddly to hear of a dearth of papers at the Photographic Society, when, at the same time, intermediate or "technical" meetings, as they are called, have been established presumably for the purpose of allowing the members to get rid of their superfluous knowledge, which there is neither time nor opportunity to make public at the regular monthly meetings. The fact that these intermediate meetings bear the name of "technical," would seem to indicate that the council have come to regard the meeting on the second Thursday of every month as a "theoretical" one. If this be the case, we would ask whether the distinction is a wise one. It is, of course, desirable that theories affecting photographic phenomena should be made public; but it is also desirable that the discussions should be such as the "average member" may occasionally join in. When a subject is introduced which touches upon a vital point in practice, the increase in the liveliness and interest is very marked. The meetings of the Photographic Society—whether rightly or wrongly—have acquired a reputation for solemnity and importance which is not calculated to encourage timidity, and hence, it may be, arises the deficiency of papers. If it be found that the "technical meetings" are pleasanter, because less formal, than the regular monthly meetings, the latter will assuredly suffer, and "stop-gaps" become more than ever necessary. Why is it that there has been such a tendency during the past two years to form other photographic societies, clubs, or whatever name they may be called by? This, at all events, should not indicate a lack of subjects to discuss, but rather the reverse. Yet the Photographic Society, which should be at the very head of all other societies, finds it difficult to get papers.

Freckled Sitters.—A sitter with a freckled face is undoubtedly a source of great worry and annoyance to the photographer. In spite of the most liberal application of the powder puff, the abominable freckles insist upon showing, and the negative requires no end of retouching before it can be made to yield prints sufficiently gratifying to the sitter. Some of the Daguerreotypists of old had a novel dodge by which they tried to get rid of the spots. Here is the method as recommended by one of the very earliest authorities in the art. "To obviate a freckly face, let the person rub it until it is quite red, and the effect will be to lessen the contrast; the photogenic intensity of the red and yellow being nearly the same, an impression can be produced nearly free and clear." Probably; but we fancy a lady of to-day, if she were told by the photographer to scrub her face violently, would doubt whether he had not taken leave of his senses.

Photography as a Profession.—The personal experience of men who have succeeded in photography would be of immense service to those about to begin. It is often said that the artistic faculty is rarely to be found in the same person combined with a business capability, and we believe that this is true to a certain extent. But it would be a mistake to suppose that because a man is artistic in feeling, and conscientious in his treatment of sitters, he cannot, if he chooses, acquire enough of business habits to make his practice a success pecuniarily as well as artistically. The one thing upon which all photographers agree is that the secret of building up a good business is to send out the very best of work. At the same time, if there is habitual delay in forwarding proofs, or further delay in completing orders, and unpunctuality in the keeping of appointments, the best of work cannot save a man from bankruptcy. A photographic business in the present day is based upon the recommendations of sitters; it is surprising how soon a man's reputation, either for good or bad work, for punctuality or carelessness, gets known. If they have confidence in him, customers will run after a photographer and put themselves to inconvenience to seek him out. Hence no one who commences photography as a profession need despair. as good work and business habits are bound to tell, if—and there is much virtue in an if—he waits long enough.

Review.

General Hand-book of Photography (Ausführliches Hand-buch der Photographie), by Dr. Josef Maria Eder. With 600 woodcuts, and six tables. Part I.: The Chemical Action of Light and Photography. (*Halle, Germany: Wilhelm Knapp.* 1882).

We have received from Dr. Eder's publisher, Herr Wilhelm Knapp, of Halle, the first part of the Handbook of Photography, of which ten will make up the volume. When this is complete, it will be, far and away, the best authority on photography and photographic processes that has ever been attempted. The name of Dr. Eder stands quite as high in this country as it does in his own, for no more hard-working investigator or thorough chemist has devoted himself to photographic science.

The first part of Dr. Eder's book consists of no less than 96 pages (the entire volume will number about 800 pages) of closely-printed matter, and deals with the history and development of photography, as also with the chemical action of light. The early experiments of English investigators are referred to in detail, and due justice is rendered to Fox-Talbot, Herschell, Ponton, Robert Hunt, and other pioneers in this country. Although at first sight the numerous notes and authorities give his pages rather a concrete look, Dr. Eder's language is of the simplest, and his style terse and interesting; while the numerous illustrations interspersed help further to make the book eminently clear and intelligibie. We have, indeed, been struck, in perusing his chapters, by the interest with which he has been able to invest even the barest facts he desires to bring before his readers.

Part I. at once shows how fully and exhaustively the author proposes to deal with his subject; but, in an introductory page, he sketches the purport of the subsequent chapters. There is not an important phase and branch of photography with which Dr. Eder does not propose to deal, and, as we have said, the finished volume must needs be in years to come the recognized authority on matters photographic, both in the old world and in the new.

To those who are wholly ignorant of the German language, Dr. Eder's volume will be of little avail; but to those who have but a casual acquaintance with the language of the Fatherland, we heartily recommend this invaluable work. The printing is in Roman characters, therefore easily legible, and we will vouch for it that any indifferent German scholar who is a good photographer will be able to study the pages with advantage. The price is 2 marks 40 pfennigs each part, and, as International Post-office orders are now obtainable, we make no doubt that Herr Knapp will be ready to send the parts as they appear, in return for a P.O.O. for two shillings and sixpence forwarded to Halle.

We ought to have mentioned that a capital heliogravure, by Klic, of Vienna, of Major Russell, forms the frontispiece to Part I.

ON SUBMARINE PHOTOGRAPHY.

BY W. D. VALENTINE.

A few weeks ago I noticed in the News the name of my firm mentioned in connection with an attempt we made at submarine photography, and a fortnight since there was given the result of experiments made by M. Forel to determine how far down the action of light penetrated in the clear water of the Lake of Geneva; perhaps it may interest the readers of this journal to have a short account of my experiences—I regret I cannot write successes—in submarine photography. At the time of the Tay Bridge catastrophe it was suggested to me that it would be of the utmost value could a photograph be obtained of the large girder in which the engine lay in the bed of the river; and as the late Sir Thomas Bouch kindly gave me the use of a steam lighter and experienced diver, of course I fancied it a very good opportunity to try such a novelty in landscape, or rather seascape, work. I first had constructed a very strong box of 1½-inch pine of sufficient size to hold an 8 by 10 camera and lens focussed. In front of it was inserted a piece of patent plate to serve as a window for the lens, said window being provided with a sliding shutter for the diver to slip open when he wished to expose the plate.

After the camera was put in with the dark slide opened, this being done in a dark room, the back of the box was put on and made fast with very powerful screws, thick india-rubber having been placed between; heavy iron legs were screwed on the box like an ordinary camera tripod, and a large hook was bolted underneath to hang the weights necessary to sink this somewhat ponderous machine to the bed of the river. I chose a very bright day in the beginning of March to try my first experiment. It required about 10 cwt. to sink the submarine camera, the whole affair being lowered by a powerful crane from the steam lighter. The diver went down at the same time, with full instructions as to placing and exposure. I gave one of Swan's gelatino-bromide plates, twenty-five times as sensitive as wet plates, twenty minutes' exposure, with the full opening of a Dallmeyer 10 by 8 rapid rectilinear, and on subsequent development there was not even a trace of fog. The depth of water my experiments were made at would be a little over 30 feet, and was strongly tinged with yellow. The plate in this case might as well have been exposed with the dark slide shut, showing unmistakably that at the depth of 30 feet of Tay water, little or none of the actinic rays penetrated. However, the experiments were not without a certain value should I ever have the opportunity to try submarine work again.

First, I believe it is impossible to construct a submarine camera of wood so as to be water-tight under the enormous pressure to which it is subjected; should I again try it, I should have it made of metal with the back to screw on. Secondly, I found in some of the preliminary dips given to the camera that the lenses and glass window "steamed" so much as to render work impossible. This difficulty was eventually overcome by unscrewing the lenses and rubbing them with glycerine, the window receiving the same treatment. In conclusion, I must add that I very much doubt whether submarine photography will be of any practical value. The electric light has been suggested, but where it will give aid I fail to see. The light would require to be placed about the same distance from the object as the camera, which in most cases would not be less than from ten to fifteen feet, and as in my experiment a powerful sun failed to penetrate thirty feet, I cannot think that the most powerful electric light, even with a very prolonged exposure, would give any practical results. At the time this attempt of mine was made the diver assured me that he could distinctly see objects at a distance of over thirty feet.

ODD JOBS.

BY THE AUTHOR OF "LOOKING BACK."

No. 8.—A Photographic Nuisance.

There are numerous subjects who may be distinguished by the above title. Imprimis, I may mention the starving employer who advertises for a "first-class operator," whose sole intention is the securing of a goodly supply of specimens for his shabby show-cases. Then there is the gentleman of the press, "who will give you a good line" in return for an unlimited supply of his own pictures. There is the seedy, bombastic, third-rate actor, who struts all over the place humming a tune, under the impression, no doubt, that it is gentlemanlike, and who desires his pictures at a "redooced" price, because he is a "pro." There is the inquisitive amateur who whistles, "To Know, don't you Know?" and, when told, gravely assures you that he thinks his own *modus operandi* the best, after all.

But of all nuisances that haunt the photographic studio, the artist—the Vandyke, the Rembrandt, the Sir Joshua of silver and carbon enlargements—is the acme; the *ne plus ultra*. Remember, I do not allude to R.A's; I allude to the class who "tear to tatters, to very rags," the works of art that line our galleries. I allude to those great little men who go sneering through our photographic exhibitions, and laugh loud at the bare idea of photography and art being anything but diametrically opposed to each other. "They are as wide apart as the poles, sir!" one of them exclaimed to me the other day, with a contemptuous wave of his hand.

The other day the Yahoo of the establishment came up to me with so peculiarly pleased a grin on his face that I knew something unpleasant was in store for me. I was not deceived, for he burst out with—"Yer in for it to-day, Mr. B———; the 'hartiss' is going to give you a sittin'. He has been took by the seventeen operators before you, an' is not pleased with any of them. Ha! ha!" And he chuckled like a laughing hyæna. Quite indifferent to the "hartiss," or his being pleased, I went on with my retouching until his arrival, which took place about half-past seven. He was a hairy little monster, with a large mouth, a flat nose with the nostrils showing absurdly, and great, light, staring eyes. He barely noticed me on entering the studio, but strode along the glass-house, pulling his slouched hat very much on one side, while he cast a wild and critical eye upon the blinds and shutters. "Hum! very good; still, this one would be better drawn a little more," quoth he, suiting the action to the word; "and the shadow side is too dark."

"I beg your pardon," I put in, as he was proceeding to throw a cross light upon the spot where the sitter would be; "but if you do that you will have a flat picture with neither high lights or shadows?"

"Ah! ah!" he answered, as he turned to me; "true, that may be so with photography—I forgot—I was arranging the lighting from an artistic point of view."

Inwardly I ejaculated "cad," and could not help smiling as I turned to arrange the camera. He saw the smile, and a settled sneer took possession of his hirsute phiz: he sneered at the furniture—he sneered awfully at the apparatus—he sneered at the Yahoo, when he appeared with the dark slides, much to that amiable young gentleman's delight—I am not sure but he sneered at himself in the looking glass—if he did not he should, for he was the only thing worth sneering at in the studio, unless it was a toy monkey that we have for amusing children.

With the self-possession that comes with years of practice, I went to work—placed a chair—and invited the "hartiss" to take a seat. Down flopped the ill-bred fellow with the air of a surly coal-heaver.

"Ah! thank you—that's nice—quite natural, but not so easy as I should like," I drily remarked, while I moved the top lights; I could feel, although I did not see him, that he gave me a look, while he brought his figure into a little better form. I spoke very little after this; but posed him—lighted him—focussed him—and was all ready for exposing, when up he jumps, shakes his shaggy head, and marches up and down the studio exclaiming, "Never do, sir, never! No mortal that was not double-jointed could ever stand such twisting! God forgive them! And they talk about photography in connection with art!" and he laughed in the most insolent manner as he looked at me.

"When you are ready, sir, I shall be happy to commence again," was my calm ejaculation, while I felt the blood boiling in my veins. Had I been the "guv'nor" I would have had less command over myself. However, as a quiet word turneth away wrath, so my manner subdued this son of the palette and brush. He condescended to inform me that his talent was hereditary; in short, that he was come of a family of artists, and descended in a straight line from the famed Sir Joshua Reynolds; asked if I had seen his last fancy picture, "Little Dewdrop," and what I thought of Sir Brown Smith's great picture of the member, and did I not think that the pose was photographic?

"Do you mean to insinuate that photographers are inferior to you artists in posing?" I asked.

"Certainly, certainly!" he replied with the greatest coolness; "there is always a—a stiffness—a—a want of nature—of life—of soul, that the artist alone can supply upon the canvas."

"My dear sir!" I could not help saying, "you speak like a book; all that I am amazed at is that such an all-souled genius as yourself should be so much indebted to us mechanical photographers as to cover over our work with your paint, and prig our ideas in posing. Were I in your place I would scorn to work longer upon vile enlargements, or finish up unartistically posed carbons; I would do nothing but canvas work, and show an enlightened public the difference—the real difference—between art and photography."

He evidently did not know how to take this, as I spoke it with an earnestness that robbed the words of any appearance of satire. He only gave me a long stare with his great eyes, and muttered something about "genius stooping his lofty head for bread." I could have told him that if genius had to stoop, he had no right to scorn the means that put that bread in his mouth. He asked to be allowed to pose himself, which I granted; and of all the spread-out-to-dry, lunatic-looking pictures ever I saw, that beat them hollow. The Yahoo nearly went into fits over it. He advised me, when in want of the next situation, to send one as a specimen of artistic posing. Having secured something of this admirable genius, I felt my spirits rising at the prospect of getting rid of him; but fancy my disgust when he started a long discussion upon the gelatine process, of which he knew nothing himself, but his brother made some wonderful studies with them: he was of opinion that when really instantaneous pictures can be taken, then, and not till then, could photographers claim any kin with art.

"By art, of course you mean, holding the mirror up to nature—something natural—eh?" I asked. "Certainly, that is it; something natural," he answered.

"Well," quoth I, "I'm hungry! That's something natural—eh? And according to your logic it is art: so excuse art and photography for going to get some lunch!"

It is needless to say that albeit the pictures were very good of him, I was classed as the eighteenth operator who had tried and failed to please the "hartiss."

DARK-ROOM ILLUMINATION.

BY EDWIN DODDS.*

From the time gelatino-bromide dry plates were introduced, to the present day, it has been a moot point how much light can safely be used in the dark-room. Before the advent of dry plates, collodion workers insisted on the necessity of perfect dark-slides, cameras free from cracks, and a developing-room from which white light was rigidly excluded. It was claimed for the earlier-made gelatine plates that they were from six to ten times as sensitive as collodion, and it was, therefore, consistent enough that it should be stipulated that they were to be changed and developed in a very much weaker and less-actinic light than photographers had been accustomed to use. Dark-room windows were reduced in size, and the flashed orange glass was replaced with "double thicknesses of the deepest ruby glass, specially tested by the spectroscope," some zealous disciples taking so much care to ensure safety in this respect that proper development was rendered impossible; the operator was reduced to the mechanical work of pouring on his developer, leaving it on for a certain time, and then washing and fixing. He over-developed, he under-developed, he upset his bottles, broke his measures, left air-bells on his plates, scratched his films, and often he damaged himself and lost his temper; but he persisted in working in a room where he literally could not see his hand before him.

After a time photographers were startled by being told that canary-coloured paper afforded a perfectly safe light by which to work, an assertion which called forth scornful opposition and much correspondence. The outcome of this was, that though most photographers did not feel inclined to trust it, those who tried it were surprised to find how little fog it gave. Canary medium, however, would probably now be considered by some a useless obstruction, for we hear reflected candle-light, naked gas-light, and even diffused day-light recommended as being perfectly safe to develop by, and particularly calculated to add brilliancy to the negative. I cannot think that this belief is wide-spread, but it seems to me so very harmful that I have written these notes in order to protest against it.

Most photographers, I believe, use what may be called a sensible light, that is, they have a window proportionate to the size of their dark-rooms, and which, by means of ruby glass or red paper, or some combination of the two, admits an amount of red light by which print or manuscript can be easily read, and by which the bottles on the shelves can be readily distinguished. If a dry plate of ordinary rapidity were exposed a few feet from the window in such a room, it would probably not show fog during the time needed for ordinary development.

Operators who use less light than this work at a disadvantage, chiefly because they are more likely to make mistakes. They cannot see to measure either so quickly or so accurately; they cannot see how the plate comes up in the all-important first half-minute; and if there has been any error in exposure, they are more apt to do what I suppose we have all done at some time, to pick up the wrong bottle. Their peace of mind, however, caused by knowing that their light is safe, places them, in one respect, at an advantage over the men who use too much light. This class may be separated into two divisions (though the whole body is not a large one): first, men who are too lazy to exclude the white light properly, who leave cracks round their windows, and crevices round their doors, or who, if they use a red lamp, always have the chimney cracked or the cap lost; the other division consists of men who, though they would scorn the slovenliness of the first party, wilfully use a light as strong as or stronger than they used for collodion, and not only use it themselves, but try to induce others to do so.

The workers in both these divisions place themselves under one obvious disadvantage. If anything in the shape of fog appears, the man who has a dark dark-room looks to his plates or his developers, but he knows it is not his illumination; the man with the light dark-room, whether he belongs to the lazy or the scientific section, must entirely re-arrange his lighting before he can turn to the other possible causes of error. And this is perhaps the most important objection to a strong light, for it must be admitted that very fine work indeed is produced in over-lighted dark-rooms; their occupants get into a way of dodging the rays of light, and they acquire a deft way of looking at the plate which enables them in part to evade the danger by which they are surrounded. Another thing to be considered is that though fog is an undoubted evil, and a very great one, yet there are some hard negatives which a very slight veil of fog would soften and improve. Operators who use too much light may sometimes make a hit in that way, but it is an undeniable fact that the general character of their work would be much improved if they would use a sensible light.

I have at various times made experiments in the lighting of the dark room, and I have lately repeated some of them carefully, for if one would safely use, say, reduced gas-light, it would certainly be very pleasant. In attempting to change the plate from the dark slide to the developing dish in candle-light or reduced gas-light, even when a card cover was employed, and all possible celerity was used, I have never been able to avoid deep fog. When the plate is changed in a safe light, the developer poured on, and development allowed to commence, and white light from gas or candle is then used, if the dish is kept covered, and the plate only looked at once or twice very quickly, the fogging is not so perceptible; in fact, in a negative which covers the plate it is sometimes difficult to detect it; but if a part of the plate is kept unexposed, the action of the light is very obvious. If ferrous oxalate developer is used, it affords better protection, apparently, than ruby glass, for while the plate is covered with a reasonable depth of it, bright gas-light in the room does not appear to affect it; but this only holds while the plate is covered with developer, and the light must be reduced when the plate is to be examined. It is generally considered that the plate is most sensitive while yet dry—that is, before development is commenced—and that it becomes less sensitive to light as development proceeds. There is a misconception here. The sensitiveness of the plate probably remains unaltered, but the developing solution, if used in any of the older forms of alkaline pyrogallic, soon turns a non-actinic yellow-brown colour, and protects the plate from the action of light to a considerable extent, even if the film is merely wet with it. Hyposulphite, too, after it has been used a short time, acquires a similar and equally protective tint. But it should be remembered that the plate is not really less sensitive at the end of development. If it is taken out of a discoloured developing solution, and exposed to light, it will fog. If any of the developer has been left on the film it will discolour rapidly—exposure and development going on at the same time. If the film has been thoroughly washed under the tap, and the developer entirely removed before it is exposed to the light, there will be no discolouration; and if the plate be then fixed it ought not to show any more fog than if it had not been exposed between development and fixing. Practically, however, there is so often a trace of developer left in the film, that a negative which, say when partly fixed, has been exposed to strong light, and then replaced in the hyposulphite bath, too often shows by an irregular stain that this is not a good way of working. It may be news to some photographers that if a gelatine plate is exposed to light, and then placed in the hyposulphite bath without being developed, it will fix quite clear. Operators often look at a plate by gas-light or even day-light after they have developed it and given it a rinse at the tap, but before it is fixed. This is a bad habit, for, as we have seen, if there is any of the developer left in the film, the purity of the plate will be marred. In short, the only reasonable plan is to change, develop, wash, and fix the plate in a red light. If reasonable precautions are taken to keep the plate from the direct action of this light, it may be used freely, and it will be found that not only the most reasonable and the safest, but also the most comfortable way to work is to have the dark room well illuminated with ruby-coloured light till every label in it is

* Read before the Newcastle-on-Tyne and Northern Counties' Photographic Association.

readable and each bottle may be recognised by its form, but not to let this light fall unnecessarily on the plate. Have light enough to see when the image first appears, and to be able to judge when sufficient density has been obtained; but during the greater part of the time of development, when there is no advantage in keeping the plate exposed to light, let it remain in shadow or covered up, and do not let any white light whatever reach it until it is completely fixed.

Notes.

Sir H. Wolff intends to move the rejection of the Copyright Bill which is now before Parliament.

Our readers will peruse with interest Mr. Valentine's account of submarine photography in practice.

Those interested in M. Léon Vidal's sensitive little photometer, to which we referred last week, will be glad to hear that there is a possibility of buying it shortly. The cost, including selenium plate, battery, and galvanometer, will be about a hundred francs, or four pounds.

Makart, the well-known Austrian painter, has given his name to a photographic portrait, the slender promenade being termed "Carte-Makart" in South Germany; now we are to have the Tadema-format, a name our American cousins invite us to accept for a monster carte they have recently sent over.

For some time past, the Paris police authorities have taken the portraits of all children found in the streets of the French capital, the majority of whom are suspected of being designedly lost by parents and guardians. It has now been decided that copies of such photographs shall be sent round to all newspapers having an office to which the public are admitted. *Le Figaro* announces the receipt of the first pair of such pictures, representing a little lad of five, discovered in front of the Louvre stores. In one of the photographs the boy is laughing, in the other he is crying.

The Arctic yacht *Kara*, which sails at the end of this month for the Polar Seas in search of Mr. Leigh Smith and the *Eira*—which never returned from her last voyage—carries with her the intrepid amateur photographer, Mr. W. J. A. Grant. This is Mr. Grant's sixth vogage to the "Frozen Deep."

The diffusion of solids into solids was regarded as impossible by the chemists of even ten years ago; yet M. Colson has demonstrated that many solid bodies penetrate each other at temperatures far below their melting points.

Solid carbon and iron placed in contact will diffuse into each other, even at 250° C., or at temperatures nearly a hundred degrees below the melting point of lead; while a similar mutual diffusion occurs between silver chloride and sodium chloride.

Just in the same kind of way are the old notions as to the way in which the halogens replace each other being ruthlessly set aside by modern research, as chlorine turns bromine out from bromide of silver, or bromine replaces chlorine, according to the conditions which obtain. M. Potilitzin, whose results will be found detailed in the proceedings of the Russian Chemical Society, has previously made similar studies with regard to iodine and iodides.

We are glad to find the Photographers' Benevolent Association is making satisfactory progress. The balance-sheet this year puts the receipts at £50 16s. as compared to £42 12s. 6d. last year; and as the subscriptions from honorary members "show a lamentable decrease," we may take it that this year's income is altogether of a more *bonâ fide* character. It will be quite time enough to call upon honorary members to subscribe more liberally when the working members testify by their adherence to the scheme that they are in earnest about helping one another. We think they are beginning to show this, for the Association now bids fair to be a firmly-established, self-supporting institution.

We have already referred to the wonderful micro-photographs of Bacteria of Dr. Koch, of Berlin, who has proved such a powerful supporter of the antiseptic treatment of our eminent surgeon, Mr. Lister. From the position of an obscure medical practicioner in Germany, Dr. Koch's microscopic researches have raised him to one of the formost scientific positions in the world. Dr. Koch has himself in these columns detailed the manner in which he succeeded in taking photographs of the minute animalculæ to be found in animal tissue, and which presage the various diseases that flesh is heir to; and last week the first public exhibition was given by Professor Lister, at King's College, of a collection of Dr. Koch's interesting results.

Those who still complain of the brown tint of negatives developed with pyrogallic acid will do well to adopt Mr. Herbert Berkeley's oft-repeated advice to employ sulphite of soda in the developer; or, better still, to make trial of the sulpho-pyrogallol, a developer made up according to that gentleman's formula. Besides sulphite of soda, the sulpho-pyrogallol contains, we believe, a citrate salt, both of which help to keep the negative clear and transparent. A negative developed with pyrogallol in this way has for the first time the appearance of a wet plate.

A glass which soon becomes partially decomposed on the surface is well known to be quite unfit for photographic use, whether for making lenses or for supporting photographic films.

Wagener's recent researches would lead one to regard glasses as consisting essentially of definite silicates; but these silicates, when melted, dissolve certain proportions of various refractory bodies, and it is only by first studying to obtain a highly stable silicate as a basis, and taking care that the dissolved body shall not be present in too large a proportion, unless this is itself but little subject to change, that a good glass can be produced.

If an emulsion is over-cooked or brought close upon the verge of chemical fog, a red brown tint results on adding a moderate preparation of tannic acid; and our esteemed correspondent, Mr. Otto Pfenninger, who gives us this information, tells us that this reaction may form a useful test for over-boiling.

A great deal of confusion is likely to arise if we go on naming photo-mechanical printing processes in the hap-hazard way hitherto observed, and we are glad to see that Dr. Vogel has called attention to the fact. It is not bad enough that we should have the word "heliograph" to signify a photographic print and a "signal by sunshine," with the heliostat at the same time, but we must perforce give half-a-dozen names to one and the same kind of print. Take the collotype process as an example—that is to say, the process that admits of half-tone impressions in fatty ink being printed from a gelatine surface. This process is known by the names of Lichtdruck, Heliotype, Phototype &c., beyond the generic term of Collotype. The last is, perhaps, the best name, since it implies that in printing we have to do with a colloid substance, such as gelatine, albumen, &c.

Dr. Vogel thinks that the Goupil process deserves more than any other to be designated photo-engraving, since it is a mechanical copper plate process with half-tones; but then what shall we call Woodburytype or photo-relief printing, of which Goupil's process is a modification? For photo-engravings on copper, in which lines are employed to give detail, the name of helio-engraving is proposed; while all photo-mechanical blocks for the printing press—etchings on zinc, for instance—it is suggested might be termed photo-types—a very good idea, we think.

In the meantime, we might at any rate divide all photo-mechanical prints showing half-tone or detail into two classes, viz., those secured by surface printing, and those printed from hollowed surfaces. The first might be called either Lichtdrucks or Collotypes, and all the last photo-engravings.

The photographic establishment of Messrs. Valentine and Sons, at Dundee, has been placed under the Factory Act, the first instance, we believe, of photographers being made amenable to this law. The reason is, that not only do Messrs. Valentine employ a large number of hands—there were fifty employés on the premises when we visited them two months ago—but steam power has lately been introduced for the burnishing of pictures after mounting, and machinery of this kind must be under Government inspection.

Messrs. Maple and Company have brought an action against the Junior Army and Navy Stores to restrain the latter publishing an illustrated catalogue, which is stated to contain engravings copied by photography from the Maple hand-book. The existence in London of several phototype establishments makes the copying of woodcuts a very quick and easy matter; but it should require no great skill to discover whether an engraving is original or a photographic copy. We wonder preparers of illustrated catalogues have recourse to drawing and engraving at all. Why do they not have the objects themselves photographed—whether fenders, hats, tables, chairs, crockery—and then get prints struck off by the collotype process?

In Vienna, Munich, Berlin, and, indeed, throughout Germany, where the collotype or Lichtdruck process is generally practised, more than half the work upon which the presses are engaged is connected with pictorial catalogues. This plan of illustrating is also more satisfactory both to buyer and seller; there is no disappointment on the part of the former when he comes to see the object he purchases, for, with the best will in the world, a draughtsman who depicts a fender, or hat-stand, or drawing-room table, is sure to make it better looking than it really is.

We rejoice to learn that our esteemed correspondent, Dr. H. Fol, of the University of Geneva, has been nominated "Officer de l'Instruction Publique" by the French Minister of Instruction, in recognition of his researches in connection with animal life in the Mediterranean. Dr. Fol has employed photography to good purpose in securing pictures of the animal kingdom, and we are glad to say that next week we shall publish an interesting paper of the professor's, touching certain improvements in emulsion making.

Mr. W. Cobb tells us that our suggestion as to the use of the Swan lamp for lighting an outside show frame is quite successful from a business point of view; the public taking evident interest in the new light. Mr. Cobb uses a five-candle lamp, and four quart cells of Bunsen battery.

They seem to have been remarkably successful on the 17th, in photographing the eclipse, several good negatives of the corona having been obtained, the spectrum of the corona being for the first time satisfactorily delineated on a photographic plate; and our readers will find further information in Captain Abney's letter which we print in another column.

The bitumen backing which we suggested as a remedy for halation was adopted, as offering the most certain safeguard against this troublesome source of failure.

In this country the eclipse was very partial, only one-fifth of the sun's diameter being covered, and we were fortunate enough to wake just in time to see several crescent-shaped images of the partially eclipsed sun on the wall of our room, these being formed by small and irregularly shaped openings in the Venetian blinds. A camera was quickly placed in position, and a plate exposed.

The Pope on photography. Even the master-hand of Apelles, says Leo XIII., could not paint a more beautiful picture than does the art of photography; for the Pope, it seems, has recently been photographed in the Vatican under the rapid auspices of gelatino-bromide, and was fairly enchanted with the result. We reprint the rhapsody in its original Latin in another column for classic photographers to study.

Half a hundredweight of well-toned and deeply-printed landscapes were treated by Mr. W. Bedford when he made his recent experiments, and the metallic value of the prints proved to be as nearly as possible 8d. per pound. The ingot of gold weighed 175 grains, and the silver 435 grains.

If M. Fritz Luckardt has made a fortune by not photographing babies, Mr. Joshua Smith, of Chicago, has prospered on their pictures exceedingly. "We come all the way from Chicago," will still be remembered by visitors to the last Paris International Exhibition, the legend being written beneath a bevy of baby faces that laughed at every spectator who presented himself. Mr. Smith's profits arising out of these baby pictures are estimated at many thousand pounds.

TWELVE ELEMENTARY LESSONS IN DRY-PLATE PHOTOGRAPHY.

No. X.—Defects and Remedies.

At the end of the last chapter we described the conditions which give rise to the occasional necessity for intensifying a negative. The term almost explains itself. It means the increasing of the density of a negative. A good intensifier will increase the density of every part of a negative proportionately; that is, when there is, after fixing, clear glass as in the shadows, no darkening will take place there, but every grade of density, from the finest detail to the densest high light, will be increased in a proportionate degree. The process ought to be thoroughly at the command of the operator, who should be able to produce any desired increase of density.

We may say at once that there is no thoroughly satisfactory intensifier for gelatine negatives, and that such a thing is a great desideratum. It is not within our province to enter into the discussion as to which is the best of the various more or less imperfect methods which have from time to time been published, but we shall give a formula which has at any rate the advantage of simplicity, and which will be found to give fairly good results. It is one of the "mercury" intensifiers. It has two drawbacks. First, the results are not always permanent. Second, there is great difficulty in regulating the amount of intensification given by it.

The first objection is much lessened, however, from the fact—not, we believe, generally known—that when a mercury intensified negative fades, it can generally be brought back to its original condition by performing again the process of intensification. We shall suppose that a negative on printing is found to give a poor-looking print, lacking contrast. Let the following solution be prepared:—

Bichloride of mercury	1 ounce
Water	10 ounces

The whole of the bichloride of mercury will not dissolve, but the residue may be left in the bottle, and as the solution gets low through necessary waste, water may be added.

Let the negative be very thoroughly washed. Let it be placed in a dish, and let the mercury solution be poured over it. It will gradually become whitened or bleached. When the film is bleached throughout—as indicated by its being white at the back—let the solution be poured back into the bottle, and let the negative be most thoroughly washed. On the thoroughness of this washing seems to depend to a great degree the permanency of the results.

The negative has now to be treated with ammonia solution, which will blacken it, but the strength of the ammonia solution must be varied according to the amount of density required. Thus, if the print got from the negative previous to treating with mercury was very nearly up to the mark, a very weak solution of ammonia must be used; one or two drops to the ounce of water will be enough. This solution is poured over the negative, and it will be seen gradually to darken. When all action ceases, the process is complete. The negative will now be of a curious orange tinge by transmitted light. If, on the other hand, the negative was one giving a very shadowy print, a solution of ammonia of one to twenty may be used. On this being poured over the plate, darkening will take place almost instantly, and the result will be a fine black-coloured negative.

Too great density of image is a fault sometimes met with. It is always due to error of judgment in development. It may be corrected by performing the first part of the process for intensification. This method is objectionable, however, as the results may not be permanent. A better plan is to immerse the negative, after fixing and washing, in a solution of one part of eau de javelle to three or four of water. After the desired amount of reduction has taken place, the plate should be again fixed and washed.

Spots of various kinds are liable to be found in the finished negative. They are of various forms, and are produced in various ways. Minute transparent spots or pinholes are caused by dust on the plate during exposure. The plate should be brushed with a broad camel's hair brush before it is placed in the slide.

Small transparent spots with irregular outlines are due to defect in the manufacture of the plate, and cannot be corrected by after manipulation.

Small transparent perfectly circular spots, with well-defined outlines, are due to air-bubbles in the developer, and are only produced when too small a quantity of developer is used. Air-bubbles do not, as is commonly supposed, form on the surface of the plate under the surface of the developer; they form on the surface of the developer, and, if there is too little solution, come in contact with the surface of the plate, and there adhere.

Opaque spots are always due to defects in the plates, and cannot be corrected by after manipulation.

A yellow stain, or rather a yellow veil, in the shadows of a negative is often found after pyrogallic development, especially if the process has been very prolonged, or if much ammonia have been used. Such stains should never occur if our instructions be carefully followed, but if it do, it may be removed by placing the negative, after fixing and washing, in the following solution:—

Saturated solution of alum ...	10 ounces
Hydrochloric acid	$\frac{1}{4}$ ounce

Mr. Herbert Berkeley has recently introduced a new developer, which totally prevents any yellow stains from occurring, and which deserves strong recommendation. The pyrogallic stock solution is mixed with four grains of neutral sulphite of soda to each grain of pyrogallic. The whole is rendered slightly acid with citric acid, for it must be understood that so-called "neutral" sulphite of soda is really alkaline. Care must be taken to use the *sulphite*, not the *sulphate*.

Unequal thickness of film is sometimes found in commercial plates. It arises from careless coating of the plates, and is, of course, incurable by after treatment. The negative resulting from a plate more thinly coated at one place than at another *may* be lacking in density at the thin place; but it should be borne in mind that it need not certainly be so. Plates are generally coated with films considerably thicker than is absolutely necessary, and, in the case of a plate unequally coated, the thinnest part may contain enough of the silver salt to give the necessary density. Plates should, therefore, be tried before being condemned for unequal coating.

Various *streaks, scratches*, &c., occur in gelatine plates, and are evidently due to defect in manufacture. They call for no particular remark.

A white powdery deposit is sometimes found on the surface of the negative after drying, especially after ferrous-oxalate development. It is, in such a case, caused by lime in the washing water. It may be removed by dipping the negative in a 1 per cent. solution of hydrochloric acid. If the solution of alum used before fixing be acid, and the negative be not sufficiently washed between the alum and the fixing-bath, a deposit of sulphur will form in a fine powder. This may be removed by gently rubbing the face of the negative with a plug of cotton-wool, while water is running on it from the tap.

Irregular action of the developer, causing zig-zag lines across the plate, may occur if the developer has not been made to flow over the plate in one wave at first.

Halation is caused chiefly by reflection from the back of the plate. It makes itself evident only when the subject includes very strong contrasts; for example, when an interior with windows open to the sky is photographed. It shows itself in the form of a halo round the highest lights, and produces a very unpleasant effect, sometimes known as blurring. It occurs only to a small extent with plates that are very thickly coated. In the case of an attempt being made to photograph a very trying subject, such as the interior mentioned, it is well to "back" the plate; that is, to paint or otherwise cover it at the back with some substance which will absorb light. The following is a good method to adopt. Procure a piece of black carbon tissue, cut out a piece slightly smaller than the size of the plate to be used (there should be about ⅛ of an inch margin all round) moisten the black surface of the carbon tissue with glycerine, allow all that will to drain off, and press the tissue against the back of the glass. It will adhere, and may be removed just before development.

A METHOD FOR DETERMINING THE EXPOSURE OF INSTANTANEOUS SHUTTERS.

BY ARNOLD SPILLER.

It seems a curious fact, in connection with methods for determining the exposure of the so-called instantaneous shutters, that the same idea has of late often suggested itself to independent individuals.

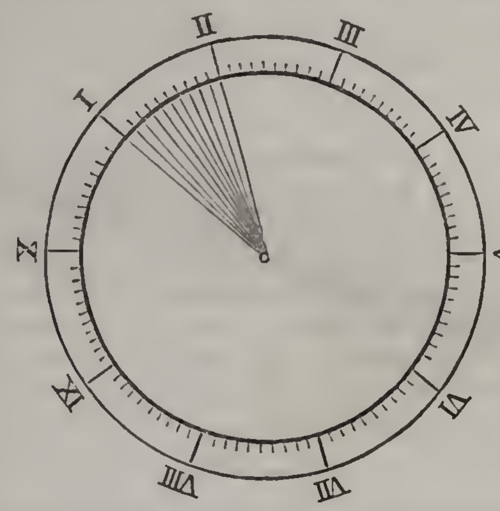
About a year ago Mr. Hadau suggested that a pencil connected with a vibrating rod, if allowed to strike against the "drop" of the shutter, would give a graphic determination of the exposure, by calculating from the number of vibrations drawn on the "drop." A short time afterwards Captain Abney exhibited a model constructed on the same principle, and stated that he had worked out the method independently of Mr. Hadan.

The mode I am about to describe was suggested by M. Léon Vidal about a month ago; but in justice to myself, I may state that I constructed the apparatus, and tried it with Mr. Brougham Young, in December last.

The principle, which most of my readers may know, depends on photographing a needle rotated by clockwork, the exposure being made by the shutter under consideration. My first idea was to use a chronometer fitted—as some are—with a hand rotating once in a second; but not having one at command, and accidentally coming upon a clock which, after removing the pendulum, gave the required rate of speed, it was soon adapted to my requirements. The hand was replaced by a large bright pin, the dial coated with black paper, and graduated—in white figures—into hundredths of a revolution; thus each division is equivalent to $\frac{1}{100}$ part of a second.

The following is the mode of working:—Place the clock on any convenient stand directly facing the sun, and about the same height as the camera, and at such a distance that the image on the ground glass is about two inches in diameter; all being ready, wind up the clock, let the hand have time to complete two or three revolutions, so as to ensure the normal speed, and expose.

On developing the plate, a negative will be produced somewhat similar to the subjoined wood-cut, which is



copied from the first of the following experimental determinations:—

Description of Exposer	Number of Divisions Registered.		Duration of Exposure Indicated.
Shutter with six-inch aperture of drop	10	...	$\frac{1}{10}$th of a second.
Same shutter using only half the *latter portion* of aperture	4·5	...	$\frac{1}{22}$ of a second.
Rotating disc, as fitted to Lancaster's instantograph ...	1	...	$\frac{1}{100}$ of a second.

Gelatine plates of about twenty times the rapidity of wet collodion were used for the above determinations, the sun shining brightly all the time.

ON THE EFFECT OF THE SPECTRUM ON THE HALOID SALTS OF SILVER, AND ON MIXTURES OF THE SAME.

BY CAPTAIN W. DE W. ABNEY, R.E., F.R.S.*

Silver Chloride.

Paper was impregnated with a 10 per cent. solution of sodium chloride, and sensitised on 10 per cent. solution of silver nitrate.

Paper thus prepared was exposed to the spectrum in a damp state, and also in a dry state, and the visible impression recorded. Fig. 35 shows the action. When the paper was exposed for twenty seconds to diffused light a different curve, as shown in fig. 36, was found; an approach to the same curve being also shown with very prolonged exposure without the preliminary action of light. This is probably due to the action of the diffused light in the prism.†

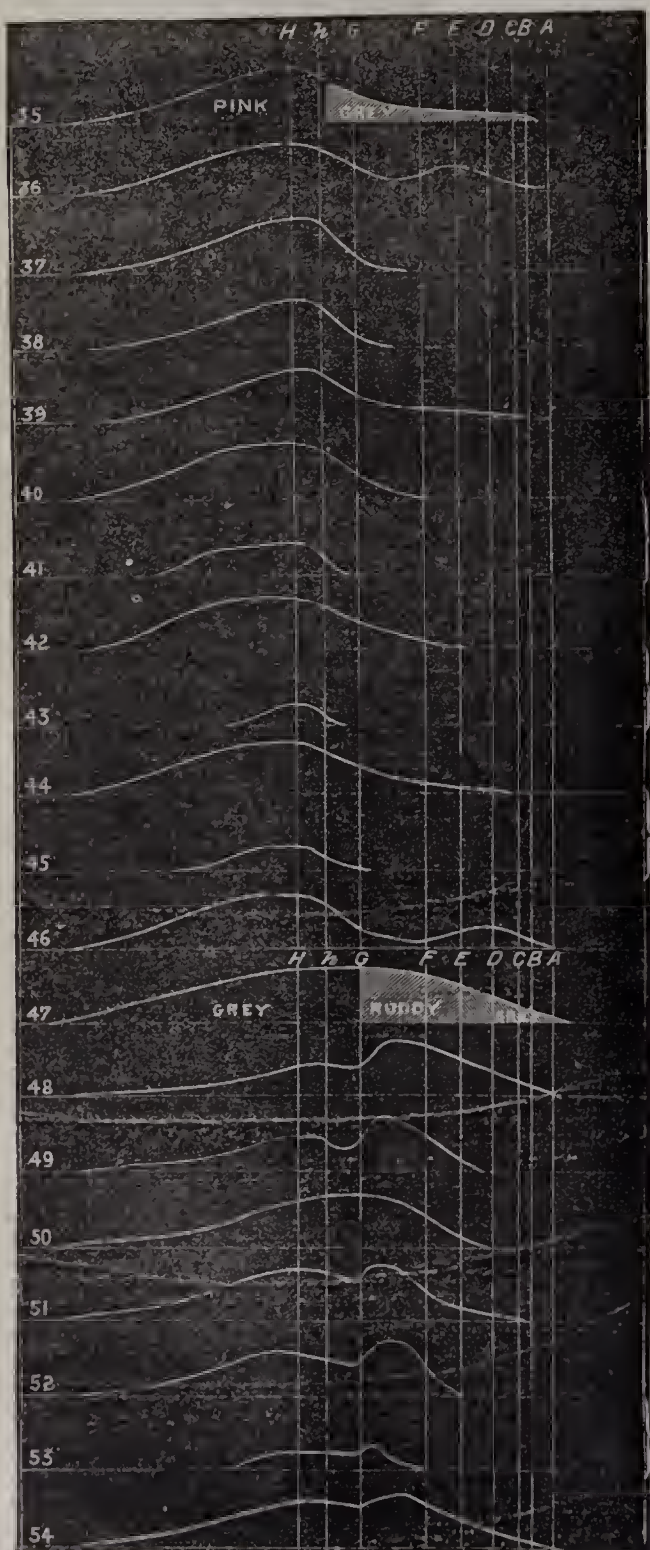
Similar paper was washed, some was used in this state and other was afterwards treated with a solution of sodium chloride and again washed, leaving thus only a trace of an organic salt of silver in the fibre. The action of the spectrum on the simply washed paper is shown in fig. 37. With a short preliminary ex-

* Continued from page 269.

† I have not taken into consideration the spectrum impressed on silver chloride visibly darkened by the light. This, as is well known, is impressed throughout the spectrum, and takes the approximate colour of the spectrum. This is true whatever vehicle is used to hold the silver chloride, and also whether exposed in the presence of an excess of silver nitrate or other sensitiser, and also when organic compounds of silver are mixed with it.

posure, traces of an impression between F and C were obtained, tending to show that the preliminary action in fig. 36 was effective on the chloride besides on the organic compound of silver. Fig. 38 gives the action of the spectrum in the chloride which had all traces of silver nitrate removed by the wash of sodium chloride.

To obtain an emulsion of silver chloride in collodion, 20 grains of calcium chloride were dissolved in 1 oz. of collodion, and 1 gr. more, or 1 gr. less, according as excess or defect of silver nitrate was required, than the equivalent of silver nitrate dissolved in another ounce of collodion; the former solution was poured in the latter, shaking at intervals, till a perfect emulsion was obtained. In some cases the emulsion was washed in the ordinary way known to photographers, and in others used when made as above, and the films washed or exposed in their natural state. In no case did any difference in the resulting impression of the spectrum appear. I may also state that other chlorides were tried, and there is no apparent difference from those obtained where sodium chloride was employed. Fig. 38 also gives the action of the



$AgCl+AgNO_3$ on Paper	*Print.*
$Ag Cl+AgNO_3$ on paper, slight preliminary exposure.	*Print.*
$AgCl$ on paper washed from excess of $AgNO_3$ ...	*Print.*
$AgCl$ on paper washed and treated with $NaCl$ and washed again, also collodio-chloride of silver, also yellow form of $AgCl$ in gelatine.	*Print.*
Grey form of $AgCl$ in gelatine	*Print.*
$AgCl$ in collodion in presence of excess of $AgNO_3$ or $NaCl$ developed; ferrous citrate or acid development.	*Developed.* (long exposure).
Ditto ditto	(short exposure).
Yellow form of $AgCl$ in gelatine, acid, or ferrous citro-oxalate development.	*Developed* (long exposure).
Ditto ditto	(short exposure).
Grey form of $AgCl$ in gelatine, acid, or ferrous citro-oxalate development.	*Developed* (long exposure).
Ditto ditto	(short exposure).
$AgCl$ in collodion given a short preliminary exposure, acid, or ferrous citro-oxalate development.	*Developed.*
$AgI+AgBr+AgNO_3$ on paper, moist	*Print.*
$AgI+AgBr$, washed from $AgNO_3$	*Print.*
Ditto, ditto, developed ferrous citro-oxalate... ...	*Developed.*
$AgI+AgBr+AgNO_3$, wet plate, developed acid, or alkaline developer.	*Developed.*
$AgI+AgBr$ in gelatine, developed ferrous oxalate ...	*Developed.*
$AgBr+AgI$ in collodion, acid or alkaline developer	*Developed* (long exposure).
Ditto ditto	*Developed* (short exposure).
$3AgI+AgBr$, on paper	*Print.*

spectrum on such emulsion, there being no apparent difference between the washed emulsion or the emulsion exposed with an excess of silver nitrate, or with an excess of the soluble chloride, unless it be one of general sensitiveness. In other words, the spectrum seemed to act on the silver chloride in one and the same manner. Fig. 39 shows the printing action on the chloride when enveloped in gelatine. The emulsion was formed in the usual manner habitual amongst photographers, each ounce of emulsion containing about 25 grs. of converted silver nitrate. Fig. 39 has reference to this emulsion after it was heated to its boiling point for half an hour, and when treated with ammonia; when used unboiled it took an impression similar to fig. 38.

When these same preparations of the chloride in gelatine are exposed for a short time to the spectrum and developed with ferrous citro-oxalate developer, or with gallic acid and silver, we get figs. 42, 43, 44, and 45, the first two expressing the result of the unboiled emulsion which transmits yellow-orange light, and the two latter numbers that on the boiled emulsion which transmits a blue-grey light. The first numbers of these pairs of figures show the result of exposures ten times longer than the exposures shown by the second numbers of the pairs.

Silver chloride in collodion, by whatever means prepared, and whether exposed with an excess of silver nitrate, or an excess of soluble chloride, gave figs. 40 and 41, the former being the result of exposure ten times longer than that shown by the latter. The mode of development had no effect on the spectrum developed.

The washed paper gave on development the same result as that shown for the direct action of light, viz., fig. 37. The mode of development had no effect on the result.

The washed paper subsequently treated with a solution of sodium chloride and again washed, when exposed to the spectrum, gave on development with either gallic acid and nitrate silver, or with ferrous citro-oxalate, the same figure as that obtained by the direct action of light, viz., fig. 38.

When a brief preliminary exposure to white light was given to either the paper or the different emulsions, fig. 46 was obtained on development. On looking at figs. 35 to 46 it will be seen that invariably the maximum intensity is reached between H and *h*. According to many authors the maximum is near G, whilst according to others it is in the ultra-violet. I have carried out about 200 experiments on the chloride with sunlight and with the electric light, and in no case have I found it possible to alter the maximum. Of course if candle or gas light be used as a source, the maximum will be about G, since the ultra-violet rays are almost absent with these. The idea suggests itself that the prismatic arrangements employed may be at fault; in some cases, where the most definite results have been registered, a direct vision spectroscope has been utilised. I need hardly say that such an arrangement, from the very nature of the apparatus, is unsuited for photo-spectroscopy. Such a spectroscope transmits very few rays beyond H, and at H their intensity is much diminished. In order to settle the matter to my own satisfaction, I used a diffraction grating with the same results as those shown in the figures under consideration. In the paper read before the British Association in August last, I pointed out the great need of caution in measuring daylight intensity by the chloride, and my subsequent examination of the subject has more than ever confirmed me in my opinion therein given.

Methods of obtaining Mixtures of Silver Iodide and Bromide, Silver Iodide and Chloride, etc.

To test mixtures of the iodide and bromide, paper was prepared by immersing it in a solution of potassium iodide and potassium bromide, the proportion of each being so arranged that there should be definite proportions between each, supposing that each salt was entirely decomposed by the silver nitrate. Unfortunately this is never absolutely the case, and hence the results obtained with the paper must be received with some caution. Chemists know that silver bromide or silver chloride cannot exist in the presence of a soluble iodide, nor can silver chloride in presence of a soluble bromide. Hence when we have an iodide and bromide impregnating paper, the silver iodide will first be formed, and then the bromide; or, again, with iodide and chloride, the silver iodide will first be formed, and then the chloride; and, finally, with bromide and chloride, the bromide will first be formed, and then the chloride.

It was necessary to make these remarks, as a right conception of the results might not be taken on casually looking at them.

The same remarks apply with equal force when a sensitive film of the double salts is prepared by the ordinary silver bath when very short immersion is given to the plate. The only true way of obtaining definite results seems to be by means of separate emulsions, in which a definite amount of soluble chloride, bromide, or iodide is fully converted into silver chloride, bromide, or iodide, and then to mix these emulsions, after proper washing, in the required proportions. It was in this manner that the emulsions which will be discussed presently were prepared.

I would here call attention to a somewhat remarkable behaviour of silver iodide. It is well known that if silver iodide be prepared with an excess of soluble iodide, it is totally insensitive to light. Thus if we prepare (say) an emulsion in collodion with an excess of iodide, and wash it thoroughly in the usual manner, and after redissolving the pellicle resulting from the washing operations, expose it in the camera, no amount of development will bring out an image. If, however, to such an emulsion but a drop of a bromide or chloride emulsion be added, sensitiveness will appear. This seems to be due to the last trace of soluble iodide being converted into silver iodide.

(*To be continued.*)

On Photographs of the Spectra of the Nebula in Orion.

BY HENRY DRAPER, M.D.*

For about eighteen months I have been giving attention to the nebula in Orion with two objects in view: first, to ascertain whether any changes are taking place in that body, by making a series of photographs to be compared in the future with a similar series; and second, to photograph the spectrum of the nebula in various parts, so as to see whether any new lines could be found, and also whether the composition is uniform throughout.

As to the first of these objects, I have recently succeeded in taking a very fine extensive photograph of the nebula containing most of the delicate outlying parts which were not in my earlier photographs. This is in the hands of the photo-lithographer now, and will shortly be published. The experiments have been very difficult, because an exposure of more than two hours in the telescope has been necessary, and an exceedingly minute motion of the stars relative to the sensitive plate will become apparent on account of the high magnifying power (180) employed.

In carrying out the second object, two contrivances have been used: first, a direct-vision prism in the cone of rays from the objective before they had reached a focus; and second, the two-prism spectroscope with which I have taken photographs of stellar spectra for some years past.

During the month of March I have made two good photographs with each of these arrangements. Those with the direct-vision prism, without a slit, have of course demanded that the image should be kept stationary on the sensitive plate throughout the exposure, viz., two hours, and they are as difficult to get as good photographs of the nebula itself. On the contrary, those obtained with the slit spectroscope do not require the same steadfast attention.

The results derived from these photographs are interesting, partly from what they show, and partly from what they promise in the future. A number of photographs, under various conditions, will be needed for the full elucidation of the subject.

The most striking feature is perhaps the discovery of two condensed portions of the nebula just preceding the trapezium, which give a continuous spectrum. At those places there is either gas under great pressure, or liquid or solid. I have not been able to detect any stars of sufficient magnitude in these portions to produce this effect, either in my photographs of the nebula, or in any of the well-known drawings of the object. It seems to me also that the photographs show evidence of continuous spectrum in other parts of the nebula. In these respects the conclusions arrived at by Lord Rosse in his memoir (Phil. Trans. Royal Society, June 20, 1867, p. 70) are to a certain extent borne out.

The hydrogen line near G, wave-length 4340, is strong and sharply defined; that at *h*, wave-length 4101, is more delicate, and there are faint traces of other lines in the violet. Among these lines there is one point of difference, especially well shown in a photograph where the slit was placed in a north and south direction across the trapezium; the Hγ line, λ 4340, is of the same length as the slit, and where it intersects the spectrum of the trapezium stars, a duplication of effect is visible. If this is not due to flickering motion in the atmosphere, it would indicate that hydrogen gas was present even between the eye and the trapezium. I think the same is true of the Hδ line, λ 4101. But in the case of two other faint lines in this vicinity, I think the lines are not of the length of the slit, one being quite short, and the other discontinuous. If this observation should be confirmed by future photographs of greater strength, it might point to a non-homogeneous constitution of the nebula, though differences of intrinsic brightness would require to be eliminated.

The April number of the American Journal of Science contains an account of a photograph of the spectrum of this nebula taken by Dr. Huggins. I have not found the line at λ 3730, of which he speaks, though I have other lines which he does not appear to have photographed. This may be due to the fact that he had

* Read before the National Academy of Sciences, April, 1882, at Washington, U.S.

placed his slit on a different region of the nebula, or to his employment of a reflector and Iceland spar prism, or to the use of a different sensitive preparation. Nevertheless, my reference spectrum extends beyond the region in question.

As illustrating the delicacy of working required in this research, it may be mentioned that in one of these photographs the spectrum of a star of the tenth magnitude is easily discerned. It is only a short time since it was considered a feat to get the image of a ninth magnitude star, and now the light of a star of one magnitude less may be photographed, even when dispersed into a spectrum.

Correspondence.

THE ECLIPSE EXPEDITION.

Sir,—I have received a brief telegram from Egypt regarding the Eclipse Expedition, and as it is in cypher I give the gist of the news. "Very successful all round. The blue end of the spectrum with lines has been photographed on a continuous background. Prominences photographed with the prismatic camera (showing, of course, ring spectrum). Three photographs taken of the corona. A comet close to sun photographed with the prismatic and also ordinary cameras."

The success here indicated is undoubted, and Dr. Schuster, who has superintended this part of the Expedition, is to be congratulated, not, too, forgetting Mr. C. R. Woods, who has done all the manipulations.

It is satisfactory to find that gelatine has behaved so well in a climate in which we now know the shade temperature during the day was 108°. No doubt Mr. Woods used the nitrate of ammonia to cool his developing solutions and wash water, since he was able to develop the same day, not waiting till night.—Yours faithfully,

W. de W. Abney.

FADING OF GELATINE NEGATIVES.

Sir,—I see by your last issue that my experience with regard to the fading of gelatine negatives has not been exceptional, although I was inclined to think that it was from the fact that no attention had been called to the subject. Now I see that several others have been troubled in the same way, and the evil is attributed to the imperfect removal of the hyposulphite. We are all aware of the instructions to well wash gelatine films; but I, for one, shall be glad to learn what amount of washing will give immunity from this evil. I have quite thought that my plates have been well washed, as I have left them soaking for several hours—always through the night—and have at intervals changed the water for at least a dozen times preparatory to giving them a good rinse under the tap, and I fear that many like myself will find that their otherwise valuable negatives have become almost worthless from a want of knowledge upon this point.—Yours truly,

Provincial.

DEATH OF MR. ROBERT BIGGS.

Dear Sir,—I much regret to have to communicate to you the news of the death of Mr. Robert Biggs, a valued member of this Society, and well known to your readers under the signature of "Photo-Chemicus." He possessed a most genial nature, and was in every respect generous in heart, while his research in photographic chemistry has been often and often productive of most instructive communications to the journals.

Amongst the members of our Association he will be most seriously missed, his bright and cheery manner making his presence at the meetings, when circumstances permitted, most welcome. But with a large practice as a surgeon at Bath, and also holding the appointment of public vaccinator for that place, and that of deputy-coroner for East Somerset, he had but little time for his favourite hobby. In fact, I fear he is another victim of over-work, which, followed by a severe chill, resulting in congestion of the lungs, robbed his large circle of friends of a good and true friend.

Large numbers, including many of the poorest, followed him to his last resting place, and with unmistakeable evidences demonstrated their sincere sorrow at his loss. Much sympathy is felt for his widow and family of twelve children.—Yours faithfully, H. A. H. Daniel.

Hon. Sec. Bristol and West of England Amateur Photographic Association.

Proceedings of Societies.

Newcastle-on-Tyne and Northern Counties' Photographic Association.

The ordinary monthly meeting was held in the College of Physical Science, Newcastle-on-Tyne, on Tuesday, May 9, at 7·30 p.m., Mr. H. S. Mendelssohn in the chair.

The minutes of last meeting were read and confirmed.

Three new members were nominated, and Messrs. J. Davidson, J. E. Stead, R. A. Collins, and W. P. Stainsby were unanimously elected members of the Association.

On the proposal of the Chairman, seconded by Mr. Doudney, Mr. Allison, of the Old Rectory, Monkwearmouth, was elected a honorary member of the Association.

It was resolved, after some discussion, that the Secretary be requested to write to the Photographers' Association of America and say that this Association will endeavour to send an exhibit, and to ask the date for sending in.

It was agreed that there be two out-door meetings this summer; the first to be held on the second Wednesday in June at Castle Eden, and the other to be held on Bank Holiday in August at Walkworth.

Mr. Louis Davidson was requested to take charge of the portfolio and photographs belonging to the Association. The Hon. Secretary read a letter from Mr. Stead, and showed some negatives and transparencies sent by that gentleman.

Mr. Dodds then read a paper on "Dark-room Illumination" (see page 279).

A short discussion followed.

The Chairman (Mr. Mendelssohn) said that he quite agreed with Mr. Dodds in thinking that it was necessary to use a ruby light, and to use it through all the operations till the plate was fixed. He considered that the best results could not be obtained unless the illumination of the dark-room was properly attended to.

Mr. J. P. Gibson said that he thought Mr. Dodds had insisted too strongly on the necessity of fixing in the dark. He had for a long time been in the habit of washing his plates and fixing in daylight, and had not observed that they were at all injured by his doing so. He now, however, fixed in the dark-room, though he did not think there was any gain in the change, save that it was more convenient. He quite agreed as to the advisability of having only red light in the dark-room, and stated that he had recently excluded daylight entirely, and now only used artificial light to develop by; and he always kept his developing-dish covered with a pane of ruby glass.

Mr. Mendelssohn said that he could quite endorse every word that Mr. Dodd had said.

Mr. Gibson remarked that he thought Mr. Dodds rather exaggerated the case in the matter of fixing, but, generally speaking, quite agreed with that gentleman.

The Hon. Secretary exhibited a number of carbon prints which were printed by Mr. Swan about 1866-7, and which passed through the severe fire at Mawson and Swan's, and had been much acted upon both by fire and water, yet preserved the details and purity of colour in a very marked manner. Even though the paper had rotted away, the tissue was perfect.

Thursday Evenings for Photographers.

At the meeting held on the 11th inst., Mr. E. T. F. Goodwin occupied the chair.

In the course of a few remarks upon film negatives, Mr. Brown said he did not find it necessary to grease the edges of the film; he found that if the film was laid in the developing tray and flooded with water and then drained, it would lay flat on the bottom of the dish through all the operations of developing, &c.

Mr. W. E. Debenham showed a negative upon a plate that had been unevenly coated. When developed, the film appeared to be perfectly clean and free from spots or markings; but upon his treating it with mercury for the purpose of intensification, a number of brownish spots appeared in all thick parts of the film. He then again placed it in the hyposulphite bath, and so dissolved the mercury out, when the colour disappeared from the spots, leaving small whitish superficial spots visible only by daylight. He attributed the markings to some compound of silver left in the film, after fixing, which had combined with the mercury.

Mr. Brown thought that perhaps a trace of bromide might have been present.

Mr. Henderson asked if anyone had tried a mixture of cyanide and hyposulphite for fixing gelatine plates? He stated that he used the following formula for reducing gelatine negatives successfully, the plates having much the appearance of wet collodion plates; viz., first apply equal portions of a saturated solution of mercuric chloride and ozone bleach, wash, and treat with a solution of cyanide of potassium, and again wash.

The Chairman exhibited a roller for mounting prints; it consisted of a piece of red rubber tubing placed over a piece of wood and revolving in a handle.

Mr. Henderson showed a plate that had been wrapped in brown paper, a circular hole being left in the paper at the back of the plate; over this was placed several thicknesses of white tissue paper similar to that used for cigarettes; it was then placed in a dark box and left for the three months; when developed, the circular opening in the paper was marked by a strong insensitive mark. This he attributed to the phosphoresence of the white paper, as it had been kept where no light could possibly have reached it, and as the paper had not been in contact with the film, it could not be due to any chemical compound in the paper.

The Photographic Society of Ireland.

The last meeting of the session of this Society was held in the Royal College of Science, Dublin, on Friday, 12th inst., Mr. J. V. Robinson in the chair.

Messrs. Robert Mitchell and Marcus Moses were duly elected members.

Mr. Herbert Bewley explained, with experiments, various methods of printing in uranium, iron, carbon, and platinum. The specimens in uranium and iron were very interesting, as they showed the different steps that photographic printing took before it reached its present form. There seemed to be a general consensus of opinion that the Platinotype process is, for permanency, decidedly the best. An ordinary silver print was laid side by side with the carbon and platinum pictures for contrast; the platinum, however, which was printed by the Chairman specially for the occasion, still held its own.

Mr. Bewley found he could get better results with this process from *hard* negatives than from those most suited for silver prints.

In the discussion which followed, the Chairman informed the meeting that he had subjected the platinotype paper to several severe tests with a view to finding whether it would keep its tone or not. He placed a print in an almost saturated solution of cyanide of potassium without perceiving any change.

A very strong solution of muriatic acid was next tried, and with the same result; and lastly, into a solution of nitro-muriatic acid as strong as not to destroy paper, and could not get any change. The results were considered highly satisfactory, and established the theory as to the permanency of the prints more than ever. As to the developing, he had found that for an under-exposed print it was better to use the solution of oxalate of potash at a much higher temperature than 190°, and for an over-exposed picture the temperature can be lowered below 190° with advantage; also that the best results were obtained by evaporating the solution until re-crystallization was about to take place, then to plunge the paper in (flooding, in his opinion, not being at all necessary), and to treat it in the usual manner.

Mr. Thos. A. Bewley drew attention to the utility.

The Chairman exhibited Captain Edwards' electric instantaneous shutter, which was the subject of much discussion as to its merits, &c. A drawing of this instrument lately appeared in the journals.

Mr. Woodworth drew attention to some gelatine film negatives which he had used in portraiture; his experience led him to believe that films were altogether unfit for this class of work, as the contraction of the gelatine caused a very unpleasant amount of distortion as shown by the proofs produced. The subject of the excursion having been brought forward, a committee was appointed to make the necessary arrangements.

A cordial vote of thanks was passed to Mr. Herbert Bewley for his communication. The meeting was then adjourned until Friday, the 13th October.

Talk in the Studio.

Photographic Society of Great Britain.—The next Technical Meeting of this Society will be held on Tuesday next, May 23rd, at the Gallery, 5a, Pall Mall East. The chair will be taken at 8 p.m.

The late Royal Wedding.—Messrs. G. Tuohy and Co., of Richmond, have had the good fortune to receive an expression of Her Majesty's approval of the group picture they succeeded in obtaining at Chertsey of the Duke and Duchess of Albany.

The Micro-Camera and Medicine.—On Monday, Professor Lister and Mr. W. W. Cheyne held a microscopical demonstration of some of Professor Koch's finest specimens in the physiological laboratory of King's College, and a large number of eminent physicians and surgeons attended. These specimens showed the baccilli of anthrax, erysipelas, tubercle, &c., which are exciting so much interest in the scientific world. The large rod-like baccilli of anthrax were plainly visible, even to an unpractised eye; but those of tubercle, &c., were only to be made out by a good microscopist. All the specimens were under first-class microscopes magnifying from 800 to 1,600 diameters, and the light was very carefully arranged. The preparations were stained with various aniline dyes; the dyes enable the specimens to be photographed, and then the baccilli are much more plainly visible. Dr. Koch's method of photographing these tiny creatures has been described in the News.

Processes in use for Book Illustration.—Last Monday Mr. J. Comyns Carr delivered the second lecture of a course of three Cantor Lectures, on "Book Illustration, Old and New." The lecturer, after having drawn a distinction between books in which the printed text is the main feature, and those which depend principally on the illustrations for their value, proceeded to discuss the gradual development of the art of wood engraving, and, as he regards this method as being by far the most important illustrative method, the greater portion of both lectures was devoted to its consideration. Many who practise the art lose sight of the circumstance that the white line should be the integral factor of the wood engraving, just as the black line forms the characteristic feature of the plate or intaglio engraving. Those wood engravers who unduly crowd their work with complex cross hatchings of black lines handicap themselves, and often miss the artistic ideal. Examples of wood engraving which were handed round served to illustrate the perfection with which the most delicate gradations of light and shade, as involved in representing the delicate variations in facial expression, could be rendered by varying the width of the closely-packed white lines, and if those who draw designs for wood engravers were to frequently execute them in white on a black ground, it is not unlikely that excellent results might follow. Many subjects well adapted for reproduction by engraving on wood cannot be satisfactorily engraved by the plate method, as, for example, the bold, clear, and broad lines and touches of Dürer and Holbein, every fraction of which has a deep artistic significance. In the hands of a master engraver like Bewick, the "white line" often takes the form of irregularly dug-out patches, which may produce an effect comparable to a stipple or coarse grain. Next Monday Mr. Carr will treat of modern processes of illustration, and those based on photography will be explained and considered.

Motes, the Photographer, secures the Gold Medal at the Exposition.—As a *Constitution* reporter was passing up Whitehall Street yesterday he spied a large crowd in front of the entrance to Motes' photograph gallery, and thinking there was a sensation brewing, approached. Just as the reporter entered the crowd, some one said: "Yes, that is fine work. It can't be surpassed, and I am told that it secured the gold medal at the Exposition." This remark gave it all away, and the reporter knew that the crowd was examining and discussing the beautiful photographs in the glass case. He had passed by it a hundred times, but never before had he noticed how beautiful and attractive it was, and the more he studied it the more beautiful and attractive it became. In the room above, where the display is made, there are hundreds of photographs equally pretty. In fact, the walls are covered with them, and a lover of the beautiful could pass a day looking at the collection. After examining the work the reporter was not at all surprised to learn that Motes had been awarded the gold medal, even though the best photographers of the north made a big effort to secure it. The photographs which took the prize hung upon the wall. One is of a child, and the other of one of Atlanta's leading society ladies. They were picked by Mr. Motes at random from his stock, and were made long before the Exposition was thought of, and were not made with a view to securing the prize. Any one who examines the work in Motes' gallery will not be surprised to learn that the International Cotton Exposition awarded him the gold medal for the finest work in photography.—*Atlanta Constitution.*

Luminous Cartes-de-Visite.—We have received a very effective luminous picture bearing the imprint of Mr. Malby, of Chichester; the picture having evidently been rendered transparent by means of some kind of varnish, and then mounted over a phosphorescent surface. It is probable that there would be a considerable demand for luminous portraits if they could be offered to the public on about the same terms as the ordinary picture; and we understand that Mr. Malby intends introducing them as a special feature of his business. It may be worth mentioning that a carbon print, a Woodbury print, or a collotype would be more suitable for this use than is a silver print, as the silver image might easily become transformed into sulphide.

Photography and Sculpture.— Since the photographer has to study modelling and lighting after the manner of a sculptor, art-training in a sculptor's studio would doubtless form the best education for a photographer. M. Adam-Solomon's success as a photographer was due simply and solely to his art training and experience as a sculptor. So says a Chicago journal, the *Picture*, and so said one of our "Notes" some weeks back. Singular instance of agreement of opinion!

The Pope on Photography.—According to our contemporary, the *Archiv*, Pope Leo XIII. recently expressed himself in the following lines upon the art of photography :—

Expressa solis speculo
Nitens imago, quam bene
Frontis decus, vim luminum
Refert et oris gratiam!

O mira virtus ingeni!
Novumque monstrum! imaginem
Naturae Appelles aemulus
Non pulchriorem pingeret.

Origin of Names of Fabrics.—The origin of some old names are given by Sir George Birdwood as follows: Damask is from the city of Damascus; satin from Zaytown, in China; calico from Calcutta; and muslin from Mosul. Buckram derived its name from Bochara; fustian comes from Fostat, a city of the Middle Ages from which the modern Cairo is descended. Taffeta and tabby from a street in Bagdad. Cambric is from Cambrai. Gauze has its name from Gaza; baize from Bajae; dimity from Damietta, and jeans from Jaen. Drugget is derived from a city in Ireland, Drogheda. Duck, from which Tucker Street in Bristol is named, comes from Torque, in Normandy. Diaper is not from D'Ypres, but from the Greek *diaspron*, figured. Velvet is from the Italian *vellute*, wolly (Latin, *vellus*—a hide or pelt). Shawl is the Sanscrit *sala*, floor, for shawls were first used as carpets and tapestry. Bandanna is from an Indian word, meaning to bind or tie, because they are tied in knots before dyeing. Chintz comes from the Hindoo word chett. Delaine is the French "of wool."

To Correspondents.

All Communications connected with Advertisements and Business to be addressed to Messrs. Piper & Carter, "*Photographic News*" *Office, 5, Castle Street, Holborn, E.C. Advertisers are requested to make all Cheques payable to* Messrs. Piper & Carter, *and crossed "Union Bank, Photographic News Co. Account."*

*** We cannot undertake to return rejected communications.

R. Morton Day.—The Silvertown India-rubber Company (100, Cannon Street, London) will doubtless make it for you.

Unbeliever.—If you had carefully read the rest of the article, you would have perceived that the printing of "second" instead of "minute" was the result of a slip of the pen on the part of the writer.

T. L. C. M.—In general a simple drop shutter would be most suitable; but most of the commercial shutters will give excellent results if intelligently used.

Achromatic.—1. It is a combination consisting of a double convex lens of crown glass, cemented to a double concave lens of flint glass. It occasionally happens that the flint glass is flat on the uncemented side, but even in this case most persons would consider the term "actinic meniscus" as being sufficiently exact for ordinary conversation. An achromatic lens is corrected especially for colour, while an actinised lens is corrected so as to ensure the coincidence of the chemical focus with the point of greatest visual sharpness; but an actinised lens is frequently referred to as achromatic. 2. We have not used the apparatus, but were much pleased with its design and appearance.

Red Sea.—In such cases we would advise you to immerse in a five-grain solution of chrome alum before commencing to develop, and should this not prove effectual, you might try Captain Abney's plan of coating with plain collodion. It is of importance that the plates should be kept prefectly dry, or the gelatine may undergo a kind of deterioration calculated to occasion the difficulty you complain of.

George Terry.—You cannot do better than obtain Captain Abney's "Instructions in Photography," which is published at our Office. A new edition is in the press.

T. Tame.—1. A very light buff tint is suitable in most cases. 2. A really good press is generally to be preferred.

G. B. (Cork).—It is rather a matter for our advertising columns.

J. Loder.—Write to the gentleman you name. A letter addressed to St. George's Hospital, London, W., will reach him.

J. M. Monto.—1. A rectilinear or symmetrical lens will prove the most suitable in a fairly good light, but under more unfavourable conditions you may have to make use of a portrait combination. 2. There are several in the market, and we believe that excellent results may be obtained with either.

T. C. H.—1. The process you describe is not very satisfactory, as the block usually suffers by the thorough wetting which it receives, and you will find it more satisfactory to prepare a fatty transfer on paper, and to transfer the image to the wood block by means of a lithographic press. 2. Sometimes it is prepared by being flooded with a weak gelatinous solution. 3. No. 4. Probably not.

Retoucher.—You can hardly complain with reason because your employer keeps you to that work for which he engaged you, as he perhaps finds this to be the only way of utilising your services to advantage.

J. R. -It is difficult to explain the affair except by assuming that the gentleman in question has but little regard for the truth.

B. Lands.—1. Add about 3 per cent of caustic soda. 2. Bichromate of potassium 2 ounces, sulphuric acid 2 ounces (fluid), and water one pint. 3. It is very likely that the carbon thread has become fractured.

C. R. Deed.—1. Generally in parallel circuit. 2. See our last number. 3. About five-eighths of an inch in diameter. 4. Not unless it has been previously softened. 5. Try the effect of five or six successive applications.

O. Gebrader.—Gutta-percha was used as a moulding material, and the surface was rendered conductive by means of fine copper bronze powder.

A Beginner.—Treatment with methylated spirit will be sufficient in ordinary cases.

Cambrian.—So much depends on local circumstances that it is impossible for us to express a decided opinion; but unless the street is unusually narrow at the part in question, the latter expedient should be resorted to.

Commerce.—Such matters can never be satisfactorily regulated by any system of combination, as such wide variation exists with respect to the quality of the work.

Thomas M——.—1.—Only through our advertising columns. 2. Three parts of the former and two of the latter. 3. No. 3 is more to our taste than either of the others. 4. A small proportion always remains in solution, but in most cases this may be disregarded. 5 Nitric acid 2 parts, and water 5 parts. 6. Not at present.

Kennington.—The immediate effect would be to make the plate considerably less sensitive; but it might, as you appear to think, prevent any decomposition of the organic matter setting in.

Enlarger.—1. The usual method is to first make a carbon transparency; but excellent results have been produced by the method you refer to. 2. Not unless it is new and in very good order.

Carlo.—The reaction sets in immediately air is admitted, but you will find it much better to revert to your old method of working.

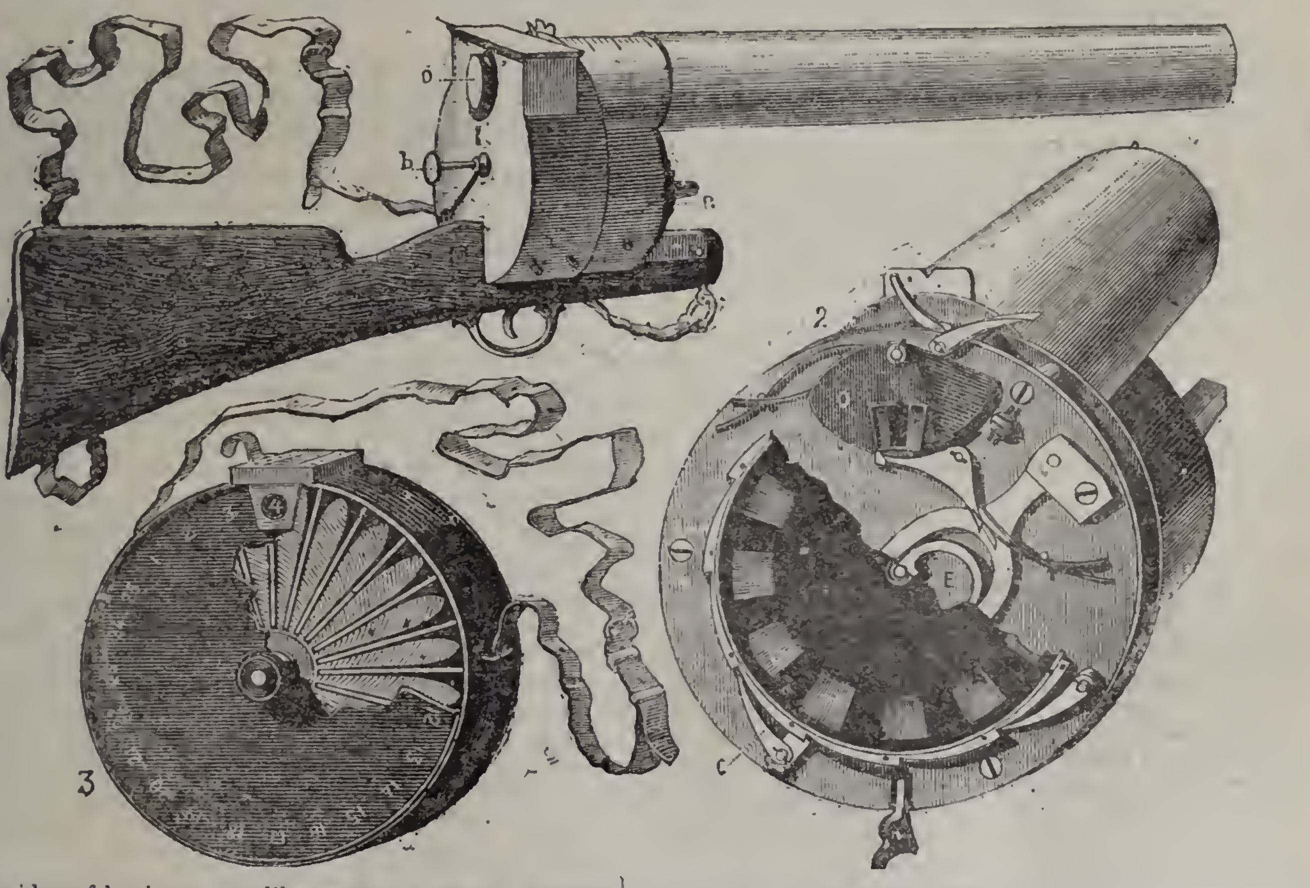
THE PHOTOGRAPHIC NEWS.

Vol. XXVI. No. 123.—*May* 26, 1882.

CONTENTS.

MAREY'S GUN CAMERA.

We are able to place before our readers a sketch of M. Marey's recently constructed camera for securing rapid exposures in series. It is obviously an instrument of somewhat limited application, but the designer of the apparatus has been successful in obtaining with it many valuable pictures, that teach us something more than we knew before about the flight of birds. Mr. Muybridge's wonderful pictures of animals in motion led M. Marey to the construction of his instrument, and the latter seems to have been as successful as the former in his results. By securing a number of photographs one after another of a bird on the wing, M. Marey has been able to analyze the action of the wings, which constitutes the act of flying, in a manner that has never been attempted before.



The idea of having a gun-like camera which can be held in the hand and aimed is not new, neither is the notion of making a rapid succession of exposures, for the French astronomer Janssen does this in his photographic revolver; but the combination is new, and so exquisitely ingenious is M. Marey's apparatus, which has been submitted to the Academy of Sciences, that we make no apology for bringing it before our readers.

The sketch of the apparatus which we take from our contemporary, the *Bulletin de la Societe Française*, speaks for itself. Fig. 1 is a general view of the apparatus, fig. 2 shows the disc which acts as a cap and means of making the exposure, and fig. 3 is the box containing twenty-five sensitive plates. The photographer raises the gun to his shoulder as if in the act of shooting a bird; he aims as truly as he can and pulls the trigger, when the lens is uncovered for the short space of $\frac{1}{720}$ of a second. If the photographer can cover the bird for the space of one second, as many as ten exposures may be given one after the other within that time.

The tube of the gun contains the lens. At the breech of the gun is a cylinder which revolves by the action of clock-work. When the trigger is pulled, it puts into action all the necessary movements of the gun. A centre axle, which makes twelve turns in a second, has under control all parts of the instrument. It is, in the first place, an opaque disc, which serves to cap the lens, the narrow slit it contains permitting the exposure as it revolves. Thus there would be twelve exposures in the second, since this revolves as many times in this period.

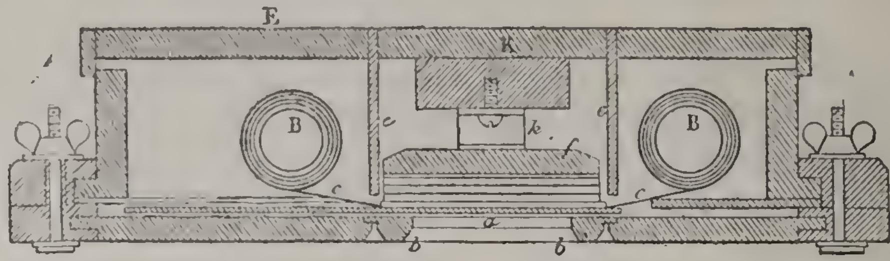
Behind this disc, and turning freely on the same shaft, is another disc, having twelve windows or apertures behind, and behind that again is the sensitive plate, either of circular or octagonal form. The disc with windows must revolve with an intermittent action, so as to stop twelve times per second in front of the pencil of rays that shines through the lens, just as the slit that makes the exposure passes. An eccentric placed upon the shaft produces the rotation required, by imparting a to-and-fro movement to a little projecting rod or tooth, which seizes at each oscillation one of the teeth, of which a series run round the disc that carries the windows.

The focussing of the instrument is brought about by lengthening or shortening the gun tube, the action of which is to advance or draw back the lens. The focus may always be verified by observing the little ground glass screen seen through an opening in the breech of the gun. A dry-plate box of circular form, similar to those obtained in commerce, serves to keep a stock of twenty-five plates, which may be lodged one after another in the gun, and subsequently withdrawn without exposure to light.

TROMEL'S REPEATING FRAME FOR PHOTOGRAPHIC PRINTING.

THE subjoined cut illustrates the latest developments of the roller printing-frame, and it is easy to believe that it may prove of considerable value to carbon printers, or to those who wish to make numerous impressions on gelatino-bromide paper.

The negative is laid over an opening, *a*, which can be



adapted to the required size by means of movable frames, one of which, *bb*, is shown in position. The band of sensitive paper is coiled on one of the two wooden rollers, BB, the free end being attached to the other roller, and contact between the negative and the paper is established by closing the door, *k*, so as to bring the platen *f*, into position. After the required exposure has been given, the door, *k*, is unfastened in order to release the paper, and a fresh portion of the paper is brought into position by sufficiently turning the uncharged roller.

It is, of course, possible to place several small negatives in a line across the frame, so as to print several pictures at once. Any which are less dense than the remainder require to be sufficiently shaded with tissue or mineral paper; and the band of impressed paper may be cut up into convenient lengths for development or other subsequent operations.

THE UTILISATION OF EXTREMELY THIN GELATINO-BROMIDE NEGATIVES.

FEW regular workers with the gelatino-bromide process have not occasionally produced negatives so exceedingly thin and ghost-like as to discourage all hope of intensification being possible. A negative of the kind we now refer to is seldom fogged, but the film is often slightly discoloured, and although scarcely any trace of an image is visible unless the negative is placed in an oblique position with regard to the light, it often happens that a careful examination will show that a highly-detailed picture, possessing full gradations of tone even in the lighter tints, is, in reality, present. Should this be the case, it is always practicable to so reproduce the negative that all gradations shall be proportionately intensified, and a vigorous replica of the original be obtained. The first step is to prepare a collodion positive by means of the copying camera, care being taken to make use of a moderately new collodion, to give a full exposure and to develop with an extremely weak iron developer, four or five grains of sulphate of iron to the ounce being sufficient in most cases; but intensification with pyrogallic acid and silver is better avoided, as often leading to granulation and roughness of the deposit. If reasonable care has been exercised in the production of this transparency, it often happens that it is sufficiently vigorous to serve by itself for making the reproduced negative; but should this not be the case, one or more additional transparencies must be made without in the least altering the adjustment of the apparatus as originally used, and it is well to employ a glass of extra good quality, and as thin as practicable. The transparencies thus obtained are placed over each other in exact register, and securely fastened by means of strips of gummed paper, after which the compound transparency is reproduced in negative form by means of the ordinary copying camera; but a lens of long focus, and well-stoppered down, should be employed, in order to reduce to a minimum any defects which may tend to result from the circumstance of the several constituent parts of the complex transparency resting in different planes. If it be preferred, a contact negative may be made from the complex transparency by the carbon process or on a gelatino-bromide plate; but in such a case it becomes necessary to print by approximately parallel light, the frame being placed either at the bottom of a deep box, or inside a room at a considerable distance from a small window. When, however, an old-fashioned, straight chimney of large internal measure is available, it can be advantageously used for printing by parallel light.

Success in the kind of reproduction now referred to cannot well be attained if old collodion be used and a short exposure be given, as under these circumstances vigour and contrast are obtained by the sacrifice of detail and modelling as regards the more delicate gradations of tone. It is scarcely necessary to remark that every circumstance which tends to produce even the slightest trace of fog must be most carefully avoided, and in order to prevent too large a proportion of silver intermingling with the iron developer, it is well to dip the plate for a few seconds in a weak silver bath—say about ten grains to the ounce—either before or after exposure. These remarks apply more particularly to the production of the transparencies, as if the multiple transparency be fairly vigorous there is generally no objection to using a tolerably strong developer, and moderately intensifying with pyrogallic acid and silver, when the reproduced negative is made.

The texture of a negative carefully reproduced by the collodion process will often compare favourably with that of a reproduction obtained through the medium of a carbon or collodio-albumen transparency.

STRAY NOTES ON DRY PLATES.

BY J. PLENER.

M. JANSSEN'S experiments, which you recently related, have enabled him to formulate two laws for the gelatino-bromide plates, viz., 1st, that a deposit on a plate of this kind is proportionate to the time of exposure and to the intensity of light, if the latter is not very great; and, 2nd, that when the intensity is very considerable, then the deposit increases in smaller ratio than the intensity of light.

In order to test the correctness of these laws, let us suppose for a moment that the second law does not exist, and that the first alone governs the formation of the deposit for all the intensities of light, and let us see what bearing this law will have on a developed plate which has been exposed for the time t under a *cliché* having continuous gradations of shades from white to black.

If we consider any two contiguous elements in the scale thus obtained on the plate, and designate the difference in the quantity of the deposit in them by dy, and by di the difference in the intensity of light which caused the decomposition of silver salts, then we are able to construct the following equation: $dy=\mu t di$ where μ represents the deposit corresponding to the unity of light's intensity and the unity of time; and the constant t the time of exposure. On the other hand, if we designate by a the least deposit perceptible to the eye, and by s the sensitiveness of the plate, then we have $\mu=as$. Substituting this in the equation above, we receive—

$$dy=astdi\ldots\ldots\ldots\ldots(1)$$

Let us apply this equation to the case of a sensitometer graduated in such a way that the difference in the transmitted light by two contiguous divisions will be Di. If we designate by P the maximum of the deposit the plate will give, and the corresponding intensity of light to it by i, then $i=nDi$ where n is the number of gradations obtained on the plate from P to the end of the scale. The equation (1) will give us—

$$\int_0^P dy=ast\int_0^{nDi} di, \text{ or } P=astnDi\text{; hence } n=\frac{1}{s}\cdot\frac{P}{atDi}$$

We observe here that n stands in inverse ratio to the sensitiveness—viz., the smaller sensitiveness—the greater is the number of gradations and the longer the scale. But in practice the reverse happens: a slow plate always has a shorter scale than a quick one. It is evident from this that the equation (1) does not hold good for all the scale of gradations, just as M. Janssen's first law sets forth. So far, all is right. But the reason of slow plates having a shorter scale must be sought for, and M. Janssen's second law, if it were true, might have accounted for the fact had it besides included the supposition that with the quick plates in high lights the deposit decreases much more rapidly than with the slow ones. If this were admitted, the curves for the plates, quick and slow, would be respectively like OBK and PCK. Nevertheless, we have direct evidence proving that in the slow plates the deposit does not decrease, but increases in greater ratio than the intensity of light.

Let us examine a slow plate which has been exposed under a sensitometer, and which gave for sensitiveness No. 10. As a rule, No. 1 will be as dense as, if not more dense than, the same number in a quick plate. We must try to calculate here the relation between the light i_{11} for No. 10, and i_1 for No. 1, and the respective deposits a and P. Mr. Warnerke's sensitometer gives us for the relation

$$\frac{s_{11}}{s_1}=12$$

It ought to be the relation of—

$$\frac{i_1}{i_{11}}$$

and for such we take it; consequently we may write—

$$\frac{s_{11}}{s_1}=\frac{i_1}{i_{11}}=12$$

Hence

$$\frac{P}{a}=\frac{i_1}{i_{11}}=12, \text{ or } P=12a.$$

If this were true, we could not make between a and P more than four gradations; therefore, we must admit that

$$P>12a,$$

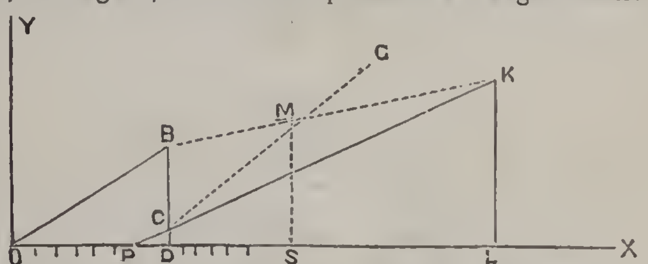
and that

$$\frac{P}{a}>\frac{i_1}{i_{11}}$$

Hence it follows that the deposit increases in greater ratio than the intensity of light.

To sum up the above, we say it is only in the quick plates that the deposit from a certain point begins to increase in smaller ratio than the light's intensity, while in slow plates the reverse happens, viz., the deposit increases in greater ratio. It seems beyond doubt that M. Janssen experimented only upon quick plates, for which his laws were formulated. It is clear now why slow plates have a shorter scale of shades. The deposit increasing more quickly than the light, the graphic power of the plate becomes sooner exhausted. This disproportion between the light and the deposit makes it possible that photography sometimes, by exaggerating the contrasts, renders distinct the shades which, in nature, are imperceptible to the eye. This is, too, one of the causes of the production of hard negatives.

Now we return to the diagram. The divisions upon O X represent different intensities of light, D C and D B represent the deposit in two plates of different sensitiveness, O D the light's intensity up to which the equation (1) holds good, P C G will represent the changes in a slow



plate, and O B K those in a quick one. The parts P C and O B are straight lines, but C G and B K are curves, and we do not know the law they follow. At the point M, common to both, they have for the same intensity of light, O S, the same deposit, M S. From this point the ordinates for M G will be greater than for M K. If, for the determination of sensitiveness, instead of the faintest tint, we were comparing the deposits represented by ordinates of M G and M K, we should find what is generally considered as a slow plate to be the quickest, and it may happen that in photographing a drawing in black lines a slow plate would require shorter exposure than a quick one.

Should we venture to explain the phenomena attending the formation of the deposit, we might suppose that, besides the known factors i, t, and s, there are two others more, opposite in their effects, one predominating in the quick plates, and another in the slow. As for the latter, it may be the electrolytic action that so much increases the deposit in them. On the other hand, in the quick plates, the relative decrease of the deposit may be the effect of solarisation, or some other unknown causes.

We said above that we do not know the laws the curves C G and B K follow, consequently we must write their equation thus—

$$\frac{dy}{di}=at\phi'(s,i,\beta)$$

where β may be a composite function of solarisation, electrolytic action, and some other unknown causes. From experience we know that, up to a certain value of i, the $\phi'(s,i,\beta)$ remains equal to s, and the above equation represents a straight line. But from this point the $\phi'(s,i,\beta)$ is

$>s$ for slow plates, and $<s$ for the quick. We may put it thus—

$$\phi'(s,i,\beta)-s=q \text{ for slow plates.}$$
$$\phi'(s,i,\beta)-s=-q_1 \text{ for quick plates.}$$

Here q changes with sensitiveness from a positive value for the slow plates to the negative q_1 for the quick. There must be some plates for which q approaches 0, the $\phi'(s_1 i_1 \beta)$ $-s$ and the curve P C G—straight line. Now arises the paramount question, how to know such plates?

M. Janssen gives us a good method to do this. He obtains on the plate two continuous gradations of shades, and superposes them in opposite directions. If the deposits were proportionate to the light and the time of exposure, we should obtain a tint of equal transparency throughout all the length of the scale.

Here is another means. If a plate really possesses the property of giving deposits proportionate, within the practical limits, to the intensity of light and the time of exposure, then it is capable of rendering truly all the shades we perceive in nature. Suppose we got a scale of shades ranging between the deepest black and the purest white, constructed in such a way that each shade differs, as regards the intensity of the reflected light, from two other contiguous shades, just as much as to make the difference perceptible to the average eye; if we photograph this scale, and manage to give right exposure, then a good plate will reproduce faithfully all the gradations of shades, while a bad one will render perceptible only some of the differences in shades, because here the graphic power, though it be the same as in a good plate, will be mismanaged in such a way that some gradations will be exaggerated, while others will disappear. It remains to count all the perceptible differences in shading to have the number which may be taken as expressive of the quality of the plate.

At Home.

MR. W. J. A. GRANT ON BOARD THE ARCTIC YACHT, "KARA."

By the time these lines are before our readers, a gallant little yacht, built expressly stout for Arctic voyaging, and manned by a crew equally gallant and stout-hearted, will be running down the Thames on a brave errand of mercy. The yacht is the good ship *Kara*, of 40 tons register, Sir Henry Booth master, bound for Franz-Josef-Land, and the desolate ice-bound sea that lies between Novaia Zemlia and the North Pole. Its object is to search the inhospitable bays and inlets in that far-off solitude of snow and ice for Mr. Leigh Smith's craft, the *Eira*, which for several years past has made surveying voyages to the far north, with a view to completing our geographical knowledge of that region. From his last voyage Mr. Leigh Smith failed to return; he was provided with provisions for a twelvemonth only, so that, whether safe on land or in a dangerous position on the ice, he must now be in sore straits. The *Hope*—a larger vessel, under Sir Allen Young—is likely to start also to his assistance shortly; but, meanwhile, the *Kara*, unhampered by a dozen difficulties which beset joint-stock expeditions, has cleared the dock, and stands ready for the voyage.

"That little craft lying by the jetty yonder, with a crow's nest aloft," says the dock constable at St. Katherine's, to whom we have turned for information. His information is good. There are masts without number before us; but only one carries an upright cask at the mast-head, designating her an Arctic voyager; for in Arctic sailing, we may mention to those who may be as ignorant as ourselves, the captain does not take his post on the bridge, but aloft, when he is once among the ice floes, for he can in this way best guide the vessel along any channel of clear water there may happen to be.

We have said the *Kara* only measures forty tons; but, if she is small, she is very strongly built. Her prow, or cut-water, is protected with iron, to prevent damage from ice, and presently, when we go below, into the hold, the cross-beams of oak and thick iron brackets at once attract attention, the destruction of the vessel by being nipped in the ice being one of the greatest dangers of Arctic voyaging. In the hold are the tanks of fresh water (for the frozen sea, although drinkable, since the salt crystallizes out, is not palatable, Mr. Grant tells us), and every nook and recess is filled with tinned meat, provisions, and stores. But we are progressing too fast; let us first descend into the cabin, and introduce our readers to Mr. Grant.

The main cabin measures about twelve feet by six, an elegant little apartment, with just room for a narrow table, a pair of benches, and a stove. At one end is a small library; on brass hooks, neatly arranged overhead, are some formidable-looking rifles; and swinging from the centre, under the skylight, is a circular little shelf, filled at this moment with a bevy of golden-tipped champagne bottles. A tiny "state-room" on either side, containing little else beside a berth, affords sleeping accommodation to Sir H. Booth and Mr. Grant; while a steward's pantry and a photographic dark-room complete the list of apartments aft.

Our readers are already familiar with the name of Mr. Grant. Still a young man, the better side of thirty, he is the hero already of half a dozen voyages due north. Under Sir Allen Young, as also in the recent voyages of the *Willem Barents*, Mr. Grant has served again and again as a scientific volunteer, and his observations in connection with deep sea soundings and meteorology, let alone his services as one of the most ardent of our amateur photographers, as well as his repeated experiences of Arctic life, have made him one of the best authorities on the subject of voyaging in the Polar seas. It is, therefore, with no surprise that we find our friend the heart and soul of this new expedition to the Frozen Deep, quietly and quickly arranging details of the internal economy of the ship, and speaking with equal promptness on the subject of magnetic observations, and of fish-hooks for the acquisition of food when the *Kara* gets north.

We doubt if ever a photographer required to equip himself with so much foresight as Mr. Grant. Now-a-days, we are apt to think that with gelatine, the whole forest of difficulties connected with photography is swept away at a stroke. An inspection of Mr. Grant's preparations soon dispels the illusion. Here in a corner is the stock of plates that Mr. Grant takes out with him; they are in their packages as they come from the maker, but every one of the packages is in a tin case carefully *soldered down*. The heavy sea fogs are so searching that nothing short of soldering can be relied upon to keep the plates dry and sensitive. These cases are never opened until the plates are required, and then the utmost care must be used to protect the films as much as possible from the damp salt air; as many people know, you can frequently taste the salt in a sea-breeze, and a deposit of salt—one of the most deliquescent of substances—upon gelatine plates simply means ruin to them. So that when Mr. Grant has rapidly unpacked his plates, and put them into their dark slides, these latter are immediately slipped into a well-fitting tin case, made as air-tight as possible by leather fittings. This tin case is then put into an outer case of stiff waterproof, to be a second time enveloped and strapped in a waterproof sheet.

Double dark slides are used, with slides that pull right out, these being employed not only for the sake of convenience, but as more likely to keep out the damp sea air. The tin case takes three of these slides, or half-a-dozen plates.

In this way the plates are carried across the ice for exposure in the camera, and yet, with all these thoughtful precautions, the plates are not always free from insensitive patches, &c. Once out of their soldered case, indeed, Mr. Grant seems to distrust the films, and he is never happy until the plates are developed and the films once more dry. "I always develop the same evening," says Mr. Grant, introducing us to his little dark-room, which is here in the warmest part of the vessel, leading out of the main cabin. A curtain pulls across the entrance, but as no rays can fall direct upon the door-way, the dark-room is well protected from daylight.

There is probably no more convenient photographic laboratory afloat than this well-fitted little recess on board the *Kara*. A spacious table and sink is before the photographer, and under these, convenient to hand, is a shelf carrying the ebonite developing trays. On one side are the developers, on the other side the drying shelves—perhaps the most important feature of Arctic photography. For it stands to reason, that no sooner is the picture developed and fixed, than, to secure it from harm, the film must on no account be permitted to freeze. Therefore, says Mr. Grant, rapid drying under your eye is of very great importance.

A well-built whole-plate camera Mr. Grant prefers for his work, and as the most steady stand, relies upon one of those tripods in which each leg consists of three supports, one drawing out from between the other two. The whole of his apparatus is packed in leather-lined metal boxes similar to uniform boxes, for the double reason of reducing the risk of breakage to a minimum, and preventing the action of that arch-enemy damp.

Many of our readers have seen examples of Mr. Grant's capital work—indeed, it is not so long ago that he secured a medal at the Pall Mall Exhibition—but few will guess how valuable some of his pictures are likely to become. The little bays and headlands on the dreary coasts, at many of which food depôts have been established or important documents deposited, have many of them been depicted in the camera by Mr. Grant, and these pictures will afford to other vessels far more valuable information as to the whereabouts of such stations than any written evidence. That the pictures, again, give us stay-at-homes a more perfect picture of the Polar regions than we are able to realise from a mere written description, is another interesting feature, for it may truly be said that until photographs of these desolate wastes of interminable ice, and these stretches of cold inhospitable shore, were put before us, a very vague idea existed of Arctic voyaging.

An ingenious pair of snow-goggles our amateur wears on his expeditions, which consist simply of caps of ebonite, one over each eye; at the end of the ebonite cap is a slit to look through, which slit can be widened or narrowed according to the glare, and another slit under the cap permits the eye to glance downwards. These two slits, when the goggles are in position, are, curiously enough, quite sufficient for the eye to look in any direction. Here also is Mr. Grant's belt for carrying his watch, whether for judging exposures or other purposes; the watch is in a fob at the end of a bit of leather, and to consult it, you unfold, much in the same way as you let down the steps of a carriage. The belt also carries two cartridge cases, so that cartridges may always be at hand, for a white bear, it seems, may turn up round the corner at any moment; "we shot eleven of them on our trip last summer," says Mr. Grant.

Here, by the way, on the cabin table, is a chart, which shows at a glance the proposed voyage of the *Kara*. After sailing due north and leaving Great Britain behind, on her left, the *Kara* coasts Norway and rounds the North Cape, as the most northern point is termed; keeping still well to the right—or rather we ought to say east—on her voyage north, the *Kara* will come to Novaia Zemlia, which she will also coast in case Mr. Leigh Smith's ill-fated crew may be here. "In fact, it was here, half way up Novaia Zemlia," says Mr. Graut, "that we last had tidings of the *Eira* in the summer from a walrus hunter. He told us Mr. Smith had collected what provisions he could and gone north." To the north of Novaia Zemlia you come upon the first serious ice difficulties; it is yet a hundred and twenty miles due north to Franz-Josef-Land—the point reached by the Austrian expedition some years ago—and it is only when open channels exist through the ice barrier that this land can be made. The Austrian expedition abandoned their ship in Franz-Josef's-Land, for the ice closed up the channel after they had gone north, and prevented any return, so that they had to make the best of their way back to Novaia Zemlia with sledges and boats. Mr. Grant thinks it not unlikely that Mr. Leigh Smith has been compelled to do the same, and for this reason it is that the coast of Novaia Zemlia will be thoroughly searched.

Novaia Zemlia has inhabitants, it seems, for the Russians have recently established an observatory there. "There is going to be a chain of observatories round the Polar Seas," Mr. Grant tells us, all the principal European nations taking charge of one; Great Britain has not, however, yet made up its mind where hers is to be placed, albeit Russia, Denmark, and Holland are already represented.

It is because she may have to afford relief to the *Eira* that the little *Kara* goes out stuffed full of provisions. She herself will not require much; all told, the crew numbers but eleven souls. She is to be navigated by Captain Bannerman, an experienced whaler captain from Dundee, and he is assisted by a mate and six able seamen. These, with Sir H. Booth, Mr. Grant, and the steward, make up the crew, all of whom will be required to lend active assistance. Besides acting generally as scientific authority and doctor, Mr. Grant's intimate knowledge of the Novaia Zemlia coast (he has photographed many of the headlands) renders him invaluable as a guide, ice-pilot, and general adviser, for if the crew of the *Eira* is located in Novaia Zemlia, he is, perhaps, more likely than any other man to find them.

The stout little craft has by this time started on her venturesome voyage, and in a few days she will be battling with the stubborn waves of the Arctic Ocean. It says something for the pluck and endurance of British blood to find gentlemen of position and independence, such as Mr. Grant and the gallant owner of the yacht, ready to sacrifice not only the comforts and luxuries of civilised life, but their health, and, may-be, their lives, in an endeavour to save brethren in danger. That they may enjoy a prosperous voyage and have a speedy and successful issue to their perilous voyage is, we are sure, the earnest hope of all of us.

The next "By-the-Bye" will be "A Unit of Light"; the following "At Home" will be "Monsieur J. Ganz in the Rue de l'Ecuyer, Brussels."

FRENCH CORRESPONDENCE.

Improvement in Photo-Engraving—Gelatine in Astronomical Work—Action of Light on Undried Bichromatized Gelatine—Luminous Photographs—Photographic Formulæ—The Rouen Prize Medals—Edinburgh International Competition.

Improvement in the Process of Photo-Engraving with Bichromatized Albumen.—A noteworthy improvement in the process of photo-engraving by means of bichromatized albumen has recently been published. The metal plate, whether of copper or of zinc, is, in the first place, coated with a very thin layer of bitumen of Judæa, and when this coat has become perfectly dry, a film of bichromatized albumen is flowed over the plate. It is then exposed to the light, and afterwards washed with water in order to dissolve all the albumen which has not been rendered insoluble by the luminous action; it is next treated with spirit of turpentine, which dissolves all those parts of the layer of bitumen that have become exposed. The plate can then be attacked directly by water acidulated with from four to six per cent. of nitric acid. The great advantage of this method consists in the high sensitiveness of the bichromatized albumen, at the same time preserving the solid reserve produced by the bitumen of Judæa on a metallic surface. The albumen flows completely over the bitumen layer, and there is nothing in the process different from its original form, except it be the use of the spirit of turpentine in order to clear the metal in those parts which have been previously stripped of the albumen. I believe that this modification will be proved to be a most interesting one, and I am glad to be able to recommend it to the notice of my colleagues.

Gelatine Plates in Astronomical Work.—Great preparations are being made by the different expeditions for observing the transit of Venus. Photography will be called in, in aid of all the observations, for it alone can give accurate information on all the phases of the phenomenon; these it will be able to reproduce in great variety during the five hours that the transit lasts. I have been asked whether gelatino-bromide plates can be used with advantage, and without having any reason to fear that the image will be distorted, the question is, will it be possible to carry out strictly accurate measurements on these images, for the least bit of distortion will lead to considerable errors? My own opinion is, that there will be no distortion if the plates are coated with a very thin film of gelatine, which has been made to adhere to the glass by some kind of substratum—as, for example, silicate of soda. Competent persons maintain that it will be impossible to rely upon gelatine in this respect. I do not, myself, share this opinion, though it is possible that I may be mistaken. I would therefore ask any of my readers who have been able to obtain information on this subject to be good enough to communicate it to the Photographic News. It is a question of to be or of not to be, so far as regards the use of gelatine plates in astronomy. If, however, there are any who are in possession of facts opposed to this view, I think that they also would do well to indicate them. Anyone who is of my opinion will also do well to mention it, in order that the observers of astronomical phenomena may know how best to avail themselves of the aid of photography.

The Action of Light on Bichromatized Gelatine which has not been Dried.—There appears to be a prejudice as to the action of light on bichromatized gelatine which has not been dried; it is supposed that in this state it has no sensitiveness. Now this is a mistake, as may be readily proved by coating either a negative or a positive on glass with bichromatised gelatine, and then exposing it to the action of light on the other side of the glass. It will be found that the bichromatized gelatine is completely protected against all luminous action except that which passes through the plate. If, after this exposure, it is treated with hot water, it will be seen that the gelatine is not entirely dissolved; the parts that have been acted on by light have become insoluble, and a relief is obtained of considerable depth. Besides, if I am not mistaken, it is on this principle that is founded the process for taking photo-reliefs which came to us from America, and of which we saw some remarkable specimens at the last international electrical exhibition in the *Palais de l'Industrie.* By means of this process we may coat a plate—either negative or positive—with a thick layer of gelatine, and then, having exposed it to the light through the glass, at the end of a certain time the layer of bichromatized gelatine will have become insoluble to a depth of perhaps 4 or 5 centimetres; then, on developing with hot water, we have a print either in depression or in relief of considerable depth. We may use either natural or electric light, as so long as the gelatine is fixed, it is not necessary that it should be dried, as this would reduce the height of the relief. When the exposure has been carried on for a sufficient length of time, the plate is treated with hot water, and this will remove the whole of the gelatine which has been rendered insoluble by light.

Luminous Photographs by the Dusting-on Process.—The following is a method for producing luminous photographic prints in which, instead of the images being on a luminous ground, the image itself is made to appear luminous on a dark ground. For this purpose is used the process of taking photographs in coloured powders published by Poitevin. A film is made of perchloride of iron and tartaric acid on a surface of softened glass; when it has been exposed, sulphide of calcium, rubbed to a very fine powder through a sieve, is dusted over it. The image is formed in the same way as if it had been dusted with any other powder, and it can then be transferred to paper. There can be no doubt that pictures of this sort will be much sought after, more so than those which can be obtained by transferring a carbon print or a Woodburytype to a surface of paper previously coated with sulphide of calcium.

Photographic Formulæ stated in Parts, and not by Weight.—I have been reading in the *Bulletin de l'Association Belge de Photographie* a very interesting article recommending that formulæ should be drawn up in parts, rather than in weights. Of course weights vary in value according to the country, whereas the proportion given in parts remains invariable. If, therefore, an arrangement of this sort could be universally agreed upon, the difficulty of reducing weights from one denomination to another would be avoided. It would only be necessary, for instance, to speak of so many parts of nitrate of silver instead of so many grammes or grains, as the case might be; or, again, so many parts of water, instead of so many ounces or so many cubic centimetres. This would enable the operator to apply the proposed formula immediately, without it being necessary for him to enter into intricate calculations. The idea seems to me to be an excellent one, and I cannot too strongly recommend its adoption.

Prize Medals Offered by the Industrial Society of Rouen.—The Industrial Society of Rouen offers competition prizes in the following subjects:—A gold medal for the application of photo-engraving to copper cylinders used in printing woven fabrics; a silver medal for the application of any photographic method to printing on stuffs.

The International Competition proposed by the Photographic Society of Edinburgh.—While I am on the subject of photographic competitions, I may say a word on that which has been established by the Photographic Society of Edinburgh. It is laid down (1) that the negatives must be able to give at least five hundred prints by a permanent process, and at a cheap rate, and that they must be lent to the Society for this object: (2) the competitors must, if required, send in their negatives to be examined before the prizes are awarded. Now, I must confess I do not understand these two regulations. What is meant by a negative capable of giving five hundred prints by a permanent process, and at a cheap rate? Should not *a plate* be written rather than *a negative*? As for the second article, it seems to be only a recapitulation of the first. If I had any desire to be a competitor it would be very difficult for me to decide accurately what the Edinburgh Society wants; greater clearness seems certainly to be much wanted.

Leon Vidal.

ON THE EFFECT OF THE SPECTRUM ON THE HALOID SALTS OF SILVER, AND ON MIXTURES OF THE SAME.

BY CAPTAIN W. DE W. ABNEY, R.E., F.R.S.*

Mixtures of Silver Iodide and Bromide.

Equal Equivalent Proportions of Iodide and Bromide.—Paper was soaked in a solution of equivalent proportions of soluble iodides and bromides, and, after drying, was sensitised on a 10 per cent. solution of silver nitrate for such a time that the back of the paper

* Continued from page 285.

became thoroughly damp. The silver nitrate solution was acidified in order to prevent the formation of any sub-salts.

A strip of such paper was exposed to the spectrum whilst moist, and the printing action noted. The result is given in fig. 47. Similar paper was washed and treated with potassium nitrite, and exposed whilst moist; the effect of the action of the spectrum is seen in the same figure.

Paper was next washed, and portions were treated with a solution of potassium bromide, and again washed. Strips of these two specimens were dried and exposed to the spectrum, and in both cases the printing action is seen in fig. 48. Similar papers, in a moist state, were also exposed without any deviation of the result. Again, paper which had been prepared as above was allowed to dry with the excess of silver nitrate on it, and exposed, and fig. 48 again approximately resulted; as also it did when the washed paper treated with potassium nitrate was dried.

The difference between curves 47 and 48 is very remarkable, and at first sight might not seem to admit of explanation. A study of the experiments described, however, affords a clue to the apparent incongruity of the results. According to text-books on chemistry, bromine will displace iodine in combination, whilst iodine displaces bromide. Later researches seem to modify the first statement to a certain extent. Bromine will only displace a definite proportion of iodine when it is in excess; but for our purpose we may take the text-book statement as practically correct. When the paper was exposed wet with either silver nitrate or potassium nitrite (I may remark that other halogen absorbents gave the same result) the iodine and bromine liberated by the action of light would be at once absorbed by them; in the one case silver iodide (or bromide) and silver iodate (or bromate) being formed, and in the other potassium iodide (or bromide); so that each of the two kinds of sensitive salt would have its full action. When the paper was washed and exposed in a dry state the result would be different, and the question would arise, what would become of the iodine and bromine liberated by light.

If silver iodide be exposed to light and treated with a trace of bromine, the sub-iodide combines with the bromine, and all trace of the action of light is destroyed. Thus when the mixture of iodide and bromide is exposed to light, both iodine and bromine being liberated, the bromine will at once combine with the sub-iodide and destroy it. Thus,

$$Ag_2I + Br = Ag_2IBr,$$

the only factor remaining being the sub-bromide, which is developable. Now it may be said that the iodine liberated should also destroy the sub-salts; but it is a matter of fact that, in the presence of light, it has no power of destroying the sub-iodide, since it is immediately again shaken off from the molecule.* Iodine can destroy the sub-bromide molecule, and form a new saturated molecule; thus,

$$Ag_2Br + I = Ag_2BrI.$$

Whether the two molecules Ag_2BrI and Ag_2IBr have the same value is a moot point, but the evidence tends to show that such is the case. If the equivalents of bromide and iodide were equal—that is, if the bromide and iodide of silver were equally distributed—supposing both the above actions took place, the locality of the spectrum in which the iodide and bromide are equally sensitive should show an almost entire destruction of a developable image, and also of a printed image.

This locality is doubtless about G, and when we come to analyse the curve in fig. 48 we see that there is very small effect about G, whilst there is an increased effect between G and F. Now, to test the matter further, paper prepared with washed silver bromide was exposed to light till it darkened thoroughly, and such paper was treated with a very dilute solution of iodine, and then exposed in the spectrum, with the result given in fig. 74, in which it will be seen that the new molecule is more sensitive to the green between G and F than above G; in fact, we have very little action comparatively at G and above it. In this case we have then a paper prepared in which there is an absolute imitation of the action that takes place in the mixed iodide and bromide. It cannot be said that by this treatment we have $Ag_2I_2 + Ag_2Ba_2$, since the molecule formed by light is Ag_2Br, and the addition of the iodine is simply to form Ag_2BrI, which is very different from a simple mixture. This experiment, then, seems to show that this new molecule is more sensitive to the blue-green than it is to the violet. The point then comes as to how, when the original paper is exposed to the spectrum, we have not only a fall of sensitiveness at G and beyond it, but also a greater sensitiveness in the green. Now, silver iodide, as has already been shown, is not in the least sensitive to beyond a very small region below G; therefore, in the green the only component of the mixture of bromide and iodide that can be acted upon is the bromide. As we see when bromide is acted upon, one atom of bromine is liberated from the molecule; thus,

$$Ag_2Br_2 = Ag_2Br + Br.$$

The liberated atom of bromine immediately attacks the molecule of iodide in its immediate neighbourhood, and forms a new bromo-iodide molecule liberating iodine. Thus

$$Br + Ag_2I_2 = Ag_2IBr + I,$$

and the iodine either escapes, or else forms the molecule Ag_2BrI; thus

$$Ag_2Br + I = Ag_2BrI.$$

Here, then, it is probable that we have a new saturated molecule formed by the action of light, which on formation is susceptible of being acted on by light in its turn. Whether iodine or bromine is liberated from this new molecule I am not at present prepared to state, but it is my belief that it is the iodine, since density in development by the alkaline method is readily obtained when experimenting with it.

To sum up, the difference in shape between curves 47 and 48 seems to depend on the destruction of the sub-iodide when formed, and its conversion into a new molecule, which is sensitive to the blue-green, the same new molecule being formed by the liberation of the bromine from the molecule of silver bromide when the sub-bromide is formed. In the case of the paper which is dried in the presence of silver nitrate and potassium nitrate the same result occurs. Bromine and iodine attack these salts when in a crystalline state with difficulty, and hence will in preference form the new molecules as before.

Fig. 49 shows the curve of washed paper when developed with ferrous citro-oxalate, and nearly the same result is seen when the development proceeds by acid development, the difference being that the dip in the curve between h and G is less pronounced. To illustrate this further, in fig. 50 we have the case of a collodion film containing equal parts of silver iodide and silver bromide and an excess of silver nitrate, the latter salt absorbing both the iodine and bromine liberated. In fig. 52 we have the results obtained from the same film, but thoroughly washed from all excess of silver nitrate. Whether the plates be developed by acid, alkaline, or an organic ferrous salt, the curves remain in all essential particulars the same. In fig. 51 we have the curve resulting from the same mixture (equal equivalent proportions) held in gelatine when developed by ferrous oxalate or alkaline developer. At first sight it might be said that this action is really due to the "reversing action" of light, of which I have treated in the "Proceedings of the Royal Society," in 1878, and the "Philosophical Magazine," in 1880. That this is not the case is shown by fig. 53, in which the exposure was exceedingly short; in fact, when very quick exposure was given the curve started at h and reached a maximum as shown in fig. 53. These results are exceedingly interesting and important. There is a figure showing something somewhat similar in Vogel's "Lehrbuch der Photographie," Berlin, 1878, but there is no explanation of the cause, nor has it been noticed by any other observer, as far as I am aware.

(To be continued.)

* At the same time it must be noted that the iodide is much less sensitive to light when no absorbent of iodine is present. This is fully accounted for by the immediate recombination of, at all events, a portion of the iodine liberated with the sub-iodide molecule.—Dec. 19.

Notes.

The Geneva Photographic Society proposes to publish an annual journal.

We are glad to hear that Mr. Russell Manners Gordon has returned from Madeira in improved health.

The German photographers have this year chosen a very central spot for their annual gathering, which is to be held at Eisenach in August next. Eisenach is not far distant from the castles of Rheinhardtsbrunn and Rosenau, where the late Prince Consort passed his "Early Days," about which Her Majesty has told us in one of her books

The Owen's College, at Manchester, is now provided with a spacious and well-fitted photographic laboratory, and we are informed that arrangements are likely to be made before long for organising a course of instruction in photography. Several well-arranged groups from the camera of Professor Roscoe may be seen hanging in some of those rooms of the College which are occupied by the teaching staff.

Sir H. Wolff is evidently no photographer, although we should not be surprised if he or his friends had something to do with publishing photographs. The key-note of his speech last week against the Copyright Bill was utter astonishment that there should be anything copyright in a photograph at all. His amazement at the impudence of photographers who thought that the posing nd lighting of their sitters involved a knowledge of art principles was, in fact, expressed so naively that one almost lost sight of the crass stupidity of his remarks, and for the moment forgot the sheer nonsense he was talking. Either Sir H. Wolff must have been speaking from interested motives, or he was profoundly ignorant of the subject he undertook to discuss.

Many people, unfortunately, besides Sir H. Wolff, maintain that no art knowledge is necessary to secure a good portrait. Yet, when they require pictures of themselves, they do not go to the first best photographer who can make a clean plate, but select a firm whose portraits, for some reason or other, are unusually attractive and elegant. What is it that renders pictures agreeable and attractive, and inclines the customer to pay highly for them? Or, why is it, when the model himself takes the posing into his own hands, the result is usually a stiff constrained position that breathes of self-conceit and coxcombery?

Posing and acting have much in common. There is scarcely a representative of the crutch and tooth-pick school who does not imagine himself a born actor, and capable of playing the part of *jeune premier* in any play. Only, when he attitudinizes in a free and easy style before an audience, instead of displaying gentlemanly complacency, to the looker-on he is merely vulgar. So in posing, when the model flatters himself he has assumed the freest and most degagé of positions, a portrait is the result which, painful enough to the photographer, invariably makes the victim begin to wish he had never been born.

A great deal of fuss has been made in the newspapers during the week about Big Paul, the new bell of seventeen tons weight which is to be slung in the belfry of St. Paul's. Its movements have been chronicled day by day, as if the carrying of heavy masses of metal was unheard-of in these days of eighty-ton and hundred-ton guns. Indeed, the first "Woolwich Infant" represented no less than thirty-five tons, and it is a dozen years or more since this was a novelty! Fortunately, it has been the custom, when devising new tackle and machinery for the lifting of our modern ordnance, to have the whole arrangement of ropes and pulleys photographed, and the pictures thus secured furnish valuable information to those who have the task of lifting the big bell into its place.

The *Medical News*, of Philadelphia, suggests that all hospitals should have a camera and stock of dry plates on the premises to enable the doctors themselves to take photographs of interesting cases in the wards, to record the progression of a disease, and to secure pictures of specimens likely to be valuable in the science of medicine. In this country, Dr. Diamond was one of the first to make use of photography for the study of disease, and he possesses at this moment a valuable collection of medical records secured by the camera. Certainly, the suggestion of our American contemporary would be exceedingly advantageous for instructional purposes.

Photographic printing upon fabrics has made but little way at present, and we are glad to see that the *Société Industrielle*, of Rouen, has determined to encourage the art. The Society offers a gold medal for a photo-engraving process applicable to copper cylinders, such as are usually employed for fabric printing, and another similar award of silver-gilt for any other practical plan of printing upon stuffs. The medals will be awarded next December.

It has been known for some time that charcoal, or other similar forms of carbon, possess the property of separating gold from an aqueous solution of the chloride, but this has been supposed to arise from the reducing action of occluded gases, or some extraneous influence. The recent experiments of Koenig prove that carbon is actually oxidised to carbon dioxide by the joint action of auric chloride and water.

Moist bromide of silver loses about 2·3 per cent. of bromine by a prolonged exposure to the rays of the sun, and Dr. Tommasi, who has made this determination, regards the brown product as containing both basic bromide and metallic silver.

Dr. Eder has been trying the addition to emulsion of various promising bodies; dextrine, according to his experiments, seems to induce fog, but an addition of sugar appears advantageous.

As everybody knows, gelatine is of itself such an untrustworthy body, that even the best formula and most skilful manipulation sometimes fail to result in clear and sensitive plates. For this reason, the Berlin Photographic Society have determined to offer a gold medal for a process which, under all circumstances, will give a *uniform* material suitable for emulsion making; whether the product is got from raw material or from commercial gelatine is of no moment.

A gift in money by some of the members of the Society will, in all probability, accompany the gold medal, which will be awarded to the best essay sent in before the 1st of October next, to Dr. Franz Stolze, 23, Schwerinstrasse, Berlin. The essays may be written in the German, French, or English language.

Mr. Swan has found the production of carbon lamps more profitable than carbon prints. Although the first to make carbon printing a practical process, we believe Mr. Swan never profited by his improvements one penny. On the other hand, the preparation of carbon thread for the incandescent lamp has turned out a very profitable affair. The Company purchased the lamp for £25,000 in money, and £25,000 in shares, and as this company has now sold its property to another, at a premium of something like fifty per cent., Mr. Swan may be classed among that small body of inventors who reap a handsome reward for their labours.

A German insurance journal comments upon the value photography might be in effecting insurance policies. By far the larger number of policies, it is well known, are effected through agents, who send up to the head office the certificate of some local medical man who has examined the applicant for an insurance. This medical certificate is carefully overhauled by the more experienced medical adviser of the Insurance Company at head-quarters, and he has to read a good deal between the lines. If he could get but a glance at the applicant's face, that, with the certificate he possesses, would enable him to form a very good opinion of the value of the life. The medical adviser often has his suspicions on reading the certificate, and these would be set at rest, one way or the other, by viewing the applicant's features; he has seen so many faces that he can guess a person's constitution by glancing at them. A photographic portrait, therefore, untouched, sent up with the medical certificate, would aid greatly in forming a correct opinion.

A mixture of 40 parts of clear linseed oil, 10 parts of strong vinegar, 5 parts of oil of turpentine, and 1 part of hydrochloric acid is recommended for polishing photographic cabinet work.

The Institute of Chemistry seems to be somewhat at a discount among the Lancashire chemists just now. Several of the leading men have already withdrawn their names, and a general secession is not unlikely.

When a Manchester man subscribes two guineas a year, he likes to know that good use is made of the money, and the advertising of his name in the public journals twice a year he evidently thinks no adequate return. A rival body, the Institute of Chemical Industry, issues a really valuable monthly journal—almost an English equivalent of "Dingler"—and, in consequence, will no doubt prove more attractive to those chemists who feel that the Chemical Society is not all sufficient for their wants.

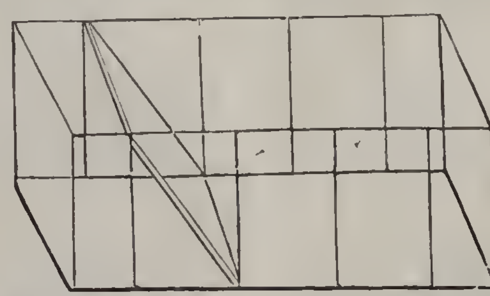
BI-CHROMATE OF POTASSIUM IN EMULSIONS.

BY A. J. BROWN.

WITH regard to Mr. Ernest Edwards's process which you published in your last number, I may say I have experimented almost on the same lines. Perhaps it may interest some of your readers to know what I have done and purpose doing.

For many months I have not made an emulsion without using potassium bi-chromate. When the emulsion is cooked, should it be acid, I make it slightly alkaline, and drop in (for what will be 10 ounces of emulsion when finished) 30 grains of bichromate, dry, shake till dissolved, and pour out to set. The bichromate is of course removed along with the other salts during washing. I can strongly recommend this; it is a much easier and better way than squeezing into the bichromate solution; it gives scarcely any additional trouble; it in no way interferes with or alters the sensitiveness, but destroys thoroughly light, and so-called chemical fog, which latter I believe does not differ in kind from the former in any way. If it occur, the emulsion or plates are simply sensitive, perhaps, far into the red, or it may be beyond (to our eyes) the visible rays, and so even be fogged, in the cooking, by those rays which make themselves more manifest to us as heat.

It was only an easy step from this practice to what will be known as Mr. E. Edwards's formula. Without going quite so far as to prepare plates in white light (which is unnecessary, and may be harmful),* I have made them after the plan he advocates, but do not like the state the film is left in after the salts are dissolved out. It is far better to wash the emulsion first, then add the bichromate—which need not be in anything like the quantity he uses—coat, and, while still wet, wash again. They require a good deal of washing, and for very rapid plates well repay the extra trouble, giving "bare glass" where not exposed, which is a very different thing from "bare glass for shadows" which we hear so much about. The plan I would advocate is this (I am, indeed, at work upon the rack and trough, and had not your article appeared, I myself should have brought it forward in probably two or three weeks): wash the emulsion, then add to each ounce two grains bichromate, filter, coat, and allow to set, then place them in a frame of tinned iron wire as per sketch; place in



Only a small number of wires are drawn, with one plate in position—film side down—for sake of clearness.

running water in a trough; after well washing, take from this to the drying cupboard—still in the rack—where it will rest upon laths, and dry at low temperature. But little water I expect will cling to the wire. From the stacking in the frame all operations may be performed in absolute darkness, and away from harmful heat rays. By the way the plates lean they may also be packed in darkness quickly and carefully, if Mr. Cowan's wrapping apparatus be used, by hand, with a little extra care. All I have written of course refers principally to really rapid plates. Should anyone care to follow Mr. Edwards's method, I would suggest the use of good yellow light—by no means white.

* I had one batch of emulsion which was left with the bichromate in for a few days—I forget how long, as it was some time ago—which became almost insoluble; it melted only just below boiling temperature, and was then like thick gum, and, of course, was quite useless. I mention this as a caution. It had only seen pure red light.

THE LAST NEW DEVELOPER.

BY W. T. WILKINSON.

Experimentalists, amateurs, and manufacturers, are chiefly interested in the various discussions upon the improvement of gelatine emulsions and drying-cupboards, &c.; but the majority of professional photographers are chiefly interested in the best method of development. Up to about two years ago the pyrogallic acid was used dry, and either weighed out in small quantities, or guessed at, until Mr. B. J. Edwards introduced his formula containing glycerine, amongst the many advantages of which was, that for the first time it was possible to dispense with the waste of time and pyrogallic involved in weighing, and the uncertainty in guessing; and, at the same time, to depend upon the solution of pyrogallic keeping in good condition for any length of time (in reason).

Advantageous as Mr. Edwards' glycerine formula was in many respects, the danger and risk of air-bubbles so easily formed when a colloid body, such as glycerine is present, was introduced. The publication of Mr. Cowan's formula, wherein citric acid was used as a preservative, was a great improvement, and Mr. Cowell's process of clearing the pyrogallic-stained shadows by immersion in a mixture of citric acid and alum seemed to promise the acme of perfection, as, with the expenditure of a little extra care and trouble, negatives could be obtained of the best quality, and free from the objectionable yellow stain in the shadows almost inseparable from alkaline pyrogallic development.

No sooner, however, were photographers settling down to this tedious but necessary method of getting good negatives, than Mr. Berkeley re-introduces a process advocated by him eighteen months ago, offering the many advantages of absolute certainty in the keeping quality of the pyrogallic solution, the greatly-improved brilliancy of the negative image, and the entire freedom from yellow or other pyrogallic stains, as well as—especially when a large quantity of negatives are developed in a batch—great economy in the quantity of pyrogallic used; and I venture to predict that, at no distant date, this formula will be the universal one.

The formulæ that I find best for portrait and general commercial work are as follows:—

No. 1.

Sulphite of soda	4 ounces
Water	40 ounces

Dissolve; then add sufficient of a saturated solution of citric acid to produce a slight acid reaction upon litmus paper; now add one ounce of pyrogallic, and make up bulk to 54 ounces with water. This gives a solution each ounce of which will contain about eight grains of pyrogallic.

No. 2.

Ammonia ·880	1 ounce
*Bromide	180 grains
Water	40 ounces

Equal parts of this will give a four-grain pyrogallic solution, a strength which is a good average. This developer will be found all that its author claims for it—viz., simple and perfect. In my hands I can get a good negative out of a plate, no matter what is the exposure (in reason). If, upon applying the developer, it is found that the exposure has been too short, wash the plates thoroughly, flood with ammonia-bromide solution, and allow it to act for three or four minutes, when the details will gradually develop, without, however, gathering density, which is easily obtained by returning the plate to the ordinary pyrogallic and ammonia-bromide mixture. When all the details are out by the method, there is immense latitude, and no danger of getting the hard negatives so characteristic of under-exposed gelatine plates. On the other hand, in case of over-exposure, stop the development, wash thoroughly, and immerse in a mixture of pyrogallic solution 4 parts, ammonia-bromide ½ or 1 part, and, instead of the ordinary flat and thin negative, useless for anything (except smashing), a good negative is obtained, only very thick and slow in printing, but yielding good vigorous prints.

If a batch of plates are to be developed, the same solution will do for them all, merely adding a little more now and again of No. 2 to replenish the ammonia that has evaporated.

Negatives possessing the colour and characteristics of wet collodion negatives are obtained by first of all soaking the plate in No. 2 solution for one or two minutes; then pour off, and apply the half-and-half mixture of Nos. 1 and 2. This plan also is strongly recommended when the exposure is either known or guessed to be short.

* Of course the bromide must be altered to suit the particular make of plate used, as recommended by the maker.

STRAY THOUGHTS TOUCHING OUR RECENT EXHIBITION.

BY J. POLLITT.*

When our energetic Secretary (Mr. W. J. Chadwick) asked me, a few days ago, to contribute a short paper for this evening, I felt that—although I had no special subject to bring forward of sufficient importance to rank as the fitting sequel of a session of unusual activity—if I could string together in an intelligible form a few of the vague generalities already floating in my mind, the effort might at least be not altogether unprofitable.

The exhibition of photographic art-treasures held in this room in November last will, doubtless, be long remembered as a red-letter day in the history of this Society, not only from the fact that no previous collection of the kind outside the metropolis had ever equalled it, either in extent or merit, but also because it was the first considerable exhibition that had been planned and successfully carried out by the Manchester Photographic Society; and, occurring as it did at what may be called just the transition period, when the old style was being gradually thrown overboard to make room for the new, the educational advantages of such an exhibition, at such a juncture, were so vastly important that, notwithstanding the heavy pecuniary loss sustained by the Society thereby (and, may I also add, notwithstanding the severe castigation which the Secretary, as well as we lesser luminaries of the committee, have received at the hands of some disaffected exhibitors?), we may rest assured, even in the depths of our poverty and humiliation, that the effort was neither short of popularity, nor will its influence be wanting as a means of future good.

It is only by means of such exhibitions that the general public (already too much familiarized to pressing invitations of the street-door tout, and his offers to produce a considerable number of "k'rect" likenesses for an inconsiderable number of bronze pieces) are made aware of the almost boundless capabilities of our art-science, and how, by an intelligent mastery of its principles, its productions are often made to rank with the ideal.

I have said we were passing through a transition period. We may be said to have already passed through it; but, like great political and international events, the importance of the transition can only be rightly estimated by the light of after history, and opinions and conclusions so frequently become modified by lengthened experience and collateral circumstances.

As regards the gelatine process: I am not here to say one word other than in its praise. Its advantages over all its forerunners are in many ways numerous and unquestionable; but we live too near the birth of the process to grasp the limitations or extent of its powers. We are, in fact, as yet surrounded by an atmosphere of enthusiasm which hardly leaves our judgment free. It is so great a departure from our previous lines of working, with the cumbrous *impedimenta* of chemicals, tents, and the like, that photographers have become in a sense intoxicated with its charms, and many have pinned their faith to it exclusively and absolutely. Not a few are boasting, as if it were a praiseworthy matter, of their rapid forgetfulness of all former methods of working; and, as in the case of fashions, some individuals must needs rush into extremes, so there are a few (presumably with advanced ideas) who have sold off collodion, baths, and all the belongings of former processes in the full and certain expectation that gelatine will henceforth reign supreme.

* A communication to the Manchester Photographic Society.

But the grand object of an exhibition of photographs such as the one recently held here is not to exalt any particular method of working over all or any others, nor to recognise motives of a personal nature, if any such should exist in the minds of exhibitors. It is an effort to bring under one general view all the capabilities of photography—not as a mere mechanical or chemical pursuit, but showing what can be accomplished in the higher walks of art when an intelligent mind controls manipulative skill. It is not so much a race of various processes, although many processes and methods, and still greater number of ideas as to their management, are represented—widely different, it may be, in many respects, but all vieing with each other in a friendly competition for excellence. But, over and above these mere methods and means to an end, it is the judicious domination of mind that alone marks the pathway to the beautiful.

The advent of the gelatine process has, undoubtedly, given a vast impetus to photography. It has immensely increased the amateur ranks, and has also considerably influenced the professional practice of the art; nor can there be a doubt of its permanent effect in the future. At the same time, it is not so much the inherent value of the process—although that is considerable—as the great charm of its simplicity, that has brought about its so extensive adoption; but no process, however simple and satisfactory as to its mechanical details, can be successfully worked without both skill and judgment, and hence we see a marked variation in the productions of different men—as widely different and more characteristic than their own hand-writing. Some take up photography, and, without any apparent trouble or tedious initiation, seem to go on producing really good work without any noticeable drawbacks; whilst others, again, after years of study and almost continuous practice, never appear to produce anything that attains to mediocrity.

Many of us remember that, so long since as twenty years, the works of Rejlander and Robinson were each in their way vastly in advance of the general character of the work produced at that period, and this not so much from any superior knowledge of chemistry or highly-trained mechanical skill, especially in the case of Rejlander, who was known to have been a slovenly operator; but from a clear conception of the intrinsically-beautiful and an unhesitating readiness to use any means, orthodox or otherwise, for its accomplishment.

To come to our own Society: we are all of us (at least the older members) familiar with Mr. Coote's charming pictures by the collodio-albumen process, and I merely mention his name for the sake of pointing out that in his able hands the gelatine process—which, I believe, he has worked almost exclusively for the past two years—has produced work not a whit inferior to the very best of his collodio-albumen productions; whilst the rapidity of the process has given him a new power in dealing with subjects which previously were beyond his reach. Much beautiful work has also been done in dealing with incidents of life and motion by Messrs. Wade, Blakeley, Chadwick, and other of our members, including Mr. Percy Collis, around whose beautiful productions recently shown in this room there seemed to be all the aroma of poetry.

If a photographer would excel, he must have no vague notions about his work, but a quick and ready appreciation of what is wanted to produce a pleasing and an artistic result, and, above all, the ability to deal successfully with every difficulty he may meet with.

I must ask the indulgence of my hearers for these rambling remarks. My time and attention have been too much taken up to do the justice that the subject demanded, and which it might have received in abler hands; but my chief object has been to point out the immense influence for good of these periodical exhibitions in an educational sense. And, although we cannot hope—at least, for some time to come—to get up another which shall equal either in merit or magnitude the grand exhibition recently held in this room, I think the Society has acted wisely in deciding that there shall be something of the nature of an exhibition next autumn, in the shape of a collection of members' own work, and which possibly may be augmented by outside contributions. Such an exhibition—taking into consideration the great number of able workers which this Society now contains—cannot fail to be both of great interest and advantage.

The season has opened auspiciously, and there is every promise of a glorious summer. Let each "put his shoulder to the wheel" with a determination and a will to produce a rich autumn harvest.

KNAPSACK TENTS.

At the last meeting of the Photographic Society, both Mr. William England and Mr. Maxwell Lyte described their arrangements for out-door photography. Mr. England said:—"At the request of Captain Abney, I have brought to-night a tent. It was made originally for working wet plates some fourteen or fifteen years ago, and has been in use since that time. At present I use it for developing and changing gelatine plates. No alteration has been made for this purpose, except to place a piece of ruby-coloured calico over the window. In place of the nitrate of silver bath, I substitute a hyposulphite bath for fixing, and with these slight alterations it is admirably adapted to its present purpose.

During the last two years I have developed in it five or six hundred plates.

But little description is needed. The support for the covering is made of frame-work, which folds up for portability, and covering is then wrapped round, which forms a protection when packed up for travelling. The whole is very portable, and weighs under fourteen pounds, with stand, so that it can be carried as a knapsack on the back.

I may also remark that, as I always prefer to sit whilst developing, it is made low for that purpose; those who prefer to use it standing can, of course, have the stand made higher.

The bamboo stand exhibited this evening is made by Mr. Collins, and is similar to one for which I gave him the design about sixteen years ago, and the one I have in use at the present time was made about that period; so that, in point of durability, I think the bamboo makes the most durable and, at the same time, the most rigid of all supports for the camera.

Mr. Maxwell Lyte said: I have had a large experience in out-door photography, particularly in hot climates—as the south of France and Spain. I never aimed at getting extreme portability, but was satisfied with a tent which a man could easily carry. The tent I used was shaped triangularly at the top, similar to Mr. England's, and was covered with a cloth not coming down to the ground like Mr. England's. It stood, however, much higher. The skeleton of the tent was, in fact, a tripod-stand, only much higher than the ordinary ones—taller, indeed, by about six or eight inches than I am tall. The three legs of the tripod were split at the upper ends in the usual manner, fitting on to the three sides of a wooden triangle, and kept open by the usual cross-pieces of wood. The triangle had a hole in the middle. The split portion of each leg extended about $2\frac{1}{2}$ feet down from the triangle, and was then prevented from going further by an iron ring or ferrule driven on. Down as far as this ring the upper parts of the legs were round; but below the ring they were left square, and in this square part was a hinged joint on each leg, so that they could be folded up inwards, and the ends of each leg made to pass through the holes in the triangle, so that they thus folded into a fairly short, not inconvenient, bundle, even when not dismounted from the triangle. When set up, the whole formed a tall tripod-stand, about six or eight inches taller than myself. I may be permitted, for the sake of better explanation, to now assume any one of the legs of this tripod to be called the front of the tent. This being so, of course the back would be the space subtended between the other two legs. Now, on the front leg, at the square part, just below the hinge, and consequently at a point just below the level of my waistband, I had two small iron eyelets screwed at each side of this front leg, and there were two others screwed into the wood at the same height on each side of the two other legs. On to these were hooked two subtending light bars of wood, and, a third bar being hooked on between the ends of these at the back of the tent, the three legs of the tripod were thus firmly linked together. On the triangle thus formed I placed a table. This was made to roll up, composed of strips of light wood fixed on canvas, covered with india-rubber, rolling up just like those rolling-up chess-boards they make at Tunbridge Wells, with strips of wood glued on to canvas, the only difference being that the glue I used was india-rubber glue.

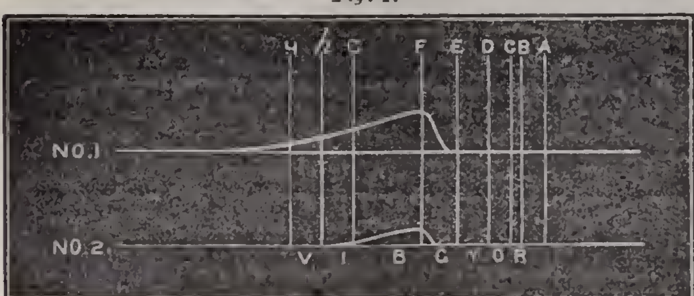
It hardly requires any further explanation to show how this table being unfolded formed a good strong platform resting on the triangle which bound the legs of the tripod together. In this table was a long hole cut in one of the strips, into which my vertical nitrate bath was sunk, the top of the bath projecting about two inches above the table, and when in place but not in use, it was kept covered with a cap of patent leather, to prevent any drops of developer or other liquid from entering it. On the table, in front of the bath, there was plenty of room for a levelling-stand and bottles of collodion, developers, nitrate of silver for darkening, fixing liquid, or what not. The tent was only covered down to the table. The cover was of cloth at the back and sides, but had a window composed of several layers of yellow calico in front. On the top of the apex of the cover was my ventilator, like a sleeve of a coat, about one foot or eighteen inches long. When at work, I kept this stuffed loosely with ferns, twigs with leaves on, or grass ; and as it was allowed to fall over like the peak of Phrygian cap, no light could enter by it, though air could circulate through it. I believe it to be impossible to work a wet process in a tent in a hot climate without such an appliance as this. At the back of my tent the cover was much gathered at the apex, so that it hung in thick loose folds, and when I was inside, these gathers left room for my head, which was not thus inconveniently pushed forward. The fulness of this back part of the tent-covering was such as just to allow room for my body standing in front of the table, and of being hooked to two hooks underneath the table, so that, when I was inside, no light could enter except through the window in front. I thus had a tent strong, fairly portable if made of light wood, light-tight but well ventilated, and not composed of too many complicated parts ; in fact, there were only practically six pieces—the tripod, which I never took to pieces—the table, and the three pieces for supporting it, and the covering. I may add that, as to this latter, it was covered with white linen over all, so as to heat to the least possible degree in the sun ; and that often in very hot weather I tied round it ferns or small branches with their leaves on, and sprinkled these with water to promote cooling by evaporation. With this tent I succeeded in making a large number of good photographs. No doubt with bamboo it could bo made much lighter and portable.

RELATIVE SPECTRUM SENSITIVENESS OF PRINTING PROCESSES, AND ON A NEW FORM OF SILVER PRINTING PROCESS.

BY CAPTAIN W. DE W. ABNEY, R.E., F.R.S.*

I propose to-night to speak on the relative spectrum sensitiveness of different printing processes, and then to introduce to your notice a modified silver-printing process. First, I propose to take carbon-printing, and to give the results of my spectrum analysis of it. In a book that I published on photography, I mentioned that when using the original "Autotype" actinometer, in which silver-chloride paper was used to discolour to a certain depth by exposure to light when placed alongside the carbon print, that in summer two standard tints were required, whilst in winter some five tints were necessary for the latter to be fully printed with a negative of ordinary density. I am aware that the effect of the spectrum on bichromate and gelatine has been studied; but, as far as I know, it has not been studied when the film was coloured. I have therefore thought it advisable to examine the question, as to the reason of this requisite shorter exposure in summer than in winter. Through the kindness of the Autotype Company, at the beginning of this year, I was supplied with various samples of tissue which I had intended to utilize for my Cantor lectures. Unfortunately, however, my lectures closed without my having the opportunity of discussing the question of carbon-printing; so I now venture to bring the subject before the Society. Becquerel and others gave the spectrum impressed on bichromate and gelatine as extending

Fig. 1.



Nos. 1, 2. Spectrum on Bichromate of Potash.

from beyond F to the ultra-violet ; but I must say I was not prepared for the fact that the maximum of sensitiveness lay beyond F, more towards the yellow. Such, however, is the case. You will see by No. 2 that, with a short exposure, the maximum lies beyond F. No. 1 is the curve for different-coloured carbon tissues, such as is supplied commercially by the Autotype Company ; and you will see that the spectrum impressed is a long one, and quite different to that impressed on the chloride of silver (No. 5). The maximum of intensity of the spectrum is in this last case between H and *h*, or at the borders of the violet and ultra-violet. It may be objected that the pigment used may have some effect on the sensitiveness ; but the example before you shows that it is not the case,—that it is the same exactly as in Nos. 1 and 2. The blue print on glass is ordinary gelatine which was impregnated with bichromate and then printed in the spectrum. The blue is merely dye with which the film was impregnated *after development*. From this we learn that no solid pigment, at all events, alters the position of the maximum of effect of the spectrum. I doubt also whether a dye as a dye will do it. We thus have a very good explanation of the reason of the greater sensitiveness of the bichromated film over the chloride film, since the proportion of green rays to violet and ultra-violet rays in daylight is much larger in winter than in summer. Carbon printing, however, is more rapid than silver printing in summer, and much more so, therefore, in winter ; it is therefore a gain at any time.

I next come to the newer mode of printing—viz., platinotype printing. It will be in the recollection of the Society that platinotype is based on the reduction of ferric oxalate to the state of ferrous oxalate. I have here a rough example of a gelatine plate impregnated with ferric oxalate ; it was submitted to the spectrum, and developed with potassium ferri-cyanide. It is somewhat difficult to fix the place of maximum sensitiveness when using the electric light, since near G we have carbon bands of intense brightness ; but I believe I shall not be wrong in taking the maximum one-third way from G towards F.

Fig. 2.

Nos. 3, 4. Spectrum on Ferric Oxalate.

It was a matter of curiosity to find out if the platinum salt used had any effect. The print I produce shows three separate spectra taken by sunlight with varying exposures. It is evident that the platinum salt has no bad effect. The maximum is situated about the place I indicated, and extends as far as where ferric oxalate alone is used. This is a matter of some interest, since the same reasons apply for the rapidity of its printing in winter, over silver chloride. Carbon printing, however, ought to have an advantage in winter over the platinotype, though not much.

I have now to bring to your notice a process which may not be new, but which, at any rate, has the form of novelty to most. It consists of printing on a film of gelatine emulsion containing silver chloride and an organic salt of silver. You may take gelatine chloride and print on it, and the image will at once appear, full of vigour and of great beauty ; but, when once an attempt is made to fix it, the image vanishes almost entirely, and, for printing purposes, unless the exposure is very prolonged indeed, is useless. In the old collodio-chloride process, introduced by the late Mr. Simpson, it will be in your recollection that citric acid is introduced in the presence of an excess of silver, and he expressly stated that its introduction was to give vigour. In fact, what is wanted is an organic compound of silver, be it albumenate or citrate, in order to give what is the foundation of vigour in all printing processes—an oxide of silver when exposed to light. Looking at it in this point of view, the old collodio-chloride process should in reality be called collodio-citrate or citro-collodio-chloride, but preferably Simpson-type.

With this object in view, I have made an emulsion of citrate of silver together with silver chloride. The method of preparation is as follows :—

1.—	Sodium chloride	40 grains
	Potassium citrate	40 ,,
	Water	1 ounce

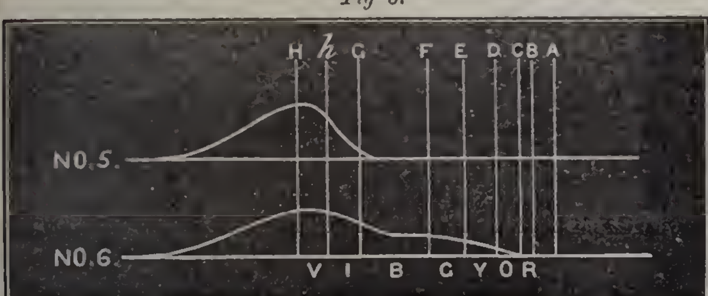
* Read before the Photographic Society of Great Britain.

2.—Silver nitrate	... ...	150 grains
Water	... ...	1 ounce
3.—Autotype gelatine	... ...	160 grains
Water	... ...	3½ ounces

Nos. 3 and 2 are mixed together, and then an emulsion formed by adding No. 1 in the usual way when forming a gelatine emulsion. When set, I squeeze the emulsion through canvas into cold water, and, after allowing it to remain in the water for ten minutes or a quarter of an hour, dissolve it up, with the addition of about 3 drachms of alcohol and 2 grains of chrome alum dissolved in 2 drachms of water. Plates or paper are then coated with the emulsion, and printing takes place in the usual manner. The rapidity of printing is very great; I think I may say that it is more than twice as rapid as ordinary albumenized paper. The image prints of a violet tint by reflected light, and of a rich chocolate colour by transmitted light. If fixed without toning, the colour of transmitted and reflected light is burnt sienna colour, and of great vigour and beauty. Prints can be toned by any of the ordinary toning baths. Borax and chloride of gold give a pleasing tone; the sulphocyanide toning bath gives a black rather approaching an inky tone. Platinum can be used to tone the fixed print, but it has a great reducing action, and there is a tendency for the whites to become yellowed to a slight extent. For lantern slides or transparencies the untoned picture would not be at all disagreeable. No doubt endless variations in the organic salts used might be made, but the citrate has answered well with me.

I hope the members of this Society will try the process, and improve on it; I think it has a future before it if properly taken up. I need scarcely say that the prints should be well washed. I doubt, however, if they would fade in the same way that albumen prints are so prone to do, as the organic salt used is a definite compound, and not one which is so complex and uncertain as the albuminate of silver is. I have in my possession prints made by Simpson-type more than thirteen years ago, and they are as fresh as the first day on which they were printed: not one has faded. The liability to fade is less with the above formula than with one which has an excess of silver present. The potassium citrate is in large excess; hence no silver will attack the gelatine. I ought to have mentioned that at first the emulsion may appear grainy; if, however, it be boiled for ten minutes, the grain disappears, for the silver citrate is soluble in warm water. The rapidity of printing by the boiling is certainly increased. The plates, when coated, are rather transparent, and *primâ facie*, a vigorous print might not be expected from them. As regards the light to which it is sensitive, I must refer to the spectrum No. 6, by which it will be seen that it is more sensitive to the blue and green rays than the chloride (No. 5).

Fig 3.



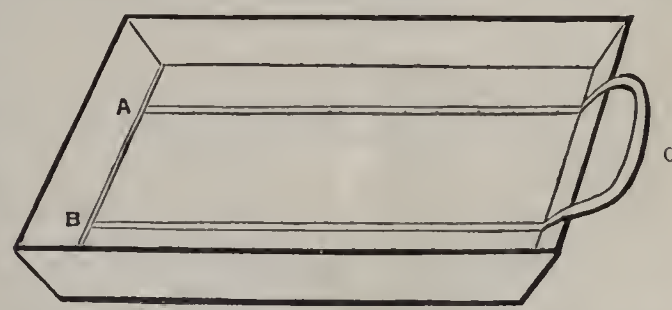
No. 5. Spectrum printed on Silver Chloride.
No. 6. Spectrum printed on a mixture of Silver Chloride and Silver Citrate

My last subject connected with printing is that of the discolouration of different sensitive salts by light. It has been assumed, I think, that a plate will not discolour so rapidly if chloride be absent as it would do if it were present. I hand for inspection plates containing a variety of mixtures, by which it will be seen that a plate containing nothing but bromide and iodide has, with me, discoloured as much as a plate containing iodide, chloride, and bromide; even equal parts of iodide and bromide discolour deeply to a fairly-deep green-black colour. Pure bromide, boiled and unboiled, takes but a slight colour; whilst both boiled and unboiled chloride take the same dirty-brown tone, which, however, as before stated, almost entirely disappears on fixing. Plate No. 1 is a mixture of bromide and chloride; No. 2, iodide and bromide; No. 3, chloride emulsion boiled; No. 4, chloride emulsion unboiled; No. 5, iodide, bromide, and chloride. I am not quite certain about the proportions. No. 6—one part of iodide to eight of bromide—is coloured quite as strongly as any chloride plate can be. No. 7 is one part of iodide to one part of bromide; No 8, bromide by itself; No. 9, one part iodide, one chloride, and eighteen bromide; No. 10, unboiled iodide with no bromide; No. 11, boiled bromide. I simply wish to bring these experiments under the notice of the members of the Society, so that they may not conclude hastily that, because they have got chloride in a plate, it blackens rapidly. It does, in fact, nothing of the kind, as iodide or bromide blackens quite as rapidly.

Correspondence.

A DEVELOPING DISH FOR PYROGALLIC SOLUTIONS.

SIR,—Seeing in the PHOTOGRAPHIC NEWS a great many complaints against the action of pyrogallic on the body, I enclose sketch of a developing dish by the use of which



the plate can be raised from the solution without contact with the fingers. A B C is a piece of wire hinged to the dish at A B, and rising from the dish in the form of a handle at C. By lifting the wire at C, the plate is of course raised from the solution, and can be examined at ease without touching it with the fingers. The dish should be of zinc or tin, and the wire of copper or galvanized iron. —Yours very truly, W. J. WILLIAMS.

DEVELOPING WITH SODA.

DEAR SIR,—A correspondent who signs himself "A. T." writes in your issue of the 12th inst. to draw attention to the fact that I have discovered a "new old" process of developing with soda instead of ammonia, and that I showed at a recent Thursday evening meeting a negative treated with this "new formula."

Before I saw this letter I was not aware that the words "new formula" were so much as uttered at the meeting. However, in looking back at the report given in your journal of the proceedings at the meeting in question, I find these words:—"Mr. Reimann showed a negative developed with the new formula, *i.e.*, using common soda instead of ammonia." This statement escaped my notice, as I seldom read the reports of our meeting, or I would have corrected it at once; as it is, the report is quite erroneous. The facts of the case are simply these. Seeing some time back that Captain Abney had suggested hyposulphite of soda in the developer in lieu of ammonia as a preventive of green fog, I tried it, and for some reason or other did not succeed as well as I should have done. I happened to mention the matter to Mr. A. L. Henderson, who advised me to try common soda, and developed a plate in my presence from a batch that gave green fog with ammonia, and under the influence of the soda no green fog made its appearance; he then suggested that I should repeat the experiment at home with different plates in order to confirm his results or otherwise. The negative I showed at the meeting was the result of that experiment, and showed that even with great under-exposure green fog was altogether avoided with the soda, whereas plates (commercial) from the same batch, developed with ammonia, gave a considerable quantity of it. All this was laid before the meeting, and a conversation took place on the subject; but never was it hinted on my part, nor was it understood by anyone present, that I had discovered and brought forward a "new formula" for developing.—Yours very truly, A. Reimann.

Proceedings of Societies.

Photographic Society of Great Britain.

The tenth technical meeting was held on Tuesday, April 25th, T. Sebastian Davis, F.C.S., Vice-President, in the chair.

Mr. G. L. Addenbrooke exhibited some paper negatives, taken by Dr. Ranking on Mongan's specially prepared paper, and stated that they were placed between two sheets of glass, and, he believed, were developed with ferrous oxalate. The sensitiveness was about one quarter that of commercial gelatine plates. They really seemed as sharp as negatives on glass; nor did the prints show grain. *Note.*—I have since ascertained that the alkaline process was used for development with the addition of sulphite of soda.

Captain Abney stated that, when in India, he had used the Callotype process, which was a most charming one, but he found that it was slow in developing. He was astonished to find that the prints from the paper negatives now exhibited were so free from texture.

The Chairman remarked that they approximated more to an ordinary wet collodion plate, and stated that in the old Callotype process he had used a frame which contained the damp paper, fastened upon pin-points. This, when dry, became tight, and, after exposure, was easily removed and developed.

Mr. Addenbrooke said that the paper used was thicker than that used for the Callotype process. He had, however, heard that Messrs. Morgan intended introducing a thinner and even more transparent paper, and that in these negatives there was an absence of blurring as compared with ordinary negatives taken on glass, though this would certainly have been even less had not a glass plate been used in front of the paper to keep it flat.

Mr. W. Bedford said that gelatine paper negatives would be liable to become spotted with the silver in printing unless they were coated with a suitable varnish.

The Chairman observed, in reference to the paper being placed at the back of a glass, that the rays of light were refracted, the angular rays became curved, and therefore any plan which did away with the glass in front would be better.

Mr. England said that the results shown tempted one to experiment in that direction, and that there was a great practical advantage in the use of paper negatives for sizes larger than 10 by 8. He suggested that ebonite would be better than the glass, to place at the back.

Mr. Cowan thought that this paper would be very good on Warnerke's roller slide.

The Chairman suggested whether blocks could not be made with this paper.

The Chairman then introduced the question, "What is the Ratio of the Light emitted by Warnerke's Phosphorescent Tables compared with the Standard Candle?" and said that in using Warnerke's sensitometer it was easy to test $4\frac{1}{4}$ and $3\frac{1}{4}$ plates; but for testing larger ones, or for giving several exposures on one plate, a modified form of holder and shutter should be constructed, the quarter-sized tablet still being used. In order to equalize the action of the light upon a silver-bromide gelatine film, emitted from a standard candle and a phosphorescent tablet, as usually used, an exposure in either case of thirty seconds' duration, he had varied the relative distances between candle and plate. Placing the light four inches in front of a white screen, he found the requisite distance approximately to be about nineteen and a-half inches, and considered the sensibility of differently prepared plates more correctly tested against ordinary daylight in this manner than by the illumination proceeding from a phosphorescent surface.

Captain Abney said that great precaution must be taken in shutting off reflected light.

Mr. Mawdsley said a good plan would be to make four exposures on one plate, and cut the plate with a diamond before development.

The Chairman said he had found, without reference to the light being compared with the tablet, that a film placed one yard from a candle, and one metre from the white screen placed behind it, and at right angles thereto, to be a convenient standard of sensibility for practical purposes.

Captain Abney said that his gas flame was of seven-candle power, and this gave the same number on the sensitometer, when placed six feet off the plate, as did a phosphorescent plate when used as in Warnerke's sensitometer.

Mr. W. Bedford said there would then be the direct rays of the candle in addition to the reflector. This might make 100 per cent. difference. Then, again, the reflector must always be the same size, if it is to serve as a standard.

The conversation then drifted into the use of the sensitometer, and testing before and after fixing, during which Mr. Mawdsley stated that it was most dangerous to take a gelatine plate into daylight before fixing, but, after being put into the alum bath, it might then be taken into a feeble white light.

The Chairman said that, in testing for sensitiveness, if twelve was the number arrived at after fixing, it would about correspond probably to fourteen before. Some of his own plates, though by no means so sensitive as some commercial plates he had recently tried, showed the figures more clearly defined, and the backgrounds in greater regularity of intensity, owing, he considered, to the introduction of silver chloride and free hydrochloric acid into the emulsion.

Captain Abney remarked that there were two ways of testing plates—by the numbers impressed, and by the range. Perhaps by the numbers was the most important. Some plates would show twenty-five numbers on the sensitometer, and many would be of the same density. Such plates were not so useful as when the ratio of density varied more.

Mr. England said he did not care to go beyond 12 or 10 for landscapes.

Captain Abney said that plates ought to be slow, if only fifteen or sixteen were arrived at; and that in his experiments good density would be the result when the plates went up to twenty-three.

Mr. Cadett observed that after twenty-three there was loss of density.

A conversation then arose about the subject of emulsion preparation, more especially respecting some made by Captain Abney, whose process had been seen and then tried by a member, but who did not arrive at such good results.

Captain Abney said that he introduced a minim of hydrochloric acid into an emulsion in the following way:—He mixed ten minims of acid with one hundred minims of water, and ten drops of this solution were introduced into seven ounces of emulsion according to his formula.

Mr. Cadett had observed that ammonio-nitrate plates were more transparent than those made by the boiling process, and stated that all plates, the more sensitive they were, the more transparent they were.

Manchester Photographic Society.

The usual monthly meeting of this Society was held at the Mechanics' Institution, on Thursday, May 11, Mr. Alfred Brothers, F.R.A.S., Vice-President, in the chair.

The minutes of the previous meeting were read and confirmed.

The Hon. Secretary exhibited a quarter-plate camera, styled the Instantograph, the camera being a most ingenious and well-contrived instrument, swing-back for horizontal and upright pictures, with a lens which the Hon. Secretary had tried and found to give excellent definition. Respecting the instantaneous shutter, which was admired by all for its simplicity, the Hon. Secretary said he had not had a fair opportunity to test it. He thought it might be improved by enlarging the aperture in the revolving disc, so as to give a longer exposure whilst actuated by the elastic spring. The lens could, of course, be worked without the instantaneous shutter. The dark slide was a good one, and the legs very light and portable. The Hon. Secretary then exhibited one of Mr. Alfred Pumphrey's filmograph and changing bag, also some film negatives sent by Mr. Pumphrey. He then exhibited the method of working the same, and many of the members were struck with the lightness and simplicity of the apparatus notwithstanding the excellent quality of the results produced.

Mr. Alfred Brothers then read a short paper entitled "Hyposulphite, or Thiosulphate of Soda."

Mr. Pollitt then contributed a paper entitled "Stray Thoughts touching our Recent Exhibitions" (see page 298).

Mr. Greatorex showed several negatives on commercial dry plates exhibiting small opaque spots, and in reply to enquiries as to the cause, various opinions were offered.

Mr. Charles Pearson exhibited negatives on plates possessing insensitive marks.

Mr. Blakeley brought a swing-front and shutter, which he had ingeniously contrived to fit his camera.

Mr. Alfred Knott exhibited several prints from negatives takenby Messrs. Marion's Academy cameras, viz., a small camera for one and a-quarter square plates. They were very fair results. Several of the members expressed their views of the camera from experience.

Photographs were shown by Messrs McKellen, Coote, Brier, Blakeley, Wade, and W. J. Chadwick, many or most being the results of the first out-door meeting of the season, which took place on Saturday, May 6th, when fourteen members enjoyed a very pleasant day at Liverpool and on the Cheshire coast.

The usual votes of thanks were passed, and the members adjourned, with the exception of out-door meetings, until September.

The second out-door meeting took place on Saturday last, May 20th, this time to Gawsworth, *via* Macclesfield. About seventeen members arrived, some by rail from Manchester, whilst others, being nearer, walked or drove, and Mr. Brier exhibited what could be done on a tricycle. The day was not so suitable as it might have been, owing to wind. The light was at its best, and exposures were confined to subjects in which wind was not so objectionable. A capital tea, and a drive home, concluded the out-door meeting. One hundred plates were exposed.

The out-door meetings committee, since making up the list of meetings, have concluded to postpone the Bolton Abbey meeting from June 10 to June 17, in consequence of the former date coming so soon after Whitsun week.

Thursday Evenings for Photographers.

At the meeting held on the 18th inst., the chair was occupied by Mr. C. G. Collins.

Mr. A. Haddon exhibited the negatives of the sun taken during the eclipse the day previous, the first being taken at 6·30 a.m., and the second when the eclipse was at its maximum. In the negatives the eclipse was very clearly defined, and, by the aid of a glass, sun spots were distinctly visible in the same position in both negatives. He also exhibited three other negatives of the sun which he had taken that day, in order to demonstrate that the spots were not due to any imperfections of the plates, and in these negatives the spots were also visible. The lens used was the front combination of an ordinary cabinet lens. He also showed the shutter used. This consisted of a diaphragm to be placed in the stop slot of the lens, leaving an opening about a quarter of an inch wide; across this a narrow slot, of about one-sixteenth of an inch in width, was pushed, giving a very rapid exposure, the duration of which he promised to measure, and communicate to the next meeting.

M. Brown handed round prints from negatives of the same phenomenon. In his case, the exposure was estimated at about the twenty-fifth part of a second.

Mr. Cowan passed round two negatives, one being taken with a baby lens, and the other with a wide-angle rectilinear, the same exposure being given in each case. The stops used were cut after the plan advocated by Mr. Debenham, and were equal to F. 16. There was no perceptible difference between the pictures, both showing the same amount of definition. He then proceeded to demonstrate the method of dry mounting. The print, having been starched immediately on removal from the washing water, is allowed to dry, and then trimmed. The mount is then well damped with a sponge, and the print, being adjusted, is rolled through an ordinary two-roller press. One great advantage claimed for this method is, that the prints, being put on the cards dry, do not shrink and cause the mounts to curl. The prints mounted by Mr. Cowan, although they had been toned and starched for eleven years, yet adhered so firmly to the mounts that an attempt to separate them immediately after they had been through the press, caused them to tear and draw the card.

The Chairman exhibited a portable camera-stand of the Alpenstock type; it was made of bamboo rods sliding one into another.

Mr. Henderson passed round two negatives on plates from the same emulsion, one of the interior of a church, which had received twelve and a-half minutes' exposure, and the other, a landscape, taken with a drop shutter. He then opened a very interesting discussion on the reversed action of light.

Mr. Cowan did not think that the reversed action sets in till the exposure has reached some thousand times the correct one, and he instanced a sensitometer made by Mr. Warnerke, each tint of which was double that next preceding it, and by this instrument it was found that no reversed action was apparent until the exposure had reached several thousands.

It was announced that a special meeting of the new Club would be held on the 8th prox. (to be advertised in due course for the purpose of forming rules, &c.

Bolton Photographic Society.

The monthly meeting was held at the baths, on Thursday evening, the 4th inst., Mr. A. Harwood in the chair.

It was resolved that out-door meetings be held at Dibchester, Rivington, Clitheroe, and Hebden Bridge, on the third Saturday in each month; and at Furness Abbey, Bolton Woods, Windermere, Kirkby, Lansdale, and Matlock, on the Wednesday preceding the third Saturday in the month.

Messrs. Charles Williams, James Kildesley, and Edward Nashworth were elected members of the Society.

Talk in the Studio.

South London Photographic Society.—The usual monthly meeting of the above Society will be held on Thursday next, June 1st, at the Society of Arts, Adelphi, at 8 o'clock, when Mr. W. Brooks will read a paper on "Practical Experiences with the Alkaline Developer for Gelatine Plates." Should time allow, the following, from the "Question Box," will also be discussed: "What is the best Formula for Toning Ready-sensitised Paper?" The President will present the medal to the sucessful competitor in connection with last year's Artistic Competition, and the Presentation Print for 1881 will be ready for distribution. Several members having failed to claim the Presentation Print for 1880, they will oblige by doing so as early as possible.

A Royal Photographer for Deal.—The number of first-class photographers who reside out of London is shortly to be augmented by the secession from the metropolis of Mr. William Mayland, of Regent Street. It is in respect to her provincial photographers that Great Britain differs from the Continent; there, all the principal studios are to be found in the capitals, while with us many ateliers in the first rank are to be met with "far from the madding crowd." Mr. H. P. Robinson of Tunbridge Wells, Mr. Jabez Hughes at Ryde, the Sarony Studio at Scarborough, and Mr. John Fergus at Largs, are instances in point; and now Mr. William Mayland goes to Deal. Mr. Mayland's careful and artistic work is well known to all visiters to the Pall Mall Exhibition, where he has in several years secured medals for his tasteful photographs, the fine enamel portraits of the young princes and princesses of Wales having gained him one of these distinctions. Success, therefore, is already assured to Mr. Mayland in his new home, and we may hope that a change of residence to the seaside, away from the noise and bustle of London, will restore him again to the fulness of his health, to secure which is the principal reason of his retirement from town.

Cantor Lectures.—On the occasion of the last of Mr. Comyns Carr's Cantor lectures on "Modern Book Illustrations," he described briefly, and in a popular fashion, some of the photo-mechanical processes which are now in general use. Mr. Carr maintained that there is a certain superiority possessed by the wood-block which cannot be obtained by any mechanical process; but at the same time he admitted the probability of results being ultimately obtained such as the most delicate wood-block cannot rival. The silver print he would not admit to a place amongst book illustrations at all, and carbon came in for rather more severe animadversion. During the lecture a number of specimens illustrating the various applications of photography to wood-engraving were shown.

Society of Arts.—On Thursday evening, May 25th, a paper on "Recent Passages of Zulu-Kafir History" will be read by Robert James Mann, M.D., F.R.C.S., F.R.G.S. The chair will be taken at eight o'clock. The paper will be illustrated by an exhibition of photographs, which will be shown by means of the oxy-hydric light.

A Costly Telescope.—The great equatorial telescope, ordered by the Austrian Government in 1875 for the new Observatory at Vienna, is now in course of transit to its destination by the American Foreign and European Express. This instrument has been constructed in Dublin by Mr. Howard Grubb; it weighs about 30 tons, and is valued at £3,000. The mechanical portions were finished in 1878, but owing to the difficulty of obtaining perfect discs of optical glasses of the size required (27 in.) it has only recently been completed ready for delivery.—*Globe.*

A Photographic Poser.—Sir Henry Wolff has raised a curious point in regard to photographic copyright. In his objections to the Fine Art Copyright Bill he observed that a Professional Beauty might have a favourite attitude in which she sat to one artist; and was she not, he inquired, to be allowed to sit in that attitude to another photographer? Of course in time she would not be able to sit at all, and then she would undoubtedly have a *standing grievance.*—*Funny Folks.*

The Doctor his own Photographer.—Attention is called by the *Philadelphia Medical News* to a recent invention by means of which photographs may be made by the medical man. "Medical men very frequently want photographs in cases of injury, deformity, tumours, &c., but the trouble and expense have been serious bars to obtaining them; and many patients, too, cannot go to the photographer. Drawings are even more expensive, and labour under the disadvantage of possible inexactness. Recently, however, the introduction of the 'dry plate' process has so simplified the method, avoided the former dangers, and reduced the expense, that any one of ordinary intelligence and means can now take all the photographs he wants at a moment's notice. At the Cincinnati meeting of the American Association for the Advancement of Science, last August, Mr. Walker, of Rochester, New York, showed a 'pocket camera,' which, according to Professor Lattimore, supplies every want of the inexperienced amateur. Its weight is only two pounds. 'Dry plate outfits are now to be had at a cost of 10 dollars and upward, which are excellent. Provided with one of these instruments, the doctor would always be prepared to photograph any case he desires, at his office or in the sick room. Our hospitals, especially, should be provided with such an outfit, so that cases and specimens could be photographed at any time, even by a resident. Our microscopists would also find it exceedingly useful to make permanent many a transient preparation not suitable for preservation.—*Brit. Med. Journal.*

The Pope on Photography.—Mr. John Eastham is good enough to send us the following translation of the epigram by his Holiness Pope Leo XIII. It was written, we are glad to hear, after some successful pictures had been secured by Mr. Eastham at the Vatican:—

Photographic Art.

Sparkling likeness! swift touch of the sun!
By a ray instantaneously, splendidly done;
Minutely and truly reflecting each grace—
Noble brow, beaming eye, and beauty of face.
What a triumph of skill, as wondrous as new;
E'en the rival of nature. Apelles ne'er drew
More beautiful picture, or portrait as true.

Rules of the Artistic Competition of the South London Photographic Society.—1. That the competition be yearly. 2. That each year the President shall announce four subjects for competition, two landscape and two figure. 3. That each picture intended for competition, bearing a private mark only, accompanied by an envelope bearing a similar mark outside, and containing proper name and address, must be sent on or before October 1st, addressed to the Secretary, South London Photographic Society, Society of Arts, Adelphi, London, W.C. 4. That the size of the pictures (landscape or figure) be 12 by 10, or under, and that each picture must be mounted on a card, size 18 by 14. 5. That three artists, not being photographers, be appointed to judge the pictures. 6. That a diploma or award shall be given for the best picture of each subject, and a special award for the best picture of the year. 7. That the envelopes bearing the marks of winning pictures only be opened, all others to be destroyed. 8. That the exhibits become the property of the Society.

To Correspondents.

All Communications connected with Advertisements and Business to be addressed to Messrs. Piper & Carter, "*Photographic News*" *Office, 5, Castle Street, Holborn, E.C. Advertisers are requested to make all Cheques payable to* Messrs. Piper & Carter, *and crossed* "*Union Bank, Photographic News Co. Account.*"

*** We cannot undertake to return rejected communications.

*** Pressure on our space compels us to postpone the Lesson this week, together with an interesting paper by Dr. Fol, and other matter.

Emulsion.—1. The ammonium and potassium salts are about equally good for the purpose, but the latter is perhaps easier to obtain in a state of purity than the former; while, when the ammonium is used, crystallization on the plates is less likely to occur should the washing have been insufficient. 2. A mixture of Nelson's opaque and Coignet's has given excellent results in our hands. 3. Generally from undue application of heat when the mixture is alkaline. 4, 5, 6, 7, 8. Follow the directions given in the Year-Book. 9. Each one is quite neutral to test paper.

R. L. T.—Five grains.

Amateur.—You will find full particulars on p. 199 of the Year-Book.

Collotyper.—1. No satisfactory work can be done until the roller has been prepared or seasoned by repeated treatments with lithographic varnish; the usual method being to work thin or middle varnish on the slab each day for a period extending over several weeks, the roller being scraped as clean as possible several times during this period. 2. The best way is to have it built up on an iron stock or spindle, this being first covered with a thin layer of ebonite, outside which there is a thickness of nearly an inch of red rubber of good quality. To make the roller truly cylindrical it is caused to revolve at a high rate of speed on the lathe, when it is turned by a sharp file held in the slide rest, the finish being given by friction with fine glass paper. 3. It consists essentially of oxide of iron. 4. Experiments in this direction have not been very successful up to the present time.

Sulphur.—The idea was suggested in the Photographic News rather over two years ago.

Beginner.—1. Doubtless the result of using dirty plates. 2. Under such circumstances every trace of silver would be precipitated, unless a very large proportion indeed were added. 3. Dilute with a mixture of about two parts of ether and one part of alcohol. 4. You may regard it as practically valueless, as it would cost much more to replace the broken glass than the instrument is worth.

Telephone.—A wire having three times the sectional area of that on the coils of the instrument will serve very well for the distance you mention; but you should take care to protect the wire against rain; or, at any rate, mount it on the usual undercut porcelain insulators.

J. P. Coombes.—1. It consists entirely of carbon, hydrogen, and oxygen, and if heated to redness in the air, it burns rapidly and completely. 2. Full details will shortly be published in the Photographic News.

Urgent.—You had better merely acknowledge the receipt of the letter in the first instance, after which you can consider the matter at your leisure.

Copyright.—The point is open to a little doubt; but in most cases your view of the case would be taken.

Samuel Jones.—We are told that the law on this point is so ill-defined and doubtful, that it is difficult to judge in what direction the decision of a court would tend.

K. T. L.—It is extremely likely that sulphide of silver would be slowly formed in such a case.

T. W.—Yes, please.

A. Gardner.—Not at all; his success came like the success of most others: (1), good fortune or opportunity, which you will; (2), good health, and consequently good spirits; (3), a moderate amount of talent and application.

Gallow.—We don't think so. We decidedly prefer citric acid to acetic acid for the purpose you mention.

Chloride.—Because of the acid that is present; most samples of chloride of gold contain traces of acid.

Poor Printer.—If, as you say, there is a good deal of chloride present, then a good deal of the nitrate of silver will be converted. If it is a thick paper, the amount of solution taken up *mechanically* will be great, and practically, therefore, the silver bath will be sooner exhausted. But the silver in this case should be recovered in washing or toning the prints. Add a little common salt to your first washing water. The stoutness of the paper, amount of chloride it contains, and also the thickness of the albumen film, must all enter into the calculation if you want to know how much silver bath is absorbed, so that a practical answer cannot be given.

Cliche.—1. You mean the ferri-cyanide of potassium. 2. Since it is patented, of course you cannot.

Wellbank.—If you send your full address to our Publishers, they will furnish the information sought.

Propertius.—See Lesson in last week's News; carbon tissue impregnated with glycerine will answer your purpose.

P. G. M.—"Bigelow's Album" is out of print; Robinson's "Pictorial Effect" may be had of our Publishers, price 2s. 8d. per post.

Norman May.—Some of them were on sale in the print shops of London a few months ago; but you had better write to Messrs. Trübner and Co.

THE PHOTOGRAPHIC NEWS.

Vol. XXVI. No. 1239.—*June* 2, 1882.

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A NOVEL METHOD FOR THE INTENSIFICATION OF NEGATIVES.

The intensification of line-negatives is, notwithstanding the many excellent processes which have been devised, still a matter which frequently causes some considerable difficulty to the photo-lithographer. When the subject to be copied consists entirely of clear black lines on a white ground, it is quite easy to obtain a satisfactory negative, and intensification by almost any good process becomes easy; but the real difficulties step in when an attempt is made to obtain a negative of a subject in which fine discontinuous lines have to be reproduced side by side with bold and solid black strokes crossed closely together, as in such a case the fine lines almost invariably tend to become blocked up during the process of intensification. The usual proceeding in such a case is to expose fully, so as to secure the finest and faintest lines, and to take care neither to develop nor intensify so far as to block these with a deposit of silver; after which the negative is shaded on the back over those parts where the blackest lines are crowded and the intermediate white portions are greyish and ill-defined. This shading is generally performed with blacklead and a stump on a sheet of transparent paper stretched over the back of the glass, and this is repeated until it is found that the whole of the negative prints at about the same rate on a piece of photo-lithographic paper. Such a process is troublesome and takes a great deal of time, and the outcome is always a negative in which the available contrast is so feeble as to tax to the utmost the skill of the photo-lithographer in making his transfer.

A proceeding which bids fair to be of great practical value to the photo-lithographer in the reproduction of difficult subjects has recently been introduced by Schlegel. After the negative has been fixed and washed, it is coated with a thin layer of bichromated gelatine, and allowed to dry in the dark. When dry the plate is laid, face downwards, on a black cloth, and is then exposed to the action of light. Under these circumstances those portions of the film immediately under the transparent parts of the negative become insoluble, and lose the power of swelling in water. After a sufficient exposure has been given the negative is soaked in water, and a suitable pigment is rubbed on—say permanent white, or any other substance which is fairly opaque—and this naturally only adheres to those parts which have become adhesive by the absorbtion of water. The great value of this method rests, however, on the facilities which it offers for local intensification, as the pigment need only be applied to those parts most requiring intensification, or which would have been shaded in the case we assumed just now.

Schlegel's process possesses a considerable value for treating ordinary gradated negatives, and those who wish to modify the relative degrees of light and shade in various parts of the picture will appreciate the power placed in their hands by this method.

Our readers will at once recognize the fact that the process of intensification just described is founded on the same basis as the Anthrakotype process of Dr. Sobacchi, which was described in the Photographic News early during the past year. A gelatinous solution of the same strength (1 and 30) may be used in each case; but for the intensification of negatives by Schlegel's proceeding it is better to add the necessary proportion of potassium bichromate (say one-sixth part by weight of the gelatine employed), rather than render the films sensitive after they have dried.

It will be quite obvious that any of the ordinary dusting-on mixtures may be employed instead of the bichromated gelatine, but in such a case the plate must only be very gently breathed on, or merely exposed to a damp atmosphere before the application of the pigment, and it would be necessary to coat the intensified picture with collodion, and soak in water, in order to remove the soluble materials used in the preparation of the so-called "dusting-on solution."

THE RELATION BETWEEN EXPOSURE AND DENSITY OF IMAGE.

Not long ago we placed before our readers some particulars of practical improvements in the gelatino-bromide process which are the outcome of experimental investigations by Mr. Plener; and we now propose to enter briefly into some theoretical questions which have recently been studied by the gentleman in question.

The laws which govern the proportionate reduction of silver on the various parts of a gelatino-bromide dry plate have not hitherto been so much studied as one would expect, considering the importance of the subject; and M. Janssen's recent experiments on the measurement of the light of the heavenly bodies by a photographic method, as detailed on p. 194 of our present volume, may be regarded as opening a new field for photographic experimentalists. As our account of M. Janssen's experiments has been so recently placed before our readers, it is unnecessary to enter into detail on the present occasion; but the collateral bearing of the points raised by M. Janssen are tolerably extensive, as a rational and accurate system of photometry appears likely to grow out of a study of them.

Mr. Plener contributed an important article bearing on this subject in our issue of last week, and he shows that the laws formulated by M. Janssen are not sufficient to elucidate all the phenomena attending the production of deposits of metallic silver in the gelatino-bromide film. He concludes that if the deposits were proportional to the intensity of the light—time of exposure being, of course, constant—a slow plate ought to have a more extended scale of gradations than a rapid plate. Practical observation shows, however, that the reverse obtains, and this led to an examination of M. Janssen's reasoning, when Mr. Plener found that by supplementing Janssen's laws by a fresh consideration, it becomes possible to reconcile practice and theory as regards the point in question; the supplementary note being to the following effect. In the case of a slow plate the deposit gains in density to a disproportionate extent as the action of light has been more prolonged or of greater energy. In other words, rapid plates yield a deposit which does not increase in vigour in so quick a ratio as the intensity of the light, while the reduction on a slow plate is greater in relation to the light when the exposure is considerable than when it is very short. These considerations enable one to understand why, in some instances, degrees of gradation which are invisible to the eye become, by the exaggeration of contrasts, well marked on the photographic plate; but in other cases, as when rapid plates are concerned, the reverse holds good, while in actual practice the two tendencies often may partially balance each other, so that the strict proportion between the intensity of the light and the density of the deposit holds good; or at any rate, an approximate expression of the actual condition of affairs is obtained by the method of Janssen. To the production of such plates the efforts of photographic experimenters should now be directed, and the method indicated by Mr. Plener towards the conclusion of his article should lead us into the way of recognizing such plates, and when this can be satisfactorily and readily done their constant production will become only a question of careful attention to details.

SOME APPLIANCES FOR GELATINO-BROMIDE WORK.

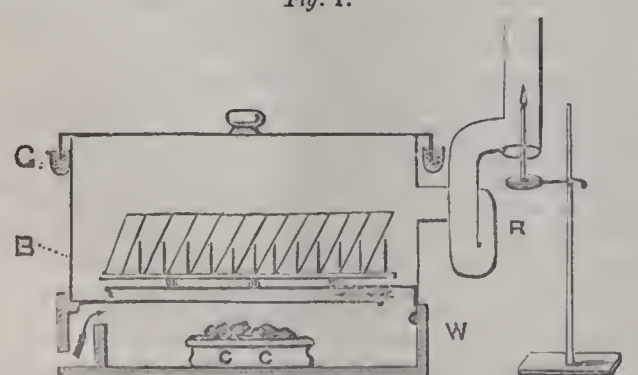
BY DR. HERMAN FOL.

A Drying Box for Gelatine Plates.

The first time I prepared my own gelatine plates, I borrowed two drying cupboards in order to dry them, but, after examining these rather cumbrous apparatus, each far too large to be put in my dark-room, I grew rather suspicious about their real darkness, and so began by putting a plate in each, and I left them to stand a few hours in broad daylight. After this I withdrew the plates with due precautions, and upon applying the developers found that both were considerably fogged.

My emulsion was ready, and seemed good; what was to be done? I had at hand a large zinc case with a lid of the same material, so I cut a long opening at one end of the bottom, and had another bottom soldered inside with an opening at the opposite end (see diagram). I then had a

Fig. 1.



B, zinc case; G, gutter filled with small shot; W, wooden tray; CC, calcium chloride vessel; R, Russian chimney.

so-called Russian chimney fastened on one of the sides, and fitted this with a gas-flame placed as shown, so that it might produce the necessary current of air. To make the cover fit air and light-tight was rather more difficult. This, however, I managed in the following manner. I had a rim soldered all round in the shape of a gutter, the edge of the lid sinking into the bottom of the gutter, and I then filled the latter with small shot, and thus obtained a most perfect closure. This box has been in use ever since, and, with the addition of a wooden tray and of an iron vessel full of calcium chloride, has done me very good service.

I should not have mentioned so insignificant a circumstance were it not that it led me to a method for shutting out light and air that seems to me to be new, and might be of service to some one or other of our confrères.

Washing Gelatine Emulsion.

I am much surprised, when reading photographic papers, to see what rough appliances are often recommended for performing delicate operations with the most fickle of all materials, viz., gelatino-bromide emulsions. None of us would use anything but porcelain vessels of suitable form for most domestic purposes, but as soon as photography is concerned, many are content with materials such as string, earthenware, canvas, and the like.

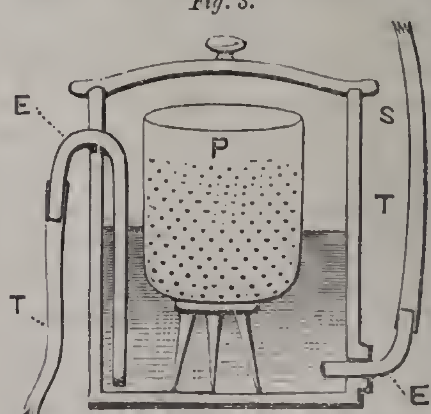
Now a good apparatus means saving of time, certainty in the operations, and the avoidance of endless annoyances. I have tried the different methods proposed for cutting up and washing my emulsions: forcing it through canvas, which is indeed a most disagreeable and unclean operation; cutting it up with a silver fork won't do, because the instrument tears rather than cuts.* I prefer a small roller with a number of sharp silver discs set up about a quarter an inch apart (Fig. 2), and all mounted by means of silvered

Fig. 2.

copper wire to a wooden handle. The discs are easily obtained by thinning out and sharpening small pieces of money. Having poured out the emulsion in a large porcelain tray, and let it set thoroughly, I pour clean water over it, and by rolling the above instrument to and fro, easily cut it up in long strips or ribbons.

For washing, I tried the washing-bottle system, but some pieces of emulsion stick to the bottom of the bottle,

Fig. 3.



S, stoneware jar; E E, ebonito pipes; T T, india-rubber tubing; P, porcelain basket filled with emulsion cut up into strips.

and don't get washed at all, so I tried suspending it in a muslin bag in a vessel through which a stream of running water circulated. This is good, but very slow, and it is disagreeable to have to scrape the washed emulsion off the cloth, to which it adheres. Leading the water directly

* I have not tried forcing the emulsion through an iron grating, nor do I intend to do so, as the contact with metallic iron is too great an outrage to my sense of what is suitable.

into a canvas bag containing the emulsion is the worst of all methods, since the emulsion is apt to fill the pores of the cloth, and stop the flow of water, so that this frequently overflows, and causes other accidents. At last I procured a porcelain vessel pierced with numerous small holes—I might almost call it a porcelain basket. This I placed in a large stoneware jar with an arrangement for filling and emptying automatically with water (Fig. 3). The emulsion, cut up into ribbons, being placed in the porcelain basket, is easily and thoroughly washed without clogging the holes, since the water passes them alternately in opposite directions, and the operation of draining and collecting the emulsion is comparatively an easy matter.

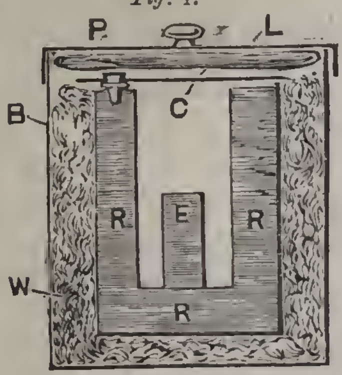
I find, by the way, that two parts of Simeon's Swiss gelatine, and one part of Nelson's No. 1, give a jelly that retains exactly its original volume, even after forty-eight hours' soaking in cold water. Simeon's gelatine alone under the same circumstances loses a part of its water, and contracts to a smaller volume.

My washing apparatus much resembles a common sponge-holder. Does not emulsion washing deserve a special vessel as well as the drying of a sponge? And if so, is it so very difficult to get a maker to alter the size and shape of his sponge-holders, and supply photographers with a most useful appliance?

Cooking Emulsions.

Some years ago I noticed in a Paris exhibition a most ingenious contrivance for cooking meat; it was termed a *cuisine Suédoise*. It consists of two vessels, fitting into one another and closing tightly; the space between the two being filled up with a non-conducting material such as wool or feathers (Fig. 4).* I had a similar apparatus made for

Fig. 4.



B, wooden box; L, lid to the same; W, space filled with wool; R, double-walled reservoir filled with warm water; C, cover to the same; P, pillow filled with eiderdown; E, emulsion.

my use; but with this difference, that the inner vessel had double walls and can be filled with warm water of a known temperature. When well closed, this temperature keeps unchanged for hours and days together. It proved a most efficient digesting apparatus. When I came to cook emulsions, I naturally used my Swedish kitchen, filling the reservoir with water of 70° C., and after a day and a half the cooking was completed with an ease and security quite unknown with any other contrivance. Seeing that many persons complain about the boilers actually in use, I venture to predict that my apparatus will shortly supersede them all.

* The meat or chicken thoroughly warmed on the fire is put into this inner space, and, after closing the lid, will be found perfectly cooked in a few hours, since the heat cannot escape.

By-the-Bye.

A UNIT OF LIGHT.

We have been accustomed so long to express the value of a light by comparison with the "standard candle," that it is very improbable we shall ever give up doing so, any more than engineers will desist speaking of engines in comparison with horse-power. Of the two measurements, that of horse-power is, perhaps, the more variable, for the discrepancies in candle-burning, large as they are, do not differ so widely as the observations in the power of horses. Watt was of opinion that the power of one horse was equal to raising 32,000 pounds one foot high in a minute; but a German engineer has placed it as low as 16,000 pounds, or just half the amount. Nowadays, as most people know, the nominal power of an engine in horses is not calculated upon the doings of any animal at all, but is based upon the effective pressure exerted by the steam against the piston. So in like manner, although we are not likely to give up measuring light by the standard sperm candle as a unit, we shall base that unit on some other data than that of a burning wick.

The standard sperm candle has long been doomed as a unit of light. Anyone who has given due attention to a burning candle knows hows how variable are its conditions of consumption. In the first place, since there is no single maker of the standard candle, no reliance can be placed upon its manufacture. It is made of spermaceti; but spermaceti is not a definite chemical substance. Spermaceti is a mixture of solid fatty ethers, containing a small quantity of oil. Again, standard candles are not made of spermaceti alone; manufacturers state that a proportion of beeswax must necessarily be added, and this amounts to from three to six per cent. Taken two standard candles of different dates or manufacture, their melting points rarely agree, a circumstance very natural, indeed, seeing that their constituents vary so much.

Again, the wick has a material influence in the burning of a candle—the number of its threads, the way it is plaited, and the treatment it receives prior to being put into the candle. But even were we to suppose that wax and wick are identical in two candles, it does not follow these would burn at an equal rate, giving out an equal quantity of light. A standard candle should burn away at the rate of about 120 grains per hour; but, as everybody knows, a certain consumption of material does not mean a certain light in candle-burning. The "cup" formed in the candle is of particular import, and so, too, is the way the wick bends over into this cup during the burning.

So unsatisfactory has been the standard candle in practice, much as it might be useful in theory as a convenient measurement, that for some time past steps have been taken to secure another unit. It is not only photographers who are interested in the measurement of light, but so important is it considered to the country to have a trustworthy standard, that the Government has given the subject attention. The Board of Trade, some time ago, nominated a committee of scientific men to address itself to the subject, this committee consisting of Professor Williamson, F.R.S., Dr. Odling, F.R.S., and Mr. Linsey.

These gentlemen are still engaged in experiment, and we have to wait another year, probably, before they make their final report on the subject; and whatever this may be, it is very certain that they will have no more to do with the standard candle as a practical measurement.

Indeed, from a preliminary memorandum this Phometric Committee has issued, we know that the members are at present inclined to employ a standard gas-burner instead of a candle. Obviously with a gas-burner there are many difficulties to contend with; but still the Committee appear to have surmounted these very satisfactorily. In the first place, the Committee does not suggest the employment of ordinary coal gas, but of a gas of a definite mixture, such as Mr. Vernon Harcourt has already recommended for taking photometric measurements. It is a mixture of petroleum vapour and air. Mr. Harcourt has taken the standard candle as his unit, and endeavoured to produce a light of about the same intensity with this air-gas, but which shall not vary like the burning candle. In a paper on the subject which he read before the British Association, Mr. Vernon Harcourt thus describes the arrangements for producing the light which the Committee contemplate adopting. "For the standard combustible I employ a mixture of air with that portion of American petroleum which, after repeated rectifications, distils at a temperature not exceeding 50° C.; this liquid consists almost entirely of pentane, the fifth number of the series of paraffins. The proportion which I propose to maintain is 576 volumes of air to one volume of pentane, measuring the liquid at, or near, 60° F., or, measuring both as gases, 20 of air to 7 of pentane." In the burner proposed to be used with the standard gas, the opening has a diameter of ¼ inch. The length of the brass tube, which the gas enters near its base, is 4 inches, its diameter is 1 inch, and the thickness of the disc which forms the mouth-piece is ⅛ inch. To this description we may add that the pressure of the gas is to be adjusted to give a flame 2½ inches high.

This, then, is the flame which the Committee, at the present moment, or, at any rate, a few months ago, had pretty well decided should be considered in the future to be a standard candle. Since then, however, electric lighting has become a household word with us, and the question arises whether a better and more unalterable standard of photometry could not be established by electricity.

Before the Electrical Exhibition at Paris closed, there was held—as most of our readers are aware—an electrical conference, at which some thoroughly good work was done. Electrical measurements had, before then, been in a very unsatisfactory state, and the Paris authorities, wisely taking advantage of the circumstance that so many electricians from all parts of Europe were present in their capital, decided forthwith to settle by an international conference the many moot points in existence. This was accomplished, and at the present moment we possess definite measures not only of the force of an electric current, but also of the amount that passes along a wire during a given time. Thus, to make a Swan lamp burn satisfactorily, we can say that it requires an amount of electricity equal to one ampère and a half per hour—we speak from memory only—exactly as one might say that an ordinary lamp required for its use a pint and a half of oil per hour. If the Swan lights were always the same as regards "resistance" they present to the electric current, and if, moreover, the carbon thread rendered incandescent were always of the same length, weight and diameter, then the amount of light produced by this ampère and a half should invariably be the same. Thus a standard of photometry would be at hand which should be easily under control.

Whether it would be possible to secure uniformity in these respects we do not know, but the difficulties in manufacture ought not to be insurmountable. To produce a carbon thread of a certain diameter is of course not very difficult, but the "resistance" it presents to an electric current is a matter not so readily under control. At the same time, the problem might easily be solved, we think, by simply choosing such carbon threads as indicate the required resistance, and employing these for the standard lamps. In our experiments with the Swan lamps, detailed in November last in these columns, we found the "resistance" of four lamps taken haphazard to be widely different. One of them gave a "resistance" equal to 67 ohms, another 59 ohms, a third 58 ohms, and a fourth 52 ohms, the result being, practically, that the first gave far less light than the fourth with the same amount of electricity. This indicates at once how necessary it would be, in the event of choosing an incandescent lamp for a standard, to see that the resistance of all standard lamps is the same.

Whether the air-gas flame or electricity is chosen, however, for measuring light in the future, it is very certain that we shall still reckon by standard candles. For this reason, it will be necessary to bear in mind that "standard candles," as we have shown, is only an arbitrary term, and no more to be regarded as a real measurement than horse-power applied to engines is to be taken to mean the power that a living horse is capable of exerting.

The "At Home" next week be "M. J. Ganz in the Rue de l'Ecuyer, Brussels"; the following "By-the-Bye" will be "A Plea for the Burette in Photographic Manipulations."

PHOTOGRAPHY IN AND OUT OF THE STUDIO

THE NEW COPYRIGHT ACT AND THE EXHIBITION OF SPECIMENS—A NEW PHOTOGRAPHIC SOCIETY—THE MEASUREMENT OF ACTINISM.

The New Copyright Act and the Exhibition of Specimens.—Though it is scarcely likely much will be done with the Copyright Bill this session, it would be well if the Photographic Society had something to say on the subject before the vacation begins. Clause 10 is one that affects the profession so keenly that, should it become law, it will lead not only to annoyance and inconvenience, but to positive injustice. The right to exhibit the photograph of a sitter is not one which the photographer can claim, nor does he ever seek to claim it. The practice of exhibiting specimens is coincident with the very commencement of the art as a means of livelihood, and no one who sits for his or her portrait can pretend to be ignorant of the fact that should this portrait prove to be a favourable example of the artist's process, he would like to exhibit it. But the barest hint on the subject expressing dislike to the exhibition is, as a rule, sufficient, and it would be difficult to point to a case where a photograph has been exhibited in opposition to the wishes of the sitter. Indeed, people generally feel flattered by the preference, and, practically, we believe that photographers exercise the greatest care in the selection of specimens so that tender susceptibilities shall not be wounded. But if clause 10 be read between the lines it will be seen that it is not so much the photographer as the photographic dealer who is aimed at—not that this is any consolation to the former. In a recent trial for libel the grievance which the prosecution most strongly commented upon was, that if your photograph became a commercial commodity and was exposed for sale, you had no remedy. We have no desire to enter into the motives which prompt a professional beauty to pass half her time in being photographed; but it is scarcely possible she can be so blind to her own celebrity as not to be aware of the risk she thereby runs of shop-window publicity. If so, has she not all the protection she desires in the honour of the photographer? An explicit statement that no use was to be made of the portraits would, we contend, be all-sufficient. It would be very interesting to know who are the thin-skinned people who require an Act of Parliament—and an Act of Parliament so monstrously stringent as this is—to shield them. Are they the actors and actresses, the poets, the novelists, the clergy, whose portraits are bought and sold by the thousand, who object? Can it be that the ladies of the ballet have suddenly evinced a desire to hide their faces? Or has Royalty determined to shed no more the light of its countenance on the loyal and gaping multitude? The general public, we are convinced, do not care a straw about the matter. It has never been made a crying shame on the part of Mrs. A. that her offspring formed the centre picture of a show case. Mr. B. has never considered that he was suffering a humiliation because his fine flowing beard made an effective picture for exhibition; and Miss C. is not altogether displeased when she is selected as "leading lady" in a similar capacity. The fact is, the power proposed to be given whereby a photographer's premises may be searched for copies of some particular photograph is oppressive and altogether unnecessary, and might, in the hands of a malicious person, be very easily abused. If there be any distinct grievance in the present practice of exhibiting specimens, photographers, we are certain, would be only too glad to remedy it; but until it can be shown that this grievance exists, the insertion of Clause 10 can only be regarded as an effort on the part of interested persons to inflict a blow on the photographic profession, for which there is not the slightest excuse. It is to be hoped the societies, and the Photographic Society in particular, will not allow the matter to be overlooked, as it is only by publicity and discussion that the real feeling of photographers can be elicited.

A New Photographic Society.—The cry is still they come. The existing societies not being able to find enough to talk about, it is, we presume, considered to be a favourable opportunity to form a new society. The proposed association has, however, features of its own, and as discussions, the reading of papers, and even meetings are not contemplated, the difficulty of finding matter for talk will not be felt. The principal objects of the Society appear to be stated in the first and second rules:—These are: That the purposes of the Society be for the circulation of prints, negatives, &c., for the advancement of the science and art of photography amongst its members, each of whom will be requested to send in one print of each quarter or half-plate he may take for insertion in a scrap-book, together with a few brief notes respecting its reproduction, kind of plate used, lens, exposure, light, locality, &c.; that a note-book be published to each scrap-book, in which members may jot down any useful hints or information, interesting experiences, &c., which may, if suitable, be compiled and published, each member receiving a copy. We gather that this Society is intended to take in the whole country, which is to be divided into districts, through each of which one scrap-book shall be circulated at a time when, having gone the round of members in that circuit, shall proceed to the next. The idea is certainly a novel one, but with good organization should prove perfectly practicable. Mr. F. C. Cowley, of 106, Western Road, Brighton, and Mr. W. B. Allion, of North Stuff's Infirmary, Hartshill, Stoke-upon-Trent, are the originators of the Society, and ask for suggestions on the subject.

The Measurement of Actinism.—The last annual report of Mr. Angus Smith, the Inspector under the Alkali Act, contains a series of experiments in relation to the measurement of actinism which will be found interesting to photographers. An important part of the duty of the Inspector is to determine the amount of vitiation which the air undergoes in consequence of the acid smoke emitted by certain factories, and as this vitiation naturally includes the effect which this smoke may have upon daylight, it was necessary to adopt some means to ascertain day by day the actinism of the light. The method employed was that of Dr. Albert R. Leeds, U.S., based on the amount of iodide of potassium decomposed by light in the presence of acid. The plan is stated to be extremely simple, the solution holding the iodide requiring only to be carefully measured, the amount of acid demanded carefully added, and the mixture stirred, and exposed to the light in a glass vessel, which, if at all covered, must not be filled so as to exclude the air. Mr. Angus Smith does not claim absolute accuracy for this method. He says: "One sees the great difference there is between the bright days of summer and the dark ones of winter; but it is also clear that the table is not perfect. The point of zero is reached frequently, and there is no doubt that there are many differences swallowed up in that one figure. There ought to be a gradation below this. To obtain such a result, it would be necessary to have more refined measures. These can be obtained by the same method, probably; but they have not yet been put in practice." The district selected for observations was Manchester, and the observations extended from May 1880 to July 1881. Two readings each day were taken, one of 2½ hours duration, extending from 9·30 a.m. to 12 p.m., and again until 3·30 p.m., the whole duration being six hours. It should be noted that the result has little relation to clear sunlight, the value of the total effective light being taken. The tables given are confessedly incomplete, and, as Mr. Smith remarks, "there is a great deal to do." Indeed, their full value can only be estimated by comparison with similar tables compiled in other districts, and this comparison Mr. Smith has not been able to establish. The observations are quite new, and no doubt they will be followed by similar ones elsewhere, and, as Mr. Smith remarks, "it would be interesting if many observers would take a similar trouble in towns and in country places." The general results are, however, as they stand, instructive. They show that in the first seven months of last year April was by far the brightest month, a total of 44·2 being placed to its credit. From the end of that month to the end of July there was a steady falling off to 25·4 against 55 for the July of the preceding year. December and January show the low total of 2·1, and November is 13·9, comparing very favourable with February, which only scored 6·8. The highest figure was reached in August, 1880, when 66·6 was recorded.

WHY AND HOW I PHOTOGRAPHED THE DERBY.

BY A. L. HENDERSON.

A few lines on the above subject may not be uninteresting to some of your readers. Having received a communication from a well-known fine art publisher, asking me to recommend someone who could or would take an instantaneous photograph of the Derby for an artist to paint from, I volunteered to do so myself, provided I got a properly arranged stand on which to place my camera. With the view of such a commission my first thoughts were, to prepare an emulsion sufficiently rapid, that no matter what light we might have on the Derby Day, I would get a picture fully exposed. The manner in which the said emulsion was made I append, should you think it of interest; suffice it to say that I have published the formula before, with a slight modification.

On the morning of the Derby I received a final reply to the effect that the artist could not get the stand for me. Nothing daunted, I determined to try on my own account, accompanied by my äerial friend Mr. Cobb, and several others. We made a rapid and pleasant journey to the Downs by rail, and although not a betting man, I could not resist the temptation of getting up a "sweep" by the way. I did not draw the winning number, yet I am still possessed of the stakes, no application having been made by the respective winners. Once at the Downs Station, the first thing was to moisten our throats and proceed to the course 'midst clouds of dust. My friend, never having seen a horse race or Derby course, will not attempt to describe his impressions; I may hear his ideas from his own lips in verse at some of our social gatherings. My next care was to ascertain which would be the best light and point of view. To get a panoramic picture, the middle of the Downs was undoubtedly the best. Here I engaged, for a major consideration, a four-wheeled van, over which boards were placed, I having previously inspected a site by climbing a ricketty ladder to the roof of a show caravan the ladder creaking under my weight making me somewhat nervous. My nerves got strung to the highest pitch at the top, when I heard the roof cracking under me, and not knowing but what I might drop through into perhaps a lion's cage. Descending at the request of the owner, I made my way further on, which proved little better. Leaving Mr. Cobb on the four-wheeler, I made my way to a refreshment stall. No! No! not for a legitimate purpose, but to ask the proprietor to allow me to get on the roof. His pert answer was, "No! I don't want you to come through on the top of me!" to which I replied that I would like to be possessed of all the gold that could be piled on the top over ten tons.

My next attempt was more successful. I enquired of a gate-keeper if he would allow me to enter the stand for a few minutes, and return me the amount (7s. 6d.) if I did not like the position. Having received a negative reply, I asked for the proprietor. I was informed that there were two, and he could not say when or where I could find them. Nevertheless I entered, got a top position, with my back to the wind, and a very good view of the grand stand and the race-course. My large frame, for once, was of use to me, as it kept the wind somewhat from the camera; yet during all the exposures, I had to hold my camera down behind, while a Scotch friend held the front leg of the stand.

I was very much afraid that, at the most important moment, some excited spectator would thrust his head in front of my lens, and eclipse the view. Here my Scotch friend's presence became a necessity, as I made him take up a position in front of my camera. By-the-bye, I may as well mention my friend's name: Mr. Dow, an old amateur, and who, I am informed, took a Daguerreotype portrait by electric light as far back as 1847). The camera I used is a 5 by 5, with six double slides, made for taking negatives for the lantern.

The lens, a Derogy-back, focus $5\frac{1}{4}$ inches, and rectilinear form $\frac{f}{11}$; a drop-shutter—opening of slit of shutter three-quarters of an inch—fixed on the front of the lens. I exposed in all twelve plates, and got eleven good negatives, the twelfth—an experimental plate—being very much over-exposed. I enclose you some proofs for inspection. In No. 1 you will perceive that the horses look more like ostriches, in consequense of the movement. This is not at all surprising, seeing that the horses run at from forty-five to fifty feet per second, and, as my drop-shutter worked at *about* one-tenth of a second, the movement must be at least five feet during exposure. No. 2 is the actual Derby finish, and to the shutter I added an elastic band to bring it down faster. I cannot say what the exposure was. Mr. Haddon, Royal Naval College, Greenwich, has kindly offered to test the speed, when, no doubt, the result will be published); but all the twelve horses are fairly sharp, and the wonder to me is that the Jockey Club should not photograph the finish of all races. No judge's eye can be so true as a photograph.

I am afraid I am wearying your readers. I will give something more photographic, viz., the formulæ.

I may say I do not believe in chemical fog in emulsion—*i.e.*, if there is a large excess of bromide used, and all the chemicals are pure.

No. 1.

Gelatine	20 grains
Water	1 ounce

I put into a 20-ounce jar, or larger, dissolve, and add—

Alcohol	$2\frac{1}{2}$ ounces
Ammonia (·880)	$\frac{1}{2}$ ounce

The ammonia and alcohol must be mixed before adding to the gelatine; then add—

Bromide of potassium	200 grains
Iodide of potassium	2 ,,

No. 2.

Nitrate of silver	200 grains
Water	$2\frac{1}{2}$ ounces

Both solutions must be warmed up to 120°. Add the silver to the gelatine and bromide, &c., in a fine stream, stirring all the time. Replace the jar in the hot water, and add of dry gelatine 6 drachms. As soon as the gelatine is all dissolved—say ten minutes' frequently stirring—add slowly, still stirring, alcohol 12 ounces, warmed to 90°. When the glass stirring-rod is taken out, it will be found that *no* emulsion is adhering to it, and yet no emulsion is felt at the bottom of the jar. The fact is that it is in a flocculent state of suspension. Remove the jar from the warm water, and substitute cold, and in a short time the alcohol may be poured off, and some cold water put on; the emulsion is then removed to wash. It will be found in a cake at the bottom of the jar, and if any difficulty should arise in removing it, a horn spoon is a useful implement.

I do not like breaking up the emulsion into too small pieces, as so much surface is exposed to the washing water, and a slimy deposit precipitated. I generally allow a small stream of water to play over the emulsion all night. I place the emulsion in a glass measure, pour in water till the bulk is 8 or 10 ounces.

Warm up and filter, when the emulsion is ready for use. It may not be generally known that the best preservative for emulsion I have tried is ammonia and alcohol mixed with the emulsion; 4 drachms of alcohol and 2 drops of strong ammonia will keep 10 ounces of emulsion a very long time. I have some by me that has been prepared for many months uncorked, and there are no signs of decomposition.

In conclusion, I must ask your readers, when trying the above formulæ, to use the utmost precautions as to light. I would suggest two thicknesses of ruby glass, two of yellow pot metal, a small paraffine lamp turned down almost half, and not to expose a plate within six feet of the light, and then not longer than necessary.

[Mr. Henderson's pictures are exceedingly interesting, and if they do not present quite so plain a representation of the race as Frith's "Derby Day," there is a life and reality about them which is unmistakable. The "crowd" is a wonderful picture, and so is the "finish," if only for the interest shown in the backs of the spectators. The horses and their jockeys are also well seen, but many of them appear to have past the post and done racing.—Ed. P.N.]

ROYAL CORNWALL POLYTECHNIC SOCIETY.

We have received the forty-ninth annual report of this Society (1881), and subjoin the section relating to photography.

Professional and Amateur.

The judges have great pleasure in congratulating the Society upon the success of this department—both as regards the high technical excellence displayed in most of the exhibits, and also in the great increase in the number of pictures in comparison with the past few years. And, again, the judges notice the rapid strides which the gelatine process has made during the past year, most of the present exhibits having been taken by this process.

Section I.—Professional.

The landscapes in this section are few in number. Mr. A. Hendrey takes the only award (second bronze medal) for a frame of charming little snow landscapes (No. 796), being beautifully rendered, and superior to anything of the kind we have ever seen, the generality of this kind of work being very hard.

Mr. J. Milman Brown contributes six pictures, which are somewhat dull and heavy, the best being "Osborne House."

Mr. John Bates Blow sends two frames. One, containing nine views, mostly of Newlyn, near Penzance, the subjects in themselves being most admirably treated, would have taken an award had it not been for the want of finish. In several are large dark spots, which might have been touched out in the negatives. Three of the prints show great artistic taste in the treatment of the fishermen's cottages and surroundings, and the groups of figures being well arranged. The other frame consists of a carbon enlargement of two dogs, which also possesses some good points from a photographic point of view.

Mr. W. G. Long forwards a frame of ships of the Royal Navy. These are good specimens of the different styles of naval architecture.

Mr. Reuben Mitchell sends two frames, "Elm Trees" (No. 815) being fairly good. "A Coast Scene" (No. 814) is an instantaneous view of the sea beach, which is not very interesting, compared with other instantaneous pictures in the exhibition.

Mr. J. G. Whaite again contributes this year four frames of charming instantaneous studies similar to those exhibited by him last year; but the fact of his having secured a medal in this section last year for the same class of picture debars him from taking a medal again. The judges, however highly commend his pictures.

Mr. C. R. Lenthall, of Reigate, sends four pictures—namely two interiors, which show clean and careful manipulation; the others are a landscape and a group, which are fairly good.

"Chester Cathedral" (interior) is a grand picture, forwarded by Mr. Silvester Parry, and is one of the finest photographs of its class ever exhibited. To this the judges have awarded their first silver medal. The same gentleman has two other pictures—one entitled "Canine Friendship," and the other "A Church, with River Scene," which possess good qualities.

No. 721—a frame of botanical studies, by Charles Henry Evans—would have been much improved if they had not been so black and cold in tone.

Mr. David Hedges contributes four frames—three being studies of animals—in his well-known style.

A very interesting collection of six instantaneous pictures is exhibited by Mr. Robert Harris (No. 772), taken on board the steamship *Arab* going full speed. To this series the judges have awarded a first bonze medal.

The Platinotype Company send a large collection of examples of printing by their process, one great charm being absolute permanency. The finest specimen is a frame of four "bas-reliefs."

Mr. W. Harrison exhibits a fine interior of "Antwerp Cathedral," which, in the opinion of the judges, would have been improved if it had been printed in silver instead of carbon, as they do not think the print exhibited does full justice to the negative.

In portraiture Messrs Byrne and Co., of Richmond, send some exceedingly fine examples of portraiture on china, which seem to have an elaborate finish. To these a first bronze medal has been awarded. The same firm also send some good examples of cabinet and promenade portraits.

Messrs. John Chaffin and Sons have been awarded a second silver medal for their excellent portrait study entitled, "The Signal," which is very artistically treated, and the composition well carried out. They also send several other pictures, notably "Going to School," "Annie's Birthday," "My Pet," &c.

Mr. Julius A. Kay sends "A Portrait" (No. 730), in the (so-called) Rembrandt style, of Mr. Perrini in character, which is well treated.

Messrs. E. Day and Sons forward six portrait studies of heads (vignettes), which are very soft and delicate.

Messrs. E. Denny and Co. exhibit six frames of small portrait studies. One is a coloured group, scarcely suitable for a photographic exhibition.

Mr. Arthur Debenham is again an exhibitor. His portrait studies are very fine. "Painting the Plaque," in the opinion of the judges, is the best. The one entitled "Summer" is also very good, representing a young lady with a lawn-tennis racket, and is easy and graceful in pose.

Messrs. W. T. Morgan and Co., of Greenwich, receive a first bronze medal for their enlarging process with argentic gelatino-bromide paper, the results exhibited being very fine indeed, and appearing to require but little working up.

Nos. 766-7, two portrait studies by J. T. Robinson, cabinet size—one entitled "Catchy-Catchy" (a little, laughing child in night-dress, which is very amusing); the other a portrait of a boy. Both these show great artistic taste on the part of the photographer.

The finest and one of the grandest composition pictures this year is exhibited by Mr. Gillard, of Gloucester, and is entitled "Reading to Granny" (No. 771)—a cottage interior, the figure of the old lady being admirable. In the opinion of the judges it is the most natural photograph of the kind they have ever seen, and they therefore award it a first silver medal. Another picture by the same artist, with some cattle crossing the stream, is very creditable.

Mr. Thomas Protheroe sends four frames of portraits, cabinets, &c., which are good, but with nothing special about them of interest.

Mr. F. Argall contributes six frames of portraits, some of which are very good.

Mr. F. A. Bridge sends a group of eighteen eminent musicians and composers who performed the "Toy Symphony." It is stated that this photograph was taken in an ordinary room. On the whole it is a very interesting photograph, and is highly commended.

SECTION II.—AMATEUR.

Mr. G. F. Williams sends one frame (No. 851) of instantaneous studies on Margate and Ramsgate sands. In the opinion of the judges these are the best and most perfect of examples of instantaneous photography they have ever seen, and they have awarded to them a first silver medal.

Mr. J. G. Horsey has been awarded a second bronze medal for four frames of photographs, some of which are perfect little gems.

Four frames by Cecil V. Shadbolt have been awarded a first bronze medal for their excellence of rendering and technical perfection.

Again this year Mr. T. M. Brownrigg contributes some of his well-known landscape studies, the smaller sizes being considered the best. The four larger ones are a trifle too soft. A little more force and brilliancy would have left nothing to be desired.

Mr. Andrew Pringle sends five pictures; but, in the opinion of the judges, they do not come up to his exhibits of 1879. At the same time his present contributions show great taste.

Mr. H. B. Berkeley sends nine small pictures printed in platinotype, which appear somewhat heavy. If printed in silver the results, upon the whole, would have been undoubtedly better.

Mr. W. J. A. Grant contributes two frames of views taken in Nova Zembla, which are full of interest.

Nos. 883-4, by R. N. Hormazdji, are two small studies, which are somewhat marred by being a little too heavily printed.

Mr. S. P. Jackson sends nine small studies—mostly on the River Thames—of boats and water in motion, which are clever and artistic.

SECTION III.—PHOTOGRAPHIC APPLIANCES.

No. 894, by Mr. Otto Mohr.—Improved lantern stand fitted with dissolving taps and valves. In the opinion of the judges this piece of apparatus has an amount of useless work about it in the way of screws, &c., the back pressure valves being very defective in construction, and perfectly useless for the purpose for which they are intended. No. 895, by the same contributor, is a piece of apparatus called "an improved oxygen-gas purifier." This is very elaborate, to say the most of it. The numerous screws, taps, &c., seem to make the simple method of washing the gas very complicated, which is not very desirable.

No. 896—an instantaneous shutter—is a clever contrivance by Messrs. Hunter and Sands, of London, and seems very effective. No. 897, a camera with swing back, contributed by the same firm, is a useful and portable contrivance; but several London makers besides the one in question adopt the same form of swing back. No. 898 is a frame of instantaneous pictures taken by the above shutter.

No. 899 is an instantaneous shutter by Mr. S. P. Jackson. This is the most simple and effective of its kind, and less likely to get out of order than many, and to it has been awarded a second silver medal.

Notes.

The Arctic yacht *Kara*, with Mr. W. J. A. Grant on board, sailed from the St. Katherine's Docks on Saturday.

Our "Photographic Studios of Europe" will be published this month.

A Society of Assistants has just been formed in Vienna, which already numbers a hundred members.

We are glad to hear that Mr. W. Brooks, of Reigate, has been elected on the General Committee of the Cornwall Polytechnic Society, in recognition of his services in promoting the yearly Photographic Exhibition of that body

We spoke the other day of Dr. Eder's new work on photography, which is likely to be the standard authority for many years to come, and one, therefore, that every experimentalist and photographic chemist must needs have upon his book-shelf. We hear Part II. is now published by Herr Knapp, of Halle, in Germany, and will be forwarded in return for a Post Office Order for half-a crown.

M. Janssen still leads the way in photo-astronomy. According to *Nature*, he has produced some magnificent photographs of the eclipse at Meudon, where his revolver was set into operation to determine the first and last contact. He seems to have employed the Daguerreotype method for some of his plates, this being the only photographic method that will yield trustworthy micrometric measurements.

M. Janssen, we are told, also took two series of photographs thirty-four inches in diameter, one negative, and the other positive, by direct exposure, with two large refractors. This is the first time that the whole photographic power of the Meudon Observatory has been set into operation. At the sitting of May 22 of the Academy of Sciences, M. Janssen presented the photographs of the last contact obtained with his revolver during the eclipse, on a Daguerreotype plate. He stated that the inspection of the several images proved the contact to have taken place at a later time than that calculated.

"It has been drawn especially by Mr. T. Scott, from a very excellent photograph," a contemporary told its readers last week in presenting them with a picture of Mr. George R. Sims. But Mr. T. Scott does not say who was the very excellent photographer; his name, evidently, was not worth mentioning.

Outdoor photography by means of the electric light is the last novelty. Liebrich, the New York photographer, has secured a stereoscopic picture of Perry's Monument, which is said to be in some respects as sharp and clear as a daylight picture. The electric light was 360 feet distant from the monument, and the exposure given was four hours.

In our account of the Arctic yacht *Kara* last week we mentioned that a chain of observatories was to be established around the Polar seas. A Swedish scientific exploring party left Stockholm yesterday, the first of June, for Spitzbergen, with a view to ascertain if an observing station could be established so far north as that inhospitable island.

At Messrs. Valentine's establishment at Dundee they adopt a very simple method of drying the many hundreds of prints that come out of the washing trough every morning. In a long apartment under the roof are upright supports, and these permit a series of wires to be stretched from one end of the room to the other. The wires are stretched three together in the same plane, about three inches apart, so as to constitute a shelf, when cardboard is laid upon the wires. The prints are brought up after draining, a sheet of blotting paper is put upon the card, and the prints then laid down to dry. The drying room is twenty-five feet long, and we counted seven treble-wire rows one below the other. As there is plenty of air, and it circulates freely between the open shelves, the operation of drying goes on apace.

M. Dumas, the perpetual president of the French Academy, has been instructed by the Minister of the Interior to make a return of all persons who have been killed or maimed in the pursuit of scientific research. It is the desire of the French Government to make some compensation for such casualties, which have hitherto been disregarded. Some time since we remember meeting M. Henri Pellet, whose blue-lined copying process is so well known, and sympathising with him on the loss of the fingers of one hand, which he had sustained through experiments with gun-cotton and nitro-glycerine. "I suppose you will give up explosives, now," was our remark. Our friend laughingly shook his head; "I have my other hand still," he cried, holding it up.

News comes to us from America that Mr. Eastman is manufacturing gelatine plates especially for the Tropics; on the other hand, as will be seen in another column, Major Waterhouse writes from Calcutta that he has no difficulty in working ordinary emulsion plates in India, provided a few simple precautions are taken.

Truth says this is a fact—an electric fact. An old couple went to the Crystal Palace; were charmed with the electric incandescent lights; asked the price, and found it moderate, the Swan lamps only costing 5s. each. Their means were limited, but the advantages seemed great, and they resolved to risk it, and invested in three or four Swan lamps. "Of course," said the intelligent clerk, who handed them the Swan circulars, "you know all about the engines and the different systems of producing electricity?" "Jist like these fellers, my dear," said the cautious old gentleman *sotto voce*, nudging his wife; "come along, Maria." He thought he was going to be wheedled into buying a lot more things by a pushing young tradesman, and so the two hurried off. They got home, and, taking a box of lucifers, applied match after match to the "filament," after removing the globe (a vacuum) with some difficulty. Still the thing would not light. At last, enraged, they appealed to the firm, and were—too late!—initiated one step further into the mysteries of electric lighting, which certainly seemed to them to be a case of "*lucus à non lucendo.*"

Some of our readers may be familiar with the simple plan adopted for hermetically closing certain parts of the continuous lime and cement furnaces. It is done by means of a sand-joint. Round the top of the kiln is an annular furrow or ditch, which is filled with sand; when, therefore, the cover is put on, its circular edge or rim fits deeply into the sand, and the kiln is closed. Dr. Fol, it will be seen, in his paper in another column, ingeniously makes use of this simple plan to close his drying closet, except that instead of sand he employs shot, which, being cleaner and more convenient, makes a capital substitute.

The conviction of Young for writing a threatening letter to the Queen rested entirely upon the identification of his handwriting. It is usual in such cases to call upon an expert to give evidence as to the similarity between the criminal document and the avowed handwriting of the prisoner, and in this instance M. Chabot was the witness. It is a pity the jury do not form their own conclusions, instead of listening to an outsider who, however skilful he may be, as a matter of course is always interested in proving what he has been called upon to prove. The only difficulty in identifying handwriting lies in the fact that the characteristic turns and twists in the letters are so small and insignificant; but this difficulty disappears at once if enlarged photographs are produced. Their cost would not be so great as the fees of an expert, and it would be much more satisfactory for the jury to draw their own inferences without the intervention of a witness.

When we visited the Police Detective Establishment in Paris, last year, we saw several interesting photographs of handwriting. The pictures had been used in securing convictions, enlarged photographs being so much more useful than the employment of a magnifier, for one juryman can then point out to another any characteristic resemblance without difficulty. Enlarged to four or five diameters of the original, the photograph shows formations in the letters which are otherwise only seen by the expert after much searching. In Paris, the enlargements we saw were sometimes mere initials upon a receipt stamp (these represented cases of embezzlement); but, limited as it was, handwriting thus placed under the fierce eye of the camera never failed to reveal truths which, without the aid of photography, would most likely have remained secret.

We saw a startling pose at Van Bosch's studio in Paris the other day. It was that of a youngster standing all alone at the very brink of a precipice. Of course, it was all "make believe," but still the picture drew a good deal of attention on the boulevards. The rock, with its sharply jutting shelf, stands in the studio about two feet high, and by placing behind it a cloud background with a low horizon, the effect of danger is at once produced.

The same ingenious effect is obtained by a masthead accessory we noticed at Liverpool in the studio of Messrs. Brown, Barnes, and Bell. By perching a youngster in sailor costume—very favorite apparel for boys now-a-days—upon it, and also using a clear background with low horizon, the same illusion of "giddy height" was the result. And yet the boy sits but a couple of feet from the floor when his portrait is taken.

Mr. Comyns Carr, who represents the high art school of engraving, can see but little to admire in anything photographic, and he considers that a mysterious something accompanies a wood-block, which photo-engravings or photo-type blocks cannot realise. If those who manufacture photo-mechanical blocks would have the courage to destroy all which are not first-class and do not truly represent the beauties of the original photograph, we are sure we should hear less about the inferiority of such work.

For some time past it has been customary to attach to embassies a military attaché, whose anomalous duty it is to make himself acquainted with any novelty introduced into the army of the State in which he resides; details of such improvement or modification he then transmits to his own Government. It has now occurred to Germany that perhaps information on matters connected with the peace and prosperity of a nation may be just as useful as news respecting warlike improvements, and so in the future there is to be a scientific attaché to the German embassy to this country. It will not be long, we may be sure, before other countries follow the same sensible course.

TWELVE ELEMENTARY LESSONS IN DRY-PLATE PHOTOGRAPHY.

No. XI.—Varnishing the Negative—Printing.

The photographer who has followed our instructions to the present point will so far have produced only means to an end; the end itself will be nowhere visible. He has made the materials for a picture, but the picture has still to be constructed from these materials. However delightful a negative may be to the photographer as containing infinite possibilities, it is to the common eye by no means a thing of beauty. Every shade is, as we explained, reversed; before a natural effect can be produced these shades must be re-reversed so as to represent those of nature. This is commonly done by resorting to the process of printing. This process consists in the placing in contact with the negative a sensitive film usually supported on paper, and allowing light to act on it through the negative—the effect being, as a little consideration will show, a reversal of all shades.

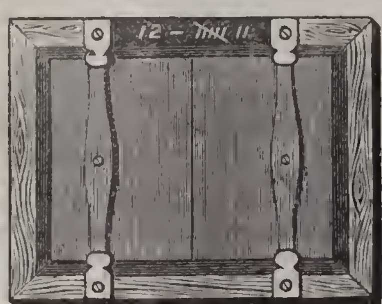
There are many printing processes, all of which may be studied with advantage by the amateur. Each one has certain advantages, and some are especially suited for certain purposes; but the process which, on the whole, has held its own against all others, and which for general purposes seems not likely to be soon superseded, is that known as "silver printing on albumenized paper." We propose to describe this, and to leave our readers to refer to more advanced or more special treatises for instructions in the various other processes.

"Ready sensitized" albumenized paper is now an article of commerce, and its convenience is so great that we should recommend its adoption by the beginner, and shall here describe the manipulation of such paper before we give instructions in the sensitizing of paper for immediate use. When the photographer has thoroughly mastered the process of printing, he will probably find that he can gain a higher degree of excellence by sensitizing his own paper; but certainly at first the contrary will be the case.

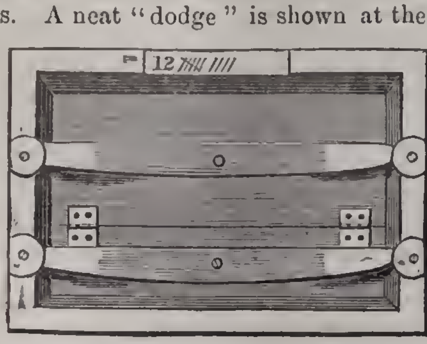
It is advisable to take a trial print from every negative before the process of varnishing is performed, and, in fact, if ready sensitized paper, which is always quite dry, be used, varnishing is not absolutely necessary. It is very advisable, however, and we shall describe the process before entering on the subject of printing.

After the negative is thoroughly washed and quite dry, take it by that corner which, were it a printed page, would be the left-hand bottom corner. Let it be warmed gently over a gas-burner till it feels just warm enough to be pleasant to the touch. If a gas-burner fixed above the level of the operator's head be used, a good criterion of the proper temperature is gained by watching the moisture which condenses on the plate from the water formed by the gas flame. When the moisture at first condensed is dispersed, and no more will condense on the plate, it is just at the right temperature. Let the plate be now held level by the corner mentioned between the finger and thumb of the left hand, whilst the varnish bottle is held in the right hand. Let a large pool of varnish be gently poured on to the centre of the plate. This pool should cover about half of the area of the plate. Let the plate be gently "tipped" so as to cause the varnish to flow first to one corner and then to another, beginning at that opposite to the one by which it is held. When the varnish comes round to the bottom right-hand corner, let the plate be tipped slowly up to a vertical position, so that all the excess of varnish may flow back into the bottle. The plate must be rocked from side to side during this part of the process to prevent the formation of crapey lines. When all the excess of varnish has flowed off, the plate must be again warmed—this time till it is about as hot as the hand can bear. When it is cold it is ready to be printed from. There is a vast difference between plates as to the ease with which the varnish will flow over them. The process is one which should in no case be performed over a choice carpet.

In printing with albumenized paper a printing frame is used. This apparatus is of various forms, but all these forms have the same object. They keep the paper in close contact with the negative, and are so constructed that one half of the print can be examined at any time, whilst the other is kept in contact with the negative to prevent it from slipping. In frames made at the present day the necessary pressure on the backs is gained by the use of springs. For small negatives, the frame is usually made exactly to fit the plate. In the case of large negatives—above whole-plate, for example—the frame is generally



made somewhat larger than the negative for which it is intended, and is fitted with plate glass, against which the negative is placed. The pressure of the springs would be liable to break a large negative were it not thus protected. In the case of large negatives it is also necessary to use a pad of felt between the paper and the back of the frame to ensure contact. We illustrate two of the forms of printing frames. A neat "dodge" is shown at the side of the



frame for registering the number of prints taken from any negative.

We shall suppose that our beginner has purchased a printing frame and a certain amount of ready sensitized paper. Let him cut the paper to about the size of the negative he has determined to print from. Now let him place a piece of the paper under the negative in the frame, and place the whole outside in a bright diffused light. It is not generally advisable to print in full sunlight. After the operation has gone on for a short time—say five or ten minutes—the result may be ascertained by taking the frame into a weak light on examining the print, one half at a time. The print must be made considerably darker than is required finally. The exact amount of depth that is lost in the after processes can only be learned by experience, but we may roughly say that it is necessary to print for about twice as long a time as that required to give a pleasing result in the frame.

When the desired number of proofs have been printed, the paper should be trimmed to the correct size. This is generally done with scissors, using "cutting moulds," or thin plates of glass, which can be had of any size. Many prefer to trim their plates after they have gone through the various processes of toning, fixing, and washing; but there are various advantages in trimming before toning. The clippings, if kept, become, when a large quantity has accumulated, of value; there is a saving of toning solutions, and the trimming is far easier to do before washing, as the paper lies flat; whereas, afterwards, it curls up in a way which makes it difficult to manipulate.

The following solutions should be prepared for toning:—

Chloride of gold	... ...	15 grains
Acetate of soda	... ...	1 ounce
Water	... ...	15 ounces

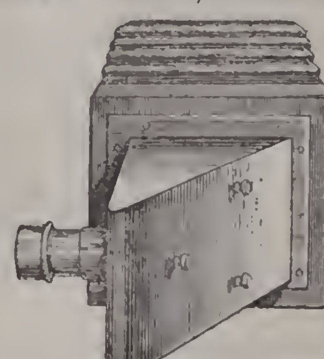
The chloride of gold is purchased in small sealed tubes holding fifteen or thirty grains each. One of these tubes is placed in a bottle capable of holding the whole solutions; when there it is broken by striking it with a glass rod, due care being taken not to break the bottle, which is quite possible. The acetate of soda is then added, and the water being poured in, the whole is shaken till the acetate dissolves. The solutions must be kept at least twenty-four hours before being used, and must not be exposed to a strong light. It should be labelled, "Toning solution, one grain to the ounce." The other solution which is required is one of three ounces of hyposulphite of soda to each pint of water, and should be labelled "Fixing solutions for prints."

NOTES ON REVERSED NEGATIVES AND SILVERING MIRRORS.

BY MAJOR WATERHOUSE B.S.C.,

Assistant Surveyor-General of India.

Reversed Negatives.—I have late been trying an arrangement made by Romain Talbot, of Berlin, for taking reversed negatives by means of a mirror placed behind the lens, instead of in front of it, as is usual, and find it answers very well indeed. It consists of a circular mirror about three inches in diameter, mounted as shown in the



figure, and is made for use with lenses with an aperture up to about $2\frac{3}{4}$ inches. I have not tried it with lenses of anything like this aperture; but with a Ross' No. 9 symmetrical it gives good definition over a 10 by 8 plate.

Another rectangular mirror about 8 by 6, belonging to the office, when fitted behind the lens, was found to give better results than when it was in front of the same lens, and altogether this arrangement seems to be an improvement over the ordinary one. A smaller mirror can be used, and the silvered surface is better preserved from dust and other chances of injury. It also seems more correct in principle, and less likely to cause loss of light and interference with the working power of the lens, that it should do its work before the rays are reflected, instead of afterwards.

I hope soon to make some comparative trials with negatives taken under similar conditions in both positions of the mirror, so as to ascertain more exactly the advantages of the new method.

Gelatine dry plates seem convenient for taking reversed negatives through the glass on the wrong side of the film; but the glass must be of better quality, and more free from blemishes, than that generally used by the makers of commercial plates; and the back of the plate must be quite clean and free from smears and patches of emulsion. There is no necessity for removing the spring of the dark-slide; a thickness or two of paper laid over the plate will effectually protect the gelatine surface from being rubbed or scratched.

While on the well-worn subject of gelatine dry plates, I may mention that I have been very agreeably surprised at the perfection at which the commercial manufacture of these plates has arrived, and the ease and comfort with which some kinds can be worked in the hot weather. We are now working with the thermometer inside a room generally in the nineties, and this even without the use of ice, though, as a matter of precaution, it is advisable always to use it for cooling down the washing waters in hot weather.

Silvering Mirrors.—Having recently to re-silver a reversing mirror, I thought that the formula given in Mr. Common's paper, "On Silvering Large Mirrors," published in the "Monthly Notices of the Royal Astronomical Society," vol. xlii., No. 2, for December, 1881, would probably be a good one, as he had used it for silvering a mirror thirty-seven inches in diameter; so I tried it, and found it exceedingly simple and efficient, more so than other methods I have used. It gives a fine strong coating of silver of good colour in about forty minutes.

Various silvering processes have been repeatedly published in the News and other journals, but a brief description of my successful experience with Mr. Common's formula may not be unwelcome to some who may be glad to know of a good method of performing this troublesome operation.

The solutions recommended by Mr. Common are three—

(1)	Nitrate of silver	1 ounce
	Distilled water	10 ounces
(2)	Caustic potash	1 ounce
	Distilled water	10 ounces
(3)	Glucose	½ ounce
	Distilled water	10 ounces

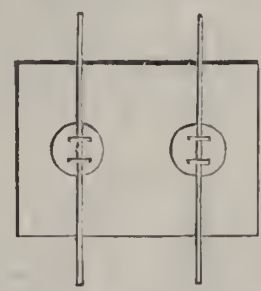
The above quantities are sufficient for 250 square inches, consequently an ordinary copying mirror 8 by 6 would require rather more than 2 ounces of each solution, and other sizes in proportion.

The caustic potash and distilled water must be quite pure. Ordinary caustic potash will not answer at all. The best to use is known as *pure by alcohol.*

The glass surface to be silvered is carefully cleaned with strong nitric acid, applied, as recommended by Mr. Browning, with a Buckle's brush, then well washed in clean water, and after rinsing with distilled water laid, face downwards, in a dish of distilled water till wanted.

Before cleaning the glass it will be necessary to arrange for supporting it face downwards in the depositing dish, so that the surface to be silvered may be quite horizontal, and just below the level of the fluid, which should be about half an inch above the bottom of the dish.

I have generally used a large cork, about four inches in diameter, cemented to the back of the plate, and fitted with three strings, by which it could be suspended in a level position and adjusted to any height by winding the string over a roller placed at a convenient height above the dish. As this arrangement was not available, I fixed on the back of the plate two ordinary wide-mouthed bottle corks of equal thickness in the positions shown in the figure, and to these corks attached thin slips of bamboo running transversely across the plate, and of sufficient length to rest on the sides of the dish, thus:—



The slips of bamboo gave the arrangement a certain amount of spring, by which the height of the plate could easily be regulated by putting on weights till the surface of the plate was just below the level of the fluid in the dish.

To prepare the silvering solution. A sufficient quantity of the silver solution No. 1 (2 ounces) is put into a perfectly clean glass. Ammonia is dropped in till the precipitate first formed is just re-dissolved. The same quantity of potash solution No. 2 as of silver is now mixed in, and the precipitate again dissolved by ammonia. A little more silver solution is then added to produce a distinct turbidity, and distilled water to make up the quantity necessary to fill the depositing dish to about three-eighths or half-an-inch, and the mixture is then filtered through cotton into another clean glass vessel.

The same quantity—two ounces—of filtered solution of glucose No. 3 as was taken of silver and potash is now mixed in, and the whole poured into a depositing-dish (which should preferably be of glass well cleaned with nitric acid).

The glass plate is then taken out of the distilled water, and laid face downwards on the silvering solution, being supported—as before described—just above the surface, so that the solution does not cover its back.

Mr. Common places the requisite quantity of distilled water in the dish, in which the mirror has been remaining face downwards, and then, having lifted the mirror up, pours in the undiluted silvering solution, together with the glucose solution, stirs well together, and then carefully lowers the mirror again into the dish.

Almost immediately after the immersion of the plate the silvering action begins, and, if things are going on well, a brilliant reflecting surface will be seen at the back of the plate; and in forty minutes, or even less, a good deposit of silver will be obtained. It is usually recommended to stop the action as soon as the silvering fluid appears clear and free from turbidity; but it is not always easy, I find, to see this.

After silvering, the plate is thoroughly well washed, finishing with distilled water, and dried off quickly. A slight cloudiness of the surface may appear, and must be removed by polishing before the mirror can be used. It is better to allow the mirror to remain a day or so before polishing, in order to harden the coating.

To polish the plate it should be slightly warmed, and perfectly dry, and rubbed very gently in small circles with a piece of very soft and dry chamois-leather, afterwards using a little jeweller's rouge.

Mirrors should always be kept in a dry place, and will require re-polishing from time to time.

It may be worth mentioning that, by mistake, the first time I tried Mr. Common's process, the potash solution was mixed at once with the silver solution, and the ammonia then added to dissolve the precipitate, followed by a little silver to produce turbidity. This did not seem to interfere much with the result, but the coating seemed to be rather brighter the second time, when Mr. Common's instructions were followed.

THE ENGLISH ECLIPSE EXPEDITION.

The eclipse is over, and the members of the different missions have arrived at Cairo on their return home, writes the *Times* correspondent from Cairo. They all seem satisfied with the result of their work, and it is probable that when their observations are properly discussed and reduced it will appear that this eclipse, although the shortest on record since the time that the value of eclipses has been properly recognized, has given us as great a harvest of fresh and important knowledge as was on former occasions secured during a much longer duration of totality.

It is difficult to give a description of the eclipse itself, and everybody who has had the good fortune to witness one will find that no description which he has read had in any way prepared him for the strange and exciting spectacle. In is indeed only when two or three eclipses have been witnessed that the phenomenon becomes sufficiently familiar to be completely enjoyed. Its distressing effect on animals has been often noticed, and it has always been found advisable to take strong measures for avoiding the intrusion of the easily excited population into the scientific observatories. Thanks to the efforts of Colonel Moktar Bey, aided by the local military authorities, soldiers were posted at intervals above the camp to prevent anyone who was not actually engaged in scientific work from approaching the observatories, and the cries which were heard during and immediately before totality proceeded from a crowd of spectators at a very respectable and safe distance.

The first contact took place a little over an hour before totality, and as the moon proceeded on her voyage across the solar disc, the air became cooler, and dark shadows were seen to cover the horizon. The observers, drawing each other's attention to the strange effects of illumination, involuntarily reduced their voice to a whisper. On went the moon, the darkness increased, a narrow strip of the sun only was left, and everybody silently withdrew to his post. A few minutes more and the corona shot out behind the dark edge of the moon, but a brilliant spark still showed that totality had not arrived, and that the last ray of the sun still found its way into our atmosphere. The spark is reduced in size; it has disappeared. The signal is given. The critical 70 seconds have arrived, during which every one is to do his work silently and steadily. There are moments, however, during which it requires a strong effort of the will to remain silent, and when, in addition to the corona for which everybody was prepared, a large brilliant comet was unexpectedly seen close to the sun, remarks were interchanged, and words passed which were not on the programme. Luckily, however, no serious disturbance took place, the totality was fully as long as was expected, and when the first ray of the sun had forced its way again over the edge of the retreating moon, all observers who could immediately judge of their results expressed themselves satisfied. It was some time before the photographic results were known, but they also proved satisfactory.

An approximate idea of the results which have been obtained cannot be easily given at present. The observations want reducing, comparing, discussing, and whatever is said at present may be subject to alteration or correction; but enough is known to show that all the trouble taken by the astronomers has not been wasted, and that all the kindness and hospitality shown by the Egyptians in the interests of science have been well rewarded. The French party consisted of Messrs. Trepied, Thollon, Puiseux. A great part of their work was done during the partial phase of the eclipse; the edge of the moon was carefully examined by them with two identical spectroscopes constructed by M. Thollon which unite great dispersion with good definition. Messrs. Trepied and Thollon express themselves with commendable caution as to their results; but there seems no doubt as to certain facts, and the only explanation which has at present occurred to them is the existence of the much discussed, often doubted, sometimes almost disproved, but always suspected, lunar atmosphere.

Professor Tacchini has also secured valuable observations of the spectrum of the corona. Little is known as to the results of M. Rauyard, who accompanied the French party. He confined himself to photography, and seems satisfied with the plates he has obtained. In the English camp, Mr. Lockyer, assisted by Mr. Lawrance, chiefly studied the uppermost layer in the solar surface, and he could utilize for this purpose several minutes before the total phase. His results are of importance, and in agreement with the phenomena predicted by him. Dr. Schuster, assisted by Mr. Woods, had charge of the photographic instrument. The plates used had been prepared by Captain Abney, who was, unfortunately, prevented from taking part in the expedition. As a sign of the great improvement which has taken place in the rapidity with which photographs can now be taken, it may be mentioned that when Mr. Brothers obtained an impression of the corona in 1870, during an eclipse which lasted over two minutes, it was considered a triumph of photography; while, during the present eclipse, a plate which was exposed for three seconds shows signs of over-exposure. The new comet appears distinctly on all the photographs. In addition, for the first time, a photographic record of the spectrum of the corona was obtained with a complete spectroscope. As some of Captain Abney's plates are sensitive in the red as well as in the blue, it may well be said that the day is close at hand, if not actually arrived, when every phenomenon seen during an eclipse can be photographed.

At a conference of the astronomers after the eclipse it was decided to give the new comet, discovered during totality, the name of the present Khedive, in recognition of the great help given by him to all observers. Three days after the eclipse the instruments were again in their cases, and only a few brick foundations remained as a memento of the important event which had brought astronomers from different parts of Europe to the village of Sohag, on the banks of the Nile.

ON THE EFFECT OF THE SPECTRUM ON THE HALOID SALTS OF SILVER, AND ON MIXTURES OF THE SAME.

BY CAPTAIN W. DE W. ABNEY, R.E., F.R.S.*

Three Parts of Iodide to One of Bromide.—When we take three equivalents of silver iodide to one of bromide the curves are somewhat modified. When washed paper prepared with the above proportions is allowed to print in the spectrum, we have the curve shown in fig. 54. When exposed damp in the presence of silver nitrate or other inoganic sensitiser, we have almost a facsimile of the curve in fig. 47.

Washed paper developed with acid developer shows that the proportion of iodido is so large in comparison to the bromide that the sub-iodide is not all destroyed, and we get the maximum corresponding with the maximum of pure silver iodide, fig. 55. The same paper developed with ferrous citrate shows a slight dip near G, fig. 56. The difference in 55 and 56 is seemingly due to the fact that silver iodide has more attractive power for precipitating metallic silver than has the bromide (a fact which is well known), and that the bromide is more amenable to reduction than is the iodide.

Figs. 57 and 58 are well worthy of attention. They are the results of the exposure of the same plate for different lengths of time to the spectrum. It was prepared in the silver nitrate bath, and exposed in the presence of free silver nitrate. Taking fig. 57 alone, it might be supposed that we had a similar case to that which we have recently considered, since we find an extraordinarily (apparent) greater sensitiveness in the green than in the violet, and yet we have the image formed in the presence of an excess of silver nitrate, which would be against the theory I have promulgated. Fig. 58, however, clears up the discrepancy; the maximum is found to be at G, and in this case the dip in the curve of fig. 57 is caused by the reversing action alluded to.

Fig. 59 gives the curve obtained by the above mixture of three parts of iodide to one part of bromide; when emulsified in gelatine the bottom curve shows a short exposure.

One Part of Iodide and Three of Bromide.—We now come to a mixture of one part of silver iodide to three of bromide. I have not described the printed spectra, since they correspond nearly with figs. 47 and 48.

If we compare the curves in figs. 60 and 57 we see a strange similarity between them; but if we take into consideration fig. 61, which is that due to a short exposure on the same plate, we shall

* Continue from page 295.

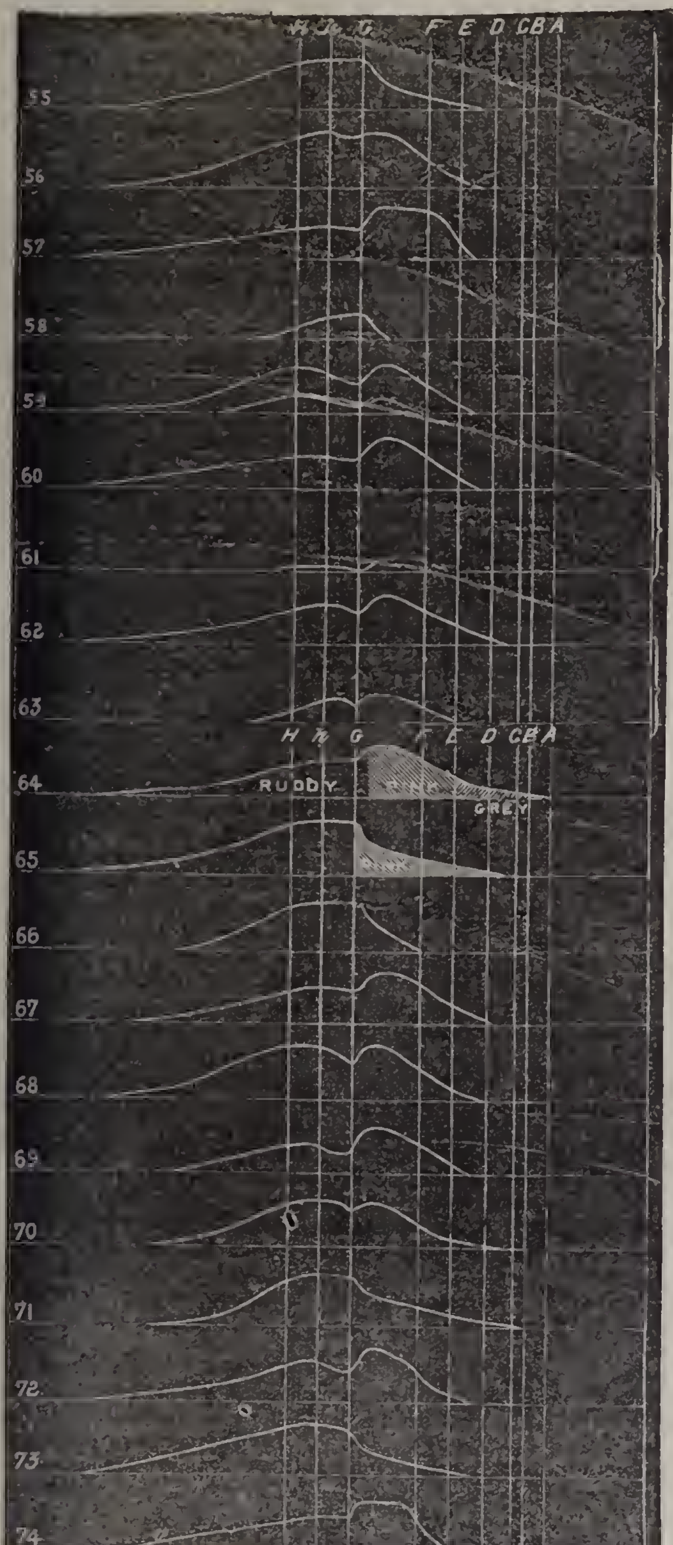
at once see that the dips about G are due to two different causes; the dip in fig. 61 is caused by the formation of the new molecule. Figs. 60 and 61 are also the curves shown by paper prepared with the above equivalents of iodide and bromide, and also of the same in collodion when developed by an organic ferrous salt. When developed by acid development, the curve in the more refrangible region is a little more pronounced in character.

Figs. 62 and 63 show the same equivalents emulsified in gelatine and developed by ferrous oxalate.

The different equivalent proportions of bromide to iodide, it will be noticed, show themselves in the curves more particularly when a comparison is made between figs. 51, 59, and 62.

Mixture of Iodide and Chloride.

Three Equivalents of Iodide to One of Chloride.—When paper is prepared with three equivalents of silver iodide to one of chloride, and washed and dried, or if exposed in the presence of dried silver nitrate or dried potassium nitrate, we have the curve shown in



$3AgI+AgBr$ on Paper developed gallic acid... ...	*Developed.*
Ditto, developed ferrous citrate...	*Developed.*
$3AgI+AgBr+AgNO_3$ collodion, wet plate, acid or alkaline developer	*Developed* (long exposure).
Ditto ditto	(short exposure).
$3AgI+AgBr$ in gelatine alkaline, or ferrous oxalate developer	*Developed* (long and short exposure shown).
$AgI+3AgBr$ on paper or in collodion, ferrous citro-oxalate developer	*Developed.* (long exposure).
Ditto ditto	(short exposure).
$AgI+3AgBr$ in gelatine, ferrous oxalate developer	*Developed* (long exposure).
Ditto ditto	(short exposure).
$3AgI+AgCl+AgNO_3$ on paper, or ditto washed, both dry	*Print.*
$3AgI+AgCl+AgNO_3$, wet, or $3AgI+AgCl+KNO_2$ wet	*Print.*
$3AgI+AgCl+AgNO_3$, or $3AgI+AgCl+KNO_2$ on paper, developed with gallic acid or ferrous citro-oxalate	*Developed.*
Washed $3AgI+AgCl$ on paper, ferrous citro-oxalate developer	*Developed.*
$3AgI+AgCl$ in gelatine developed ferrous oxalate...	*Developed.*
$AgI+AgCl$ in gelatine developed ferrous oxalate ...	*Developed.*
$AgI+3AgCl$ paper, washed	*Print.*
$AgI+3AgCl+AgNO_3$ wet	*Print.*
$AgI+3AgCl$ in gelatine or on paper, developed with ferrous citro-oxalate or acid developer	*Developed*
$AgI+3AgCl+AgNO_3$ acid developer	*Developed.*
$AgBr$ exposed to light, treated with I, exposed to spectrum	*Print and also developed.*

fig. 64. If, on the other hand, we have the same paper exposed moist, with silver nitrate or potassium nitrite, we have the curve shown in fig. 65. The reasoning applied to the mixture of iodide and bromide applies with equal force here, the results being modified for the shift of maximum of the chloride which lies about ½ Hh. In fig. 64 the most refrangible part of the spectrum as far as G is ruddy, between G and F a pink colour, and beyond that grey. This difference in colour indicates (as it does in all other photographed spectra where different colours are impressed or developed) a difference of compound acted upon. According to our theory the molecule acted on beyond G in the violet and ultra-violet would be $Ag_2I_2+AgICl$, and between G and E $Ag_2ICl+Ag_2Cl_2$ alone. The grey here is probably due to the organic silver compound formed in the paper.

Fig. 66 shows the same equivalents if contained in paper or collodion, and when exposed to light in the presence of moist silver nitrate or other inorganic sensitiser, and developed by acid or ferrous citro-oxalate developer, the slight modification due to the former developer noted above still holding good. Fig. 67 shows the same paper or collodion emulsion washed and developed with ferrous citro-oxalate. Fig. 68 shows the same when emulsified in gelatine and developed with the same ferrous developer.

There is a difference in the curves obtained with collodion and gelatine, but not more than is explainable by the fact that the former is essentially porous, and the latter almost continuous.

One Equivalent of Iodide to Three of Chloride.—When three equivalents of silver chloride are taken with one of iodide, we have, on printing a washed paper, the curve shown in fig. 70; exposing the same paper moist in the presence of silver nitrate we have fig. 71; the reasoning given when the mixture of bromide and iodide was under consideration holds good. Figs. 72 and 73 show the same equivalents of sensitive salts held in paper, the former showing the action of development on washed salts, and the latter on the same exposed in the presence of moist silver nitrate.

Fig. 69 shows the effect of the spectrum on equal proportions of the iodide and chloride when emulsified in gelatine.

Paper and also collodion films containing silver chloride were blackened in the light and treated with a solution of iodine till the darkening was obliterated, washed, and then exposed, with or without sensitisers; we had nearly the same results on printing and on development as shown in fig. 74; hence it was thought useless to repeat the curve there shown. (The same applies to darkened bromide treated with iodine, exposed to the spectrum and developed.) This appears to be a confirmation of the view already propounded regarding the formation of a new molecule, in the case of the chloride and iodide, the new molecule taking the form of Ag_2ClI, as already indicated.

From these results we may observe that to obtain a compound sensitive to the green a mixture of iodide and bromide, or iodide and chloride, should be employed, the former in preference to the latter, since it is more sensitive. The same sensitiveness to daylight with the former in gelatine plates can be obtained as when using pure bromide alone, the sensitiveness being preserved by a shift of the maximum to the green.

Mixtures of Silver Chloride and Bromide.

There is nothing special calling for remark in a mixture of these two sensitive salts. The printed spectrum and the developed seem to be a combination of the spectra impressed on each individually, a slight prolongation towards the least refrangible end taking place.

Mixture of Silver Iodide, Bromide, and Chloride.

When these three salts are combined together we have spectra which are very similar to the spectra produced on iodide and chloride, or iodide and bromide, with a prolongation towards the red.

Concluding Remarks.

In a paper read, in 1880, before the Photographic Society of Great Britain, I recommended the addition of a small quantity of iodide to the bromide used in the preparation of gelatine emulsion. On carefully examining spectra photographed on such plates (having $\frac{1}{12}$ part of iodide to $1\frac{1}{2}$ of bromide) I find traces of the loss of sensitiveness about G. I stated also that addition of iodide diminished the sensitiveness of the bromide to the red rays; an examination of curves given for the mixtures of bromide and iodide of silver bears out my statement.

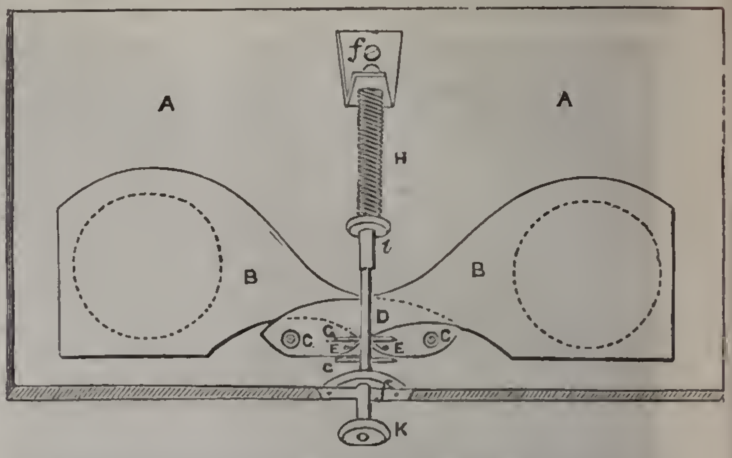
It will be noticed that I have not touched upon organic sensitisers of the haloids, prepared with an excess of silver and then washed, and such sensitiser applied. I have only treated of the haloids themselves, endeavouring to eliminate every extraneous effect which would modify the action of the spectrum.

REGULATOR SHUTTER FOR STEREOSCOPIC WORK.

BY P. H. PHILLIPS.*

In these days of rapid gelatine plates the necessity for some means of obtaining the minute and exact exposures required has led to the production of shutters, instantaneous and otherwise, truly bewildering in their number and variety. None, however, with which I am acquainted supply the want experienced in my own case, namely, a plan by which both halves of a stereoscopic plate could be exposed simultaneously, giving precisely the same exposure to each, and allowing any latitude desired in the duration of such exposure.

I consequently contrived and manufactured one for myself which I considered would fully meet the requirements of my own case. The following is a diagram and description of the shutter in question:—



A, base of wooden frame of shutter; B B, shutters made from thin sheet brass or ebonite; C C, screws acting as pivots for shutters; D, steel piston working up and down through bridges, *f f*; E E, two pins attached to shutters, working between the parallel bars, G G (which are in holes drilled through the piston), causing the shutters to rise and fall with the piston; H, cylindrical spring to aid in closing the shutter, the force of which may be regulated by raising or lowering the collet, *i*.

On lifting the piston, D, by means of the button, *k*, the lower bar, G, engages with the pins, E E, thereby raising the shutters clear of the lens aperture. The shutters fall by their own weight, assisted by the spring, H. A shallow box with the necessary apertures should be placed over the front of the shutter, to make the whole light-tight. By means of a small india-rubber bladder enclosed in a tube under the button, *k*, and inflated by a pneumatic syringe, the exposure may be regulated to any extent from about the fourth of a second to five minutes or more duration.

* A communication to the Liverpool Amateur Photographic Association.

Correspondence.

HOT-WEATHER TROUBLES.

Dear Sir,—I have, during the last nine months, made all my own plates, the formula being Dr. Eder's, as described in his book; and until three weeks ago everything went on successfully, when the plates frilled so much that it became impossible to develop them. Thinking a harder gelatine would prevent it, I used only Coignet's; but still they frilled. I then reduced the quantity of water, but the result was just the same. I then thought an emulsion which contained no ammonia might answer better. Accordingly, I tried the process described by Mr. W. K. Burton in his lecture at the Society of Arts, but with no better success. I prepared some plates one day by the latter process, in which six ounces of water were used instead of eight, and to which I also added two drops of a ten-grain solution of tannic acid in alcohol. This time I felt sure of succeeding, but, on developing next day, to my great disappointment, the defect still remained—the emulsion seemed perfect excepting this one grave fault.

The mode of drying the plates is exactly like that described by Mr. E. Phillips in the Year-Book for 1881. The weather down here is very warm, but I have experienced no difficulty in getting the plates to set: in fact, they set quite as hard as they did in winter. Is it the mode of drying? Do you think if I were to dispense with the lamp, and use sulphuric acid, the difficulty would be overcome? In trying Mr. Burton's process I used Nelson's No. 2 gelatine. Northumberland.

Proceedings of Societies.

LIVERPOOL AMATEUR PHOTOGRAPHIC ASSOCIATION.

A MEETING of this Society was held at the Free Library, on Thursday, the 25th ult., Mr. E. ROBERTS, President, in the chair.

The usual formal preliminaries having been transacted, Mr. T. Newall and Mr. J. Billington were elected members.

The CHAIRMAN then delivered an address upon instantaneous work, giving many useful hints and directions, especially for the photographing of animals.

A discussion took place as to the date and place of a proposed excursion. It was finally resolved, after many proposals had been discussed, to visit Storeton, near Bebington, on Saturday, the 10th of June, and Mr. B. J. Sayce kindly undertook the office of conductor on the occasion.

Mr. H. E. WOOD showed an "academy" camera and a small and portable stand made on Kennett's principle. The camera and changing-box excited a great deal of interest.

The HON. SECRETARY exhibited one of Lancaster's instantographs, with the new lens and instantaneous shutter. The apparatus was greatly commended for its combined lightness, portability, strength, and inexpensiveness. It was thought that the aperture of the shutter should be enlarged; but that in other respects the exposer was an exceedingly good one.

Mr. PHILIPS described a new and most ingenious shutter of his own make and invention, designed for two stereoscopic lenses (see page 318).

Mr. BOOTHROYD exhibited a fine enlargement of one of his negatives, made by Mr. Morgan.

Mr. SAYCE showed a print taken in mid-ocean on board the *Aconcagua*. The group could hardly have been more successful had it been taken in a studio.

The CHAIRMAN displayed a large number of excellent pictures of cattle, &c., in illustration of his address.

Mr. SAYCE having proposed a hearty vote of thanks to the Chairman for his valuable address, and for the interesting series of prints which accompanied it, the meeting adjourned to the last Thursday in June.

THURSDAY EVENINGS FOR PHOTOGRAPHERS.

AT the meeting held on the 25th ult., Mr. C. J. OLDHAM, of Graham's Town, Cape Colony, occupied the chair.

Mr. PRESTWICH exhibited a set of cutters for cutting the paper to the various sizes before printing. They consisted of steel frames, having knife edges, and were used in a hand-press, Mr. Prestwich stating that he was able by this means to cut from sixteen to twenty thicknesses of paper at one operation. The only drawback to their use was that the edges of the prints were liable to get ragged during toning, &c.

Mr. HADDON said he had measured the exposure given by the shutter he used to photograph the eclipse of the sun, and found it was between the 80th and 90th parts of a second.

Mr. BROWN passed round a solution made from a specimen of an article sold as Judson's *aurine*, which had been handed him by Mr. Debenham, but which, when examined by the spectroscope, was found to be perfectly unsafe as a dark-room medium, differing totally from any other sample he had tried. He also exhibited some plates coated with an emulsion made from a sample of Kennet's pellicle (some of the first made) handed to him by the Chairman at the last meeting. He found them rather slow and slightly fogged through the pellicle having been kept in the packet in an unsafe light.

Mr. HENDERSON passed round two negatives, both taken with a drop shutter under the same conditions, one by the Ampit and one by the boiling process; the Ampit was about six times as sensitive as the other.

The CHAIRMAN showed a model of a portable studio, made from designs by Mr. Cowan, which he intended to have constructed and take back to the Cape with him.

Several gentlemen then related their experience with Dr. Eder's new intensifying process as published in the NEWS of the 19th ult.

Mr. BROWN found it slow in action, and most dense in the yellow or first stage.

Mr. COLLINS had also used it successfully, he finding it very dense in the first stage.

Mr. HENDERSON exhibited a series of negatives taken at the Derby, one of the race being especially fine.

Mr. BROWN passed round a plate showing the reversed action of light.

Talk in the Studio.

MR. SAMUEL WALKER, OF REGENT STREET.—In speaking last week of Mr. Mayland's retirement from Regent Street, we should have mentioned that his valuable collection of negatives has been taken over by Mr. Walker. Mr. Walker, we believe, has for years past possessed an interest in the Houses of Convocation; at least, his fine series of portraits of the bishops and clergy might lead one so to suppose. Or, possibly, it is the new "Church and Stage Guild" with which he is connected, for a magnificent portrait of Mr. Irving, our *premier* actor, and another of Miss Ellen Terry, both emanating from Mr. Walker's studio, have recently found their way to our office. We have never given an "At Home" at Mr. Walker's for the simple reason that he is generally out, taking portraits "at home" on his own account; in fact, most of Mr. Walker's portraits are, we believe, not taken in a studio at all, but at the residence of the sitters themselves.

THE AUSTRALIAN CRICKET TEAM.—Messrs. Stilliard and Co., of Oxford, send us a series of portraits of the Australian team of cricketers. The pictures were secured on Wratten plates, and not a single film was spoiled in taking the series, says our correspondent. The series contains some very fine portraits, and none of them are anything but satisfactory.

THE PHOTOGRAPHIC CLUB.—At the last meeting Mr. White showed the old-fashioned "lamp without flame," in which a thin piece of platinum is kept incandescent by the slow combustion of alcohol vapour, and said that he had found it answer fairly well as a dark-room lantern. Mr. J. T. Taylor then made some remarks on the peculiarities of certain photographic lenses of American origin, and it was announced that at the next meeting he would exhibit several of the instruments, and describe them in detail.

THE ALEXANDRA PALACE.—On Monday last, several highly-successful photographs were taken in competition for the prizes offered, and the decision of the judges will shortly be given.

BICHROMATE OF POTASH DISEASE.—The corrosive action of the bichromates is well known, but the *Times* tells of other injurious influence. It says:—"It has been observed that the manufacture of bichromate of potash has a singular effect upon the nose, manifesting itself in a curious manner. A little hole is formed on the *septum* or partition of the nose dividing the nostrils, and increases gradually until the partition entirely disappears, with the exception of its lower part, so that to a superficial observer there is nothing the matter with the nose, except a little outward depression. It is noticed that as soon as the partition is destroyed the process appears to stop there, neither the lungs, air-tubes, nor throat being in the least degree affected. Some workmen at the chrome factory in Russia, where the disease has been chiefly watched, have been employed for ten years and remained unaffected, while with others the hole in the nose begins to be formed after one month's work. But that the disease is something more than an individual peculiarity is evident from the fact that an inspection of all the hands proved that more than 50 per cent. of the men had diseased noses. The early symptoms are a slight tickling of the part affected, followed by bleeding, but with no uncomfortable feelings, and, in fact, the destructive process is painless.

HANGING AT EXHIBITIONS.—A good many complaints have recently been made on the subject of hanging photographs at Pall Mall. But to judge from the following remarks in *Truth*, exhibitors at the Royal Academy have more reason to cry out. "Never was the grumbling at the hanging at the Royal Academy louder and deeper than it has been this year, and no wonder. No less than nine thousand contributions had to be inspected and the fate of each decided upon. Pictures and sculptures, &c., are sent in up to the end of March. The hanging committee sit for about five days to discriminate, and the rest of the month is devoted to hanging. This is at the rate of adjudication upon 1,800 works of art *per diem*. Say the working day is ten to six, with an hour for luncheon. This gives over two hundred and fifty-seven contributions to be inspected per hour, or less than fifteen seconds average for deciding the fate of what may be the making or marring of the struggling artist. Does anyone suppose that such cursory glances, even by experienced eyes, can fairly estimate the merits of the productions in competition?"

REMARKABLE EXAMPLE OF REFRACTION.—Herr Hakonsen-Hansen draws attention to a remarkable phenomenon due to refraction, observed by him at Trondhjem, on January 17, and similar in all respects to one witnessed by him at the same place on November 15, 1881. On both occasions, at 2.50 to

3 p.m. in the day, a rose-coloured stripe was seen to stretch across the sky from about north-west to east. From the middle of this rose a vertical column of a somewhat lighter red colour, and inclining on its western side to a shade of yellow, the whole being intensely luminous. After remaining visible for about ten minutes, the bright reds and yellows gradually faded away, leaving nothing but a blackish-grey streak across the heavens. The sudden and striking apparition of this vertical column recalled, as Herr Hansen observes, the descriptions given in past ages of bloody crosses seen in the heavens, and regarded as prophetic of coming wars and pestilence, and he remarks that if it had been seen at a later period of the day, it might have been taken to be a specially brilliant aurora.

To Correspondents.

All Communications connected with Advertisements and Business to be addressed to Messrs. Piper & Carter, "*Photographic News*" *Office, 5, Castle Street, Holborn, E.C. Advertisers are requested to make all Cheques payable to* Messrs. Piper & Carter, *and crossed* "*Union Bank, Photographic News Co. Account.*"

*** We cannot undertake to return rejected communications.

Provincial.—There would be no difficulty in developing carbon prints on the articles in question, but the slight unevenness of surface would render it difficult to print by the ordinary methods.

T. E.—The best thing to do in such a case is to direct a letter of enquiry to the Inspector at the Police Station nearest ——— Street.

Bewildered.—Either you must have been misunderstood, or an attempt has been made to perpetrate a joke at your expense. The element carbon is said to be dimorphous, as it crystallises in two incompatible forms, the crystals of plumbago being six-sided tables belonging to the hexagonal system, while those of the diamond belong to the regular system, being derived from the cube. The peculiar crystalline carbon which has been found at Singbhom, near Calcutta, is neither diamond nor plumbago, and it may perhaps constitute a distinct form of carbon. Uncrytallised or amorphous diamond is of little value except as a cutting material when reduced to coarse powder; but the amorphous or non-crystalline plumbago is well adapted for the manufacture of the best pencils. The ordinary or crystallised plumbago yields a powder which consists of minute cleavage plates derived from the original tabular crystals, and it is of especial value in electrotyping, for protecting iron work, and as a lubricant. It is a curious circumstance that when carbon separates from a liquid it generally takes the form of plumbago, and not that of diamond. In the case of the recent artificial production of diamond, it is difficult to determine the exact conditions under which the deposition occurs.

Captain Turton.—You will experience no difficulty in removing it with a mixture of equal volumes of alcohol and ether.

Little Nemo.—We can trace two kinds of spot: one which looks as if due to the presence of hyposulphite in the mount, and the other appears to arise from contact with bronze powder. Try fresh mounts. Damp considerably expedites the mischief in either case.

X. Y. Z.—The cattle picture is the best of your series, and you had better submit this to a photographic publisher; but you will find it difficult to compete with the numerous excellent photographic scraps at present in the market.

A. M. M.—Your proportions are approximately correct, and we can only conclude that the negative was too much over-exposed.

Edward Ashby.—1. It should be grains, not minims. 2. We are under the impression that they have been advertised in the News. 3. In a few weeks.

Aqua Regia.—When in the form of wire it dissolves with remarkable slowness.

Novice.—1. Very much under-exposed. 2. A saturated solution. 3. Hardly sufficient to ensure perfectly equal resistance. 4. No.

Argent.—Although it is readily reduced under the circumstances, we would advise you not to attempt it as a working process.

Busy.—1. Under such circumstances the copyright of the picture should belong to the photographer. 2. Not unless a definite agreement was entered into at the time.

Erratum.—In Mr. A. Reimann's letter on "Developing with Soda," in our last, for "*hyposulphite* of soda," read "*hypophosphite* of soda."

T. E. G. G.—The description is quite correct; the bichromate serving to undo the work effected by exposure to light.

C. E. G.—Chrome alum is to be preferred.

Advertisements should be sent to Messrs. Piper & Carter, "Photographic News" *Office*, 5, *Castle Street, Holborn, E.C., not later than the 10th inst.*

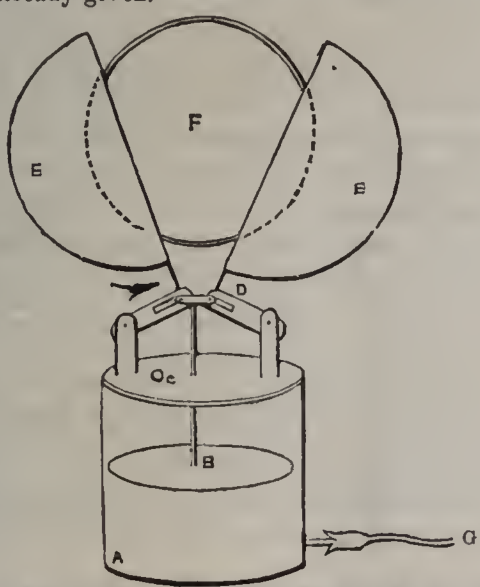
THE PHOTOGRAPHIC NEWS.

Vol. XXVI. No. 1240.—June 9, 1882.

CONTENTS.

MR. SPINKS' PNEUMATIC SHUTTER.

The novel and ingenious pneumatic shutter which we described on p. 194 of the present volume is the invention of Mr. Henry Spink, of Brighton, and we are now enabled to give our readers a sectional drawing of the working parts of the shutter as now found best in actual practice. No detailed explanation is necessary, a mere inspection being sufficient in the case of anyone who has followed the description already given.



Sectional diagram illustrative of Spink's pneumatic shutter; half open. A, cylinder; B, loose piston or plunger; C, hole in lid for escape or entry of air; D, cross head and crank action for moving flaps, E E; F, lens; G, flexible tube joined to pneumatic ball.

With regard to the practical working of the shutter, Mr. Spink writes as follows :—

Having been requested by the worthy Editor of the Photographic News to give some particulars regarding my shutter, I do so with pleasure, as I am confident it will be found a great help to any portraitist who tries it, especially as regards the attainment of what constitutes the greatest element of success in portraiture, viz., expression. Having been engaged daily for many years in the practice of photography, and often being obliged to deal rapidly with numerous sitters, I found the greatest causes of delay and failure were movements by the sitter from nervousness or ill ease. I therefore set to work to devise some means of making the exposure without the sitter knowing *exactly* when it was done, and, after many experiments, devised the simple little machine already described. It was first made many years ago so as to work with a string and balance weight. I afterwards, after trying electricity, adopted the air-ball, but the top arrangement, the idea of which was taken from a pair of scissors, remained the same. A very short description will render the arrangement clear to any one, and the apparatus can be readily made.

Suppose the shutter to be closed, a touch on the air-ball opens it, and all is ready for focusing. Another touch, and it closes ready for the exposure. Now you have a stiff and nervous sitter; face drawn, eyes rolling, convulsive twitching, and general uncertainty as to whether the hair cap, ribbons, coat, or tie, whatever it may be, is all right. The first thing I do is to show them their image in a small hand-mirror, and gently place the head in a suitable position, at the same time remarking pleasantly, "I should like you to look just like that; in fact, you look so well that any great change is likely to be for the worse. "This observation generally causes them to take pains to keep their position. I then make my little arrangement as to cuffs, chain, folds in dress or coat, &c., talking pleasantly all the time, which need not be many moments. I then step back and take a general view of the victim—the air-ball lies on the tail of the camera out of sight—so I then take an imaginary picture, perhaps two, saying, "Look here!" or "Look there!" in the meantime working myself towards the air-ball. When within reach—speaking slowly—I remark, "You have managed that very nicely indeed; I am much obliged." An easy and gratified expression steals over the face of the sitter. I go on slowly, saying, "But we will just try one more; I shall be ready in two seconds; many thanks to you for having so much patience to keep just so," &c. But before this time the real exposure is generally over. Again, in taking a dog, the shutter is very useful; any movement the dog can see makes him restless, as a dog generally watches the hand. I think it is because the hand feeds him, pats him, or thrashes him, as the case may be, and he looks after your hand: therefore, when you move your hand up to uncap, or if you open an outside shutter, the action causes him to move his head. In the case of my shutter, there is nothing he can see, and consequently a better chance of success.

In conclusion, I can only say that, being greatly indebted to many gentlemen of the profession for assistance in difficulties, and valuable information, I am only too happy if the shutter, or anything herein written, should be of any assistance to a generally painstaking and hard-working fraternity, in their endeavours to do good work and give satisfaction to that "many-headed monster," the public.

At Home.

M. J. GANZ IN THE RUE DE L'ECUYER, BRUSSELS.

Brussels may be said to be celebrated for two things; its dear hotels, and the absence of any great object to interest travellers. There is Waterloo in the vicinity, it is true; but the hot dusty fields require no little cool courage to face, and you must follow the advice of "the little marchioness," and pretend a good deal, if you are to realise the famous battle. The dear hotels are, of course, a relic of Waterloo—about the only genuine relic left, we suspect—and if the clean little capital is still to attract tourists, it will have to get rid of them; otherwise Paris, with its heavier metal and lighter cost, will draw off the visitors of the future.

We need not specify the name of our hotel, for an experience of several visits has shown them to be very much alike. But a quotation from the tariff "hung in every room" shows so well the relation between visitor and host, how the former must conform to this regulation and to that, under certain penalties, that we cannot refrain from alluding to it. The room might be a cell, and the visitor a convict, he could not be more in the power of the landlord when once he has unstrapped his portmanteau and taken possession of the quarters. As he walks uncomfortably up and down, he consults the tariff much as he would the prison rules. The price of this room is six francs a day, is the stern edict at the top; *but*, runs the first severe warning, if the traveller occupies it but one night, he will be charged eight. The charge exacted for your dinner, please to bear in mind, will be so much; *but* if you take it after prescribed hours, it will be so much more. The charge you will be mulcted for service is one franc; *but* if you do not take your meals regularly in the house, an impost will be made over and above this. What the amount of the penalty will be is not specified; no doubt it depends upon how you otherwise behave yourself, and whether the gold-capped porter below has other complaint to bring against you.

The Rue de l'Ecuyer is exactly like our Baker Street at home. It is narrow, crooked, and ill-paved, it is true, while Baker Street is a broad, straight, and even thoroughfare; but it contains an élite congregation of photographers. Here is the establishment of MM. Ghèmar frères; both brothers, alas! have gone to their long rest, but we remember forming one of a big group of volunteers sixteen years ago at the palace in Brussels, and being photographed by the firm, which then held the rank of court-photographers. Here, too, is Géruzet, one who has made a European reputation by the circumstance that he prints in permanent pigments, and in pigments alone. And here, too, is M. Ganz's noted little studio, which we have come to visit, and give some account of to our readers.

M. Ganz carries on his work very quietly. He would like to exhibit more specimens in the salon, only he cannot. He is perfectly satisfied with his *clientèle*, except in this respect: they refuse permission for their photographs to be exhibited. The aristocracy of small capitals is always more punctilious than that of larger ones, as anyone who has a knowledge of the little German dukedoms and their surroundings know very well. A princekin, let him be ever so microscopic, has a tremendous idea of his dignity, and his court ladies and gentlemen are naturally imbued with the same ideas. In Brussels there is to be found a good many representatives of *la vielle noblesse*, and from these, it seems, it is difficult to obtain permission to exhibit a photograph in the show-case, or even in the salon. Moreover, as the professional beauty does not occupy a place, as with us, among the upper ten, there is not even this source at the disposal of the photographer.

Boudoir and promenade pictures are in demand at M. Ganz's studio, and share with the cabinet equal favour. M. Ganz's work is especially soft and brilliant, and marked throughout with good taste. A fine picture of Listz, the famous composer and pianist, his soft white hair contrasting with his vigorous features, struck us particularly. M. Ganz studies a good deal from Meissonier's pictures, and in posing and grouping seeks to follow the example of this master of art. Our Brussels host, indeed, has courageously set himself the task of reproducing some of Meissonier's chef-d'œuvres, the French painter's "Brawlers" being here most faithfuly and successfully pourtrayed. The two combatants, one with drawn sword, and the other in the act of drawing, each held back by a group of friends, are wonderfully well set forth, and with a reality and truth that is astonishing; while the lighting, modelling, and posing represent very finished photography.

"In these group pictures," says M. Ganz, "I always find that the background employed appears too clear and prominent. To subdue this effect, and throw up the action of the picture, is therefore very necessary; to do this, thin tissue paper is put at the back of the negative, which is then stumped with graphite dust wherever this appears to be required."

We walk upstairs into the studio. It is a large, roomy apartment, with a lofty glass roof—"too lofty," our host assures us. There are two layers of curtains overhead, one above the other; the upper curtains, stretched immediately under the glass roof, are of blue linen, while six feet below is a horizontal curtain of brown holland. There is plenty of light at Brussels, but of course the two curtains are only employed in the height of summer. M. Ganz employs large backgrounds; those we see are not less than ten feet broad. He need not then change them so frequently, for two dissimilar pictures are at once produced by using different portions of the screen as background. He mounts the backgrounds on castors, so as to be able to move them without disturbing the sitter, and to slope them towards or away from the light as he may deem expedient.

Gelatine plates are in general use in the Ganz establishment, with oxalate development; but the silver bath has still a place on the premises, for it is employed for enlargements. M. Ganz agrees with Angerer in his process of producing enlargements, with one little exception, that, when it comes to making the carbon cliché, he makes use of red pigmented tissue, instead of black. M. Ganz takes from his negative an enlarged transparency upon a collodion plate, of the same size, in fact, as he desires his finished picture to be. He does a little retouching upon this collodion positive—but not very much—and then prints from it, in a pressure-frame, an impression in carbon, or, rather (as we have said), in red pigment. This is developed upon glass, and the huge reddish-brown negative thus obtained he again retouches. The red pigment seems to impart more vigour to the details in the shadows, which bid fair to be lost altogether in an enlargement if this is not very carefully handled. M. Ganz believes in maintaining his silver bath for these large transparencies at an equal and moderate temperature, and, for this reason, allows the bath to be lowered into a cupboard, the temperature of which may be regulated by the aid of a small Bunsen burner.

We ascend to the printing-room. M. Ganz employs albumenized paper with a slight roseate hue. "But I find you cannot always depend upon it, and therefore I never accept a supply without first practically testing the paper. Many samples, after toning and fixing, are apt to assume a yellowish tinge."

The printing room deserves a few words of description, for it is very practical and convenient. Imagine a square turret-shaped room; the interior is not very light, so that in the middle of the room the printing frames may be opened, and fresh paper substituted for the printed impressions. There are two large windows, or rather two openings, broad, but not high, in the room, facing different points of the compass, and here are the trays upon which the printing frames rest; in other words, there is a window facing north, and another east. The east window being much exposed to the sun, a light awning is used to protect the frames in glaring light. This awning is simply a light frame-work with tracing-paper stretched over it. As in most printing establishments, the trays may be pushed out, or drawn in, according to the nature of the light; but, besides this choice, the printer can make selection of the two aspects, for his negatives. While one window has light flooding into it, the other is in the shade, and hence delicate printinng can be conducted without difficulty. The printer has both batches of frames under his hands at the same time, and may, indeed, if he so chooses, change the printing of a negative at any moment. It is a question here, as in many high-class studios, not to get off a large number of prints during the day, but to print as carefully as possible, especially in the case of vignettes, to which too much attention cannot be given, and for this work the printing-room of M. Ganz appears especially fitted. Behind the printing room is another for sensitizing, toning, and washing the prints, but these present no point of interest.

The "By-the-Bye" next week will be "A Plea for the Burette in Photography"; the following "At Home" will be "M. Van Bosch on the Boulevard des Capucines, Paris."

STRAY NOTES ON DRY PLATES.

BY J. PLENER.

On a preceding occasion we arrived at the conclusion that in order to determine the quality of a given plate it is necessary to photograph upon it the scale of perceptible gradations. Now it remains to consider how such a scale may be constructed.

There are some theoretical considerations which we wish to point out as likely to be of help in practical solution of the question. Let us suppose that we got such a scale, the reflected light from the shades of which we designate by—

$$A_1, A_2, A_3, A_4 \ldots\ldots\ldots\ldots A_{n-1}, A_n,$$

where A_1 represents black, A_n white, and n the number of shades.

When we go through the psychological process of comparing two shades, we accomplish an action similar to that of dividing the reflected light from one shade by that of another. The physiologists express this thus: they say that our sensations vary as logarithms of the causes that produce them; for instance, the difference in the sensations produced by the reflected light from A_2 and A_1 will have for expression—

$$\log A_2 - \log A_1, \text{ or } \log \frac{A_2}{A_1}$$

Considering that we have a scale of equal differences between shades, the relations below must be equal too; thus—

$$\log\frac{A_2}{A_1} = \log\frac{A_3}{A_2} = \log\frac{A_4}{A_3} = \ldots\ldots \log\frac{A_{n-1}}{A_{n-2}} = \log\frac{A_n}{A_{n-1}}$$

Hence

$$\frac{A_2}{A_1} = \frac{A_3}{A_2} = \frac{A_4}{A_3} = \ldots\ldots\ldots \frac{A_{n-1}}{A_{n-2}} = \frac{A_n}{A_{n-1}}$$

If we take for unity the very small amount of light reflected from black A_1, and designate the relation

$$\frac{A_2}{A_1} \text{ by } \rho$$

then

$$A_2 = \rho,\ A_3 = A_2\rho = \rho^2,\ A_4 = A_3\rho = \rho^3 \ldots\ldots A_n = \rho^{n-1},$$

and the reflected light from each shade will be respectively

$$1, \rho, \rho^2, \rho^3, \rho^4 \ldots\ldots\ldots \rho^{n-2}, \rho^{n-1}.$$

Suppose, now, we have two powders, some white and some black, and want, by mixing them, to construct the scale of perceptible gradations. To begin with, we must find the relative value of the intensity of the reflected light from black, which we took for unity, and from white, which we will designate by W. To do this we must make the supposition that the reflected light from a mixture of two powders will be equal to the sum of the reflected lights of its component parts, thus designating by r the volume of black, by r_1 that of white, while the mixture will have the unity for volume; the reflected light from black will be r, from white r_1W, and from mixture $r+rW$.

Now we add to the black as much of white powder as to make the difference in colour perceptible. Let us designate by r the volume of added white powder to the unity of mixture's volume, then

$$\rho = 1 - r + rW.$$

$1-r$ represent here the reflected light from the black in the mixture.

Next we add in the same way black powder to the white, and let it be the volume r_1 of the former that produced the marked change in the white, consequently we receive another expression for

$$\rho = \frac{W}{W - r_1W + r_1}$$

hence

$$1 - r + rW = \frac{W}{W - r_1W + r_1};\ \text{or } (1 - r + rW)(W - r_1W + r_1) = W$$

Thus

$$W^2 + W\left(\frac{2rr_1 - r + r_1}{r - rr_1}\right) = -1,$$

and

$$W = -\frac{2rr_1 - r + r_1}{2(r - rr_1)} \pm \sqrt{\frac{(2rr_1 - r + r_1)^2}{4(r - rr_1)^2} - 1}$$

When the value of W is known, we calculate ρ from the formula $\rho = 1 - r + rW$.

To prepare the mixture for ρ^2 we must replace in the mixture for ρ a certain quantity of it by white powder; thus if we designate by χ this quantity, we have—

$$\frac{\rho - \rho\chi + \chi W}{\rho} = \rho;$$

hence

$$\chi = \frac{\rho^2 - \rho}{W - \rho}$$

For the number of shades we have the equation

$$\rho^{n-1} = W,$$

because of the last shade being white. From this we receive

$$(n-1)\log\rho = \log W;\ n = \frac{\log W}{\log\rho} + 1.$$

Besides the above method, the definition of the quality of the plate might be made with the aid of any sensitometer à cliché, provided the relation between the transmitted light by two contiguous divisions are of due value; but the construction of such a sensitometer might involve considerable difficulty. Let us at first consider the rules that govern the construction of a sensitometer à cliché, like Mr. Warnerke's.

If the thicknesses of the film in various divisions stand in the ratio of numbers

$$1, 2, 3, 4, 5 \ldots\ldots\ldots\ldots 24, 25,$$

then the transmitted light by each division will be respectively

$$i\lambda, i\lambda^2, i\lambda^3, i\lambda^4 \ldots\ldots\ldots\ldots i\lambda^{25}$$

when i is the standard light, and λ a fractional co-efficient variable with the nature of the film and with that of standard light. If we so arrange the sensitometer as to give for λ comparatively considerable value, then the scale will be long; should λ be made very small, then the scale will be very short. Now the question arises, what value must λ have, so as to give n gradations, supposing n to be the number of perceptible gradations between black and white?

Let us have a print on albumenized paper from Mr. Warnerke's sensitometer. If for the densest tint we have received N°m, then for the faintest we have $m+n_1$, where n_1 is the number of gradations. The sensitometer we want to construct would have m and $m+n$ respectively. But the densest and the faintest tints receiving the same amount of transmitted light in both prints, consequently we have two equations—

$$i_1\lambda_1^m = i\lambda^m;\ \text{and } i_1\lambda_1^{m+n_1} = i\lambda^{m+n}$$

hence

$$\log\lambda = \frac{n_1}{n}\log\lambda_1$$

Now, in Mr. Warnerke's sensitometer, n and λ_1 are known, and n being the number of perceptible gradations, the corresponding to it λ will be found from above.

But for our purpose it is not enough to know the value of λ; we must determine the quantity of Indian ink to be added to gelatine, so as to obtain a film having λ for its co-efficient. To be able to do this, we ought to find the exact relation between two variables, λ and the Indian ink in gelatine. This must be done by experiments. Theoretically, we will examine only one, and the most simplified case of the above problem, viz., if, instead of the quantity p of Indian ink, we add double quantity, $2p$ of it to the gelatine, will λ_1 of the new cliché, be > or < than λ^2 of the original cliché, provided we have made due correction for the different amount of gelatine in both films? It is evident that the amount of Indian ink will be the same in both films, corresponding to λ_1 and λ^2, with the only difference that in the second case it will be distributed in a film of double thickness. These two cases are quite identical with those of two gelatine plates, one dry and another soaked in water till swollen twice its original thickness. Hence their importance.

Now we have to examine the two above-named films, which we will designate as films λ_1 and λ^2. Let us consider a very small element on the surface of the film λ_1, so small that its thickness will be equal to the diameter of the particles of the carbon in the Indian ink. Suppose that before the amount of Indian ink was doubled, this element transmitted the quantity $\frac{l}{a}$ of light, where $a > l$. In this case the absorbed light will be equal to $l - \frac{l}{a}$. When we have doubled the amount of ink, the absorption will be doubled too, and the transmitted light will be equal to—

$$l - 2\left(l - \frac{l}{a}\right) = \frac{al - 2al + 2l}{a} = \frac{2l - al}{a}$$

while in the film λ_1 the light passes through one element, it must pass through two elements in the film λ_2, consequently the transmitted light in the latter case will be $\frac{l^2}{a^2}$. It remains to compare the two values—

$$\frac{2l - al}{a} = \frac{a(2l - al)}{a^2} = \frac{2al - a^2 l}{a^2} \text{ and } \frac{l^2}{a^2}$$

their relative value depends on the relation between

$$2la - la^2 = l(2a - a^2) \text{ and } l^2, \text{ or } 2a - a^2 \text{ and } l.$$

We said above that $a > l$, consequently we may put it thus—

$$a = l + \beta,$$

substituting this for a, and taking l, the standard light, as unity, we receive

$$2(l+\beta) - (l+\beta)_2 = 1 - \beta_2 < l = 1.$$

This shows that the transmitted light by the first element of λ_1 is smaller than that transmitted by two elements of λ^2. If we designate the first by i, and the second by i_1, the amount of light transmitted by the films λ_1 and λ^2 will be respectively—

$$i^m = \lambda_1 \text{ and } i_1{}^m = \lambda_2,$$

where m is the number of elements in the film λ_1. As we have found, $i < i_1$, consequently,

$$i^m < i_1{}^m \text{ and } \lambda_1 < \lambda^2.$$

That is the reason why a gelatine plate in dry state is more opaque than when wet. On the other hand, a moist plate, transmitting more of incident light and absorbing less, must of necessity require more exposure.

We have said above that the relation which we designate by λ between the transmitted light by two contiguous divisions of Mr. Warnerke's sensitometer can be easily found; indeed, considering that

$$\frac{s_1}{s_{11}} = \frac{i_{11}}{i_1} = \lambda$$

we have only to divide the value given for the sensitiveness of one number by that of another; thus dividing No. 1 by No. 2, we receive $\frac{1}{1318}$. The importance of the correctness of this value cannot be too much insisted on, because if λ be incorrect, then all calculations of relative sensitiveness of the plates will fall to the ground. Mr. Warnerke, in his paper read last year before the Photographic Society of Great Britain, said that the relative values of the various tints, or numbers representing them, were carefully calculated and verified by a system different to that which was used for calculation. It is much to be regretted that he should have withheld from us the two methods he spoke of. Nevertheless, in his paper we find some data, though given for a different purpose, but which are quite sufficient to enable us to calculate for ourselves the value of λ, and to compare it with that to be found in the sensitometer.

There are two tables given by Mr. Warnerke.

No. 1.

A phosphorescent plate was illuminated with one inch of magnesium ribbon, and, after a lapse of two seconds, put in contact with the sensitometer, and a sensitive gelatine plate placed behind. Similar experiments were repeated, giving continually increasing rest to the luminous plate up to 900 seconds. All these plates were afterwards simultaneously developed, and the following results obtained :—

After	a rest of	2	seconds,	last number	developed was	20
,,	,,	10	,,	,,	,,	18
,,	,,	20	,,	,,	,,	17
,,	,,	30	,,	,,	,,	17
,,	,,	60	,,	,,	,,	16
,,	,,	90	,,	,,	,,	15
,,	,,	120	,,	,,	,,	14
,,	,,	150	,,	,,	,,	12
,,	,,	300	,,	,,	,,	9
,,	,,	600	,,	,,	,,	8
,,	,,	900	,,	,,	,,	6

No. 2.

The sensitive plate was cut in six parts, and after a phosphorescent plate was exposed to the magnesium light, and had one minute's rest, it was used to act through the sensitometer on to these several plates during varying periods of time, as per table, and simultaneously developed with the following results :—

After	5	sec. exposure	No. 12	was developed
,,	13	,,	15	,,
,,	20	,,	17	,,
,,	40	,,	18	,,
,,	80	,,	19	,,
,,	160	,,	20	,,

To the table No. 2 we can add some numbers, and it will stand thus—

After	5	sec. exposure	No. 12	was developed
,,	13	,,	15	,,
,,	20	,,	17	,,
,,	30	,,	$17+\chi$	,,
,,	40	,,	18	,,
,,	60	,,	$18+\chi$	,,
,,	80	,,	19	,,

To calculate λ from these tables, we have equation

$$y = asti\lambda_e,$$

where y represents deposit, a the smallest deposit perceptible to the eye, t time, i intensity of standard light, and e the thickness of the film. If we apply this equation to the last developed number, then we have $y = a$, and e equal to the developed number. Thus

$$a = asti\lambda^n, \text{ or } 1 = sti\lambda^n \text{............(1)}$$

From the table No. 2 we have for 30 seconds' exposure N17$+\chi$, and for 60 seconds No. $18+\chi$. Substituting these values in the above equation we receive—

$$1 = s.60.i_1\lambda^{18+\chi}$$

$$1 = s.30.i\lambda^{17+\chi}$$

hence

$$\lambda \frac{i_1}{i} = \tfrac{1}{2} \text{............(2).}$$

Now we must find the relation $\frac{i_1}{i}$, where i_1 is the intensity of light of the phosphorescent tablet between 60 and 120 seconds after exciting, and i between 60 and 90 seconds. Let us designate by t_1 the intensity between 30 and 60 seconds, by t_2 between 60 and 90 seconds, and by t_3 between 90 and 120 seconds. Then from the tables No. 1 we have—

After a rest of 60 seconds, last number developed was 16
„ 30 „ „ „ 17

We can put it otherwise—

$$\frac{t_2+t_3}{2} \text{ gave No. 16, and } \frac{t_1+t_2}{2} \text{ gave No. 17.}$$

Substituting this in the equation (1) we receive—

$$1 = s.30(t_2+t_3)\lambda^{16}, \text{ and } 1 = s.30(t_1+t_2)\lambda^{17},$$

hence

$$\lambda = \frac{t_2+t_3}{t_1+t_2}; \text{ and } t_1 \text{ being greater than } t_2,\ \lambda < \frac{t_2+t_3}{2t_2}$$

On the other hand, i_1 being equal to

$$\frac{t_2+t_3}{2}, \text{ and } i = t_2$$

the relation—

$$\frac{i_1}{i} = \frac{t_2+t_3}{2t_2} > \lambda, \text{ or } \lambda < \frac{i_1}{i}$$

Now we take the equation (2)

$$\lambda \frac{i_1}{i} = \tfrac{1}{2}$$

and substitute in it

$$\lambda \text{ instead of } \frac{i_1}{i}$$

As

$$\lambda < \frac{i_1}{i}$$

consequently the first part of the equation will become smaller than the second, or

$$\lambda_2 < \tfrac{1}{2}, \text{ and } \lambda < \frac{1}{\sqrt{2}} = \frac{1}{1{\cdot}414}$$

We see that λ as calculated here differs considerably from what value Mr. Warnerke has found for it, viz., $\frac{1}{1{\cdot}318}$; still more so if we compare (say) λ^8, or $\frac{1}{15{\cdot}98} > \lambda^8$ with $\lambda^8 = \frac{1}{9{\cdot}147}$ as given by Mr. Warnerke. The corresponding values for sensitiveness when N9 is the last developed, from Mr. Warnerke's sensitometer will be 9·147, while as calculated here more than 15·98. This difference is too wide to be left unexplained, but we are unable to do this, as we do not know the methods which Mr. Warnerke followed.

FRENCH CORRESPONDENCE.

POITEVIN MEMORIAL—SOLAR ECLIPSE—PRINTING PROCESS ON ZINC—CELLULOID PELLICLES.

The Committee for the Poitevin Memorial.—The committee for organizing subscriptions in aid of the Poitevin memorial has been definitely constituted; of this committee, M. Davanne is president, M. Lévy vice-president, M. Londe secretary, and M. Léon Vidal treasurer. At the next meeting of the committee printed circulars will be issued, and the lists of subscriptions drawn up. The committee will appoint corresponding members everywhere, to receive subscriptions and transmit them to the central body in Paris. Although the memorial is to be one in honour of a Frenchman, the work ought by no means to have a national character only; the object is to do honour to the name of one who was a light of photographic science, without reference to the country of which he was a native. For my own part, I should like it to be generally admitted that the photographic profession is not divided into distinct groups, each belonging to a different nation, but that it forms one great whole, belonging to the entire world. So far as Poitevin is concerned, the initiative would naturally belong to France, just as, if the memorial referred to Talbot, it would belong to England: but, when once the start has been made, it is only a question of honouring the memory of a man whose services to photography are appreciated in every land. It is, therefore, to the whole world that an appeal can be made for subscriptions. The memorial itself is assured; what we have still to look forward to is that the contributions in its favour may be as general as possible. Large individual subscriptions are not necessary, but the smallest sum will be sufficient to prove the sympathy we each of us feel with the labours of a man who was as modest and retiring as he was earnest and devoted to the cause of photography. Those of our readers who wish to take a part in the work of the central committee at Paris should send their subscriptions to the Editor of the PHOTOGRAPHIC NEWS, who has kindly consented to transmit them to us.

Photographs of the Solar Eclipse.—At the June meeting of the Photographic Society of France (we were glad to welcome at this meeting Mr. Wilson, the editor of the *Philadelphia Photographer*, who is paying a visit to Paris) M. Janssen, member of the Institute, exhibited a fine print of the recent solar eclipse, which was partially visible at Paris. He drew attention to the fact that the outline of the moon on the solar surface was very clear and distinct, showing that if the moon has an atmosphere, it cannot be one of any appreciable importance, since its interposition in front of the sun produces no effect. This would not be the case if we were able to take a photograph of a partial occultation of the sun by the earth; the terrestrial atmosphere, by its power of absorption and refraction, would produce effects which would be correctly rendered by photography. It is generally held by astronomers that the moon has no atmosphere, and the result obtained by M. Janssen confirms the correctness of this view. M. Janssen is at present engaged in experimenting with the photographic revolver, using a sensitive plate to which a continuous motion is communicated; he proposes shortly to show some proofs of the correctness of his views. So far as I am concerned, I am quite convinced that for objects strongly illuminated it is completely useless to proceed by means of successive stoppages. What difference can it really make, since the object to be reproduced is already in more or less rapid motion?

Printing Process on Zinc.—M. Janssen, at the same meeting, described a process for printing on zinc which is used in the Ministry of Public Works, and of which I already have had occasion to speak. Let me give a brief *resumé* of it:—The zinc plate is first prepared by cleaning, and there is then a solution of gallic acid and gum flowed over it; this is wiped off, and when the plate is dry it is coated with a solution of bitumen of Judæa in benzine; it is exposed behind the original drawing—that is to say, a positive—and the bitumen which has not been rendered insoluble by the action of light is dissolved out by means of spirit of turpentine. The lines of the drawing appear everywhere where the metal has been laid bare. It is next treated with water acidulated with acetic acid, a solution which restores to the zinc the property of retaining a fatty substance—that is, the property of which it had been deprived by the solution of gallic acid. A roller charged with fatty ink is then passed over it, producing a picture in black, and the whole plate is then cleaned up with essence of turpentine. Impressions can now be immediately taken in the lithographic press from the zinc, and we obtain positive prints identical with the original drawing. It stands to reason that this process is only applicable to the reproduction of line drawings.

Improvement in Celluloid Pellicles.—M. David pursues with perseverance worthy of complete success his endeavours to find a use for celluloid in photography. At the meeting above alluded to, he showed some very thin pellicles, obtained by passing with a brush over glass a film of varnish, which is nothing more than liquid celluloid. He hopes to be able to work with a varnish of this kind in the same way as collodion, and thus to obtain more regular films than those produced with a brush. The varnish thus spread over the glass he coats with gelatino-bromide, and the whole is then capable of being stripped off very readily. Celluloid in sheets, when it is wetted, stretches like paper. Without having arrived at perfection, from which he is yet at some distance, M. David has, at all events, made some improvements in his previous methods.

Leon Vidal.

THE ECLIPSE.

The actual work of the observers is thus described in the *Daily News*.

In an eclipse there are four critical points: the first, second, third, and fourth contacts, so called—the first when the moon makes its appearance on the sun, the second when it first totally obscures it, the third when the sun again reappears, and the fourth when the sun is quite clear of the moon again. It is of course with the totality—that is, the time that the sun as we know it is invisible between the second and third contacts—that the physical astronomer has almost exclusively to do; but as some of the phenomena are visible slightly before totality, the time has to be carefully watched. During totality this has to be done in the most steady manner, and the observer upon whom this duty falls has a most responsible task. In the English Observatory, to which I shall now confine myself, this fell upon Mr. Buchanan; and as the arrangement adopted this time was new, I will describe it. It was devised by Mr. Lockyer as the result of his Indian experience, when the timekeeper found it so difficult to keep the time and to observe the eclipse, which he had come 600 miles to see, that he resolutely turned his back upon the sun lest he should fail in his self-imposed task, and so disturb the work of others. What one wants to know at any moment during an eclipse is for how many seconds the phenomenon is yet to be visible, and when each ten seconds of the totality have flown away, as each observer has generally more than one thing to do, and the announcement of the timekeeper is the signal for changing his instrument. On this occasion a clock used for testing gas metres was employed, with a seconds pendulum set going at the moment of totality, and with a large dial marked 65, 60, 50, 40, and so on to 0; 65 being the number of seconds which it was thought would leave a safe interval for covering the lenses of all the cameras before the actual termination of the eclipse. The plan answered admirably. Mr. Buchanan sang out the times shown on the dial, and sketched the eclipse with perfect ease.

While the land was darkening and the sky and the Nile were beginning to put on those indescribable hues round which so much of the terror of eclipses is centred, and while the whispers on the hill at Sohag were beginning to surge into a sound—half roar, half moan—some eight minutes before totality, Mr. Lockyer announced the appearance of bright lines, indicating that our atmosphere was already dimly illuminated enough to permit of the atmosphere of the sun being seen through it, and it was easy to see by the rapid pencilling on a copy of Angström's map, which was arranged on a stand under the eye-piece of his spectroscope, that observations in earnest had commenced. This went on, the image of the retreating cusp of the sun being carefully kept on the slit of the spectroscope by Mr. Lawrence until Dr. Schuster, as had been arranged, announced the instant of totality. At this signal Mr. Buchanan said, "sixty-five seconds," Mr. Lockyer left the spectroscope to study the structure of the corona with the telescope, and Dr. Schuster uncovered all the lenses of his cameras—all four of them arranged on a single stand—and to all, except the observers, the sun's atmosphere shone out in all its splendour and majesty, and the roar increased on the hill. In the telescope the verdict was that the solar conditions of 1871 were again present; and at the signal "forty seconds more," the information to be gathered by the naked eye and the grating was to be sought by one observer, while the photographic plates had to be changed by another. At this moment the silence in the observatory was broken by shouts calling attention to a strange object among the fainter exterior details of the corona itself, which were more suspected than seen. There, one solar diameter to the right and one solar diameter long, was an exquisitely formed comet, complete with nucleus and tail, sweeping in a beautiful curve, in brilliancy almost, if not quite, equalling that of the very corona itself—a real photometer, in fact, of which we have not yet heard the last. As in the naked eye view, there was a struggle with the comet, so with the grating there was a struggle of another kind. A prism or a diffraction grating used without lenses forms what is called a slitless spectroscope. The coronal ring is really used as a circular slit, and according to the substances present in the solar atmosphere we shall have rings or no rings; and if rings are seen, then their presence in certain definite positions will tell us what substances are present. Now in 1871 rings were seen, and they were very bright. In 1878 no ring whatever was seen. The question to be decided, then, was, Did this year's eclipse resemble in this respect the eclipse of 1871 or 1878? The result of the inquiry was that there were rings, but that they took time to see. This indicated a solar condition more resembling that presented in 1871 than in 1878, but stopping short of it.

Owing to these difficulties, hardly had Mr. Lockyer time to pass back to the telescope by means of which the spectrum of the corona was to be studied, when the clock showed that sixty-five seconds had elapsed, and Mr. Buchanan's "over" filled all with regret that the phenomenon, so rare and beautiful, and full of such precious knowledge, which each was doing his "level best" to secure, should be so ephemeral. So the caps were put on the cameras by Dr. Schuster and his assistant, Mr. Woods, lest the precious records which it was hoped might have been secured should be spoiled by the first beam of the re-appearing sun. It turned out, however, that so admirably had the eclipse been calculated, and so exactly had the French party hit upon the central line, that the totality really lasted 7 seconds more, that is, the full 72 seconds. The spectrum of the corona, therefore, was studied for a second or two under, perhaps, better conditions than had ever been present before, excepting during the memorable observation of Janssen in 1871. There were the red and green and blue lines stretching right across a wide field of view, and although no obvious dark lines were seen in the momentary glimpse, it was obvious that the spectrum was not truly a continuous one. There were variations of intensity here and there, and not the equal toning generally observed. So then ended the totality in one of the observatories. Dr. Schuster and his assistant at once proceeded to the extemporised dark room on board the steamer to develop the photographs, while those members of all the parties who had made telescopic or spectroscopic observations retired to the solitude of their tents to write down their results while they were still fresh in their minds.

A NON-ELECTRIC INCANDESCENT LAMP.

A bright light, easily obtained and sufficient for projections has frequently been regarded as a desideratum where it has been impracticable to procure either the electric or the lime-light. The French Minister of Public Instruction lately appointed a special commission to indicate the apparatus most suitable for projection in primary schools; and it appeared that while there was no lack of simple arrangements for the projection proper, the problem of easy production of an adequate luminous source was hardly solved.

Dr. Regnard has lately conceived the idea of getting a bright light by burning on platinum gauze a mixture of air and petroleum vapour. The intense heat which results raises the platinum to bright incandescence, giving a light equal to about half the lime-light.

The apparatus is very simple. There is an ordinary Bunsen burner, terminated by a small cage of platinum wire. The mixture of air and petroleum vapour is admitted below, in place of the gas; it is produced by a familiar method, and the current is generated by means of a pair of bellows or a Richardson "pear." With a ventilator or "trompo," several of the lamps may be maintained in action at once, for lighting halls, workshops, &c., where there is no gas. The aspect is that of electric incandescent lamps. In this case it is well to augment the volume of the carbonator, so that the supply of petroleum vapour is abundant. To send all the light in one direction, the Bunsen burner may be fitted with a bent trumpet-shaped nozzle closed with platinum gauze. One has merely to regulate, with the ring of the burner, the admission of the mixture of air and vapour, to have, whenever the current is produced, an extremely bright light.

With a large loaded bag of air under the table the lamp may be kept in action for several hours without requiring attention.

The expenditure is very small, only a few centimes an hour, with maximum action.—*Nature*

PRACTICAL EXPERIENCES WITH THE ALKALINE DEVELOPER FOR GELATINE PLATES.

BY W. BROOKS.*

IT always has been a common remark that "more plates are spoilt in developing than by any other operation connected with photography." Now in the days of rapid gelatine plates it applies more than ever it did in the days of wet collodion with the nitrate bath. For instance, it is possible at times to get a passable result by proper development from an indifferent plate, and with improper development with a good plate the worst result is sometimes obtained; therefore I consider that too much attention cannot be paid to development. My first trial with gelatine plates was with Mr. Kennett's on their introduction, and these at that time were as sensitive as many of the plates now in the market. In those days the alkaline developer was not so well understood as it is now, when I considered the failure was that the alkali was not sufficiently restrained, and fog was the result. Following these came Messrs. Wratten and Wainwright with their commercial plates; the developer recommended for the plates contained more of the restraining bromide than the former, with a better result, and the same developing formula is in use at the present day. In my hands it is somewhat slow, so I have given it up in preference for another containing a larger amount of bromide. With Wratten's developer at first the great complaint was, that it did not give sufficient density. Many attributed that to over-exposure. In many cases I know it was so, and in others where proper exposure was given, intensity was very difficult to get without a great deal of forcing. I still use their form of developer, generally for testing the rapidity of plates with Warnerke's sensitometer. It may be remembered by many of our members, that Mr. Cowan used to bring up to the meeting at various times some excellent results, and on one particular occasion the difficulty of getting sufficient density was discussed. I well remember him saying that to get density he commenced with a very strong solution of pyrogallic, about six grains to the ounce, and sometimes more, using about five drops of the bromide and ammonia solution, which was

Liquor ammonia	1 ounce
Bromide of potassium	1 dram
Water	2 ounces

I have used this system of development for years with success, but for the last eighteen months I have used the following:—

Solution P.

Pyrogallic acid	2 grains
Water	1 ounce

Solution A.

Bromide of ammonium	6 grains
Liquor ammonia	20 minims
Water	1 ounce

This developer was first brought to notice about twelve months since, Mr. Debenham being the first to use it. To develop (say) a $7\frac{1}{4}$ by $4\frac{1}{2}$, I take one and a-half ounces of solution P, and half an ounce of solution A; this I pour over the plate at once without any soaking, and if the exposure be correct, the image at once flashes out and gains sufficient intensity in about two minutes. It will be seen that the developer contains ten minims of liquor ammonia, but is well restrained; there is not the slightest fear of fogging unless from over-exposure. Some few months since I took the trouble to try it on several makes of plates, and in each instance I found it to give far better results than those recommended by the makers. I will give a few names of the plates I tried: Swan's, Wratten's, Mawdsley's, Cobb's, Fry's, Britannia, Miall's, and several other makes by private people; in every instance the development was more rapid than that given with the plates. Now, if we compare these three developers I have mentioned, it will be found that the bromide is increased, and I have noticed that with the increase of bromide, less pyrogallic is required to obtain sufficient intensity (I not long since made an experiment by increasing the bromide still further, and was surprised how little pyrogallic was required to give intensity; I found that one grain per ounce was quite sufficient).

I was so satisfied with this developer that I thought it was as perfect as it well could be, and several friends said to me, "Have you tried sulphite of soda?" My reply was, "No, I can get all I require without it," and thought so until one evening when in conversation with Mr. England, when he asked me the same question, and he strongly recommended me to give it a trial, which I did, and, as I think, I never did finer negatives by any process. Before I made up my mind to employ it, I made several experiments with it as regards exposure, and I am inclined to think that it gives more latitude in exposure than without it. It slightly increases the length of time in developing, but the gradations are far finer, and I am sure those who will once give it a trial will never develop another plate without it. One experiment I tried was how far I could force an under-exposed plate without producing chemical fog, or the blacking that comes with forcing, that is so common in forced plates. The plate I now hand round was the one I intentionally under-exposed; it was in the developer nearly half-an-hour, without the slightest trace of fog, as you will see; and the developer contained 40 minims of the strongest liquor ammonia, 12 grains of bromide of ammonium, and only three grains of pyrogallic, and I must not omit to mention 16 grains of re-crystallized sulphite of soda. This was a plate of my own preparation containing a chloride, and, when I use a chloride in "the emulsion," I use a certain portion of citric acid in the developer. It not only helps to keep the pyrogallic solution clear, but, with a chloride in a plate, the citrate of ammonia that is formed materially assists in developing the image. Now I make up my solutions as follows:—

Solution P.

Pyrogallic	2 grains
Sulphite of soda	8 „
Citric acid...	1 grain
Water	1 ounce

Solution A (*same as before*).

Bromide of ammonium	6 grains
Liquor ammonia...	20 minims
Water	1 ounce

Using it in the same proportions as before.

I now pass round for your inspection some half-a dozen negatives developed by this formula, with prints from same, and I think you will agree with me that they are as near an approach to wet plates in look as possible; the extreme shadows are bare glass, and the general image grey in colour, so that there is no difficulty in judging as to their printing value. At first I thought I could make up any quantity of solution P that would keep (say) a week or ten days; so it does to all appearance without changing colour. A few days before I developed these plates I had some of the solution P left over, and when about to develop these plates I made up some fresh in another bottle, and I found that the fresh solution worked in about one-tenth the time of the old, which had not been made up more than five days at the outside. Of two of the negatives that are of the same subject, one was developed with the fresh solution, and the other with the old, and it is impossible to tell one from the other; all that I can find is that the time in development was only protracted, but the finished result was the same.

I now keep an old solution by me which I find very valuable in this way. At times I have to develop a great many plates for amateurs, and have but very little knowledge of the exposure that has been given; so when such is the case, I commence with the older solution, and with a much over-exposed plate the image makes its appearance very slowly, so there is plenty of time to see whether the correct exposure has been given without risking the plate. Of the plates I have passed round, some I do not wish you to look at in an artistic point of view, but only from a photo-chemical standpoint, as they were taken when out with an amateur gentleman pupil of mine, showing him what won't look well, and what will, in a photograph. In one batch of plates I made I tried to get a little more sensitiveness, and over-cooked it, and the result was green and red fog when developed with ammonia. Having seen it mentioned in one of the journals that plates that gave this green and red fog were quite free when developed with carbonate of soda instead of the ammonia, I tried it, and the result I now pass round. The only alteration I made in the developer was the substitution of half an ounce of a saturated solution of common washing soda for the ten minims of liquor ammonia. I find it is not quite so quick in its action as the ammonia, but the result is about the same. I know several operators who cannot stand the fumes of ammonia without feeling a pain in the chest. To those so affected, by using the soda all this is avoided; it is very easy to substitute one for the other, calculating that one ounce of the saturated soda solution is equal in effect to twenty minims of strong liquor ammonia.

In conclusion, I wish to say that I have only given my own system of working, and I hope those who hold different opinions will not omit to express them.

* Read before the South London Photographic Society.

Notes.

Mr. J. T. Taylor is editing a new edition of "Hardwich's Photographic Chemistry."

The army estimates this year include a sum of four hundred pounds for "photographic services" for the army.

The Copyright and Works of Art Bill before Parliament has been blocked; there is, consequently, no chance of it becoming law this year.

Berlin is to have a retouching school. The proposed fee is thirty marks (shillings) per month, and a month is to be the minimum term of attendance. The Society for the Advancement of Photography seems inclined to take the matter under its wing.

According to Schlegel, gelatine negatives acquire the character of wet plates if a few drops of a solution of cyanide of silver in cyanide of potassium are added to the developer.

A monument to the memory of Poitevin is to be raised. Of the committee appointed to carry out this object, M. Davanne is president, and our esteemed Paris correspondent, M. Léon Vidal, the treasurer. Already the list of subscribers is a lengthy one.

Dr. Vogel, of Berlin, confirms the practical value of Eder's new intensifying process; the Vienna photographers seem also well pleased with it.

Dr. Vogel immerses the negative first in a solution of bichloride of mercury (water 50 parts, mercury 1 part) until a whitish veil appears, and the plate is then transferred to the Eder intensifier. The film first grows yellow, then brown, and then very intense. Afterwards the action is reversed. Dr. Vogel speaks highly of the smooth and gradual change that comes over the negative.

According to the yearly report of the Astronomer-Royal which he made to the official visitors last Saturday, the number of hours of bright sunshine recorded by Campbell's sunshine instrument during 1881 was 1,301, or more than 100 hours above the average of the four preceding years.

Another interesting fact in the report is, that out of 365 days, it was possible to take photographs of the sun on 200 of them; and, curiously enough, only on two days out of this 200 did photographs show that the sun was free from spots.

Sun-spots on the face of the sun have recently been studied, as everybody knows, with much care by scientific men, and endless theories have been built on the phenomena. Whatever the nature of these speculations may be, it is obvious that the first thing is to secure trustworthy records, and in doing this photography renders invaluable service. The evidence of the camera, it seems, is to the effect that sun-spots have increased materially of late, and the area covered daily in 1881 is found to be nearly double that covered in the preceding year.

Garibaldi's death reminds us of his visit to this country in April, 1864. We had the pleasure of taking his portrait on that occasion; the general's aversion to being lionised, as well as his irritability just then occasioned by his wounded foot, were reasons for believing that he would not sit still very long, and in these circumstances arrangements were necessary to make the posing as short as possible.

A semi-circle formed by five converging lenses consequently awaited the patriot when he arrived in the studio. The posing chair was immovable, and a sitter had been focussed in position immediately before Garibaldi entered. It was only necessary, therefore, for the general to sit down for a period of some twenty seconds. In his grey toga, worn over a red shirt, the grizzled warrior sat as firm as a rock, and not one of the five portraits betrayed a movement. "I never faced such a battery before," cried Garibaldi, jokingly, in French, as he rose.

Platinotype printing is attracting the attention of the Vienna Photographic Society. Under the anonymous name of "Platina," a photographer has submitted some fine platinum impressions, produced by a method he describes in confidence.

One would scarcely have thought to find electricity and burglary coupled, but in these days of electrical progress nothing occasions surprise. At Liverpool, two housebreakers were smartly captured the other day by one of the inmates, who received intelligence of the visitors through the medium of an electric bell attached to the door. One of these days there will be a detective camera in the doorway, and burglars will find their portraits forthcoming at the trial, to be used, as constables say, in evidence against them.

The American photographic journals seem to be without their editors just now. Mr. E. L. Wilson, of the *Philadelphia Photographer*, and Mr. J. T. Taylor, of the *Photographic Times*, are both of them in this country. Nevertheless, the journals do not lack interesting matter; the latter last month published a series of excellent lessons in dry plate photography, which are really so good we should have reprinted them, only that they originally appeared in these pages.

History repeats itself. In the chronicles of the Pickwick Club it is recorded how the astute Pickwickians dug up near Cobham an historical stone, apparently of great antiquity, the marks upon which, however, turned out in the end to have been made by a prosaic individual named William Stubbs. A similar disclosure is now made in respect to the lacustrine canoe which was discovered two months ago in an excellent state of preservation near Bex, in Switzerland. The fact that this hollowed-out, Robinson Crusoe-like craft was found 3,000 feet above the Valley of the Rhone made the discovery all the more interesting, since no other relics of the lacustrines —that strange pre-historic people, who lived in habitations on piles above the lakes—had been met with at such an elevation.

Photographs of the canoe were made for distribution to the learned societies, and antiquaries in the neighbourhood paid speedy visits to the spot. The result is that Dr. Forel, whose experiments on the penetration of light below the surface of the water were recently recorded in our pages, has pronounced the lacustrine canoe to be nothing more than a water-trough made from the trunk of a tree, such as one meets with in every mountain village.

The electric studio of Stagel and Eckel, in Vienna, has closed for want of patronage. The reasons given are that during the present winter and spring the weather has been exceptionally fine, and hence artificial illumination was uncalled for, and that only the wet process was employed, necessitating long exposures. In London, on the other hand, we hear that two new electric studios have just been established.

"Twelve Lessons in Elementary Photographic Chemistry," will follow our dry plate lessons, which are now coming to an end. We shall follow the same plan of adapting our remarks to the beginner, and shall not omit the explanation of a single change or reaction merely because it happens to be simple or well-known. For we hold that those unacquainted with a fact will be glad of the information, while those who possess the knowledge already will not be ungrateful for having it once more impressed upon them.

The electric light that streams forth into the dark night from the big black hulls of our ironclads seems to have produced a scare at Alexandria. Nearly every one of our first-class battle ships is now provided with this vivid means of illumination, and some of them, like the *Inflexible*, are fitted with incandescent lamps between decks as well. One of the principal uses of the electric light in war vessels is to sweep the seas at night to prevent the approach unseen of any torpedo launch or other nocturnal visitor. At Alexandria our war ships are so near that men busy at the earth-works at night are at once discerned by throwing the electric beam on shore.

"When I was in London, window cleaning was a trifle," said a Manchester photographer to us the other day; "but here all the glass must be cleaned each day, or my exposures are nearly doubled." In Manchester, therefore, there is plenty of scope for beginners to learn the rudiments of their art.

La Grande Chatreuse. Everybody has heard of the famous golden green *liqueur* prepared at the monastery, and most of us have tasted it. The monks are said to make an income of a million francs a year by their Chatreuse, the secret of preparing it from aromatic herbs within the walls having been religiously kept from time immemorial. But of late the cells have been the scene of other work than that of liqueur-making; they have been converted into photographic laboratories.

Came the prior of la Grande Chatreuse recently to Paris to acquire instruction in the ways of photographers, for the monks desire to be adepts in the art. For some time past, it appears, they have been working the wet collodion process in the vicinity of their monastery, taking pictures of the wild inhospitable country around, and securing photographs of monastic life. It is the wonders of the gelatine process which have now tempted them to seek outside help, and hence the temporary descent into the world once more by the reverend father.

Mr. Spinks' method of dealing with nervous sitters, as detailed in another column, is calculated to prove of more value to the portraitist who wishes to secure a natural and easy expression, than to the youth who would rather die than tell or act a falsehood.

MOUNTAIN PHOTOGRAPHY IN NEW ZEALAND.

MR. BURTON, of the photographic firm of Burton Brothers, has recently returned, the Otago papers tell us, from what appears to have been a most interesting though difficult trip among the mountains inland from Milford Sound, New Zealand. This spot and its surroundings have been frequently photographed, and the beauties of the neighbouring scenery are tolerably well known; but Mr. Burton has, on this occasion, pushed his way up the Arthur River, making good use of his time meanwhile, and reaching the Poseidon River, at the head of Lake Ada--spots where foot of photographer has never hitherto been set. The goal aimed at—viz., Mount Balloon—time did not enable the party to reach; but the already rich collection of views of New Zealand mountain scenery has received many most valuable additions from Mr. Burton's trip. Mr. Burton's diary presents so many points of interest, that we have not hesitated to reproduce it. To judge from some fine pictures he also sends us, the little expedition was a very successful one.

It was to be a month's trip, says the hardy photographer, but there must be deducted two days' steaming from Port Chalmers to Milford Sound, and two days for the return trip; so that there remained just twenty-two days net—that is, if the Union Steam Ship Company's steamers kept exact time. This Company arrange for several of their vessels to call at the Sounds, both to and from Melbourne. The last of these callers for the present season was to be the *Rotomahana*, leaving Port Chalmers on February 2nd; and t'other way the *Rotorua*, leaving Melbourne on the 21st, being due at Milford Sound about five days later—namely, the 26th. An application for a return-ticket for Milford Sound was met by the bland explanation that the Company did not give return-tickets on such occasions, as they could not guarantee that their steamers would call in at Milford Sound at all. This was refreshing intelligence, truly, as, in case of weather preventing the last steamer from calling in, the only thing would be to patiently wait for the visit of the Government steamer *Stella*, on one of her lighthouse inspection trips, and then be carried, some time in the course of the autumn, away to Wellington. However, a "single" ticket was taken, the resolve being to "risk it." It was to be the writer's fourth trip to the Sounds; but, on this occasion, it was not to be merely the Sounds that were to be photographed, but a long-cherished design was to be carried out, and this was to make way into the mountains, striking into the interior from Milford by way of

Arthur River. There had been a standing challenge from Mr. Donald Sutherland, who has lived four or five years in the Sounds, to pilot the writer into a district of weird beauty and surpassing grandeur, by ways only known to himself and his mate. The programme of the scenic entertainment promised included a waterfall more than 4,000 feet high, appropriately named, after its discoverer, Sutherland Falls. Visitors to Milford Sound, who have noted with admiration the Bowen Fall, are invited to imagine its height multiplied by eight! Another wondrous item was Mount Balloon, a mighty monolith cut by nature's own hand, which standing as on a vast base, upon a range of hills 4,000 feet above the sea, towers, in shape like an enormous Cleopatra's Needle, 1,200 feet higher into the heavens. Mount Balloon it is fittingly named, as by no other means will it ever be topped by man. The most distant of these wonders was about thirty miles from Milford, and to those whose ideas of travelling reach only to railways or turnpike roads, it may seem absurd to make a fuss about such a distance; but eight days of fine weather would be needed for the trip, and, in our variable climate, it can be seen how easily these eight days might be doubled, or even trebled, ere head-quarters can be reached again. Ample employment for the camera would be found in Lake Ada and on the Poseidon River, through which the way to Mount Balloon lay. Now, then, to begin—diary fashion.

February 2nd.—Depart Port Chalmers in the *Rotomahana*, Captain Underwood. There is no need to "bombast out" this account with details of "board-steamer" life, though, as our fellow-passengers included a venerable bishop and veteran actor, there would be some excuse for indulgence in penny-a-lining, especially when the bishop gravely informed us that he had once passed a night in a lock-up on the West Coast! As to the "veteran," he was amiable enough to allow himself to be drawn out upon two most interesting topics—his early Colonial experiences, and Shakespeare. He related a story of a successful digger, who, calling for a case of champagne, arranged nine of the bottles as skittles, and hurled the remaining three at them in lieu of balls. The total cost of this lavish gentleman's "spree" was the respectable sum of £850. Another reminiscence must be related. The "veteran" was acting as money-taker for a benefit entertainment. Front seats, 5s.; back seats, 3s. Enter four diggers. "Back seats, gentlemen?" he asked with great suavity." "Back seats? No, you(so-and-so). Front seats!" clapping down a £5 note and passing in. "Your change, sir!" called out the "veteran." Said the digger, "(So-and-so) the change! Keep it, you hungry-looking beggar!" Veteran pocketed the affront and carried the change to private account. Of course, everyone has heard many such stories; but it is pleasant to hear them again from one who was an actual eye and ear witness; now especially, as those early diggings times seem to belong to a very remote and misty past.

February 3rd.—Made the usual call at the Bluff, leaving again at 4 p.m. Genial veteran again delighted us with his reminiscences, drawing from the rich storehouse of his memory anecdotes of actors and actresses, living and dead, able and unable. Especially was it refreshing to hear him, when talking of "acting editions," express his utter contempt for those beings—such as Colley, Cibber, Tait, and Garrick—who had dared to "improve" upon Shakespeare.

February 4th.—All was anxiety this morning as to the weather, for we were due in Milford Sound early in the afternoon. The writer was lifted into a position of fictitious and temporary importance on the strength of his previous visit, and especially as being "the man who was to be left at Milford." Martin Chuzzlewit, it will be remembered by all readers of genuine history, was complimented by a levée at Colonel Kedgick's hotel on his departure for the new settlement of Eden; but it only came out afterwards that the excitement among the citizens whom he "received" arose from the fact that, as the Colonel put it, "he was not like emigrants in general. . . . Nobody as goes to Eden ever comes back alive." If the presumption involved in such a comparison may be forgiven, there is some parallelism in the cases. Early in the morning there seemed some likelihood of fine weather, but as the day wore on the sky became more and more leaden-hued, until we entered Milford in a steady downpour. But few of the marvels of this most marvellous of the Sounds were the *Rotomahana's* passengers privileged to see. Just a few hundred feet of perpendicular cliff on either side, with countless cascades rushing down; above the rolling mist, through which ever and anon the summit of Kemberley would appear for a few moments; but the Mitre remained hidden, and of glorious Pembroke there was not a sign. "Now, sir," called out the chief officer, "boat's all ready; will you point out your traps?" In a few minutes the "social hall" of the *Rotomahana* was exchanged for No. 1 Kennedy Street, Freshwater Basin, and the steamer resumed her voyage to Melbourne. The city of Milford makes quite an imposing show from the water, no less than three buildings revealing themselves to the astonished gaze of those who had imagined that there were no signs of civilisation in this out-of-the-way spot.

February 5th.—A glorious day! The camera was soon at work, and eight "exposures" made before breakfast. To see Milford Sound in perfection, the day should not be too clear. A perfectly cloudless sky seems to minify the heights of the mountains, and to render somewhat reasonable the incredulity of visitors unused to mountainous regions when they are told that such-and-such a peak is nearly a mile and a-quarter in perpendicular height. But let fantastic masses of cloud wreathe the giant mountains, or hang like a belt around the peaks, always leaving the actual summits clear above; then let the spectator wander away until he has lost sight of every indication of human companionship, and he will realise the combined immensity and beauty around him.

February 6th.—Another change. A pouring rain, a gale of wind, the spray from the Bowen Falls—hidden from us by Cemetery Point—driving across the Sound, and the Cleddau River rushing down with great violence a few yards from our doors, and in the worst of it the *Te Anau*, from Melbourne, made her signal by whistle. The whole of the (permanent) inhabitants of Milford put off in a boat to the steamer, taking with them a gentleman of Invercargill, who had just finished a sketching tour. On its return the progress of the boat was followed with anxiety by the eyes of the solitary observer on the beach. Duly rounding the point, it shot out of the driving mist, and then—suddenly disappeared! Rapidly through the watcher's mind passed the thoughts—"Alone, the steamer gone, no boats, no sign of human beings, and no communication with the outer world for three weeks." On the other hand, there were plenty of provisions and a good roof. And here a selfish thought would obtrude itself. Could the survivor be regarded as the inheritor of the property around? However, there was no need, happily, to pursue that subject, as the boat reappeared as suddenly as it had vanished. It had merely been hidden by the branches of a large tree that had been carried down the Cleddau by a recent freshet, and now was fixed in mid-stream.

February 7th.—Another wet day, clearing up towards evening; took advantage of this to get some negatives, with delicious "effects." Rigged up one of the huts as a developing-room, covering up windows and fireplace, shutting out the evening light, which would steal in at the crevices in door and floor. The result of this first batch of "developing" was highly encouraging.

February 8th.—Showery, but managed to get a few negatives.

February 9th.—Wet; but stole a couple of negatives just before dark.

February 10th.—Showers occasionally, and leaden sky all day defying photography.

February 11th.—Showery again, but with occasional peeps of blue sky; so managed to dodge the weather and secure a dozen negatives. Had a grand "medicine talk" this evening as to the probability of getting to Mount Balloon. Out of the twenty-two days seven were already gone. The guide (Sutherland) said we must have two fine days before it would be prudent to start, as the bush would not otherwise be fit to travel through. Still there was as yet a margin of four or five days, so "turned in" hopefully.

February 12th.—Wet, oh, so wet!

February 13th.—A grand day. Pulled down to Harrison's Cove, and did a great stroke—exposing no less than twenty-nine plates from all parts of the beach; secured some grand views of the "Lion" and Pembroke Peak. While the photographer was "taking" the peaks, the other two of the party were "taking" the fish, and at midday a most appetising *al fresco* meal was discussed. A four-mile pull home; then tea; then developing till midnight; then a consultation as to probability of reaching *ultima thule*—in our case, Mount Balloon. Turned in at 1 a.m., hoping that the next, or rather that, day would be as fine as the preceding one. But, oh!—

February 14th was just a damper. Spirits very low; hopes of reaching the mountain now very slight.

February 15th.—A grand day. Photographer in his glory—hard at work all day "bagging" negatives in all directions; ditto all night developing.

February 16th.—Clambered up the "slip" above the huts a few hundred feet, and was gladdened with a distant view of Lake Ada, and made six successful shots at it and the surrounding scenery. Spirits, which in the morning had been buoyant, were depressed, in sympathy with the weather; in the afternoon—dark—lowering.

February 17.—Wet once more. "Crushed again." Thirteen days had now gone, and reluctantly the truth had to be faced that Mount Balloon would for this time escape the trying ordeal of being "took." To get to Lake Ada was now the extreme of our ambition, even if that modest goal could be reached.

February 18th.—Wet once more, and, to vary the monotony, hail and thunder in addition.

February 19.—Very much the same; rather more so, if anything.

February 20th.—The morning opened deliciously. What had been rain to us we found had been snow on the heights, and Mitre Peak especially was a glorious object. To watch the changing hues on its brilliant summit—first blue grey, as the light of early morning struck it; then golden, as it caught the first direct rays of the sun; then dazzling white, against a background of brilliant blue—surely nothing earthly could be more beautiful. Our practical photographer became rapturous, till he recollected that his mission was not to poetise, but to depict, and forthwith he was "up to his eyes" in negatives. For only a part of the day, however. Once more the clouds gathered, showers fell, and hopes of reaching the lake fell likewise. There was still a chance, though. If to-morrow were fine, then—

February 21st.—And it was fine. "Explored" all day; packed up for Lake Ada; then "developed" all night.

(*To be continued.*)

ON THE CAUSE OF THE LIGHT BORDER FREQUENTLY NOTICED IN PHOTOGRAPHS JUST OUTSIDE THE OUTLINE OF A DARK BODY SEEN AGAINST THE SKY; WITH SOME INTRODUCTORY REMARKS ON PHOSPHORESCENCE.

BY PROFESSOR G. G. STOKES, SEC. R.S.*

An observation I made the other day with solar phosphori, though not involving anything new in principle, suggested to me an explanation of the above phenomenon which seems to me very likely to be the true one. On inquiring from Captain Abney whether it had already been explained, he wrote:—"The usual explanation of the phenomenon you describe is that the silver solution on the part of the plate on which the dark objects fall has nowhere to deposit, and hence the metallic silver is deposited to the nearest part strongly acted upon by light." As this explanation seems to me to involve some difficulties, I venture to offer another.

1. I will first mention the suggestive experiment, which is not wholly uninteresting on its own account, as affording a pretty illustration of what is already known, and furnishing an easy and rapid mode of determining in a rough way the character of the absorption of media for rays of low refrangibility.

The sun's light is reflected horizontally into a darkened room, and passed through a lens,† of considerable aperture for its focal length. A phosphorus is taken, suppose sulphide of calcium giving out a deep blue light,‡ and a position chosen for it which may be varied at pleasure, but which I will suppose to be nearer to the lens than its principal focus, at a place where a section of the pencil passing through the lens by a plane perpendicular to its axis shows the caustic surface well developed. A screen is then placed to intercept the pencil passing through the lens, and the phosphorus is exposed to sunlight or diffuse daylight, so as to be uniformly luminous, and is then placed in position; the screen is then removed for a very short time, and then replaced, and the effect on the phosphorus is observed.

Under the circumstances described there is seen a circular disc of blue light, much brighter than the general ground, where the excitement of the phosphorus has been refreshed. This is separated by a dark halo from the general ground, which shines by virtue of the original excitement, not having been touched by the rays which came through the lens.

2. The halo is due to the action of the less refrangible rays, which, as is well known, discharge the phosphorescence. Their first effect, as is also known, is, however, to cause the phosphorus to give out light; and if the exposure were very brief, or else the intensity of the discharging rays were sufficiently reduced, the part where they acted was seen to glow with a greenish light, which faded much more rapidly than the deep blue, so that after a short time it became relatively dark.

3. This change of colour of the phosphorescent light can hardly fail to have been noticed, but I have not seen mention of it. In this respect the effect of the admission of the discharging rays is quite different from that of warming the phosphorus, which, as is known, causes the phosphorus to be brighter for a time, and then to cease phosphorescing till it is excited afresh. The difference is one which it seems important to bear in mind in relation to theory. Warming the phosphorus seems to set the molecules more free to execute vibrations of the same character as those produced by the action of the rays of high refrangibility. But the action of the discharging rays changes the character of the molecular vibrations, converting them into others having on the whole a lower refrangibility, and being much less lasting.

4. Accordingly, when the phosphorus is acted on simultaneously by light containing rays of various refrangibilities, the tint of the resulting phosphorescence, and its more or less lasting character, depend materially on the proportion between the exciting and discharging rays emanating from the source of light. Thus daylight gives a bluer and more lasting phosphorescence than gaslight or lamplight. I took a tablet which had been exposed to the evening light, and had got rather faint, and, covering half of it with a book, I exposed the other half to gaslight. On carrying it into the dark, the freshly exposed half was seen to be much the brighter, the light being, however, whitish, but after some considerable time the unexposed half was the brighter of the two.

Again, on exposing a tablet, in one part covered with a glass vessel containing a solution of ammonio-sulphate of copper, to the radiation from a gas flame, the covered part was seen to be decidedly bluer than the rest, the phosphorescence of which was whitish. The former part, usually brighter at first than the rest, was sure to be so after a very little time. The reason of this is plain after what precedes.

A solution of chromate of potash is particularly well suited for a ray filter when the object is to discharge the phosphorescence of sulphide of calcium. While it stops the exciting rays it is transparent for nearly the whole of the discharging rays. The phosphorescence is accordingly a good deal more quickly discharged under such a solution than under red glass, which along with the exciting rays absorbs also a much larger proportion than the chromate of the discharging rays.

5. I will mention only one instance of the application of this arrangement to the study of absorption. On placing before excited sulphide of calcium a plate of ebonite given me by Mr. Preece, as a specimen of the transparent kind for certain rays of low refrangibility, and then removing the intercepting screen from the lens, the transmission of a radiation through the ebonite was immediately shown by the production of the greenish light above mentioned. Of course, after a sufficient time, the part acted on became dark.

6. I will mention two more observations as leading on to the explanation of the photographic phenomenon which I have to suggest.

In a dark room, an image of the flame of a paraffin lamp was thrown by a lens on to a phosphorescent tablet. On intercepting the incident rays, after no great exposure of the tablet, the place of the image was naturally seen to be luminous, with a bluish light. On forming in a similar manner an image of an aperture in the window-shutter, illuminated by the light of an overcast sky reflected horizontally by a looking-glass outside, this image, of course, was luminous; it was brighter than the other. On now allowing both lights to act simultaneously on the tablet, the image of the flame being arranged to fall in the middle of the larger image of the aperture, and, after a suitable exposure, cutting off both lights simultaneously, the place of the image of the aperture on which the image of the lamp had fallen was seen to be less luminous than the remainder, which had been excited by daylight alone. The reason is plain. The proportion of rays of lower to rays of higher refangibility is much greater in lamplight than in the light of the sky; so that the addition of the lamp-

* A Paper read before the Royal Society, May 25th, 1882.

† The lens actually used was one of crown glass which I happened to have; a lens of flint glass would have been better, as giving more separation of the caustic surfaces for the different colours.

‡ The experiments were actually made, partly with a tablet painted with Balmain's luminous paint, partly with sulphide of calcium, and other phosphori in powder.

light did more harm by the action of the discharging rays which it contained on the phosphorescence produced by the daylight, than it can do good by its own contribution to the phosphorescence.

(*To be continued.*)

Correspondence.

THE MOON'S ATMOSPHERE.

Dear Sir,—You no doubt have lately read in the newspapers an account of the discovery recently made by the French savants of the Egypt expedition respecting a special atmosphere to the moon.

I take the liberty to recal to your memory that in 1870 my partner in business, Mr. E. Ogier, had arrived at the same conclusion by photographic means. Your journal, as well as those of Paris and America, received Mr. Ogier's communications on the subject, and his discovery caused much wonder and surprise in both the Old and New World.

Unfortunately, M. Ogier has abandoned photography, which he had taken to temporarily, to retake his old profession, that of author. Perhaps, after having referred to your journal of the 19th August, and following in the years 1870 and 1871, and re-read the articles therein on the luminous power of the moon and its photosphere, you will think it advisable to affirm the discovery made by photographic means eleven years ago, and recognised as a fact at the present day.—Yours, &c., Godfray.

[Those of our readers who have the News for 1870 and 1871 will doubtless turn with interest to M. Ogier's letters of that period.—Ed. P.N.]

MY TENT.

Dear Sir,—Seeing in your journal of last week's issue descriptions of dark-tents, it occurred to me your readers may feel interested, and perhaps find something useful, in another form. Should you think so, you are at liberty to let them have, through the medium of the News, the following description of my dark-tent :—

It is made of three thicknesses of black twill calico ; its shape is that of an inverted bag (square), and measuring two yards high ; each side measures a yard. In one of the sides is cut an oval-shaped opening, measuring 8½ by 6½ inches. A square piece of calico is sewn over this opening, on the inside, like a pocket, in which is cut an oval opening the same size as the outer oval. The size of this square piece is 10½ by 8½ inches ; the top edge is not sewn, so that a plate of ruby glass, 10 by 8 inches, can be slipped down, like one would drop a large card into his coat pocket. There is a flap over the top edge, sewn on to the outer calico, like a pocket flap, which falls over the top edge of the glass, and thus completely preventing any white light from entering. The oval is prevented from opening too wide, or from losing its shape, by five or six cords laced across from side to side, like miniature cross-bars of a window. Across the top of the tent are placed two sticks in the form of an X, four feet long, one inch thick, having a nick cut out of each end. Four strong brass curtain-rings are firmly sewn outside on each corner at top, into which the nicks are inserted. The two sticks are just long enough to keep the top extended, allowing a little sag to the calico. They are held together at the centres, where they cross by means of a running loop of good stout cord or rope. This rope is seven or eight yards long, and is intended to suspend the tent by throwing it over the limb of a tree, and hauling on it. By this means the tent can be raised or lowered. On the top of the tent is laid a square yard of india-rubber cloth, through the centre of which passes a short brass tube, having a flange outside, and another inside. The india-rubber cloth and calico are of course thus held between the two flanges, which can be secured tight together, thus making it perfectly water-tight. In this manner I have a very good water tank on the roof. The india-rubber tube is slipped over the brass tube, then carried into one of the angles (that is, left of window) by means of tape loops, and terminated by a small brass tap. I have three small pockets sewn on right-hand side, to hold bottles for developing. I cannot describe my table better than saying that it is a large camp stool with a stout piece of coarse canvas on top, and kept tight by a twine tying down the legs. As you will perceive, there is no door. The only means of egress is by raising the tent at one side, and getting in and out underneath. When inside, the bottom edges of the calico are trampled with the foot, so as to exclude all white light. I generally pitch my tent on an incline, so that the water may run off from under the feet. This tent has, like all dark tents, its disadvantages, but after trying other forms I find it the best. It is very portable, as it can be folded up into a small space, tied on to the camp stool, and will not take long to put up, provided you have a tree or some other suitable support from which to suspend it. If not, it cannot be used. I have used it many times in different parts of Ireland, and have never been disappointed in finding a peg from which to hang my tent.

T. O'Connor.

THE RECENT ECLIPSE OF THE SUN.

Dear Sir,—The paragraph which you quote from the *Times* refers to the great improvement in photography since 1870, and says : "It may be mentioned that when Mr. Brothers obtained an impression of the corona, in 1870, during an eclipse which lasted over two minutes, it was considered a triumph of photography ; while during the present eclipse, a plate which was exposed three seconds shows signs of over-exposure." This would lead anyone to suppose that in 1870 it required the full duration of the eclipse to produce the photograph referred to. The fact is, that during the 104 seconds I exposed *five* plates ; but owing to the partially clouded sky during the greater part of the time, only one of the photographs was of any scientific value, and this was obtained in *eight seconds*. The comparison, then, is really between *eight* and *three* seconds ; and when we consider the difference between the collodion plates as I used them, and the gelatine plates employed lately, the comparison is not so favourable to gelatine as might have been expected. I should have supposed that less than *one* second would have produced the picture referred to.—Yours truly,

A. Brothers.

HOT WEATHER TROUBLES.

Dear Sir,—If your correspondent will refer to the description of my "drying box," &c., in the Year-Book for 1881, he will find I there state that I have had the same experience as he has, but found a remedy in the use of plenty of cold or cool fresh air for drying, instead of that which is heated by the lamp. He can easily try this by putting his lamp on top of the box, and letting it draw its air supply through it—or possibly, if the room in which he uses the box is not very well ventilated, an increased supply of air to the room itself might relieve him.—Yours truly,

Richard Parr.

Dear Sir,—I notice that "Northumbrian" mentions, in connection with the formula for gelatine emulsion which I gave at the Society of Arts, troubles which he has had on account of the frilling of plates. Experience which I have had of this nuisance, and the conclusions to which I have come with regard to the cause of it, may possibly be of use to "Northumbrian" and others.

The cause of frilling is, I believe, in nine cases out of ten, an insufficient quantity of air through the drying-box, or an unevenly-distributed current and too high a temperature. Very few of the drying-boxes which I have seen have nearly large enough air-passages. With an insufficiently-ventilated box, and a high temperature, frilling is almost sure to occur. With a brisk current of dry air, and no artificial heat, frilling never occurs. In winter, a little artificial heat seems to be quite necessary; but in summer it is neither necessary nor desirable.

I may say that I do not consider the gelatine used by "Northumbrian" to be by any means the least prone to frilling. I should advise him to try the gelatine specially made by the Autotype Company for dry-plate purposes.

W. K. Burton.

PS.—I may say, in connection with the formula which I gave at the Society of Arts, that I have since then found an advantage in increasing the amount of chloride to two or three times what I at that time gave. This will not alter the composition of the emulsion, as it is intended that there should be no chloride in it, but will allow the boiling to be performed in the presence of a greater excess of soluble chloride, and sensitiveness will be more rapidly gained.

PHOTOGRAPHING THE DERBY.

Sir,—I think you will pardon me if I let your readers into the secret that you have never witnessed a Derby race, or your ideas of locality are somewhat at sea. This I infer from your criticism of my Derby race photograph, where you say, "The horses and their jockeys are also well seen, but many of them appear to have passed the post and done racing." Now, as a matter of fact, none of the horses have passed the winning post, although within a few yards of it. We all know that in front of the Grand Stand the final struggle takes place. The horses at this point must have been running at over fifty feet per second. A photographic friend (expert) who I showed the picture to, exclaimed, "Why, they are standing still!" Did he expect to see them move in the photograph? I admit that had a slight movement during exposure taken place, it would have given a better representation of the race as presented to the eye. This is very apparent in some photographs I took at the Alexandra Palace a few days ago (copies of which I will have pleasure in sending you in proof of the above statement).

I will thank you to find a place for this letter in your next issue, as I believe that the photograph in question is the first successful Derby race that has been photographed. Please also correct a typographical error that has crept into your report of the Thursday Evenings for Photographers. I am represented as exhibiting a negative taken by the "Ampit" process; it should read, ammonia nitrate process.—Yours truly, A. L. Henderson.

Proceedings of Societies.

South London Photographic Society.

The ordinary monthly meeting of this Society was held at the house of the Society of Arts, John Street, Adelphi, on Thursday evening, the 1st inst.

A communication was read from the Rev. F. F. Statham, M.A., President, regretting his inability to be present, and the chair was then taken by Mr. P. Mawdesley, Vice-president.

The minutes of the previous meeting having been read and confirmed,

The Treasurer read a communication he had received anonymously, commenting upon a practice indulged in by the members, during the reading of papers, of conversing in loud tones. The writer seemed to think that this was to a great extent the cause of the unwillingness of members to contribute papers.

Mr. W. Brooks, who has been lately elected on the Council of the Royal Cornwall Polytechnic Society, with which he has been many years connected, drew the attention of members to the Fiftieth Annual Exhibition and Jubilee of this Society, which takes place in September next, and urged upon th Society to assist in making it a success.

A number of prize lists were distributed amongst the members, and Mr. Brooks expressed his willingness to supply any further information that might be needed.

Mr. Brooks then read a paper entitled "Practical Experiences with the Alkaline Developer for Gelatine Plates" (see p. 327), and handed round for inspection some negatives, and also prints from the same.

At the conclusion of the paper Mr. E. Dunmore agreed with Mr. Brooks' opinion that sulphite of soda was a valuable addition to the developer.

Mr. Brooks remarked that many persons thought sulphite of soda prevented green fog; in his experience the reverse was the case. He thought all green and red fog was due to sulphur in some form, and believed that a great deal of green fog was owing to the decomposition of gelatine through boiling.

Mr. Dunmore thought that with regard to sulphur being the cause of green fog, in his experience he did not find any trace of it until after the plate was put into the hyposulphite.

Mr. Brooks had often seen it before being placed in the hyposulphite.

Mr. Mawdsley was very doubtful about negatives in which the shadows remained perfectly pure; where the shadows retained their pristine brilliancy there was always in his experience green fog.

Mr. Dunmore thought that might possibly be the result of not washing the negative sufficiently before putting into the hyposulphite bath.

Mr. Brooks said he had endeavoured to get the neutral tint more commonly obtained with wet plates; it took him a long time to get this colour, and it was done by using an emulsion containing chloride, and a large proportion of citric acid in the developer.

Mr. Henderson thought Mr. Dunmore was quite correct in saying that an imperfectly washed picture is more likely to give green fog. He had made an experiment with a plate which he developed in the usual way. One-third of the plate was then immersed in weak acid, the opposite end being immersed in a weak solution of ammonia for two minutes, the centre portion receiving no further treatment. When fixed, the portion treated with acid was perfectly free from green fog, the other portions showing it more or less.

Mr. J. Nesbit thought it would often be found that green fog was the result of the action of ammonia upon the gelatine in some way; it seemed to him that this would point to the action of ammonia upon the pyrogallic developer, and not to anything in the hyposulphite or pyrogallic. He would like to ask if any one had ever noticed green fog after using the ferrous-oxalate developer.

Mr. Dunmore had often found it so.

Mr. Brooks remarked that by substituting carbonate of soda, you did away with green fog altogether.

Mr. Nesbit thought it seemed strange to get green fog with the ferrous oxalate developer, and that an excess of ammonia must be the exciting cause of it.

Mr. Henderson said it had nothing to do with the gelatine whatever, but was caused by the bromide.

Mr. Bolas remarked that opinions were so diverse on the subject, that it was difficult to arrive at any conclusion whatever. He thought the green fog arose in some cases from gelatine in a state of decomposition, and said that when Mr. Plener changes the gelatine, the green fog disappears.

Mr. Brooks said some gelatines would stand more cooking without giving green fog than others.

Mr. Coles had found sulphite of soda to be a valuable preventive of green fog.

Mr. Brooks said that many photographers, instead of getting sulphite of soda, got sulphate. In his hands sulphite was more a producer of green fog than otherwise, but those plates that gave it thus had not a trace of it when common washing soda was used. In place of ten minims of liquid ammonia he used a saturated solution of soda. He had not tried carbonate of potash, but had tried chemically pure carbonate of soda; he found, however, common washing soda preferable. Ammonia affected the chest of some operators, which was not the case with soda. He did not find soda caused "frilling"; he generally used a very hard gelatine, and had actually developed with water at 90° temperature without "frilling."

The Chairman then remarked that the general opinion seemed to be in favour of the use of sulphite.

Mr. Bridge informed the meeting that there was a question in the box, "What is the best formula for toning ready-sensitized paper?"

Mr. Henderson thought this was a very difficult question to discuss until they knew how the paper was prepared.

Mr. Bridge had found it better to make a new bath than to strengthen the old one. In buying paper, you perhaps got one sheet perfectly good, and the next one might be of no use at all. A gentleman had told him it was a good plan to soak the prints in a weak solution of soda.

Mr. Foxlee had met with great success with an obstinate sample of paper by immersing the prints in a weak solution of washing soda.

Mr. Dunmore thought it was the introduction of acid into the toning bath that caused prints to go "mealy," and would recommend a fresh bath.

Mr. Brooks had been using a chloride-of-lime bath, but found it better to introduce acetate of soda. After washing the silver out of the prints, he recommended letting them lie for a few minutes in a weak solution of carbonate of soda, putting them in singly, to make sure of the action taking place equally, and then taking them out and filling up the dish with water. He would have the bath made up of double strength, and get about the same bulk of hot water. When he did not raise the temperature of the bath above that of the atmosphere, he found the toning to go on slowly. He used 15 grains of gold, ½ drachm of chloride of lime, 1 ounce of acetate of soda, and about ¼ ounce of chalk. He had not the slightest difficulty, and could tone three sheets of paper with 2 grains of gold. He had great difficulty in toning until he neutralized the acid with an alkali.

Mr. Cowan recommended the following:—

Borax	2 ounces
Boiling water	80 "

and

Chloride of gold...	10 grains
Water	80 ounces

using 8 ounces of each solution to tone a sheet of paper. If used at a temperature above that of the atmosphere, the prints would be mealy.

Mr. Nesbit found the gold go down more readily with durable sensitized paper than with ordinary.

Mr. Mawdesley believed it was false economy to use a bath a second time.

Mr. Bridge found less markings with ready-sensitized paper. For some years he had used a composition called York's salt of gold, and found that the bottle would tone twenty-four sheets of paper. Since he had used ready-sensitized paper, he could get the same result.

The Chairman then presented Mr. E. Dunmore with the Society's silver medal, won by that gentleman in the Artistic Competition.

This being the last ordinary meeting of the season, a discussion ensued as to the rendezvous for the usual outdoor meeting, and it was eventually decided that the first should take place at Jack Straw's Castle on the first Saturday in July, tea being arranged for six o'clock.

The Chairman then called the attention of the Society to the presence in their midst of Mr. J. Traill Taylor, formerly one of their members, and remarked that he was sure that they would all be glad to see him.

Mr. Taylor, who was heartily received, said he had great pleasure in appearing amongst them again; he came as a representative of the Congress of Photographers' Associations of America to be held in August next, and said he had a very great desire to see English art well represented on that occasion. He would be very glad to take charge of the pictures of intending exhibitors, which he would have placed in the most favourable positions possible, and would return them safely. Any pictures addressed to him in the care of either of the weekly journals would reach him, and he would like them to be sent not later than the first week in July if possible, as he would be leaving England about the 13th to 20th July. The pictures need not necessarily be large, and he would like to see landscapes of subjects out of the ordinary beaten track of portraiture.

The Chairman having called for a vote of thanks to Mr. W. Brooks for his able and interesting paper, which was heartily responded to, the meeting closed.

Thursday Evenings for Photographers.

At the meeting held on the 1st inst., Mr. Alexander Collier occupied the chair.

Mr. Henderson passed round a negative which he had, with a view to reduce the density, treated with a solution of iodine and cyanide; this removed most of the silver, but left an opalescent stain, apparently caused by some insoluble compound left in the film.

Mr. Coles exhibited a transparency that had been reduced by immersing it in a solution of permanganate of potash; but it having been left exposed to light behind a negative for a week or ten days, the negative image was printed on it, showing that negatives so treated darkened by exposure to light.

Mr. Brown said he had frequently used a solution of permanganate of potash as a stain for wood; it darkened by exposure to light, giving quite as good a stain as that obtained with bichromate of potash.

Mr. Henderson exhibited a number of instantaneous negatives taken at the Alexandra Palace on Whit Monday.

Mr. J. Traill Taylor, in the course of a few remarks upon photography in Amercia, said that at present there is an enormous number of amateur portrait makers (not photographers) in America, and that he estimated there were more cheap sets of apparatus disposed of in one day in New York than by all the English makers in three months; and he exhibited a specimen of the dark slides issued with these cameras; it was machine-made, the plates sliding into grooves; the slides, which were made of stout milboard, drew right out, a light-trap closing after them.

Mr. Le Fevre introduced M. De Fonville, president of the French Aeronautical Society, &c., to the meeting, and he gave a most interesting acount of the progress of balloon photography in France, stating that on his next trip he intended using the photographic revolver invented by M. Janssen, and he was very sanguine of success.

Mr. Ashman said it had been stated that immersion in the hyposulphite bath reduced the intensity of negatives; in his experience the result was quite the reverse, and he passed round a negative, half which had been left for twelve hours in the hyposulphite solution, and was much more dense than the other half.

Mr. Debenham thought the negative was stained by sulphide of silver, for which he knew no solvent.

Mr. Ashman had been able to remove the stain by treating the plate with hydrochloric acid, boracic acid, and alum.

Talk in the Studio.

Photographic Society of Great Britain.—The last meeting of this Society for the present session will be held on Tuesday next, June 13th, at 8 p.m., in the Gallery, 5a, Pall Mall East, when papers will be read by C. R. Woods, "With the Eclipse Expedition," and by J. Cadett, "On the Comparative Efficiency of Various Instantaneous Shutters."

Glass Roofs and Ceilings.—M. Arthur Morin, director of the Conservatory of Arts and Trades at Paris, writes on the influence of glazed roofs and ceilings during the winter:—"If in the summer season the glazed roofs of stations and covered courts present the inconvenience of producing a heating effect, which it is necessary to overcome, in winter they have the contrary defect, which often leads to very disagreeable results. The conductibility of thin glass then leads to a considerable cooling of the interior layers of air in contact with the glass; this air, becoming denser than that below, descends, and is constantly replaced by more, which is likewise cooled, and by this continued movement the rooms thus covered become very difficult to warm. To these troubles is added that of the motion of the cold air, which naturally flows towards the chimneys, or the discharge openings, if there are any, so that the occupants feel a descending current of cold air, the more unpleasant the nearer they are to the chimney or the discharge openings. If the glass roof is single, and has, as is almost inevitably the case, joints, through which the external air—much colder than that in contact with the internal surface—penetrates into the room, the effects which have been mentioned become more sensible and disagreeable. There is also the danger that water will enter during rain storms. It is, then, necessary in occupied buildings, when similar plans are adopted for lighting, to place under the roof a glass ceiling with as few joints as possible, and in the loft thus formed and limited above and below, to provide heating arrangements which will prevent the cooling of the ceiling, and thus to avoid the cold air currents which have just been referred to".

NEW ZEALAND SCENERY.—We have received from Messrs. Burton Brothers, of Otago, New Zealand, some charming views of lake and mountain, secured on a visit to a remote portion of the island, of which an interesting account appears in another column. We cannot give higher praise to Messrs. Burton than to say that their productions remind one of a series of Mr. W. England's Swiss views. There are here placid lakes, snowy mountains, lofty crags, and magnificent cloud pictures, proving that not only are the antipodes blessed with magnificent scenery, but also with photographs of taste and culture capable of doing justice to it.

ALBUMENIZED AND SENSITIZED PAPER.—Speaking of Mr. William England, we may mention that that gentleman, or rather we believe one of his sons, is occupying himself with the manufacture of albumenized and sensitized papers. Mr. England has never used any but paper of his own preparing in producing the vast number of prints which, for a quarter of a century past have made their way out of his studio into every corner of the world, and hence we may take it there is plenty of knowledge and experience at hand for undertaking the manufacturing work in question.

ROYAL CORNWALL POLYTECHNIC SOCIETY.—The next Exhibition will open on Tuesday, September 5th, and the following regulations affect photographic exhibits. In all cases state whether the work is professional or amateur, and name process of production. All works sent for competition must have been executed within eighteen months of the date of this Exhibition. Carte-de-visite portraits are excluded from Exhibition except when illustrating some special process or novelty. *Professional Photographers*—Medals are offered by the Society for meritorious productions in the following subjects:—1, for landscapes; 2, for portraits; 3, for composition pictures; 4, for instantaneous pictures; 5, for dry plate pictures; 6, for pictures by improved processes; 7, for enlargements. *Amateurs*—Medals are offered for meritorious productions in this department. *Photographic Appliances*—Medals are offered for improved apparatus and appliances, including magic lantern work. All exhibits in this department must be accompanied by a written explanation of their specialities. Further information respecting the photographic department may also be obtained from Mr. W. Brooks, Warren Road, Reigate, who has kindly undertaken to assist the Society. All paintings, drawings, sketches, and photographs must be framed; and if left at one of the following places on or before Tuesday, August 22nd, will be conveyed from these depôts to and from the exhibition free of charge, namely:—Mr. W. A. Smith, 20 and 22, Mortimer Street, Regent Street, London, W.; Messrs. Worth and Co., Cathedral Yard, Exeter; Mr. T. T. Bartlett, Ebrington Street, Plymouth; Mr. H. M. Harris, Union Street, Plymouth; Messrs. Thomas Solomon and Co., King Street, Truro.

ATMOSPHERE DE LA LUNE.—Les journaux de France annoncent que les savants de l'expédition d'Egypte viennent de découvrir que la Lune avait une atmosphère. Il y a dix ans que nous connaissions à Jersey ce que ces savants ignoraient il y a quelques jours. Qui ne se souvient ici des photographies lunaires de M. E. Ogier, et du tapage qui se fit en Angleterre à l'occasion de sa découverte? Nous voyons encore ces images obtenues par l'atmosphère lumineuse de la Lune à La Collette; nos confrères de Jersey publièrent la plupart des articles de la presse Anglaise de 1870 à 1871, surtout ceux du *Photographic News*. Un an après, si nous avons bonne souvenance, M. Baudoux, photographe, de Jersey, exposait un cadre de photographies lunaires au Collège; donc, pour rendre le communiqué des savants français tout-à-fait amusant, il serait à désirer que leur preuve ait été acquise par la photographie; ce serait un comble. M. Pegot-Ogier a quitté la photographie pour reprendre les travaux historiques et littéraires, mais nous qui connaissons son mérite et l'antériorité de sa découverte, nous croyons devoir l'engager à réclamer l'honneur qui lui appartient. On ne saurait assez remarquer combien est grande la part des amateurs dans le progrès des sciences et des arts. Est-elle moindre que celle des hommes de profession? Non; mais justice leur est bien rarement rendue.—*Jersey Chronicle.*

LONDON RELICS.—The issues of the Society for Photographic Relics of old London, now ready for forwarding to subscribers, comprise twelve large photographs by Mr. Dixon, of Albany Street, and two sheets folio size of letterpress descriptions, furnished by the hon. secretary, Mr. Alfred Marks, of Long Ditton, Surrey. The series of interior and garden views of Ashburnham House are especially interesting and apropos. With these is the old Buckingham Water-gate, whose fate it is in these latter days to be entirely separated from the river whose waters once washed its stone steps; and the Banquetting Hall, Whitehall, immortalised as the scene of King Charles's execution. The remaining photographs are views of fine old mansions on the west side of Lincoln's-inn-fields, regarding the history of which Mr. Marks furnishes some interesting particulars. The past year, we learn, has been fatal to more than one of the few works of Inigo Jones which but a little while ago yet lent beauty and interest to London streets. This circumstance yields an additional ground for satisfaction in the fact that the labours of this celebrated architect furnish most of the subjects of the present series of the Society's issues.—*Daily News.*

ACTION OF LIGHT ON FERRIC-OXALATE.—M. Jodin writes, in the *Comptes Rendus*, that the sensitiveness of ferric-oxalate solutions varies with their composition. If one takes a solution containing half molecule of ferric-chloride and half molecule of oxalic acid to each litre, and compares it with a solution containing three molecules of each, the photo-chemical sensitiveness of the former is about six times greater than that of the second. This decrease of sensitiveness with increase of strength seems connected with a certain complexity of the photo-chemical and photo-thermic properties of ferric-chloride.

OXIDATION OF PYROGALLOL IN PRESENCE OF GUM ARABIC.—Ph. de Clermont and P. Chautard.—The authors, following the indications of H. Struve, obtain purpurogalline by causing aqueous solutions of gum arabic to react upon pyrogallic acid, likewise dissolved in water. They dissolve 10 grms. pyrogallic acid in a little water, and add to the solution 500 c.c. of a solution of gum at one-tenth. The whole is introduced into a wide flask containing 2 litres. In a few moments the mixture becomes pale yellow, and shortly afterwards brown. After some hours the purpurogalline begins to be precipitated; the deposit increases daily, and in two months the operation is terminated. They add then an excess of water to remove the gum; the precipitate is let settle, and washed several times by decantation, and then filtered. The purpurogalline is thus obtained in crystalline needles of a fine golden-yellow, which are freed from traces of gum by being dissolved two or three times in alcohol.—*Chemical News.*

To Correspondents.

All Communications connected with Advertisements and Business to be addressed to Messrs. PIPER & CARTER, "*Photographic News*" *Office*, 5, *Castle Street, Holborn, E.C. Advertisers are requested to make all Cheques payable to* Messrs. PIPER & CARTER, *and crossed* "*Union Bank, Photographic News Co. Account.*"

*** We cannot undertake to return rejected communications.

AN IGNORANT AMATEUR.—1. The substance in question adheres most persistently, even such solvents as chloroform and carbon disulphide only removing it with extreme slowness. 2. We think you have made some mistake in the figures: write again. 3. It is principally a difference of name, the proportions not being very considerably altered. 4. Just so.

INSPECTOR.—1. The firm referred to undertook its manufacture over six months ago, but after several trials have failed to finish a single instrument, the very easy adjustments required proving too much for them. Any philosophical instrument maker can make the apparatus if you furnish him with the description and drawing which appeared in the PHOTOGRAPHIC NEWS, or with the Specification issued by the Patent Office, and you cannot do better than apply to the maker of the lens to which you refer. We are told that a simplified form is sold by the Photographic Stores Company, but we have not seen one. 2. Shortly.

STUDIO.—What you wish for can be easily attained by hanging curtains obliquely across, so as to shade the end at which you have placed the camera. The tint mentioned is as suitable as any.

A. B. C.—A notable degree of cold is produced when hyposulphite of soda is dissolved in water, and if the solution is used when cold, its solvent power is proportionately reduced. No doubt this is the cause of the irregularities you notice.

H. H. B.—1. They must be mounted before removal from the glass, and moderately thin glue answers extremely well. 2. The so-called albumen colours are very suitable, or a little of the pigmented gelatine taken from the surface of carbon tissue may be used. A good method is to place a small piece of the tissue on a warm plate, and work a little of the pigment off with a brush moistened with a two per cent. solution of potassium bichromate, this latter serving to quickly render the spotting insoluble.

E. A. M. (Barnet).—A mere trace is present; but one never can know how little may do mischief.

G. M. Redaway.—As you require nothing larger than 10 by 8, you had better take your pictures direct, except in special cases. The most suitable lenses are those of the symmetrical or rectilinear type, and for the two sizes you mention you might commence very well with a wide-angle rectilinear or portable symmetrical of six inches focus, and a rapid lens of the same character having a focus of eleven inches. In each case the lens may be divided, should you require to approximately double the focal length; but the marginal lines will suffer a little as regards straightness. An ordinary bellows camera will be most suitable, and it is very questionable whether it is advisable to have one fitted with a swing-back.

A Query.—Mr. George Breithaupt, of the Bank of Madras, Bellary, writes:—"I should like to place the following question before you and the many readers of your paper for an opinion, and shall feel greatly obliged by your kindly giving it a place in one of your issues. Is it usual with respectable trading firms to advertise that they are prepared to supply all articles at manufacturers' prices (as also advertised by them) less 5 per cent. discount for cash, and when receiving an order to add on to the manufacturer's prices in their invoice, and then grant the discount on the *increased sum?* Is this a perfectly fair and equitable transaction, and the usual practice of London firms? To the instance in point. About September last, I received from Messrs. Blank and Co. a rapid rectilinear lens, 12 by 10, by Dallmeyer, in *rigid setting* (I asked for one with rack-and-pinion). Mr. Dallmeyer's price for this lens is £11, as per his and Messrs. Blank and Co.'s catalogue. Messrs. Blank and Co., however, charge me £11 10s. in their invoice, and then allow me 5 per cent. on the £11 10s. Presuming it was an accidental error, I wrote to them on the 25th August last, but my letter was ignored. I wrote again on 21st March after a lapse of seven months, and am now told that I only paid £10 18s. 6d. for the lens, and that that "answers my query *re* price." Their logic is beyond me. I *have* paid only £10 18s. 6d. (*i.e.*, with 5 per cent. off £11 10s.); but as the original and correct price of the lens was only £11, and not £11 10s., I ought not to have been charged more than £10 9s., *i.e.*, 5 per cent. off £11, in lieu of £10 18s. 6d. As Messrs. Blank and Co. do not appear inclined to act fair by me in the matter, and refused the over-charge of 9s. 6d., it's a duty I owe to myself, and to others out here, to ask you to publish this letter in common justice. Messrs. Blank and Co's. conduct in this matter has surprised me; but what follows will, I think, surprise you and your readers. They conclude their letter to me by saying that they "think that our Mr. Blank's friendly relationship with the heads of the two journals (even if other reasons do not interfere) will prevent your troubles (if such exist) having any outlet from those sources." In plain language, Blank and Co. have the assurance to insinuate that their "friendly relationship" with yourself and the editor of the *Photographic Journal* (?) would interfere with your positions on which we rely, and would prevent your doing an outsider an act of justice in making public the unfair treatment I have been subjected to. If Messrs. Blank and Co. care to admit that the invoice at £11 10s., in lieu of £11, was a clerical error, and refund the overcharge with that explanation, I shall certainly have a better opinion of them than I can possibly have now. [We have personally dealt with Messrs. Blank and Co. for several years prior to our connection with this journal, and must avow that we always found the firm straightforward and courteous. We cannot but think a little "friction" must have here come between buyer and seller, and no doubt, ere this, a satisfactory ending has been made to the little quarrel. As to the reference to ourselves, it is amusing, certainly, but nothing more.—Ed. P. N.]

W. Paton.—Certainly; use a little bromide of potassium.

T. W.—We should advise you to purchase the sulpho-pyrogallol from the Platinotype Co.; see our advertising columns. If you cannot make that answer, let us know again; but we have had no difficulty in getting negatives both *clear* and *vigorous*.

An Old Dry Plate.—1. Probably the developer would no longer develop; anyhow, you might try it. 2. Let us have further particulars, especially as regards the advantages over the old method.

Big Nemo.—We have observed something similar in the case of a badly albumenized paper with which we met some time since, when an irregular reduction of silver took place.

THE PHOTOGRAPHIC NEWS.

VOL. XXVI. No. 1241.—*June* 16, 1882.

CONTENTS.

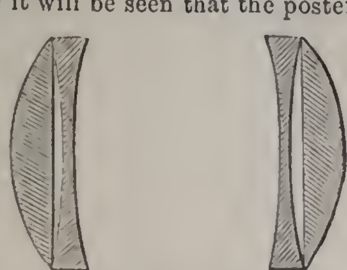
CERTAIN MODIFICATIONS IN THE CONSTRUCTION OF PHOTOGRAPHIC LENSES.

Mr. J. TRAILL TAYLOR has recently given most interesting demonstrations of certain modifications of the forms of photographic lenses which are common in America, but which are so little known in this country that such recollections as we can give of Mr. Taylor's remarks may be interesting to our readers.

The first modification illustrated has reference to portrait lenses. A demand was made for a lens similar to that known as the carte-de-visite lens; that is, one which would cover with full aperture a considerable plate. The desired effect was brought about by allowing a small air-space between the two lenses forming the front combination. These were ground to slightly different radii, so that, while they touched at the edges a little, they were parted at the centre.

The next modification, and a far more important one, is that made in the class of lenses of the "rapid rectilinear" or "symmetrical type." The object which the American optician who introduces the changes has in view is the minimizing of the thickness of the optical glass used, as such glass is subject to an enormous duty in transmission to America. All those who are familiar with our English and Continental rapid lenses know that each combination consists of a very deep meniscus made up of two lenses, one a deep converging meniscus, the other a deep diverging meniscus. Those who are not familiar with the lens may refer to our recent illustrations, although in them we do not show the separate lenses of each combination.

The deep form of lens involved thick glass before grinding, and Mr. Morrison, an American optician, found that he could get the same result by the use of flatter lenses if an air-space were left between them as shown in our illustration. Here it will be seen that the posterior surface of



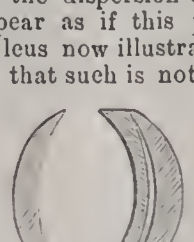
the front lens is a plane, whilst the anterior surface of the back lens is slightly curved, so as to touch at the edge, but not at the centre.

By comparing this sketch with that of one of our Continental or English lenses it will be seen that the American form involves far thinner glass than the other. Mr. Taylor tells us that as regards definition and covering power the one seems to be as nearly as possible equal to the other. A great drawback is to be found, however, in the two extra reflecting surfaces. It is true that the loss of rapidity from many reflecting surfaces is small. There is a reason for this. It must be taken into consideration that every reflecting surface is also a diffusing surface, sending light in all directions; and also that every reflecting surface sends light not only back from the lens towards the object, but also re-reflects the light reflected from every surface behind it, and also the light falling on the sensitive film. All this inclines to increase the dispersed light in the camera, whilst it slightly diminishes the direct or useful light. The diffused light acts somewhat as the "auxiliary" exposure which used to be permitted in collodion days, and counteracts the slowing action due to the loss of direct rays; but it is at the sacrifice of quality, and, to a still more notable degree, of latitude of exposure. This applies, of course, specially to rapid dry plates, which require such care in working. With such the greater latitude afforded by a single lens than that afforded by one having several combinations is very marked.

The next modification referred to is a still more remarkable one. It is made in the lens known variously as "globe lens," "wide-angle rectilinear," "wide-angle symmetrical," &c.

The usual form of this lens is well known. It consists of two very deep menisci opposed to each other, and so placed that the outer surfaces very nearly form parts of a sphere.

By a well-known principle in optics, when two uncorrected deep meniscus lenses are thus placed with a small stop between them, all oblique rays will be achromatized, the back lens correcting the dispersion of the front. At first sight it would appear as if this principle were taken advantage of in the lens now illustrated; but a little consideration will show that such is not the case. The front



lens of this combination is the usual one—that is, it is achromatic, whilst the back one is uncorrected. It is evident that in such a case there must be considerable chromatic aberration. It is impossible for rays already achromatized to pass through an uncorrected lens without suffering chromatic aberration. The fact, however, remains that the lens works in practice; the explanation must be that given by Mr. Taylor. He points out that the achromatism in a photographic lens is always but a compromise, and it is likely that in the case of the lens in question, which works with but a small aperture, the aberration is in reality less than it is in a large aperture lens, which is nominally fully corrected.

Several American "dodges" were shown besides these modifications in construction which we have described, such as vulcanite diaphragm, peculiar arrangement of the rackwork of the portrait lens, a shutter in the form of a diaphragm dropping through the lens, &c.; but as all these have been already described in our columns, they do not call for particular notice here.

Mr. Taylor's excellent demonstration suggests to us many reflections, principally the one made by himself. He asks why photographers should leave themselves so completely in the hands of the opticians as they do? Why should they not take the matter of their lenses in their own hands, and experiment for themselves? Every photographer is a chemist; how few are opticians! Yet the one is nearly as easy as the other. It is generally supposed that to have any knowledge of optics, deep skill in mathematics is necessary. How little true this is, is shown by the fact that some of our most successful practical opticians have been but ingenious workmen who have arrived at most useful results by simply trying the effects of different combination of lenses. It is true that without a deep knowledge of mathematics no man need expect to perform a master stroke such as Petzval did, when he turned out the portrait lens in such a form that for a third of a century no improvement but in details has been made in it. But a little experimenting combined with some common sense will show the photographer that he has in most of his lenses powers he has little dreamed of. The optician makes a lens; he says, "This is a landscape lens." The photographer obediently uses it for landscape, and landscape only. Yet were he to venture to enlarge the aperture which the optician has provided for him, we know that he has a lens for portraiture superior, under certain circumstances, to the most expensive instrument marked by the optician "portrait lens;" whilst in the latter, did he dare to unscrew one combination, he has a perfect "landscape lens."

How great a power the photographer who gives the subject his consideration has, is shown by an example given by Mr. Taylor. This gentleman, having a globe lens of the ordinary pattern, with two combinations, and wishing a pair, unscrewed the back combination, and, fixing a deep meniscus spectacle glass behind each combination, had a pair of lenses similar to the one sketched above, and working, he says, admirably!

The remarks which were made at the meeting referred to bring up to our minds forcibly the necessity, which we have often urged, for a *standard of definition*. In astronomical work there is such a standard, and we do not have such terms as "perfect definition," "sharp as a die." That photographers are inclining to take the matter of their lenses into their own hands is shown by the fact that our advice, given more than a year ago, as to the advisibility of a standard of rapidity, seems likely to be put in effect. Let us hope that it will be the first of a series of standards, one being a *standard of definition*.

RECENT RESEARCHES ON ALBUMENOID BODIES.

A tolerably exhaustive monograph on bodies of gelatinous nature has recently been published by M. Béchamp, and the great importance of this subject from a photographic point of view renders it necessary that photographers should know something of the work of this able investigator.

Those complex organic bodies ordinarily known as albumenoids and gelatinous substances, whether liquid and coagulable, as white of egg and vegetable albumen; or solid, as in the case of the fibrous and horny constituents of the animal organisms, are, perhaps, at the same time the most interesting and the least known of organic compounds. As they are neither volatile nor crystallisable, the greatest difficulties are experienced in obtaining them in a pure and isolated state, and it not unfrequently happens that what appears at first sight to be a new body turns out to be a previously-known substance in an impure condition. Up to the present those distinctive properties which should enable us to draw sharp lines of demarcation between the various albumenoids are obscure and ill-defined, and a study of their elementary composition presents unusual difficulties, while when formulæ are deduced, they offer so much complexity as serves to put them almost outside the pale of the systematic organic chemistry of the present day. Notwithstanding this, there is some hope that before long the true composition of these bodies may be unfolded by patient labour and investigation.

Notwithstanding the amorphous nature of these bodies and their non-volatility, there is one characteristic which enables us often to judge of their purity, this being their rotative action on a bundle of polarized rays; and, by taking advantage of this characteristic, M. Béchamp has classified these bodies into well-defined groups, and it is to be hoped that further work in this direction will yield abundant and valuable results.

The white of egg appears to contain no less than three albumenoid bodies, one of which is precipitated by acetate of lead, another which is thrown down by basic acetate of lead, while the third is not coagulable by heat, is soluble in water, and insoluble in alcohol. The two first-mentioned offer the general characteristics of albumenoid bodies, while the third is rather of the character of a ferment, and it possesses the property of liquefying starch. These three bodies rotate the polarized ray to the left, their powers in this respect being 34°, 52°, and 78° respectively, and they appear to unite with acids almost as if they possessed basic properties.

The ferment thus discovered in the white of egg explains certain phenomena incident to the process of incubation, and there can be but little doubt that this substance will be found to have an important bearing on the process of silver printing, especially with reference to the permanency of the pictures.

Among the remarkable chemical re-actions which modern research has brought to view, may be mentioned those of a so-called catalytic nature in which a substance seems to induce decomposition by its presence without in itself undergoing any change, and the decomposing action of fibrine on peroxide of hydrogen is of this nature, the peroxide splitting up into water and free oxygen. When fibrine is treated with dilute hydrochloric acid the greater part dissolves, but an insoluble residue always remains, and Béchamp has demonstrated that it is this insoluble body which induces the decomposition of hydrogen peroxide.

The insoluble body in question is a true albumenoid, and, when heated to the boiling point, in contact with water, it loses its decomposing influence on peroxide of hydrogen. When, however, it has been dried at a low temperature, it retains its catalytic properties unimpaired for a length of time.

The investigations of M. Béchamp are being extended to the decomposition products of albumenoids, and we shall not fail to present to our readers full particulars of those points which appear likely to have a very direct bearing on photographic progress.

SOURCES OF FAILURE IN PHOTOGRAPHIC WORK.

An interesting article on this subject, from the pen of Dr. H. W. Vogel, appears in the *Notizen*, the substance thereof being as follows:—

It is frequently my lot to give counsel and advice to photographers who come to a dead block with their chemicals, or otherwise get into difficulties; but to always give useful and practical advice through the medium of a mere verbal or written communication is not by any means easy.

On one occasion a collotypic printer informed me that he had been troubled for some weeks with roundish spots on his negatives, and these had remained master of the situation, notwithstanding changes of collodion, bath, and developer. He sent two negatives for my inspection; these being taken from the same original (a map), but on a different scale. When I came to examine them I soon found that the relative position of the spots was identical in each negative, clearly proving them to arise from some peculiarity in the original map; and an examination of the batch of maps which the collotyper was engaged in reproducing showed the presence of yellowish iron stains, so faint as to be scarcely visible to the eye, but of sufficient intensity to notably influence the photographic reproduction.

In another case a photographer was troubled with faint, cloudy markings, concerning the origin of which it seemed by no means easy to form an opinion. The silver bath was changed, and the trouble immediately ceased; yet the defect was rather in the developer than the bath, this preparation containing enough alcohol to work well with a new bath, but not sufficient to enable it to flow smoothly over a plate sensitized in an old bath. Collodions differ much as regards the amount of alcohol which it is necessary to add to the developer, the use of horny kinds often necessitating the addition of a considerable proportion.

I could give many instances of troublesome failures arising from a careless reading, or insufficient study, of clearly-expressed printed directions; and these failures have, in many cases, had very serious consequences for the photographic practitioner, besides often occasioning much loss of time to the originator of the directions, who may write letter after letter without touching on the real cause of the failure. On one occasion I recommended a manufacturer to practise Liebig's process for silvering by the chemical process, as I had found it to yield most excellent results. He, however, instead of adding the potash gradually, as ordered in the directions, added the whole quantity at once to the silver solution; and this failure to comply with plain directions caused him to lose several months of time. On the other hand, we sometimes meet with those who fail to read the current photographic literature because they consider their knowledge so complete as to render such a proceeding unnecessary. Not long ago, a person of this class, who receives my journal, but seldom cuts the leaves, asked me for information on a point which had been repeatedly discussed, upon which I of course referred him to my journal.

There are also some eccentric people whose proceedings are such as to confound every kind of instruction; and one of these, who had lately removed to Berlin, was much concerned when he found that the water in which he first washed his prints did not become milky as he had usually seen it, the fact being that the Berlin town water is unusually free from chlorides. This intelligent individual could not rest until he had found a water which would become milky; he fancied that his work was unsatisfactory when done with the Berlin water. At last he secured what he wanted by digging a well at a considerable expense.

MR. PLENER'S PHOTOMETRICAL INVESTIGATIONS.

In our issue of last week Mr. Plener resumed his study of the relation between exposure to light and density of deposit in the case of dry plates, and he has raised points which are likely to call forth a considerable amount of discussion; moreover, his argument will doubtless lead to numerous experimental investigations, which may be undertaken with the view of further elucidating the subject.

Mr. Plener's idea of constructing a scale of perceptible gradations by the intermingling of definite proportions of white and black powders is ingenious, and appears to be thoroughly practicable if carried out with sufficient care and attention to detail; while it appears that two careful and accurate experiments with definite pigments will afford the data for constructing a scale of any required extent and completeness by the admixture of the pigments in question.

Mr. Warnerke's sensitometer is next brought under consideration, and it is pointed out that this might have been constructed so as to give the scale of perceptible graduations rather than a series of varying stages of opacity having a highly complex ratio to each other.

A wet gelatine plate, having its film thickened by the absorption of water, transmits a larger proportion of the incident light, and, as a consequence, it absorbs less, and therefore requires a longer exposure: and something similar will necessarily hold good in the case of two of the Warnerke screens having the same amount of Indian ink, but distributed through different thickness of gelatine. Mr. Warnerke's sensitometer numbers are next brought under consideration, and it is found that, assuming No. 9 to be the faintest tint, the real sensitiveness rather corresponds to 15·752 than to 9·147.

By-the-Bye.

A PLEA FOR THE BURETTE.

The photographer is usually deficient in chemical apparatus, and, truth to tell, he can get on very well with a limited supply of it. But if there is no need for a complete chemical laboratory in connection with the dark room, it is important he should have proper utensils at hand when he does want to perform an experiment or make some simple assay. Where space is limited, our advice is to keep one corner of the work-room, or of the dark-room, if it is large enough and light enough for the purpose, for a laboratory corner; all that is absolutely necessary is a shelf near at hand, where a few pieces of apparatus may be kept clean and orderly, a small firm table or ledge for working on, and an adjacent sink. It is well to have a gas main with flexible gas tube and burner, but this is not indispensable, as a spirit lamp answers most purposes.

A few glass beakers, test-tubes, and wide-mouthed stoppered bottles, always kept clean, some filters and a filter stand, a flask or two, and iron ring-stand for boiling, one or two porcelain evaporating dishes, and perhaps a retort, represents a stock of apparatus that most photographers would consider luxurious. Yet its cost is only a few shillings, and any photographer who desires to learn the why and wherefore of this or that reaction can scarcely do without it. But we are about to advocate a still further addition to the modest outfit of a photographer, an item more expensive still than any just enumerated; we mean the burette.

The burette, however, is not a very costly piece of apparatus, after all. We show two kinds of burette here (fig. 1), either of which will suit the photographer, though we advise him to use the one having a glass stop-cock. They are termed Mohr's burettes, and are to be obtained of any dealer in photographic and chemical apparatus. Supposing the photographer to be satisfied with a burette containing 50 cubic centimetres, he can obtain one with a glass stop-cock for five shillings, while that with the pinch-clamp costs four. For this amount he will receive a vessel graduated not only into cubic centimetres, but into tenths of these as well.

For use, the burette, after being filled with liquid, is made fast to a firm stand—the iron ring-stand will do—in such a way that it hangs over the table before the experimentalist, its tap ready to hand, and its scale more or less on a level with the eyes. The tap should be some inches above the table, so that any vessel destined to receive the liquid from the burette can be placed underneath without difficulty. The tap is turned and the liquid runs from the burette in a small stream. To control the amount of liquid issuing forth is the easiest thing in the world, for you have simply to observe the scale on the burette, and

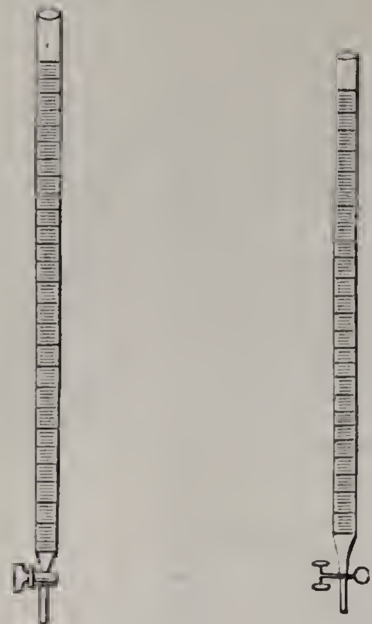


Fig. 1.

to turn the stop-cock as soon as the liquid has sunk to a certain degree. Thus it is easy not only to read off cubic centimetres, but also tenths of cubic centimetres, without much difficulty. To aid in reading off, chemists generally employ a little screen, half white and half black, which is put behind the scale, and so shows the level of the liquid at a glance (fig. 2). This screen, of course, is easily made out of a bit of cardboard.

Fig. 2.

For some purposes the pinch-cock—a pincers pinching a little bit of rubber tube—is more handy than the glass stop-cock, which, by the way, usually wants greasing a little to make it work smoothly and to prevent leakage; but for photographic purposes we think the latter is preferable. The rubber tubing contains sulphur, which is objectionable, and cannot well be cleaned; at the same time this form of burette is more quickly used, and the liquid flows more freely.

It is difficult to say for what photographic operations the burette may not be used with advantage. In the first place, it may be employed as a simple measure, or converter of English drams and ounces into cubic centimetres. All calculation of fractions is at once avoided; to turn a fluid ounce (English) into cubic centimetres (French), we simply turn the liquid out of the ounce measure into the burette. To measure off cubic centimetres accurately again, there can be no more simple plan than that of filling the burette, opening the stop-cock, and reading off as the liquid descends in the scale.

A burette divided into tenths of cubic centimetres allows of the measurement of very small quantities, and the measurement of small quantities is usually not gone into by the photographer, because in ordinary circumstances it is troublesome. But, as soon as he finds that it is as easy to make small and accurate measurements as to make haphazard guesses—and with a convenient burette this is so—the photographer will be ready to adopt the more rational mode of proceeding. The fraction of a cubic centimetre may appear very small to write about, but when familiar with the burette, the measurement of tenths is a very simple matter. In fact, it is almost impossible to make such measurements without it.

We have found it convenient to employ the burette to hold the warm solution of silver in emulsion making. The fine stream of silver can be regulated with the greatest nicety in a burette. The eye watches the scale as the liquid gradually runs down, and both hands are at liberty for mixing the emulsion. If coming too fast, the stream may at any moment be cut off, and the dose of silver increased or diminished to the tenth part of a cubic centimetre with exceeding accuracy.

Other similar uses will suggest themselves for the burette, but its existence in the photographic laboratory is called for, if only because of the means it furnishes of testing the strength of silver solutions. This may be done roughly, as most photographers know, by employing a floating argentometer, which is immersed more or less according to the gravity of the silver bath. But silver solution, if it has been employed, say, for sensitizing paper, contains other bodies beside nitrate of silver which interfere with its gravity, such as nitrate of potash and ammonia. Its strength may have been exhausted by the formation of haloid salts of silver, or the amount of nitrate of silver in solution may have been uncertain from the first. To discover, then, the actual contents of silver in a solution by chemical means should be in the power of every photographer, and, without a burette at hand, the process is both a long and tedious one.

We have made use, for some time past, of the scale given by Dr. Lagrange some years ago, which is one of the most practical the photographer can employ for testing the value of silver solutions. He has simply to note in his laboratory-book, or hang up in his work-room, a series of numbers, which show how much salt solution is required to neutralize silver solutions of certain strengths, and then a simple laboratory experiment proclaims at any moment the strength of any silver solution he may be called upon to examine.

A standard solution of common salt is prepared with distilled water. If the photographer desires to be very accurate, he may purchase pure crystallized chloride of sodium for testing purposes; but this is hardly requisite for every-day work. The standard should be made up of—

Chloride of sodium	1 part
Water...	10 parts

and this may then be put into the burette. To test your silver solution, put a cubic centimetre of it into a test-tube, add about twenty times as much distilled water, and a few drops of nitric acid.

The silver solution is now ready for bringing under the burette; turn the tap, and let the standard solution of salt flow for awhile. A white cloud of chloride of silver will be produced, and this whitening of the solution will proceed as long as there is silver left in it. The salt solution should be added with care, too little rather than too much being employed. In fact, it is well to make the addition twice, thrice, or even oftener, the solution being carefully filtered in between every addition. As soon as no more chloride is formed, the amount of standard salt solution emptied out of the burette is read off. If, say, the reading is 5·7, which means that five cubic centimetres and seven-tenths of a cubic centimetre of salt solution have been expended, then the photographer knows he has a solution of silver under examination of a strength equal to one part of nitrate of silver dissolved in ten parts of water. If the salt solution expended amounted to 4·8, then the silver solution would be shown to be of a strength of 1 to 12.

But here is a table, which the photographer would do well to note as showing the amount of standard salt solution required to neutralize silver solutions of various strengths. It is one of the most important of tables for the photographer, for however quickly photography progresses in these days of new processes, silver solutions are still to him of the utmost importance.

Of a standard solution of salt,—

14·00	c. c. neutralise one c. c.	of silver solution of	1 : 4	strength.
11·3	,,	,,	1 : 5	,,
9·5	,,	,,	1 : 6	,,
8·1	,,	,,	1 : 7	,,
7·1	,,	,,	1 : 8	,,
6·3	,,	,,	1 : 9	,,
5·7	,,	,,	1 : 10	,,
5·2	,,	,,	1 : 11	,,
4·8	,,	,,	1 : 12	,,
4·4	,,	,,	1 : 13	,,
4·1	,,	,,	1 : 14	,,
8·8	,,	,,	1 : 15	,,

The "At Home" next week will be "M. Van Bosch, on the Boulevard des Capucines, Paris;" the following "By-the-Bye" will be "About Photographic Journals."

FRENCH CORRESPONDENCE.

Undried Bichromatized Gelatine—Exposure with the Drop-Shutter—Camera for Sensitive Pellicles—The Photographer on the Tramp.

Mr. Woodbury and Undried Bichromatized Gelatine.—My excellent friend, Mr. Woodbury, is vexed at some remarks which I made in my last letter on a subject in which he claims priority of invention, a claim which I had never the least intention of disputing. He refers to the description of the action of light on undried bichromatized gelatine which I gave in my last letter. So long ago as 1864, Mr. Woodbury says that he obtained reliefs on undried gelatine coated on sheets of mica; it was a further step to produce luminous photographs by the dusting-on process. Mr. Woodbury was the first to describe this in the News, at a time now sufficiently distant, in an article entitled "Ephemeral Photography." I am quite willing to admit that Mr. Woodbury is the original inventor of these two methods, and I am glad to have the advantage of being corroborated in my views by the authority of so competent an observer of facts, which I only desired to recal to notice without the slightest pretence of being the original discoverer. It has often happened to me to recur to old ideas or to processes already known, though not sufficiently so; since it is not enough that a thing should have been spoken of only once for the whole world to become acquainted with it. Besides, it may very well occur that I may hit of my own accord upon an idea, without knowing that the same has presented itself to some one long ago, and that I may then publish it, although I am quite ready to resign any pretension of being the original discoverer. And this is what I now do with pleasure with regard to Mr. Woodbury.

To Obtain Fixed Time of Exposure with the Drop Shutter.—MM. Londe and Mauduit have been occupying themselves with the difficulty there is in fixing the length of the exposure with quick moving shutters, and they describe a method of graduating a drop shutter for given exposures. They have arranged so as to vary the duration of the exposure for an invariable length of drop by separating more or less the two plates between which is situated the opening for the admission of light. Evidently, with the same velocity of drop, the duration of the exposure will be less in proportion as the opening is narrower. On this point I may observe that, like everyone else, I also have designed an instantaneous shutter on the drop principle, but situated behind the lens, and moving upwards by means of spiral springs. This is of course not a drop, but the motion produced by the two springs is very regular. There is a slit in the shutter which can be made narrower at pleasure, and can be reduced to a breadth only limited by the necessity of avoiding interference. This shutter may be employed in the interior of any kind of camera immediately behind the lens; it moves upwards, because in taking landscapes when the exposure is of comparatively long duration, as the sky will be printing for about a half of the duration of the movement, the motion is kept more regular and free of all vibration, unless this were produced at the commencement, which I do not think possible.

M. Martin's Camera for Sensitive Pellicles.—The camera maker, M. Martin, showed one which he has arranged for portfolios to carry pellicles, in which may be exposed papers like those of Mr. Morgan, or Mr. Stebbing's pellicles. There is no frame outside the camera except these carriers, so that the weight is considerably reduced. The apparatus is very well made. There is at the present day much to be done in this direction in order to save the tourist photographer from the burden of heavy and cumbersome weights. Glass plates are in any case too heavy, so that we must have recourse to pellicles, and these must be capable of being carried in the hand twenty-five or thirty at a time without being exposed to the light, and arranged in some kind of frame which shall replace the dark slide, so that the pellicles may be exposed successively in the camera. It is surprising that an apparatus of this kind is not more largely used.

The Photographer on the Tramp, by Mr. O'Madden.—MM. Gauthier-Villars have just published a little brochure, entitled, "The Travelling Photographer," being a description of the apparatus and photographic equipments necessary for the photographer when travelling, by the Chevalier O'Madden, a distinguished amateur photographer, to whose works I also have had occasion to refer.

Leon Vidal.

Review.

Cours de Reproductions Industrielles, Exposé des principaux procédés de reproductions graphiques, héliographiques, plastiques, hélioplastiques, et galvanoplastiques. *(Par M. le Professeur Leon Vidal, Paris, Librarie, Ch. Delagrave, 15, Rue Soufflot.)*

[second notice.]

In fulfilment of the promise made when recently noticing the above work, we now briefly summarise the chapters relating to the commercial reproduction, in several colours, of polychrome subjects, water-colour and oil paintings, enamels, &c., or subjects from nature herself.

Engraving in colour dates back to the commencement of the seventeenth century, when Lastmann, a Dutch painter, made the first essays in this direction by placing the different colours successively on a plate engraved in mezzotint and stipple. A little later, in 1704, Leblond sought to apply Newton's theory of colour to painting. His first attempts not being satisfactory, he came to England, where he succeeded in obtaining the advances requisite to put his ideas into practice. Starting with the principle that the primitive colours were reducible to three, he thought that it would suffice to engrave three copper-plates in order to obtain the intermediate or combined shades; but his attempts in this erroneous direction were not more fortunate than those which had preceded. Thus more than a century and a half ago Leblond's essays had for starting point the same ideas as those adopted by MM. Cros et Ducos du Hauron in the present day for their process of natural héliochromy.

About the same time Gautier came to Paris with a similar idea, employing, however, a fourth colour—black—in addition to the three primitives of Leblond, and his processes were adopted and practised. He moreover found that it was desirable to employ different shades of blue, yellow, and red, according to the subjects to be rendered. For anatomical and antique subjects, works of the old masters, &c., he used a palette composed of pure, or German black; dull, or Prussian blue; clear yellow ochre, and cinnabar. For silk draperies, velvet, stuffs, and bright-coloured works, he employed ultramarine, a golden yellow, and carmine; having likewise a third scale of colour with a mixed blue and a mixed yellow. His first plate was engraved for all the black tones to be reproduced, this colour, with the white of the paper, rendering all the grey tints. Having printed the black, he proceeded with the blue, then the yellow, and, lastly, the red.

Following these first attempts many others were made with a greater or less number of colours, and at the end of the 18th century many prints were coloured by engraving; but with the invention of chromo-lithography this method was gradually abandoned, and is now rarely used.

In the same manner that coloured impressions are obtained from the sunk lines of the copper plate, so can they be taken from typographic, or raised clichés, and though each separate colour must be formed by lines or dots, these become lost in the superposition of several colours, and a chromo with even tints is produced. Excellent typographic clichés can be made by transfer to zinc of monochromes, in line or stipple, executed with a pen on the lithographic stone; or a series of wood blocks can be prepared by an engraver using the same tracing on each block. There is, however, a degree of dryness and hardness about works produced by the preceding methods, that they will not bear comparison with a drawing in colour by a skilful artist on the lithographic stone.

There is next a short account of chromo-lithography, much too large a subject to be fully entered into in such a treatise, and of steno-chromy, in which latter process it is sought to obtain a many-coloured impression with a single printing. This end is attained by the formation of a kind of mosaic work, or matrix, in solid colours; the required colours, incorporated with a soapy matter soluble in spirit of turpentine, being cut to shape by the aid of patterns, and placed in position. An unsized paper moistened with turpentine is used for receiving the impression, and a short contact under pressure allows of a certain quantity of the colour being brought away. The process is suitable for impressions on silk and velvet stuffs and on leather.

M. Vidal now approaches the deeply interesting question of natural heliochromy, or the art which, in his own words, *would* consist in the reproduction of natural colours by photography, for there exists as yet no method of accomplishing this directly, the tentative essays not having reached a practical application, though theoretically offering great interest. Important experiments, commencing in 1838, were made by M. Edmond Becquerel, and eventually he succeeded in obtaining the colours of the spectrum, using the violet sub-chloride of silver formed on a metal plate by the action of chlorine. Of these experiments Hunt, in his Researches on Light, says: "I cannot learn that such impressions were ever rendered in any respect permanent; consequently we may regard this result as a slight advance only upon what Herschel had previously done with the chloride of silver."

The attempts of M. Niepce de St. Victor are dismissed by our author with a notice of only four lines, as differing little in method or result from those of Becquerel. This was not, at the time of their publication, the opinion of many competent judges, who thought that they marked a considerable advance upon the efforts of previous workers. He, however, was unable to fix the colours, which, though not so evanescent as on the earlier plates, eventually became of one uniformly reddish tint. In a memoir entitled "Upon the relation existing between the colours of certain coloured flames with the heliographic image coloured by light," he has indicated his method of operating, and the conditions which seemed involved in the production of colour. A plate of silver, previously connected with a voltaic battery, is plunged into a bath of chlorine water to which has been added the salt essential to give predominance to any particular colour, the selection of the salt being determined by the colour which it imparted to the flame of burning alcohol. The circuit being completed, the plate becomes covered with a dark coating, probably of subchloride of silver mixed with the particular salt used. After remaining in the bath some minutes, the plate is washed in a large quantity of water, and dried over a spirit lamp. The surface thus produced is of a dull neutral tint, often almost black. The sensibility of the plate appears to be increased by the action of heat, and when brought to a cerise red colour the plate is in its most sensitive condition, which even then is but low, two or three hours being required to produce a decided effect in the camera. Very lively colours are obtained with a bath composed of all the substances giving separately a dominant colour, but it is difficult to mix the salts in such proportion as to give equality to the tints. All the colours of a picture have been obtained with a bath of dento-chloride of copper, which salt, says M. Niepce, produced a variegated flame.

In 1865 M. Poitevin succeeded in obtaining coloured images on paper, which Niepce had failed to do, the end being accomplished thus: to paper coated with violet subchloride of silver, produced by the reduction in light of white chloride in presence of a reducing salt (usually protochloride of tin), and well washed, is applied a mixture composed of equal proportions of a solution of bichromate of potash, of saturated solution of sulphate of copper, and of a 5 per cent. solution of chloride of potassium. The paper is allowed to dry, and must be kept in the dark. By an exposure of five to ten minutes to the sun's rays, under a painted glass, all the colours of the spectrum may be reproduced; but the paper is not sufficiently sensitive for use in the camera. After being passed through certain chemical solutions, and well washed, these coloured impressions may be preserved in an unaltered condition in an album away from the light.

M. Cros and M. Ducos du Hauron, on the 17th of May, 1879, by a curious coincidence, communicated simultaneously to the French Photographic Society a method of heliochromy similar to each other, accompanied by specimens. M. Ducos' theory, like that of Leblond (previously mentioned) was, that all colours are comprised in three, reasoning from this, first, that it was necessary to take three negatives of the coloured object, interposing successively between the lens and the object a green, an orange, and a violet glass. That each negative would differ from the other, the first being formed by the yellow and blue light of the model, as the green glass, absorbing its complementary colour, red, allows only the blue and yellow to pass, and so with the orange and violet glasses; second, that by the aid of coloured tissues (carbon process), proofs would be obtained of a colour complementary to that of the glass which served to produce the negative, the cliché made behind the green glass giving a red positive proof, that behind the violet screen a yellow positive, and that with the orange screen a blue positive; third, that these three pellicles, superposed, will give the colours of the natural object to be reproduced.

Of this process M. Vidal, in one part of his work, says: "The reasoning is erroneous, its execution impossible. The solution of the problem of héliochromy by these means may be ranged with squaring the circle, or perpetual motion." But we find this sweeping assertion afterwards somewhat modified, and the specimen shown would, we think, impress favourably most of those who see it. The process has been taken up commercially in Paris, and M. Albert and M. Obernetter, of Munich, have produced coloured impressions by it.

M. Vidal, while seeking to obtain coloured prints other than by manual or chromo-lithographic processes, denies the possibility of doing so in a direct manner as M. Ducos desires. From a transparent positive M. Vidal makes as many negatives as are required, and stops out certain portions of each; he then prints on coloured tissues from each negative the positive proofs, which are afterwards superposed; the whole is finally covered with a carbon print of neutral tone, to give exact drawing and vigour in the shadows. This method is evidently one requiring great care, and not easy of execution, so the first portion of the work is now, in general, purely chromo-lithographic, the impression of the separate colours being taken mechanically from the lithographic stone in the usual way, a photographic image being lastly printed by phototype or photoglypty over the coloured impression.

M. Germeuil-Bonnaud has likewise devised a method of photographic printing in colours; but as these must be capable of withstanding the chemical agents and manipulations involved in the process, his plan seems scarcely practical.

"At present," says M. Vidal, "we can only produce photographs in colours by using certain artifices. Possibly a day will come when we may be able to obtain the images with their colours as seen on the ground glass of the camera; but everything seems to indicate that this day is, at least, very far distant."

ON THE CAUSE OF THE LIGHT BORDER FREQUENTLY NOTICED IN PHOTOGRAPHS JUST OUTSIDE THE OUTLINE OF A DARK BODY SEEN AGAINST THE SKY; WITH SOME INTRODUCTORY REMARKS ON PHOSPHORESCENCE.

BY PROFESSOR G. G. STOKES, SEC. R.S.*

7. The other observation was as follows:—The same tablet was laid horizontally on a lawn on a bright day towards evening, when the sun was moderately low, and a pole was stuck in the grass in front of it, so as to cast a shadow on the tablet. After a brief exposure the tablet was covered with a dark cloth, and carried into a dark room for examination.

It was found that the place of the shadow was brighter than the general ground, and also a deeper blue. For a short distance on both sides of the shadow the phosphorescence was a little feebler than at a greater distance.

This shows that, though the direct rays of the sun by themselves alone would have strongly excited the phosphorus, yet, acting along with the diffused light from all parts of the sky, they did more harm than good. They behaved, in fact, like the rays from the lamp in the experiment of § 6. The slightly inferior luminosity of the parts to some little distance on both sides of that on which the shadow fell, shows that the loss of the diffuse light corresponding to the portion of the sky cut off by the pole was quite sensible when that portion lay very near the sun.

All this falls in very well with what we know of the nature of the direct sunlight and the light from the sky. In passing through the atmosphere, the direct rays of the sun get obstructed by the very minute particles of dust, globules of water forming a haze too tenuous to be noticed, &c. The veil is virtually coarser for blue than for red light, so that in the unimpeded light the proportion of the rays of low to those of high refrangibility goes on continually increasing, the effect by the time the rays reach the earth increasing as the sun gets lower, and has accordingly a greater stretch of air to get through. Of the light falling upon the obstructing particles, a portion might be absorbed in the case of particles of very opaque substances, but usually there would be little loss this way, and the greater part would be diffused by reflection and diffraction. This diffused light, in which there is a predominance of the rays of higher refrangibility, would naturally be strongest in directions not very far from that of the direct light; and the loss accordingly of a portion of it where it is strongest, in consequence of interception by the pole in front of the tablet, accounts for the fact that the borders of the place of the shadow were seen to be a little less luminous than the parts at a distance.

8. The observations on phosphorescence just described have now prepared the way for the explanation I have to suggest of the photographic phenomenon.

It is known that, with certain preparations, if a plate be exposed for a very short time to diffuse daylight, and be then exposed to a pure spectrum in a dark room, on subsequently developing the image it is found that while the more refrangible rays have acted positively, that is, in the manner of light in general, a certain portion of the less refrangible have acted in an opposite way, having undone the action of the diffuse daylight to which the plate was exposed in the first instance.

It appears, then, that in photography, as in phosphorescence, there may in certain cases be an antagonistic action between the more and less refrangible rays, so that it stands to reason that the withdrawal of the latter might promote the effect of the former.

Now the objective of a photographic camera is ordinarily chemically corrected; that is to say, the minimum focal length is made to lie, not in the brightest part of the spectrum, as in a telescope, but in the part which has strongest chemical action. What this is depends more or less on the particular substance acted on; but taking the preparations most usually employed, it may be said to lie about the indigo or violet. Such an objective would be much under-corrected for the red, which accordingly would be much out of focus, and the ultra-red still more so.

When such a camera is directed to a uniform bright object, such as a portion of overcast sky, the proportion of the rays of different refrangibilities to one another is just the same as if all the colours were in focus together; but it is otherwise near the edge of a dark object on a light ground. As regards the rays in focus, there is a sharp transition from light to dark; but as regards rays out of focus, the transition from light to dark, though rapid, is continuous. It is, of course, more nearly abrupt the more nearly the rays are in focus. Just at the outline of the object there would be half illumination as regards the rays out of focus. On receding from the outline on the bright side, the illumination would go on increasing, until on getting to a distance equal to the radius of the circle of diffusion (from being out of focus) of the particular colour under consideration the full intensity would be reached. Suppose, now, that on the sensitive plate the rays of low refrangibility tend to oppose the action of those of high refrangibility, or say act negatively, then just outside the outline the active rays, being sharply in focus, are in full force, but the negative rays have not yet acquired their full intensity. At an equal distance from the outline on the dark side the positive rays are absent, and the negative rays have nothing to oppose, and therefore simply do nothing.

9. I am well aware that this explanation has need of being confronted with experiment. But not being myself used to photographic manipulation, I was unwilling to spend time in attempting to do what could so much better be done by others. I will, therefore, merely indicate briefly what the theory would lead us to expect.

We might expect, therefore, that the formation of the fringe of extra brightness would depend:—

(1.) Very materially upon the chemical preparation employed. Those which most strongly exhibit the negative effect on exposure to a spectrum after a brief exposure to diffuse light might be expected to show it most strongly.

(2.) Upon the character of the light. If the light of the bright ground be somewhat yellowish, indicating a deficiency in the more refrangible rays, the antagonistic effect would seem likely to be more strongly developed, and, therefore, the phenomenon might be expected to be more pronounced.

(3.) To a certain extent on the correction of the objective of the camera. An objective which was strictly chemically corrected might be expected to show the effect better than one in which the chemical and optical foci were made to coincide, and much better than one which was corrected for the visual rays.

It is needless to say that on any theory the light must not be too bright or the exposure too long; for we cannot have the exhibition (in the positive) of a brighter border to a ground which is white already.

P.S.—Before presenting the above paper to the Royal Society I submitted it to Captain Abney, as one of the highest authorities in scientific photography, asking whether he knew of anything to disprove the suggested explanation. He replied that he thought the explanation a possible one, encouraged me to present the paper, and kindly expressed the intention of submitting the question to the test of experiment.—*Chemical News.*

* Continued from page 332.

Notes.

Mr. Maxwell Lyte was cordially greeted as an old friend, when installed as Secretary of the Photographic Society of Great Britain on Tuesday last; but all present at the meeting felt the loss of Lieutenant Darwin, who shortly leaves for Australia.

In a somewhat less mathematical form the whole subject matter of Mr. Cadett's paper on "Shutters" appeared in the NEWS during the autumn of last year; but in our leaders it was pointed out that a well-designed shutter opening and closing at the centre is practically better, and nearly as good theoretically, as any other form.

Still, for convenience of handling, the simple drop shutter is often preferable, as each complication in a shutter considerably increases the chances of failure, and when the drop shutter is made according to the principles which we laid down, its theoretical effectiveness is only a fraction behind that of the best.

The lens Committee seem to have worked altogether on an English basis as regards screws; but there can be no question as to the convenience of having stops so marked that the numbers shall indicate relative exposures.

Strong ammonia and pure water act with about equal energy on glass, says Mr. Cowper; but mix one volume of the former with five volumes of the latter, and it will be found that this dilute ammonia acts on glass with something like sixfold force.

"The Photographic Studios of Europe" will be published at the end of next week. An edition will be published in Germany by Dr. Liesegang, of Düsseldorf; another in America by Messrs. Anthony & Co., of New York; and a fourth in French, by the firm of Gauthier-Villars.

Many of our sea-painters are becoming expert photographers. Mr. Brett, Mr. Henry Moore, and Mr. Colin Hunter, whose pictures are always conspicuous on the Academy walls now-a-days, are all well versed in camera work and the development of dry plates. The camera is usually taken on board a yacht, that instantaneous views may be secured of passing craft, which are rapidly depicted in every phase of sailing by the ready yachtsman.

The photographs are put away in the portfolio with other study sketches, to be used hereafter, as occasion serves, in picture making. It is in this way the painter acquires the wide experience one often marvels at in his productions. Whether he is called upon to depict the seashore, the highlands, a street in Cairo, a Tyrol village, an Irish cabin, or a Russian market place, the painter, if he has travelled, as he assuredly has, finds no difficulty in filling up all details in his studio at home, since his well-filled portfolio furnishes him with just the life and character he wants.

We had a long chat with Mr. E. L. Wilson, of the *Philadelphia Photographer*, on the subject of photography as a profession in the United States, and were glad to hear from his lips that our art was taking a higher standard in America than it had hitherto done. From small towns and remote districts he received pictures displaying art and skill that showed unmistakably a generation was now engaged in the work who had been properly tutored and trained to it. If finer pictures are not produced, they are, at any rate, much more general than was the case twenty years ago.

The ex-carpenter, ex-tailor, ex-butcher and baker, and candlestick-maker are no longer the general practitioners of photography, but thorough-going men who have education, taste, and a good knowledge of photographic chemistry. In a word, they are men who are photographers by profession. The charge made for cabinet portraits in the best studios in the States is from ten to twelve dollars a dozen, or, say, from forty to forty-eight shillings.

We begin to think that photographers will really find it worth while to take Mr. Francis Galton's advice, and set about making composite portraits. Even if it is only to produce something quaint and interesting, something to talk about, this new feature of photography is worth attention. A gentleman possessing three daughters placed in our hands a composite the other day, which was most perplexing from its definite likeness to all three. He had taken three negatives, all full-face and of the same size, and forwarded them to Mr. Francis Galton, in reply to that gentleman's general invitation given in these columns. The result was most diverting to those acquainted with the originals, and gave rise to endless fun and controversy. In our YEAR-BOOK appear full details as to method of securing these composites, but Mr. Galton, as we have said, is prepared to make them, if provided with suitable portraits.

There is one serious difficulty in the way of getting all the portraits in a series to impress themselves equally upon the sensitive film so as to produce a fair composite picture, and that is the vigour of the various original prints. If it were possible to present before the sensitive plate a number of personages one after another, all equally lighted and all equally exposed, a well-balanced result might be forthcoming; but when the negative is secured from a series of photographic prints, the vigour of these must surely exert some influence. Thus, to take an extreme instance, if a soft vignette and a hard over-printed impression were exposed one after another, the latter would obviously impress itself more vigorously on the film, and the composite in this case would present more distinctly the features of No. 2 than No. 1.

Dr. Wright, of St. Mary's Hospital, has long been engaged in important physico-chemical researches, and, considering that that he has recently estimated with great accuracy the feeble thermic and electric energy developed on mixing solutions containing different proportions of the same body, we may hope this investigator will soon turn his attention to the dynamical changes occurring during the exposure of sensitive bodies to the light. Such investigations would place photographic operations on a firm scientific basis; and we may hope that Dr. Wright's labours will lead to the framing of a notation which shall render complete account of the play of forces accompanying chemical reactions, just as the usual chemical symbols express the weights of the reacting bodies.

Photographic records of the pulse, similar to those taken by Dr. Luys, are employed to some purpose in the education of the medical student, for the pictures tell, perhaps more than any other medical record, of the vitality of the human system at different ages. The photographs, as most of our readers are aware, are in the form of wavy lines, the waves or curves being impressed upon a sensitive film by the action of a column of mercury in a glass tube, rising and falling with the pulse. If the pulse is vigorous, the mercury rises and falls quickly, and in a great degree; while if the pulse is feeble, the movement of the mercury is also feeble.

We have before described the process of photographing the pulse. The reservoir of mercury in a flexible bag is simply placed upon the wrist of the patient, the glass tube dipping down into the mercury, and thus it comes about that the movement of the pulse moves the mercury in the tube. The photographic film is kept moving along behind the head of the mercury column, and thus the up-and-down motion of the mercury is made to impress a wavy line upon the film. These waves vary with the age of the patient. Thus the pulse of a boy five year sold, beating eighty to the minute, forms a line of sharp zigzags; in a man in the prime of life there are not so many ups and downs—that is, not so many pulse beats—but the waves are represented by sharply pointed spires, double as high as the zigzag marks made by the child's pulse. In old age, to take a third photographic illustration, we find vitality has indeed fallen off; the picture here is of a series of low rising curves, as rounded as a mole-hill, and in a fair way of ceasing to be waves at all.

Those who have never tried it, have no idea of the value of a sheet of ground glass in the process of enlarging transparencies in the camera. The negative or positive upon glass, to be copied, is usually fitted as a sort of window, and then the camera adjusted, so that the enlarged image falls upon the focussing screen. If, while looking upon this image in the camera, an assistant is instructed to place a sheet of ground glass in front of the original negative—that is, between the source of light and the transparent window—it will be seen that the focussed image is at once perceptibly lightened up.

The tiny facets on the surface of the ground glass reflect the light coming to the negative equally in all directions, and thus it is more evenly distributed over the surface of the enlarged image in the camera, which is otherwise inclined to be brilliant in the centre and dull at the margins. But we repeat, unless anyone has tried the experiment, interposing and withdrawing the ground glass two or three times while the focussed image is under observation, he will fail to realise the full advantage of the modification.

Viscount Cranbrook recently narrated a telling anecdote when distributing some science prizes to working men. He begged the medallists and prize winners not to be puffed up with their own importance because they had answered certain questions in chemistry and physics without a mistake. It was most gratifying to know that they, as hardworking handicraftsmen, were well grounded in science; but, for all that, they were not yet chemists. An old cobbler of the Viscount's acquaintance was exceedingly proficient in the subjects taught at science classes; he knew pretty well every star in the heavens by name, his knowledge of inorganic chemistry was profound, and he was one of the best draughtsmen in the village. But, after all, his great pride was to make a sound pair of boots.

An idea to illustrate "Edwin Drood" by photography has been mooted. It is, of course, well known that Dickens laid the scene of his last novel principally at Rochester, Cloisterham being none other than that Cathedral city. "The Nun's House" is a veritable building; the river and the bridge spoken of are the Medway and Rochester Bridge, while the Close described is that of the old Kentish pile. It is not unlikely that a large edition of such an illustrated work would be sold if the photographs were taken with taste and skill.

There is, indeed, no reason why a realistic author, such as Dickens proved himself, should not be further connected with real life. Dickens exaggerated many of his personages, but his localities were very true to nature. It would therefore add a new interest to a book like "Pickwick," if illustrations of the places spoken of—which are rapidly fading from our eyes—were produced by means of photography. The Marshalsea is no more, and the Fleet Prison is pulled down; Goswell Street, the abode of Mrs. Bardell, is rebuilt, and the "Saracen's Head" has been levelled to the ground.

But the "Bull Inn," where Alfred Jingle made love to the buxom widow at the ball, is still extant, and a photograph of the ball-room might be taken to-morrow. The "Leather Bottle," at Cobham, whither Mr. Tupman retired from the world after his unlucky love escapade, is still open for the reception of travellers; the old inn in the Borough, with its court-yard and gallery where Mr. Pickwick first fell in with Sam Weller, is probably still to be found; and the "White Horse" at Ipswich, famous for the lady with the yellow curl-papers, as well as the "Angel" at Bury, are to this day well-known hostelries. We ourselves secured a photograph not long ago of Dotheboy's Hall, with the identical well from which Nicholas Nickleby and his charges drew their supply of washing water. Indeed, Dickens's works suggest both to professional and amateur photographers plenty of interesting objects for the camera.

TWELVE ELEMENTARY LESSONS IN DRY-PLATE PHOTOGRAPHY.

No. XI. (*Continued*).—Printing.

It will be noticed that the prints as they come from the frames are of a more or less unpleasant colour. The operation which is to be described, and which is called toning, is intended to correct this defect, and to give them the pleasing colour which we are accustomed to see. The process consists in covering the image with an exceedingly thin film of gold.

Toning may be said to be at once the easiest and the most difficult photographic process. Nothing is easier than to *tone*, nothing more difficult than to tone *well*. Anyone can change the colour of a print to a sort of slatey grey; there are not very many who can be sure of getting at all times a pleasing tone and the exact tint required. The difficulty lies in the direction so common in photographic operations. A certain result is gained, but the after processes modify this result, so that great experience is necessary to know beforehand what will be the final appearance of the subject.

We shall describe as exactly as possible the operations, and for the rest, as in so many cases, the beginner must look to intelligence and experience for success.

The toning solution mentioned in the first part of our lesson is too concentrated to use as it is; it must, therefore, be diluted. The common practice is to use a large quantity of toning solution, and, if it is not exhausted, to keep it for after-use. This is very well for the professional who tones at regular intervals, but in the case of the amateur we think it is not advisable. The solution once used is very liable to "go bad," the gold being deposited at the bottom of the bottle. We therefore recommend that the beginner estimate the amount of toning that will be necessary, allowing a little margin, and after he is done, throw it away. The waste will be very small—so small that it will not be found worth while to keep the liquid as residue. If the prints be trimmed before toning, one grain of gold is amply sufficient for each sheet of paper measuring 17 inches by 22 inches. Let, therefore, one ounce of the stock toning solution be taken for every sheet of paper, and let it be diluted with six or seven times its amount of water.

Now let the prints be taken one by one, and placed in any dish which is suitable for washing them in; a common small wooden tub is the best of all. Let the prints be kept from sticking to each other, and be moved about by hand. It will be seen that the water becomes milky from the nitrate of silver in the paper forming chloride and carbonate of silver with the salts in the washing water. The water must be changed several times till this milkiness disappears entirely, or almost so. Now the prints are ready for toning. The washing is best done by the light of a candle or lamp, as such will not affect the paper. The toning must be done in feeble white light, as it is difficult to judge of colours by yellow light. It is best performed in a flat white dish at least an inch larger each way than the prints.

Let one print be taken from the washing water, and placed in the toning, first face downwards, then turned face up, then down, once or twice, so as to allow the solution to act evenly on it. Now let another print, and perhaps two or three more, be similarly placed in the solution. It will be noticed that the prints, during washing, turn to a brick red. In the toning they will turn to a brown, and gradually to a sort of violet or purple. They must be kept in constant motion. The best plan is to keep continually lifting the undermost print, and placing it on the top. At first, only a few prints should be attempted; after some practice, a dozen or two may be in the solution at once. When many prints are toned together, it is a good plan to have two dishes of toning, side by side, and keep lifting the prints out of one into the other, the whole of the prints being turned over in a mass when they are all in one dish.

The difficulty is the one indicated before, viz., at the time of toning to discount the change which will take place during the after processes. The difficulty is greatly increased by the fact that every brand of paper acts in a somewhat different manner from any other. Very few ready sensitized papers will stand being pushed to the purple stage; that is to say, if the toning is continued to the purple, the final result will be disappointing, although the prints will look beautiful before fixing. It is usually advisable to remove the prints from the toning solution whilst they are still of a very warm brown in the shadows. It is a good test to watch the half-tones, and when these begin to become purple or violet, to remove the print. The prints when removed are placed in another dish of clean water. They must be moved about for a short time after first placing them here, so as to get rid of the greater part of the toning solution which is in the pores of the paper, and which would make the toning proceed after it was desired to stop it. When all the prints have passed through the toning bath they must be washed in several changes of water, being kept moving for about five minutes during each change. Now comes the fixing; the prints are removed from the washing water, and are placed in a flat dish. Sufficient fixing solution to quite cover the prints is poured in, and they are kept moving for about twenty minutes; more than one change of colour will be noticed during this time. The first will be an almost total loss of tone; afterwards the colour will return to something like its former self. A further change will take place when the prints are dried. After fixing, it is necessary to wash the prints most thoroughly for not less than twenty-four hours. This is best done in running water, but if this cannot be had, then frequent changes will do. The smallest trace of hyposulphite in the prints will cause them to fade.

The prints, after washing, are allowed to dry spontaneously, being placed on any clean surface; or they may be mounted wet on cardboard. In either case they should be afterwards rolled. A rolling press is an expensive article; but the amateur can generally find some neighbouring photographer who will roll his prints for a small consideration.

The great convenience of ready-sensitized paper is that it will keep for a very considerable time, either before printing, or between printing and toning. The means of preparing such paper is at present a trade secret, and when the amateur prepares his own paper, he will find that it will turn brown after about twenty-four hours. He must therefore do his sensitizing and toning all in one day. If he has time to do this, he will probably be rewarded by superior results. We shall therefore describe the process of sensitizing.

"Salted" albumenized paper is purchased—that is to say, paper coated with albumen which is impregnated with soluble chlorides.

A "silver bath" is prepared by dissolving nitrate of silver in distilled water. The strength of the bath varies with the paper used. Every dealer in albumenized paper will state what strength of bath is best to use for the particular brand. One containing sixty grains of nitrate of silver to each ounce of solution will suit most papers. Enough of this must be prepared to cover the bottom of the flat dish to be used in sensitizing to a depth of at least ⅛-inch. The dish should be half an inch larger than the paper in each direction. If much paper is to be used, it is best to sensitize in large pieces, and cut it into sizes before printing. Professional photographers usually sensitize a whole sheet at a time.

A room lighted by a lamp or gas is the best to carry on the sensitizing process. Strings should be stretched in convenient position for hanging the paper on to dry. American clips are useful for fixing the paper to the strings.

Let the silver solution be poured into the bath, and let a piece of the paper be taken by opposite corners, and with the albumenized side downwards. Let the paper be so held that it will first touch the surface of the solution in a line between the two corners not held by the hands. We again take the *simile* of a printed sheet. Suppose the paper held by the right-hand upper and left-hand lower corners. Now let the left-hand upper corner touch the surface of the solution, and let the paper be lowered till it touches in a line from the left-hand upper to the right-hand lower corners. Now let the two corners held in the hands be dropped, first one and then the other. This sounds elaborate, but is very simple in practice. If it be carried out properly, there will be no air-bells under the paper, but it is best to lift it from the solution after about a minute and look, to make sure. If there are any, they can be broken by gently moving about the paper whilst one-half is held out of the solution.

The time of floating varies with different papers and different strengths of baths. It should be ascertained when the paper is purchased. With a 60-grain bath from three to five minutes is usually ample. If the paper curl out of the bath at the edges, it may be caused to lie flat by blowing on it.

After the specified time has elapsed, let the paper be removed from the bath by drawing its surface over one edge so as to drain off most of this silver solution. It is only necessary now to bring it up by one corner to dry. A small fragment of blotting-paper should be caused to touch the lower corner immediately that it is hung up. This will adhere by capillary attraction and collect a drop or two of solution which would otherwise fall on the floor.

If the room be warm, the paper will dry in ten minutes or a quarter of an-hour.

When it is dry, printing, toning, &c., are performed as described for ready-sensitized paper. Good paper sensitized as described may be toned to a far deeper purple than the paper purchased ready sensitized.

The silver solution becomes weaker through use, and it is necessary to strengthen it at intervals. Its strength can be ascertained by the use of an "argentometer," which is a cheap form of hydrometer specially graduated for grains of silver per ounce of water.

The solution must be filtered every time it is used.

ODD JOBS.

BY THE AUTHOR OF "LOOKING BACK."

No. 9.—Copying.

When the dull season has begun to set in along with the short days, and sitters have as gradually dwindled away as the bright sunshine, the photographer turns his attention to filling up time. He arranges his negatives, washes old plates, burns residue, and, among other necessary labours, when the light will permit him, works off his accumulation of "copies," that were not wanted in a hurry; indeed, I believe many houses will not take anything to copy unless it is left entirely to themselves when it may receive attention. Still, despite this cavalier way of treating the subject, copying is a very remunerative branch of the business. I have frequently arranged in the evening before I left six C.D.V.'s that had to be copied the same size, fixing them on a board by means of drawing pins three in a row, so that they could easily be covered by an 8 by 10 plate; then in the morning using a Kinnear camera and a Ross C.D.V. lens, and using a small stop, I make a negative of the lot at once, thus at "one fell swoop" making as good money as if I had six sitters. One thing I would mention to the inexperienced in this way of doing copying, and that is they must be careful in the picking the six—viz., have them either all vignettes, or full printed pictures; for it is easy to see you could never render justice to a dark plain printed picture and a faded vignette on the same plate.

I have found the above mentioned lens very serviceable in copying; either enlarging or reducing. I have found it to do almost everything; it will enlarge a carte to 20 by 15, or reduce the same to a locket; it will do everything except copy a 15 by 12 the same size; it will do a whole plate, or, at a stretch, a 10 by 8 with a very small stop, covering well to the corners the same size; but if a 20 by 15 or 25 by 20 be required, the best lens to use, in my estimation, is a Dallmeyer group and view lens. Triplets are very good to copy plans or letter-press with, but they have two objections to copying photographs—they give a startling vividness to the grain of the paper, and take an awful time in exposing. Yet, when pushed once, I made a couple of remarkable enlargements with a Dallmeyer triplet. So good were they that silver prints with a little working up (of course a good deal of work on the negative first) defied the inspection even of professionals to tell whether they were copies or direct photographs.

In the way of copies we meet with very "Odd Jobs." Not long ago a lady in deep mourning, with a crape veil so thick that I could not see her features, stepped from a closed cab, and, after a stately bow, asked if the artist could make a photograph of some flowers that she had brought with her, at once, and in her presence, as she could not allow them out of her possession. Upon being told that our time was fully taken up, and that it was not usual for us to do copyings during the hours of sitters, she asked the price of a sitting. £1 1s.! She immediately laid two sovereigns on the desk, and producing a card, requested that it should be taken to the next sitter with her compliments. The name was the "Countess C——, Aberdeenshire." She spoke to the next sitter, and almost at once got permission to take the appointment. In the studio the Countess produced a small curiously carved little box, and opening it took out a small bouquet of faded flowers; her hand trembled, and her breast heaved as she looked at them. Seeing this, I at once disappeared in the dark room. I made a cabinet picture of them—allowing her to arrange them as she thought fit—never once dreaming to touch those faded little memories of the past with my rough hands. In this case I had to use the triplet, else I would not have got the back leaves in focus at all—using a small stop and giving about fifteen minutes' exposure. I remember that same week that the Countess came with her faded flowers, I had a bride's cake to photograph—a case of Alpha and Omega—and I had the same lens to use and cut a smaller stop of cardboard blackened with ink so as to make all the little Cupids and sprays that hung around it as sharp behind as in front.

The next instance of "Odd Jobs" in copying is rather of an amusing nature. One dull November day, when everything felt damp and everybody miserable, the studio was hurriedly entered by a little shabby old man carrying a brown paper parcel under his arm. He lifted his hat in a most solemn manner, and at once proceeded to business. "Sir," he commenced, "I have a parcel here of great, very great importance!" Here he looked at me as if expecting the word of denial. He then proceeded to open it. After numerous wraps of newspapers had been undone, he produced a faded water-colour profile of a lady—one of those curiosities that were the fashion just before the Daguerreotypes.

"This is number one," quoth the little man; "my wife, sir!"

"Yes," I answered, "she is very pretty but (and it struck me that if she were still alive, they might be comparing the picture I should make of her in the flesh with this half century old thing), but she must be greatly altered since this was done?"

"She is dead, sir!" was the solemn answer, as he proceeded to unwrap the rest of the parcel. "This is number two," he continued, as he produced a coloured cabinet photograph of a sharp, shrewish, old-maidish-looking female, that looked business all over; indeed, one of the sort that may be expected to exclaim, "Never say die!" I made sure that she was above ground.

"Of course, you mean this is your second wife?" I asked.

"Yes—yes—my wife, sir, my wife!"

"Ah! it is very good; taken some time since, I see. I shall have no difficulty in making a better picture than this, when she does me the honour of granting a sitting." This I spoke with my pleasantest smile.

"She is dead, sir!" was the remark of the little man, spoken more solemnly than before. I was swamped.

"Now, look here! continued my customer; "now we come to number three!" Then he produced from the depths of an inside pocket a small carte of a very robust female. I commenced to think that I had dropped upon a modern Bluebeard, and I could not help looking at the thin face, scranny whiskers, and seedy-black coat, and wondering how many more "numbers" he would pull out.

"My third wife, sir!"

"Of course, she is dead?" I suggested, making sure I was right this time.

"What!" shouted the little man; "what do ye take me for? What do you mean, sir?" And he stamped his feet with wrath, and foamed with fury.

I begged his pardon, which appeased him; then he explained that number three was still his partner in this life, and he wished a family picture to be got up (all cabinets), himself in the centre, and his wives all round him, "with their names underneath," he added. "Ah!" I could not help exclaiming; "No. 1, No. 2, and No. 3. Eh?"

"What! What!!"

The shouts that he gave made me think I had gone too far; but a long face and a supernaturally earnest manner pulled things straight again. So I set to work upon them next day, and had the satisfaction of getting good results off each by means of the Ross C.D.V.

MOUNTAIN PHOTOGRAPHY IN NEW ZEALAND.*

February 22nd.—Weather all that could be wished, and with every probability of continuing so. The first part of the journey was by boat up the Arthur River, and delicious pictures were revealed at every bend of the stream. These were duly "spotted" by the operator, and a day's work hereabouts planned should there be time on the return. As we pulled up the river the navigation became more and more difficult, the utmost exertions of our two powerful and skilful oarsmen being unable to stem the current which rushed by "Manœuvring Rock" until the tide had risen sufficiently to counteract it. Now came the second phase of the trip. Blankets, food, and photographic paraphernalia, previously divided into three swags (the photographer, in consequence of his "youth" and inexperience, having been considerably made light), were now shouldered, and the march through the bush and over the boulders in the river bed began. The bush part was the more preferable, as a capital track had been cut by Sutherland and his mate; but the boulder part was "a caution." A short "blow" was allowed at "Smoke ho!" (half-way), and another good long spurt carried us to the foot of Lake Ada. At the end of the track we duly found the canoe (17 feet long) which our explorers had "dug out" of a birch tree two seasons ago. Swags were slipped from the shoulders and stowed in the little craft to the great relief of one of the party, and Sutherland and the photographer paddled their, or rather the former's, own canoe up the lake. The third member of the party (Mr. Malcolm) returned to the boat, engaging to meet the others on the Arthur River on the evening of the next day but one. Lake Ada is some eight miles long by an average breadth of about a mile and a-half. It is by no means deep; indeed, in comparison with other Otagan lakes, it may be considered remarkably shallow, being only about ten or twelve fathoms in the deepest part. It is the opinion of "the guide" that the judicious expenditure of a few charges of dynamite among the boulders where the Arthur River leaves the lake would reclaim a large portion of its surface, leaving just a channel for the stream. And how fertile would be the banks of the stream then! Though a stranger might be incredulous, it is a fact that there is a considerable amount of level land in the valleys and gullies, with soil of a rich chocolate, and often of great depth. The height of Lake Ada above the Sound is about a hundred feet. There is no part of the lake which does not abound in points of beauty, scarcely a turn or an islet which does not "make" a fresh picture; but the completest effect is gained from the centre. Then you have on the right-hand Sheerdown Hill (how unobstrusively is this mighty mass named!), which is so grand an object at the head of the Sound, and the peculiar peaks of Camp Mountain; next, the Wick Mountains, with a glimpse of the Sinclair chain through the gorge of Joe's River; next, right ahead, the imposing Castle Mountain, only a very few feet short of 7,000; then, more distant, and still loftier, Mount Danger Mountains, and range after range cut apart by deep defiles. On our right hand the fantastic Terror Peaks, with the strangely-shaped summit, to which the restful appellation of the "Devil's Armchair" has been given. Lastly, behind us are Mount Phillips (beautiful here, but the only ugly mountain as seen from the Sound), the Barren Peaks, and even a glimpse of the far-off monster, Mount Titoko. One of the most noticeable features of the locality must not be omitted. On the west side of the latter a densely-wooded sweep, like an inverted arch, one side descending from a spur of the "Devil's Armchair," and the other reaching up to a companion peak a mile or more away to the south, forms a mighty wall, behind which and far beyond rise the Terror Peaks spoken of above. In the very centre of this inverted arch—if that term conveys a clear idea to the reader's mind—is a vast rift, narrow, but something like 1,200 feet deep. This defile is impassable, and the hidden wonders of the huge ampitheatre, of which only glimpses are obtainable, can only be discovered by climbing the mighty forest-covered screen itself. What startling effects of glacial action that enormous basin would exhibit can only as yet be conjectured. However, the rift itself, called the Giant's Gate, is an earnest of what may fairly be expected to be revealed. Sutherland, the guide, has determined to solve this question when other more pressing matters of exploration and prospecting will allow him sufficient leisure. On reaching the head of the lake a well-pitched tent was found, in good order, and while one attended to matters culinary, the other made the best of the daylight that remained, taking six negatives—the only difficulty being to make a choice amongst the wealth of scenery spread around. A few drops of rain falling while at supper, filled both with fear as to the morrow. Had we then but reached thus far to be tantalised with a sight of what might be done if only the weather would allow? Even though the floor of the tent was as elastic as a spring mattress, occasional showers through the night made sound sleep impossible; for should wet weather be likely to set in in earnest, we must start back without delay of an hour.

February 27th.—All forebodings vanished, for this morning was simply delicious. The lake was without a ripple; the snow-clad peaks were mirrored with startling exactness—a slight belt of fog just hiding the water-line, while fleecy clouds developed the shoulders of the mountains. Needless to say the camera was "at it"—a coo-ee to breakfast was felt as almost a nuisance. The meal despatched, we paddled up the Poseidon River, "working" the country as we went. In photographing such a country as this, a billhook is almost as necessary as a camera, for while one (the photographer-in-chief) spots and "composes" the view, the other clears away the undergrowth that would have blocked up the pictures, and thus "opens up the country." We were now floating up the upper lake or lagoon out of which the Poseidon River runs, and one could not suppress a feeling of self-gratulation at being the first to depict such scenes as those among which we were revelling. As many as twenty or thirty persons may have seen Lake Ada from the foot, but those who have reached the head might be numbered upon the fingers of one hand, while even fewer than these had ever found themselves on the spot where we now were. But we had now reached our farthest point, and with a longing glance in the direction where Sutherland Falls and Mount Balloon lay, we took the back track. Still four or five "subjects" tempted us ashore, until we had to tear ourselves away, lest we should be benighted far from our camp.

February 24th.—Another day such as gladdens a photographer's heart, and on our downward journey we made even better work than yesterday. Some sweet views were found from an island—some very telling ones of the Giant's Gate, and so down to the foot of the lake. One cannot live upon photography alone, however, and a long and exciting day deve-

* Continued from page 331.

loped an appetite such as only a mountaineer or a bushman knows. The meal we sat down to was not to be despised. It consisted of a delicious stew of four teal, a weka, and a pigeon. Not amiss, this, for two persons. But, sharp as was the appetite, and savoury as was the meal, it was with the utmost difficulty it was discussed. Oh, those sandflies! People complain that they are sometimes "bad" at the Bluff, when two or three settle on the face or hands. They are troublesome in the Sounds generally. They are irritating on Lake Manipori. But for thorough-going, temper-destroying, blasphemy-producing, temporary-insanity-engendering little demons, the sandflies about that swampy camping-ground at the foot of Lake Ada knock spots out of all creation. Swags were again packed. This time, however, there were only two backs to bear them instead of three. Like consideration as to weight for age again marked the apportionment of the burdens. Evening was fast falling, and bush-tracking and boulder-climbing had to be done at a small pace. Malcolm with the pack was duly on the watch, and by-and-bye we were fighting our battles over again over a billy of tea in Freshwater Basin.

February 25th.—This was to be the last day with the camera, as the steamer might be expected in the afternoon, or next day at latest. The Arthur River was accordingly chosen as the scene of our last "shots," and the views noted three days before were duly secured. After half a day's work, we felt we had earned the "usual Saturday half-holiday," so knocked off and began, not to chop wood, but to pack up.

February 26th.—A steamer's signal started the "inhabitants" out of their bunks soon after day-break, and quickly a gun from "Sutherland's Battery" boomed a welcome to the *Rotorua*. Sutherland and Malcolm pulled off in their boat, speedily to return with the intelligence that Captain Tozer could only give the photographer "five minutes!" This was news indeed, as it had been understood that the day would be spent in Milford. A "round-robin" had been concocted, it would seem, requesting the captain to run through other of the sounds, instead of making a stay a Milford. Remainder of packing was done in a rush, and in a very short time the photographer had bidden good-bye to his hosts and guides, and his trip to the mountains was virtually over. As "the man who had been a month at Milford," a transient popularity again awaited him; but truth compels the admission that the attention of the lady portion of the passengers was devoted more to a certain case of flowering Alpine plants—a nice specimen of the *Ranunculus Lyellii* among them—which formed a portion of his baggage. A timely suggestion by the chief officer that these floral treasures should be put into one of the boats relieved any embarrassment which gallantry, struggling with pardonable selfishness, might have produced. In at Thompson Sound; out at Doubtful. In at Breaksea, through Anchor Passage, and out at Dusky. Thus the *Rotorua* threaded her way; weather delightful; passengers in ecstasies; photographer alone moody and discontented. Lovely scenes were passing before his eyes, and not a "shot" could he take at them.

February 27th.—The Bluff. Expended the last five plates in taking views of the town and shipping, and groups of the captain and officers of the *Rotorua*.

February 28th.—Port Chalmers at daylight.

EXTRACTS FROM THE REPORT OF THE ASTRONOMER-ROYAL TO THE BOARD OF VISITORS OF THE ROYAL OBSERVATORY, GREENWICH,

Read at the Annual Visitation of the Royal Observatory, 1882, *June* 3.

BY W. H. M. CHRISTIE, ASTRONOMER-ROYAL.

In the year ending 1882, May 20, photographs of the sun have been taken on 200 days, and of these 352 have been selected for preservation. Since the end of last August photographs have been taken on Sundays as well as on week days. There were only 2 days out of 200 on which the sun's disc was observed to be free from spots. There has been a large increase in the number and size of spots and faculæ, the mean of the daily area for each in 1881 being nearly double of the corresponding quantities for 1880, and the increase is still continuing, though with well-marked fluctuations. A very remarkable outbreak of spots occurred in April last.

As regards the photographic reductions:

The photographs have been measured in duplicate, and the measures entered, to	1882, May 9
The areas of spots and faculæ have been completely reduced, so as to exhibit areas in millionths of the sun's visible surface, to	March 19
Radii of the sun, corrections for zero of position-circle, and heliographic elements, have been computed to... ...	May 9
Distances from the sun's centre and position-angles of spots and faculæ, corrected for distortion and refraction, have been formed to	March 19
Heliographic longitudes and latitudes of spots have been computed to	March 19

In order to save labour, without appreciable loss of accuracy, the reductions, since the beginning of this year, have been carried only to tenths of a degree instead of to minutes in position-angles and heliographic longitudes and latitudes, and to thousandths of an inch instead of ten-thousandths in measures of distance from sun's centre. To facilitate the computations, tables of sines and log sines, cosines and secants for degrees and tenths have been printed on a card, and the time occupied in the reductions is thus very materially shortened.

We are troubled at times in the magnetic basement with discolouration of the photographic sheets, apparently caused by want of ventilation in a room which has to be kept from the influence of changes of temperature in the external air. Possibly the adoption of one of the newer photographic processes might meet the difficulty, or it might be removed by the construction of a subterranean channel of sufficient length to bring the air entering the room through it to the temperature of the soil, which at a depth of a few feet is sensibly constant.

As regards the magnetic reductions, the eye-observations of the upper declination magnet and of the horizontal and vertical force magnets, giving zeros for the ordinates of the photographic curves, are reduced to the end of the year 1881.

The time-scales for declination and horizontal and vertical forces are complete to the end of 1881, and the base line values are formed. These are entered on the photographic sheets, and new base lines laid down.

The hourly ordinates of the photographic curves are read out to the end of 1881 for declination and horizontal force, and the taking of hourly and monthly means is complete. The time-scales for the earth-currents are laid down for 1881. The observations of dip are completely reduced; those for horizontal force are reduced to the end of 1881.

On four days during the year—viz., September 12 and 13, and April 16 and 19—magnetic storms have occurred. Those of April were of more marked character than any that have taken place since the great storms of the year 1872, and it is a significant fact that exceptionally large spots made their appearance on the sun shortly before—viz., on April 11 and 17. Smaller magnetic movements are now also much more frequent, the traces exhibiting a marked contrast to their general appearance some two or three years ago.

The number of hours of bright sunshine recorded by Campbell's sunshine instrument during 1881 was 1,301, which is more than 100 hours above the average of the four preceding years.

As regards solar photography, the value of our results would be very greatly increased if the gaps in the Greenwich series were filled up by the help of the photographs taken in India and elsewhere under the auspices of the Solar Physics Committee, so that the areas and positions of sun spots and faculæ should be given for every day. I am in communication with the Committee on the matter, and am in hopes that the saving of labour recently effected in our photographic reductions will enable us to undertake the work with our existing staff.

Royal Observatory, Greenwich, 1882, *May* 20.

Proceedings of Societies.

PHOTOGRAPHIC SOCIETY OF GREAT BRITAIN.

The last meeting of the session of this Society was held on Tuesday evening, the 13th inst., at 5A, Pall Mall East, the President, JAMES GLAISHER, Esq., F.R.S., in the chair.

Before opening the proceedings, the CHAIRMAN expressed his conviction that they would all feel much pleasure at seeing in their midst an old friend, Mr. J. Traill Taylor, of New York, and called upon the members to give him a hearty welcome.

The minutes of the previous meeting were then read and confirmed.

The Chairman stated that the Council had received a letter from Mr. Darwin, informing them with much regret that he was compelled to give up the secretaryship of the Society, as he was leaving for Australia in September; he (the Chairman) wished to take the opportunity of bearing testimony to Mr. Darwin's faithfulness to the interests of the Society, and his agreeableness in his intercourse with the members. He stated that the council had elected Mr. Maxwell Lyte, one of the oldest members of the Society, to fill the vacant post, and called upon that gentleman to take the secretary's place.

Mr. Henry Stevens was duly elected a member of the Society.

Mr. T. Sebastian Davis read the report of the committee appointed by the Society to consider the establishment of a standard of rapidity for lenses; this report would be circulated as the standard of the Society.

Captain Abney then gave a brief abstract of Mr. C. R. Wood's paper on the recent eclipse operations, the paper itself being taken as read.

Mr. Cadett was next called upon to read his paper on "The Comparative Efficiency of Various Instantaneous Shutters." In introducing the subject, he pointed out the importance of utilizing to its fullest the effect of the action of light. It was usual to work with lenses of large aperture, though it was true there were instances on record of seascapes having been successfully rendered with the aperture as small as $\frac{f}{18}$; but these were exceptional cases. Mr. Payne Jennings was continually complaining that he could not get plates rapid enough. If the sensitiveness of plates for ordinary work was a matter of such importance, it was surely equally important to utilize the light to the fullest advantage. He stated that the best position for the shutter was undoubtedly immediately in front of the plate. After that, a shutter immediately behind the lens utilized the largest portion of the light which passed the latter, and he showed that, with the shutter placed in front of the lens, the greatest loss occurred. He demonstrated, by means of a diagram, the amount of light wasted by different forms of shutters. The ordinary drop-shutter, with square aperture the height of the opening of the lens, wasted exactly one-half of the light which ought to pass from the lens during exposure; while in using the shutter opening from the centre, loss of three quarters of the total light occurred. He alluded to the method adopted by Mr. Warnerke and himself in estimating the duration of exposures of various shutters, and stated that Mr. Warnerke had since improved upon the plan by constructing an arrangement consisting of a revolving disc of metal in which was a small aperture. This was placed in front of a bright light, such as the sky or light reflected from a sheet of paper, and the disc caused to revolve at the rate of once per second. A photograph was then taken while it was in motion, and by measuring the arc formed on the plate by the moving aperture, the duration of the exposure could be calculated exactly. With the simple drop shutter the duration of the exposure could be calculated without the assistance of any special appliances, and he showed on the blackboard a simple formula by which such calculations could be worked. He alluded to the influence which friction produced on the working of the drop shutter. Ignoring friction, he pointed out that the speed of the drop is continually accelerating; but Mr. Warnerke had found that after a certain speed was attained, the influence of friction intervened and prevented any further acceleration.

Mr. Addenbrooke then exhibited and described an arrangement he had devised for the purpose of measuring exposures, similar in general principle to Mr. Warnerke's, the chief point of difference being that the plate itself was caused to revolve. The duration of exposure was estimated, as in Mr. Warnerke's case, by measurement of the arc described upon the plate; it had the advantage of enabling ten or a dozen measurements to be made on the same plate by simply altering the centre of revolution of the latter. A negative bearing several measurements was passed round for inspection. A description of the apparatus will be given in a subsequent number.

Mr. Payne Jennings, in referring to Mr. Cadett's remarks to the effect that plates which were very rapid should of necessity not be of so good a quality, said, that in his experience, the more rapid a plate was, the better was the quality. He might say that he did not know how those who recommended that a plate should be slow base their arguments, and that he certainly thought they would be going a step backward if they gave out that slowness must be compatible with quality in results. They all knew that tide, water, foliage, &c., were constantly moving, and whatever they might wish to depict, it must be done as rapidly as possible, from which he concluded that the whole energy of plate makers ought to be directed towards the attainment of the utmost rapidity possible. With regard to small stops, he himself liked sharpness.

Mr. W. K. Burton said Mr. Cadett's remarks appeared to him to be thoroughly sound, and to cover the whole of the ground; but he would like to add emphasis to one or two of the points touched upon, points which had been brought to the notice of photographers times out of number. Firstly, with a shutter which worked close to the lens, the object was to have it very long, otherwise there was an enormous loss of light without any of the advantages accruing. Another point was that of the shutter working between the lenses of a combination; if the shutter opened and closed at the centre, there must be a loss of light under any circumstances; but it must be remembered that the shutter acted as a stop, and enabled you to use a lens of larger aperture. Mr. Cadett had said that there must always, theoretically, be a motion in a shutter; this was quite true respecting shutters with only one moving piece; but in shutters with two moving pieces, opening and closing in the centre, there was, theoretically, no motion.

Colonel Stuart Wortley said that from his experiments, he found he only lost one-sixth or one-seventh of the rapidity with a shutter just behind the lens. Some people thought it was not necessary to have a rapidly moving shutter for an instantaneous picture, but he could not agree with those who favoured a slow shutter. He produced and exhibited a shutter which he said might be classed as a very rapid one, and with which he had last year worked while at Niagara, to get a view of the falls from a very short distance, but he only succeeded after having strengthened the spring and thereby rendered the shutter five times as rapid.

Mr. Addenbrooke remarked that with breaking waves, the sea, streams, &c., one-fifth of a second was ample, and that the best way was to work with as slow a shutter as possible. Trees on a breezy day might easily be got with an exposure of one-tenth of a second.

Mr. Peek said some views he took of the seashore at Brighton were exposed by hand, and were perfectly sharply defined.

Mr. Maxwell Lyte agreed with some of the speakers that the use of a very small diaphragm is sometimes desirable in order to give sufficient definition to the picture; but he thought that an extreme diminution of the diaphragm might, if carried to a very great extent, greatly injure the balance of the picture.

Captain Abney thought that Mr. Cadett, in his diagram, had only taken into account shutters in which the height was equal to the diameter of the lens. In the case of a drop shutter, in front or behind the lens, the loss of light was one-half; but with the shutter he used himself and which he recommended, the length of which was equal to three times the diameter of the lens or more, instead of there being a loss of one-half of the light, there was really only a loss of one-eighth of the light. He disagreed with Mr. Jennings insomuch as he thought that if you had a moderately rapid plate, that was all you need desire. Except for special work, he thought a plate that took a good picture within a second was all that was to be wished for, and that Mr. Jennings' best work had hardly ever taken less than five seconds. He agreed with Mr. Burton's remarks respecting two opposing shutters, and had found that with this arrangement you had no motion on the camera at all. When at Scarborough he took two pictures of a sea-piece, in one of which he uncapped the lens with his hand, and in the other gave an exposure of $\frac{1}{20}$ part of a second. An artist, on seeing the former, said, "Oh! you have been copying a picture!"; but, on being asked his opinion of the other, thought it was a photograph, because, he said, "even an artist never saw ripples on the water, like that."

Mr. Cadett remarked that he thought a rapid plate would aid them towards progress in the future. Mr. Burton, he said, favoured a shutter which opened and closed in the centre, as it acted as a diaphragm. He (Mr. Cadett) thought this a mischievous practice; he preferred to use a more efficient shutter, and put a diaphragm in his lens. He said that Mr. Burton forgot that the period of time that shutter was open was exactly the same as occupied by a more efficient shutter. As Captain Abney pointed out, every shutter ought to have several times the aperture of the lens itself.

The Chairman called for a vote of thanks to those gentlemen who had taken part in the discussion, which was responded to.

Mr. Ackworth showed a conveniently fitted tourist's camera.

The Chairman then made the following announcements :— The exhibition would open on the 7th October, and would remain open every day, Sundays excepted, until the 16th November ; the *soiree* would take place on the 7th October. The latest date for receiving packing cases will be the 29th September, and nothing can be received after 9 o'clock on that evening The Council have also resolved that the exhibition should be open on three evenings in the week instead of two—viz., Monday, Wednesday, and Saturday ; also to have season tickets this year, the prices being £3 for one person, and £5 for two. The usual judges will be appointed.

The next Technical Meeting was announced for Tuesday, June 27.

The Chairman having remarked that the present meeting closed the session, and expressed a hope that they might have an interesting session next year, the meeting was brought to a close.

Sheffield Photographic Society.

The usual monthly meeting of the above Society was held in the Freemason's Hall, Surrey Street, on Tuesday, the 6th inst., Mr. Dakin in the chair.

Messrs. Pawson, Mallham, and J. Pilley were unanimously elected members of the Society.

The report of the last excursion (to Welbeck) was then presented by the Secretary, who stated that, owing to the persistent rain, very few plates were exposed, and those only in the Riding School, of which some good negatives were obtained, though a very difficult subject to photograph. Prints and negatives were brought to the meeting, to compare results, &c. It was proposed that the next excursion be to Matlock, on Friday the 23rd inst.

Mr. Dickenson showed a fine enlargement, 15 by 12, from a half-plate negative, taken by him at Hadden Hall, on gelatino-bromide paper, executed by Mr. Pumphrey, of Bradford.

A very interesting discussion took place on the merits and demerits of sulphite of soda in the developer, and also of the sulpho-pyrogallol, one member stating that, in his experience, it was unnecessary, as he always developed his plates very quickly, and so avoided staining the film, which, he contended, was always the result of prolonged development. He said he always got clear shadows by that method. The general opinion, however, was that the use of the sulphite was an advantage ; but the solutions should be used fresh, otherwise the pyrogallic lost its strength, and the negatives their pluck and vigour.

Thursday Evenings for Photographers.

A general meeting of the members and others interested in the formation of the new society arising out of these meetings was held on the 8th inst., Mr. W. E. Debenham in the chair.

The Chairman, in his introductory remarks, pointed out why it had been decided expedient to form a new society, and the special advantages it was proposed to confer. It was intended that the reading of papers should not be the chief object of meeting, although they would gladly welcome any papers on new discoveries or investigations ; but it was not possible to obtain such papers for every meeting. During the whole of the Thursday evening meetings, he, the Chairman, did not remember one meeting at which something fresh had not been been brought forward, or one at which he had not learned something. In the new society it was intended that the meetings should be occupied after the plan of the Thursday evenings, viz., by the exhibition and explanation of new apparatus, the communication of new formulæ, the result of investigations, and the discussion of matters of photographic practice, on which any of the members had met with difficulties. This latter point he considered a most important one, and one which was calculated to be especially useful to young photographers, amateurs, and assistants, who would all be welcome on an equal footing. It was believed that, with the large number who would appreciate the advantages offered, the subscription—which it was intended should be 5s. per annum—would suffice to pay all expenses ; but, as this was necessarily an experiment, two gentlemen had come forward as guarantors, in the event of there being any deficit in the funds for the first year.

After some discussion, and many suggestions from those present, it was resolved to name the society "The London and Provincial Photographic Association."

The Hon. Secretary *pro tem.* is Mr. C. B. Cutchey, 62, Gracechurch Street.

Bury Photographic Club.

Several gentlemen, photographers and amateurs, having a love of photography and the fine arts, met together on April 29th, May 10th, and May 16th, to form a Club, which it was agreed to call the Bury Photographic and Arts Club, its object being to provide a means of social intercourse amongst its members, and to foster and develop the application of photography to the arts and sciences. The following gentlemen were elected officers :—

President—Mr. J. E. Mellor.

Vice-Presidents—Messrs. W. S. Barlow and Edward Eccles.

Council—Messrs. F. W. Cooper, James Shaw, Daniel Mellor, Rushton, and H. Dearden.

Treasurer—Mr. John Nelson. *Secretary*—Mr. F. W. Livsey.

After the members had confirmed the rules and minutes of previous meetings,

Mr. Rushton introduced the question of drop and instantaneous shutters, and showed one of his own construction of a simple and very efficacious form.

Talk in the Studio.

Green Fog by Ferrous Oxalate Development.—When Mr. Dunmore seemingly confirmed Mr. J. Nesbit's remarks at the last South London meeting he did not intend to convey the notion that his experience was altogether identical with that of Mr. Nesbit. What Mr. Dunmore did say, so he informs us, is this, "that I had seen green fog after ferrous oxalate development, and that if, as Mr. Brooks thought, green fog was caused by sulphur, it might possibly proceed from the hypo. bath itself, green fog being invisible prior to fixing."

A Family Album.—A French photographer residing at Tangiers has just received a most interesting order from the Sultan of Morocco. He is commissioned by his Highness to photograph the 364 wives of this modern Solomon. The portraits will be contained in an album, of which the Sultan alone will have a key. If the photographer could only manage to strike off some duplicates from the negatives, they would doubtless command a considerable sale.—*Truth.*

Electrolytic Deposition of Copper from Alkaline Solutions.—In order to deposit a satisfactorily compact film of copper on iron, it is generally necessary to work with an alkaline bath, and cyanides have generally been employed in the preparation of the fluid. Weil has, however, found it advantageous to replace these poisonous salts by organic acids or by glycerine. Such a bath dissolves oxide of iron, leaving the metal bare and clean. Either the single-cell method may be employed, or a separate source of electricity can be used ; but, in the former case, the porous cell in which the zinc plate is placed must be charged with a solution of caustic soda, instead of the usual dilute sulphuric acid.

The Electric Light and the Growth of Plants.—Further details of Dr. Siemens' researches have been published. Two 4,000 candle lamps were used, one being enclosed in a glass lantern and placed outside a greenhouse, while the other lamp was placed inside a greenhouse. The result was not satisfactory in the case of direct exposure to the uncovered arc ; but under the influence of the protected lamp, which was only kept in action during the night, peas which were sown at the end of October were gathered in the middle of February ; strawberry plants placed in the greenhouse on December 16th yielded ripe fruit on February 14th. The interposition of yellow or red glass between the light and the plants retarded their progress notably, and, strange to say, blue glass exercised a still more injurious action.

To Correspondents.

*** We cannot undertake to return rejected communications.

Major R. Gordon.—1. Doubtless ; but the sample sent is so far peroxidised by exposure to the air, as to be practically useless. 2. You cannot do better than adopt the proportions given by Dr. Eder on p. 35-37 of the current Year-Book. 3. It makes no difference whatever.

H. Spink.—We have not heard of the application you mention, but would suggest that you should make a trial, and, if successful, let us have a description of your mode of working.

F. Cowley.—1. The best method is to tightly roll on a cylinder of moderately hard wood, and then cover with a few thicknesses of stout brown paper. If the picture is one of considerable value, a sheet of very thin sheet brass—or, better still, German silver—may be placed between the layers of brown paper. Mounted prints must be placed between packing boards. We do not know of any method of mounting which allows of the print being folded or rolled to a small radius without damage. As regards the scrap-book, the only point is to make it as light as possible consistently with sufficient strength. 2. We have asked Mr. Brooks to send you a prospectus.

Dark Room.—1. The best form of bichromate battery for the purpose is that which was described in the Photographic News about three months ago; while the worst is one made up like a Bunsen battery, but with a mixture of bichromate and sulphuric acid instead of nitric acid. Considering everything, the ordinary Bunsen battery is generally preferable.

C. R. F.—1. In all probability it was written several months before the close. 2. Simply ludicrous.

T. E. Forrest.—It is probable that your trouble arises from the reflection of light from some portion of the mount or tube, rather than from "flare" in the usual sense of the term. Mix some starch paste and lamp black, and with this mixture carefully cover any portions of the inside of the tube which appear to reflect light. The rapidity with different stops varies approximately with the squares of these diameters, and the relation would be absolute were it not for certain slight disturbing influences.

County Amateur.—1. Probably from over-exposure or the accidental access of light. 2. A very undesirable proceeding. 3. Nothing of the kind exists. 4. By itself it is a little too brittle, but this can be remedied by adding a little thin solution of india-rubber in benzole. 5. Certainly; but we should prefer to employ the wet collodion process for the purpose. 6. Dr. Eder's work on "Modern Dry Plates," published at our office.

J. M. Nisbett.—Look well to the camera and lens with a view of ascertaining if anything partially obstructs the light; or perhaps the lens is not placed centrally with regard to the plate. With respect to halation, you may either adopt the plan of squeegeeing a piece of carbon tissue softened in a mixture of glycerine and water against the plate, or you may paint the backs of your plates with a bitumen varnish.

Eta.—Not just at present. See notice of the Royal Cornwall Polytechnic Society, in the Photographic News of last week.

An Amateur.—The quantity first used is so much in excess of that theoretically required, that it is seldom requisite to add more. Yes, add a new bath.

W. E. D. Jones.—1. As regards the spotting, the principal thing is to obtain a sable brush of good quality, so that a fine point can be readily kept. 2. The result is very good. 3. We will devote a leader to the question shortly.

Amateur (Islington).—The back lens alone will not give a good picture, but if you unscrew the back lens and leave the front lens in position, very good views can be obtained. There are, however, advantages in using the front lens behind the stops, and with its convex side next the sensitive plate.

Mr. Spink's Shutter.—We have received a letter from Mr. Volk, of Brighton, in which he claims to be the true inventor of the shutter in question. Mr. Spink, in one of his communications to us, mentioned that his idea had been carried into practice by an electrician residing in Brighton; but no name was mentioned, and we must regard this as one of the numerous instances in which it is difficult to exactly apportion the merit of an invention between two individuals. Here, however, is Mr. Volk's view of the case:—"The facts are these. Some three years ago, Mr. Spink asked me if I could contrive a shutter for him, and I agreed to do so. All he suggested in the matter was, that it opened down the middle. I constructed it, and submitted it to Messrs. Marion and Co., with a view to patenting and publishing it. The patentee of a pneumatic shutter they supplied, however, stated that he claimed all pneumatic shutters, and, to avoid all trouble, I gave Mr. Spink the single and only one I ever made, without fee or reward, telling him why I did so. I may say that I have since been advised that I could have manufactured them without infringing the other patent. Had Mr. Spink acknowleged me in any way, I should have been satisfied; but seeing my indentical apparatus, I take the opportunity of explaining how matters stand."

Vexed.—1. We believe not. 2. We think you must, if you wish to obtain the best results.

H. H.—There is no such book; but information will be found in back numbers of the News and in the Year-Books.

R. M. L.—Our "Twelve Lessons on Dry-Plate Photography" will be shortly reprinted in book form; but you should also obtain Eder's work on "Modern Dry Plates," which is published at our office.

C. T. B.—If regarded from your point of view, it is an admirable practical joke.

THE PHOTOGRAPHIC NEWS.

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CONTENTS.

RECENT RESEARCHES OF DR. EDER ON GELATINO-BROMIDE.

Dr. Eder has already demonstrated that a bromo-iodide emulsion containing one-twelfth of silver iodide, and which has been emulsified in a neutral or slightly acid state, is less sensitive and gives thinner images than is the case with a pure bromide emulsion, provided that oxalate developer has been used, and that neither emulsion has been digested at a high temperature. The same holds good in the case of a bromo-iodide emulsion prepared with ammoniacal silver solution, and digested for about half an-hour at 35° to 40° C., the difference being very noticeable when the proportion of iodide ranges from one-twenty-fifth to one-twelfth of the bromide. In both these cases, then, the iodide exercises an injurious action.

It must not be lost sight of that the distinction—as regards properties—between a pure bromide emulsion and a bromo-iodide emulsion depends largely on the duration of the digestion and the degree of heat to which the preparation may have been subjected. As an illustration of this, it may be mentioned that a bromo-iodide emulsion containing one-twenty-fifth part of iodide, and boiled for half an hour while slightly acid, was hardly less sensitive than a similarly prepared bromide emulsion, although the former did certainly give thinner and weaker negatives than the latter, and more time was required for developing them.

The bromo-iodide precipitate is ordinarily flocculent and cheesy, when (as in the case of an emulsion containing about one-tenth of iodide) the gelatine, soluble bromide, and soluble bromide are first dissolved, and the silver nitrate is subsequently added, even though the gelatinous liquid may be dilute. Hence it frequently becomes necessary to first prepare a bromide emulsion, and to subsequently iodize it by the addition of iodide of potassium, so as to partially convert the silver bromide into iodide. When this expedient, due to the investigations of Abney, is adopted, a longer digestion is necessary than when the iodide is formed in the first instance, or it will frequently happen that the sensitiveness is less when the silver iodide is subsequently formed by the reaction of silver bromide with potassium iodide.

It has been proved by experiment that iodide of potassium exercises a very slow decomposing action on silver bromide when a considerable excess of potassium bromide is present. In one instance a washed and decidedly foggy emulsion was warmed for a short time with iodide of potassium, and afterwards well washed, the result being to considerably reduce the tendency towards fogging; but the sensitiveness was less than that of an ordinary clear working bromo-iodide emulsion containing one-fiftieth of silver iodide.

Iodide, to the extent of one-fiftieth, in the boiled or non-ammoniacal emulsion, tends, then, towards greater thinness of image and retards the development, but in the end the same details are obtained in the shadows. When, however, the proportion is increased to one-twelfth there is a loss as regards sensitiveness and vigour; this being more noticeable when oxalate developer is used than when pyrogallic acid is employed. An emulsion of bromo-iodide (containing one-fiftieth iodide) which has been boiled, and then digested with ammonia in the usual way, gives clear and vigorous negatives, which possess an exceptionally wide range of contrast; and, in some cases, the addition of iodide offers decided advantages.

The various emulsions may be arranged according to the vigour of the image obtainable with equally long exposures; and in the following statement the least vigorous is placed first:—

1. Boiled bromo-iodide emulsion.
2. Boiled bromide emulsion.
3. Bromide emulsion boiled, and subsequently digested with ammonia.
4. Bromo-iodide emulsion boiled, and subsequently digested with ammonia.

Lunge has recently made the observation that the action of dilute acids on easily-attacked substances, such as metals or ultramarine, is materially diminished by the presence of inert bodies, such as gum, glycerine, or lamp-black, and it is possible that the comparatively inert iodide may act in the same kind of way in relation to the developer. The thinness of image obtained when a considerable proportion of iodide is present may merely result from its non-actinic colour, and certain yellow colouring matters produce a similar effect. The retarding action of the iodide may, to some extent, be imitated by adding glycerine, sugar, or dextrine to the developer.

If the above considerations are correct, the presence of a silver salt which is difficult to reduce must diminish the chances of fogging, and, if present to a moderate extent, render the development slower, but without reducing the sensitiveness.

Taking this view of the case, some highly sensitive bromide emulsion, which rather tended towards fogging, was mixed with some immature or unripe emulsion, and the result was highly satisfactory, sensitiveness, vigour, and clearness being the result, proving that unripe bromide emulsion may replace iodide as an addition; and it was found that from two to five parts of the unripe bromide may advantageously replace one part of the iodide.

The addition of a small proportion of silver chloride to the bromide emulsion tends to favour the production of detail in the shadows, and it is probable that this action may be rather due to the ease with which the chloride is attacked by the developer, than to any extra sensitiveness of the bromo-chloride film. It is probable that the most perfect control over the quality of emulsion will result from the proper admixture of ready-prepared bromide, chloride, and iodide emulsions.

A remarkable fact which recent experiments have proved is that a very high grade of sensitiveness results when silver bromide is boiled with not less than ten times its weight of water and a considerable proportion of gelatine. The following proportions yield a highly sensitive preparation:

Bromide of potassium	24 parts
Gelatine	20 ,,
Water	200 ,,
mixed with	
Nitrate of silver	30 ,,
Water	125 ,,

Boil thirty to forty minutes, and add to 20 parts gelatine in 400 parts of water.

In the case of this emulsion it is easy to take advantage of the known remarkable effect of ammonia or carbonate of ammonia for increasing the vigour of the emulsion, and a very advantageous method of working is to only boil nineteen-twentieths of the whole quantity; the remaining one-twentieth being added after the boiled portion has been cooled to 40° or 50° C. Twenty parts of a ten per cent. solution of carbonate of ammonia are now added, and the whole is digested for half an-hour at 40° to 50°, after which the final addition of gelatine is made (20 parts gelatine and 300 of water).

RELATIVE POWER OF ANTISEPTICS.

The photographer, who deals so frequently with substances like albumen and gelatine, which are much prone to decomposition, will be glad to note the results of some exhaustive experiments on the subject of antiseptics recently made by M. Salan de la Croix. It was M. Croix's object to ascertain the relative value of the various well-known substances usually employed to prevent decomposition, as well as of others known to the chemist, and the issue of his work he has now published in the form of a table. Photographers are in the habit of using alcohol, phenol or carbolic acid, as also thymol to mix in their solutions of albumen or gelatine, but they will see by reference to the results below that the first-named has a comparatively very small protective power.

M. de la Croix's plan to ascertain the value of a substance in preventing the development or evolution of the microbia of putrefaction was a very simple one. He placed finely-divided boiled or raw meat in water, and ascertained the maximum and minimum quantities of each substance that were effective. The figures in the following table indicate the number of grammes of water in which one gramme of the substance mentioned prevents the development of microbia:

Substance employed.	Maximum dose in which development is not arrested.	Minimum dose in which development is arrested.
Alcohol	30	1·77
Chloroform	134	1
Soda biborate... ...	107	14
Eucalyptol	308	14
Phenol...	1,002	10
Thymol	2,229	20
Potash permanganate	3,041	35
Picric acid	3,041	100
Borated soda salicylate	3,377	30
Benzoic acid	4,020	50
Ethereal oil of mustard	5,734	40
Sulphurous acid ...	7,534	72
Alum acetate	7,535	478
Salicylic acid	7,677	343
Mercury bichloride ...	8,358	2,525
Lime hypochlorite ...	13,092	109
Sulphuric acid ...	16,782	135
Iodine	20,020	410
Bromine	20,875	493
Chlorine	34,509	431

From which it will be seen that chlorine, the hypochlorites, and perchloride of mercury are very effective, while alcohol is comparatively impotent.

At Home.

M. VAN BOSCH ON THE BOULEVARD DES CAPUCINES, PARIS.

The name of Van Bosch has been growing quite familiar during the past two years. Dashing portraits of French and German actresses and lady celebrities of the opera, all executed with a considerable amount of chic and "go," have lately been seen in our shop windows, both in town and country, bearing the quaint Dutch signature, and at some of the recent European exhibitions, medals—in one case a gold one—have been awarded for the pictures. As many of our readers are aware, Van Bosch earned for himself a name in Frankfort before his studio in Paris was opened, and in the old free town on the Main he still presides over a large establishment. But it is in Paris that he has made his mark, and hence it is to that capital we journey in order to set down an "At Home" in these pages.

Van Bosch has opened his campaign in Paris with vigour. It is always a bold thing to carry the war into a foreign capital, but Van Bosch has proved himself a bold man. In the best part of the Boulevards, where that magnificent thoroughfare is broadest and brightest, just between the Grand Opéra and the Madeleine, the favorite promenade of every fashionable visitor to the French metropolis, he has secured magnificent premises. A large emporium to the sign of "Old England" will have been remarked by many visitors to Paris, and it is above this establishment that Van Bosch has organized his studio.

As in the case of ninety-nine photographers out of a hundred, the studio itself is up many pairs of stairs, and not very far from the roof. The *porte cochère*, or broad doorway of Paris houses, affords an ample and favourable locality for the display of specimens, and on either side of the roomy recess are charming examples of work. Van Bosch does not, however, employ frames; he simply pins the card mounts against walls of handsome plush, and in this way secures a very fine effect. The bright photographs with their dark, rich tones, harmonise well with the soft amber background, and no valuable space is taken up by the gilder's art. There are cartes-de-visite, cabinets, promenades, and huge mammoths, which go by the name of Cartes Van Bosch, the last measuring twelve inches by eight, with a head frequently five inches in height. The price of the Van Bosch portraits is fifty francs, or £2 for the first, and half that price for copies; while cabinet portraits are sixty francs a dozen. The last-named figure may be taken as a standard for houses *du premier rang* in Paris just now. When the visitor gets to the end of this broad passage, and has seen the specimens, it may be that he is inclined to have a portrait taken; in this case he opens the door at the end, and in many establishments is directed by a notice to mount "*au cinquième*," or some such lofty elevation. The visitor looks up the vista of broad, shining stairs, and if he has been pacing the hot flags for some time, the chances are he will feel scarcely equal to the exertion; he shuts the door again, and postpones his call. M. Van Bosch has arranged matters differently, however, displaying not only common sense, but a knowledge of the public. A tiny piece has been cut off the end of the broad passage and made into a neat little office—there is hardly room for a writing table and a couple of chairs—and here on the ground floor the visitor may make enquiries, see further specimens, and make an appointment without further trouble.

When the sitter afterwards comes by appointment, he is shown upstairs to the second floor into a magnificent salon.

The busy boulevard is at your feet, and through the windows you can glance up and down the lively thoroughfare for a considerable distance. This room measures no less than forty feet in length, its breadth being about thirty. The furniture is "old German" and Flemish, with many examples of costly carving and rich tapestry, as attractive almost as the wonderful view to be seen from the windows. But there is no time to linger here; we proceed to an ante-chamber, from which, right and left, rises a handsome staircase. That to the right leads to a smaller salon, set apart for lady visitors; that to the left brings you into the studio.

The dimensions of the studio are unlimited; that is to say, when you have mounted you may look back over the balustrade, down upon the stairs again, and the ante-chamber you have left; or you may cross over to the ladies' salon without going down stairs; or you may walk past screens, among cameras and backgrounds. The working studio, in fact, is only an enclosure of a part of this apartment, in which visitors may tarry while still their presence is unnecessary before the camera.

There is plenty of light here where the portraits are taken; there is clear glass looking on to the boulevard ten feet high, which rises from a skirting board of eighteen inches. Then there is another ten feet of sloping glass roof, while the reverse side of the studio is, as we have just explained, simply made up of upright screens, which can be moved to any distance. These screens are covered with grey or slate-coloured fabric, while on the floor are light rugs of soft buff or light grey. "I like to work with plenty of light," says our friend the manager, who, with M. Van Bosch, junior, is good enough to accompany us on our round of inspection. Curtains of dark-blue pulling upwards provide for screening off too much glare, but these are not used when subsequently, obedient to command, we sit down to be posed; and it is noon, albeit there was no direct sunshine.

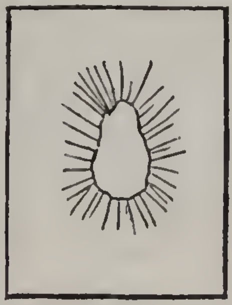
For vignettes, Van Bosch employs a revolving chair—a solid one, of course—and uses a parti-shaded background; this latter is darkly shaded at one extreme, the shading growing less towards the middle, until at the centre it disappears altogether. So simple a background has a good effect in giving relief to the vignette, and by means of the revolving chair the drawback of disturbing the sitter is reduced to a minimum.

It is the rule of the studio to take two pictures of every pose, one smaller than the other, a step, of course, easily taken, by retiring the camera a foot or two between the exposures. "Sitters so frequently complain that a head is too large or too small, that we now always submit two sizes," explains the manager.

A "rock-work" accessory in the studio deserves a few words of description. It is made up in three pieces, one main portion and two minor pieces. These latter may or may not be used to alter the shape of the pile, but they permit the placing between of pots of growing flowers and plants, which in the photograph appear springing out of the rock. In the picture, the flowers appear natural, as indeed they are, and for this reason the rock seems natural too.

In speaking of his *clientèle*, our friend informs us that nine-tenths are visitors to Paris, while one half are English. A sore subject he broached upon, which has already been ventilated both at Berlin and Vienna, although we have heard no complaint upon the subject in this country: we mean the giving of commissions to agents—douceurs, we believe, is the right name—who may secure the sitting of celebrities. This matter of douceurs is evidently becoming a great nuisance, and it prevails not so much in the case of great celebrities, as in mediocrities. "We are growing wiser now," says our friend, "but we have had to put up with douceurs, in some cases of a thousand francs, for the honour of receiving a visit, the profits of which to us, from portraits sold, have not amounted to a thousand centimes." Of course, these fees are accepted—to use a mild term—by agents, who may be perfectly unauthorized: but, in any case, it would seem that the greater personages—those whose portraits are really worth having—are free from the suspicion of requiring commissions of this kind.

A glance at the printing, which is done on a convenient flat roof, teaches us two little things: firstly, that only albumenized paper purchased ready sensitized is employed; and, secondly, that, in the delicate vignetting work, neither cotton-wool nor serrated cardboard openings are used. An opening is cut in a piece of card of the



shape desired, and then the "softening off" of the vignette is produced by simply making cuts into the card with a pair of scissors. There is no forcing open of the cuts thus made, which permits quite enough light to penetrate without further manipulation.

The work of the studio is much subdivided—the artist who poses, and has nought to do with developing the plate, the studio, so to speak, being under one management, and the dark-room under another; albeit, there is, of course, an *entente cordiale* between the two. Only gelatine plates are in use, and only oxalate development Another characteristic in the working is that there is no saving of waste. Residues are considered too insignificant to be taken care of.

The Van Bosch establishment has now existed in Paris for three years, and so successful has this branch of the Frankfort House proved, that there are whispers of further branches to be established in other capitals of Europe.

The next "By-the-Bye" will be "About Photographic Societies"; the following "At Home" will be "Picture-making with Mr. H. P. Robinson at Gwysaney Hall, North Wales."

PHOTOGRAPHY IN AND OUT OF THE STUDIO.

PHOTOGRAPHY AT THE ROYAL ASTRONOMICAL SOCIETY—PHOTOGRAPHING PUBLIC BUILDINGS—A NEW METHOD OF TESTING NITRATE OF SILVER—THE ELECTRIC LIGHT AND THE INSURANCE COMPANIES.

Photography at the Royal Astronomical Society.—At the last meeting of the Royal Astronomical Society, a paper by Dr. Henry Draper on his photographs of the nebula in Orion was read. The negatives (photo-lithographic enlargements from which were exhibited) were taken on the 14th of March last, an eleven-inch refractor being used, and the exposure being one hundred and thirty-seven minutes. In consequence of this lengthened period, the stars were much over-exposed, and were somewhat altered in form, in consequence, so it was stated, of a slight movement of the telescope during the long exposure. One notable feature of these photographs was that certain small stars, which are almost invisible when looked at through the telescope, were brought out so that, as Dr. Draper remarked in his paper, it would appear possible, by still further increasing the exposure, to photograph stars which are invisible to the eye. It was also stated that photographs of the spectrum of the nebula taken without a slit show that two of the condensed masses preceding Trapeziums give a continuous spectrum, and therefore contain either gas under pressure, or liquid or solid matter. It was noticeable that the photographic experience of Captain Abney, who was present at the meeting, furnished a reasonable explanation of the increase in the size of the stars. Captain Abney pointed out, in contradistinction to the statement of Dr. Draper, and also to the opinion of one of the members, that this increase in diameter was due to reflection from the back of the plate, and he suggested that this might have been prevented by backing the plate with asphaltum, which was the method adopted for the photographs of the recent eclipse, and which was suggested last year in these columns. According to Lord Rosse, photography fails to reproduce drawings containing faint details. This statement was made in consequence of a suggestion that a singularly perfect drawing of the nebula made by Mr. Lassell, of the Royal Society, should be reproduced by means of photography. Did Lord Rosse mean that faint detail cannot be photographed, or that it cannot be reproduced in photo-zincography or photo-lithography? If he meant merely the reproduction, he was quite right; but it is almost too much to say that faint detail cannot be photographed.

Photographing Public Buildings.—It may save some trouble to photographers to know that public buildings under the charge of the Office of Works cannot be photographed without an order. A photographer recently attempted to photograph the sculpture at the base of the Albert Memorial, but was peremptorily stopped by one of the keepers for the reason just stated. Of course it is quite reasonable that certain structures, such as fortifications, should not be photographed without permission; but one fails to see on what ground an order is necessary for the photographing of the Albert Memorial. The point suggests the question whether the owner of a house can prevent its being photographed. If he cannot, it may come to pass that some ultra-sensitive person of influence will, before the passing of the Photographic Copyright Act (if it ever comes to be law) get the insertion of a clause making it a criminal offence to photograph a house without permission. Who knows?

A New Method of Testing Nitrate of Silver.—Hydro-fluo-silicic acid is recommended as a test for the purity of nitrate of silver. The silver salt is first dissolved in the smallest possible quantity of water, filtered, and hydro-fluo-silicic acid is added drop by drop. If turbidity is produced, an alkaline salt is indicated; but should the solution remain clear after several drops of acid have been added, the liquid is mixed with an equal bulk of alcohol, when any alkali is at once precipitated. To detect nitrous acid and nitrites, the liquid is evaporated as much as possible, and a solution of one-hundredth per cent. of magenta in glacial acetic acid added. If nitrous acid or nitrites are present, the liquid changes colour, running from violet to yellow. Free mineral acids also cause a similar change; but if water is added the red colour is restored.

The Electric Light and the Insurance Companies.—The Electrical Exhibition at the Crystal Palace has settled satisfactorily the question of the insurance of buildings lighted by electricity. When the Exhibition was first opened at the Palace, the insurance companies immediately were alarmed, and intimated their intention of raising their premiums; although why electricity should be considered more dangerous than gas, it is difficult to see. The experience of the last six months has, however, proved that there is very little to fear from the use of the electric light, at least so far as "extra risk" is concerned, and the companies now intimate that they will insure buildings lighted by electricity at the ordinary rates, provided certain conditions and stipulations are fulfilled with regard to laying the wires. By the way, it is to be hoped that at the next photographic exhibition, photographers will have an opportunity of seeing what the electric light can do in the way of untouched photographs. The specimens of a well-known photographer now to be seen in many shop windows are admirable as pictures, but they are so worked up on the negative that it is quite impossible to judge of what electricity is capable.

Ignorant Photographers.—We can call to mind a parallel case of ignorance to the one instanced last week by Dr. Vogel, in which an intelligent (?) photographer used a water unusually free from chlorides for washing his prints, and thought there was something wrong because no milkiness followed. In the incident we are about to relate, however, the photographer was a lady, and her ignorance of chemistry was, therefore, more excusable. This lady had heard of the amount of silver which could be recovered from the washing waters, of which she had hitherto taken no notice. She determined for the future to be much more economical; accordingly, she carefully hoarded up the water in a number of winchester quart bottles, and threw away the chloride of silver deposited as being perfectly useless. The delightful unconsciousness that she was doing anything ridiculous reminds us of the simplicity of a photographic dealer in the early days of the art, who, when asked in what consisted the superior qualities of a certain collodion, replied, with a very wise look, "Oh! it's so much *stronger* than anybody else's!"

FRENCH CORRESPONDENCE.

The Photographic Exhibition in August next—Photographic Photometry—Husnik's Sensitive Bitumen—Photo-engraving by Bichromated Albumen.

The Photographic Exhibition in August next.—The coming photographic exhibition of the Union Centrale promises to be one of great interest and importance. There are already enough photographs to fill two large galleries of the Palais de l'Industrie, and fresh applications for space are still being received. Let me remind my readers that this exhibition is not to be exclusively a French one; foreign productions will be admitted. Applications for space may be addressed up to the 15th of July next to the Union Centrale, 3, Place des Vosges, Paris; or to the President of the Photographic Committee, 20, Rue Louis-le-Grand.

Photographic Photometry.—Great attention is being paid to the question of establishing a luminous standard. Our esteemed colleagues, Mr. Warnerke and Dr. Vogel, are studying the subject with great care, but they have not yet succeeded in mathematically solving the problem with sufficient accuracy. The difficulty is to find a unit of light which is really constant, and next a means of determining scientifically the greater or less number of these units. This problem has nothing to do with the investigation with which I myself am at present engaged; the object of that investigation is to establish a method of photometry by which the length of exposure of a photograph, whether negative or positive, may be fixed and known. Up to the present I have successfully employed a graduated scale of tints each of which is pierced with a hole at its centre. Underneath this scale is placed a piece of sensitive albumenized paper, and after a minute's exposure in diffused light the degree of luminous action is found by the number of the tint which matches best, so far as depth is concerned, with that of the sensitive paper. We can then deduce the necessary duration of exposure in the camera, having given the focal length of the lens, the diameter of the diaphragm, and the sensitiveness of the film. Silver chloride paper answers very well for operations in the open air, because at the end of a minute, even in diffused light, there is always obtained an appreciable change of tint, whatever may be the weather. But this is not so in the case of dark interiors, where sometimes no change is observed even after ten minutes' exposure, and it may be necessary to continue the exposure to fifteen or twenty minutes. For this reason I have made the attempt to substitute for chloride-of-silver paper, a gelatino-bromide paper like that of Mr. Morgan. To effect this I increase the sensitiveness by dipping the paper, just before exposure, in a bath of nitrate of silver of not more than 4 or 5 per cent.; I then wash it, and let it dry. This paper only gives a slight change of tint; but its rapidity is four times as great as that of the chloride-of-silver paper. Gelatino-bromide pellicles can also be used extremely well for this purpose. The iodide-of-silver paper, which Mr. Warnerke used to prepare at one time, gives a more strongly-marked discolouration in a lapse of time less than two-thirds of that required for chloride of silver. I am endeavouring to fix accurately the different relations between these facts, in order that a photometric standard for the different circumstances which may arise may be readily obtained.

Husnik's Sensitive Bitumen.—I have been trying with success the liquid bitumen prepared by Husnik's method, which is much more sensitive than the ordinary bitumen of Judea. It can be procured from M. Moll, of Vienna Bitumen of Judea is a substance which, though possessing many valuable properties, is not generally distinguished for its sensitiveness to the action of the luminous rays; it is, therefore, of importance to discover any means by which this substance may be rendered more sensitive.

Photo-engraving by Bichromated Albumen.—I have in previous correspondence spoken of a process of photo-engraving in which bitumen of Judea is advantageously replaced by bichromated albumen, on account of the much greater sensitiveness of this latter product. This process I have studied with great care, and I have drawn up a detailed account (see page 363) of it which, as I think it will be of use to my readers, I have sent for publication in the News. It will, I think, be found to be of great use to those engaged in photo-engraving. No account with full details has yet been given of the process, and for this reason I think that my paper will be of interest to anyone who may wish to experiment with it.

Leon Vidal.

THE MODERN PHOTOGRAPHER: HIS POWER AND APPLIANCES.

BY J. M'KEAN.*

We have seen and heard much of what has been done in the progressive art of photography in this the gelatine era of its existence, the unlimited rapidity of the modern dry plate, and its application to almost every branch of science. Amongst the mysterious orbs of heaven and the rolling clouds, from Alpine heights to the deepest caverns of the earth, the camera is capable of revealing to the eye of man a mighty store of knowledge meet for his most profound contemplation.

As professional workers in this interesting field of research, we owe a deep debt of gratitude to those noble pioneers of the art who have placed in our hands such a marvellous power in so simple a form as that of the gelatine dry plate. Yet, simple and reliable as we find it, how few of the profession have mastered the process of making such a plate to their entire satisfaction, contenting themselves with simply exposing and developing those of commercial fame under whatever name they are known, though differing chemically in a very small degree. That photographers should thus allow a most important weapon to be taken out of their hands is not, to my mind, as it should be. We are neglecting to fortify our position, and so profit by what we have learned. Let me therefore direct your attention to the stern realities of our calling, and, if possible, open the eyes of some who have not, as yet, fully recognized the great power we now possess of bettering our position in the eyes of the public, calling forth that artistic skill without which no man need hope to succeed as a modern photographer.

Apart from this, however, there are other qualifications none the less needful, and to these in particular I shall briefly refer, presuming you all know wherein lies the beauty of the sun picture—how that, by the lighting and posing of the model, effects may be produced according to your ideal or artistic conception of it.

* Read before the Edinburgh Photographic Society.

Taking, then, in our hand a modern dry plate and holding it between us and "the light of other days," let us weigh its advantages over its many predecessors – first, with regard to its simplicity of preparation; second, its extreme rapidity; third, its certainty and convenience in the studio or field.

Under the first head, namely, its simplicity of preparation, I intend this evening to give you a practical demonstration of my mode of working; and I venture to say that after two years' work without a negative bath, and daily using my own plates, there is no reasonable excuse for even the humblest in the profession not becoming their own plate makers. I have said the humblest in the profession, and refer to those who, in the hand of iron fortune, are swimming but slowly with the stream of progress, with the risk of being swamped by that great revolutionary wave we call gelatino-argentic-bromide.

The appliances before you, with the exception of the drying cupboard, are, of their kind, familiar objects to you all. Two bottles, a bowl, and jam pot contain the simple ingredients for the production of ten ounces of emulsion. In the first bottle we have:—

Silver nitrate	200	grains
Distilled water	$1\frac{1}{2}$	ounces

In the second bottle:—

Ammonia bromide	105	grains
Ammonia chloride...	5	"
Ammonia liquor (·880)	6	drops
Water	$1\frac{1}{2}$	ounces

The jam pot contains:—

Gelatine (Nelson's No. 2)	40	grains
Potassium iodide	5	"
Water	$1\frac{1}{2}$	ounces

We now place in the bowl one-half ounce of gelatine (I use equal proportions of German and Nelson's No. 2), and covering it with water, leave it to swell till we have mixed and digested our emulsion, which we will now proceed to do.

Placing our two bottles and jam pot with their contents into a pan of sufficient size, along with an ordinary bath thermometer and a little water, we raise the temperature to 140° Fahr. over a fire or Bunsen burner, and shutting out all actinic light from the room, we take in our hand the bottle containing the silver nitrate, and in the other a glass rod, or glass or silver spoon. I have used them all with good effect, though for the last twelve months I prefer a horn spoon for this as well as coating plates with emulsion. The following are its advantages:—It never breaks, and soon gets seasoned for the work; in washing it parts with the emulsion freely; for coating plates it is light and easy to handle; with Scotchmen, at least, it is no stranger, from its long association with "the halesome parritch, chief of Scotia's food." In its new capacity, then, as an aid to science, and, if you please, a promoter of the fine arts, we begin operations by using the handle to agitate the solution of gelatine and iodide. We next introduce in a gentle stream our solution of silver nitrate, *a la* Captain Abney. We have now our old friend the iodide of silver in contact with our new love gelatine, though they do not seem quite to agree with each other, the iodide clinging to the handle of the spoon as if anxious to avoid the hot treatment to which it shall shortly be subjected. But immediately we introduce the solution of bromide and chloride, harmony is restored.

Our emulsion is now in its first stage of sensibility, and may, after a thorough wash and the addition of the rest of the gelatine, be considered in its infancy, capable of receiving impressions of the outward world, though a little too slow for these days of spring shutter and photographic revolvers. We have, however, a simple and effectual means of attaining this desirable degree of sensitiveness, namely, the process of boiling. Before doing so it is well to withdraw a few drops of our emulsion, and spreading them on a glass plate we may, by tranmitted light, mark the difference between its youthful bloom before, and its grey maturity after boiling.

So far we have accomplished our task in making what we would term a modern emulsion. We will now cover with a lid the dish containing it, round which I place a cloth to keep it from coming in contact with the sides of the pan in which we intend boiling it. Covering all with the lid of the pan, and relighting our Bunsen, and the room if necessary, leave it to "cook" as long as in the present occasion we may find it convenient. I usually allow it thirty minutes.

Meanwhile let me ask if there is anything so far as we have gone to debar any one with moderate intelligence from the independent position of having at his command, not only as quick plates and reliable as any in the market, but plates suitable for all circumstances? This is a desideratum with every photographer.

We know that in the wet collodion process it was necessary to modify not only the silver bath, but the state of collodion for certain kinds of work. For example, in copying we desired an impression that would bear any degree of development without fogging; preferring to use an old collodion and acid bath. And for a so-called instantaneous photograph, the very opposite would be our mode of treatment. Now to accomplish all this it was necessary to be daily surrounded with an innumerable multitude of bottles, baths, and fumes that were injurious to the health, and worrying to the mind. It is only those who have passed through such a fire of affliction that can hail with pleasure the present revolution. My desire is to lift the veil from the seeming mystery that shrouds the process of making a gelatine dry plate, but can add little more than what has already been done by abler hands than mine. It is much, however, to be brought face to face with the naked truth; to divest a process of many of its encumbrances and technical phrases in which men of science delight to revel. To this end I have employed nothing but what is in the immediate reach of all.

The formula I prefer, after trying many others, is one by Mr. Bedford, though, as you see, I have made some modifications, and it is right that I should give you my reason for so doing. First, I have replaced five grains of iodide with five of chloride, thus reducing the yellow colour of the film with an increase of rapidity. Second, I add in the first instance twenty grains more of gelatine, as by this quantity the haloid salts are held in better suspense during the process of boiling. I have also found it necessary to increase the quantity of water. The German gelatine, though excellent in other respects, is too hard to be used alone, and absorbs less water in the course of washing. My mode of mixing and digesting is reduced to the very verge of simplicity. My object in making these modifications was to lessen the risk of failure through want of skilful manipulation, not always to be found within the secret precincts of the dark room.

Thus far it may be said the process is casy and clearly understood; but our task is not yet done, nor is the contents of the pot sufficiently cooked. So to sharpen your appetites till that is ready, I will say a little on a dry subject; though this in reality should be the first matter for consideration with those who have not made a beginning in the process of emulsion—namely, a quick and ready means for drying your plates after they are coated. This has been the subject of much study, and many and various plaus have been adopted. After carefully weighing one with the other with regard to simplicity and expense, consistent with the object in view, I plied the tools to the formation of the drying-cupboard now before you. It may be thus briefly described:—

Made of dry pine, it measures 3 feet 4 inches high, 32 inches wide, and 1 foot deep from front to back. It contains eight shelves of the same materail, capable of holding twelve quarter or three whole plates each. The top and bottom are double, with sufficient room for the entrance and exit of air without light. From the upper air chamber rises a metal chimney, inside of which is a gas-burner at the end of a brass tube, through which, from the side of the cupboard, is led the supply of gas for the purpose of rarefying the air, and causing a draught. From the bottom right-hand side runs, in a horizontol position, an oblong square tube, through which passes, perpendicularly, a Bunsen burner. For cooking my emulsions I light the gas in the usual way outside the wire gauze; but when drying plates, the gas is lighted inside the tube of the "Bunsen," causing, with a small peep of gas, a sufficient heat to dry the air as it enters the cupboard, and winds its way over the shelves, the latter being open alternately at back and front. The principle, as you see, is not new, though the design is, perhaps, a little novel. It has been in constant use for these last two years; in fact, I would feel a little out of my element were it not before me on the present occasion. It stands in a convenient position in the dark-room, and takes the place of the negative bath; and to its credit be it said, it has never been the worse for alcohol (as we often find our bath), even after treating the emulsion to a "wee drap" with no apparent advantage. As I said, various plans have been tried in the formation of a drying cupboard, and, as there is always a desire to strike out something original, I may advise you that, whatever plan you may adopt, experience will teach you that there is nothing like wooden shelves. They are always dry, and the moisture from the plates has a tendency to be drawn thereto, which, in its course, is expelled from the cupboard by the current of air. I usually coat my plates after business hours, and they are ready for use the next morning; and so confident am I of the success of each batch of plates, that I never think of trying a plate before using it for a sitter in the usual course of business.

This brings me to a point which I must not pass without some observations, as I know that in this particular my experience differs from some of my professional brethren. Let us reason. I gave you my formula, and have shown you how to treat it in making an emulsion. You observe the conditions necessary to secure the best result, and have succeeded, we shall say, to your entire satisfaction. You repeat the process, and observe the same conditions as regard time and temperature. Is it unreasonable, then, to expect anything but the same result? If the contrary has been the experience of some, I am pleased to say it is not mine, therefore can prescribe no remedy. I may, however, point to a few causes and their effect, which in the course of a few experiments I have discovered. I have, for example, tried the effect of adding more bromide, iodide, and chloride to the same proportion of silver, and in every case it has lessened the rapidity of the plate, though greatly improving it as regards grain and clearness of shadows in the resulting negative. From this fact I have come to the conclusion that, for a suitable plate for landscape work, we must look in this direction, as such a plate will bear any amount of development without stain or fog. Another cause for slowness will be found in the nature of the gelatine; the harder that is, the slower the plate, unless the washing of the emulsion is prolonged accordingly. There are many other causes for slowness which must be apparent to all, as insufficient digesting, &c.

I need hardly say that to secure the most rapid plates we must work in the opposite direction. There is a way of increasing the sensitiveness of emulsion which may not generally be known. I have found that by keeping the emulsion (after washing and draining) for several days before coating, there is a considerable improvement in this respect. In any case the material is in our own hands, and it is capable of being moulded to suit any circumstances, without, as I have said, half the complexities and perplexities common to the wet collodion process. It it certainly more congenial to our feelings to look upon a boiling pot with the assurance that there is something good therein; but let us see.

Previous to stopping the boiling operation, we shall drain the water from the bowl of gelatine, and, turning out the gas under the pot, withdraw the dish of cooked emulsion, and replace it with the bowl. After stirring the emulsion for a little, we shall examine a few drops through a glass plate, and, comparing it with the first, we find it has changed from orange to a grey-blue colour—a change which I do not pretend to explain. It is enough for our purpose to know it has become more sensitive to light, and in this state I decant it right into the bowl, and in a few minutes the gelatine is dissolved. I now leave it to "set" all night, and, in the morning, squeeze it through coarse canvas into a can of water, over which I tie a piece of finer material. At the bottom of the can is drilled a small hole, through which is passed a rubber tube, forming the simplest and cheapest washing apparatus yet invented. We have only to connect the tube with the water tap, and cover the mouth of the can with a light-tight lid, turn on the water, and leave it till you are ready to coat plates in the evening. I usually finish up by inverting the apparatus a few minutes previous to turning off the water. I then disconnect the tube, and blow through it; by this means the water is rapidly expelled from the emulsion.

We now begin the operation of coating plates by getting everything in position. Into our pan, filled with hot water, place a bowl, into which the emulsion is transferred from the washing apparatus, when it will quickly be dissolved. Over a second bowl I stretch two plies of fine cotton, through which I filter the emulsion, and it is ready for use. For this operation, the only addition to our appliances will be two levelling-stands and two plates of thick glass. Placing one on the table at the left, and the other within arm's length of the cupboard, and with horn-spoon in hand, proceed. Many plans have been tried to secure uniformity in coating plates. I have tried many, but like none so well as this. The spoon contains perhaps three times the quantity of emulsion necessary to cover the quarter-plate in my hand; but pour it all on, and you require no glass rod to conduct it to the edges of the plate; pour off the surplus into the spoon, and return it to the bowl. By this means the coating is conducted smoothly and more quickly than coating a plate with collodion. You have not to wait till the film sets in your hand, but placing it on the level glass go on with another till that is filled, after which pass it over to the other stand next the cupboard, and begin filling the next plate as before. By this time the first plates will be thoroughly "set," and may be placed in the cupboard. In this way the shelves are speedily filled, after which the door is closed, and the gas lit above and below. Thereafter you may retire to rest, with the satisfaction of knowing that a batch of cheap and reliable plates will be ready for the first sitter in the morning.

This is my experience in making a modern dry plate, and so ends the first part of my paper, namely, "its simplicity of preparation." We have to consider in the second place, "its extreme rapidity," but fearing I have trespassed already too far on your time and patience, I must for the present forbear. I shall at a future occasion take up this part of the subject, when I hope to give it more justice than would be possible under present circumstances. I know that I have been treading on the toes of commercial plate makers, but I do it in the interest of the photographic profession; indeed, I question the application of the word "photographer" to those who do not make their own plates—artist, if you will, but no more like our fathers in this respect "than I to Hercules."

PHOTOGRAPHY AS A HANDMAID TO THE SCIENCES, AND AS A RECREATION.

BY W. DOUGALL.*

The following short paper may not be without interest to the members of the Edinburgh Photographic Society, as it is a reminiscence of one who acted for some time as secretary to the Photographic Society of Scotland, the predecessor of our present society.

The late Dr. Joseph Dougall, F.R.C.P.E., was educated at the University of Edinburgh, and was a keen student of many subjects beyond the usual studies pertaining to his profession. Being a phonographer as well as a photographer, he took a great interest in the work of the old society, and made notes of its proceedings in shorthand, which were extended in the official minutes. He spent twenty years in the Indian Medical Service, and travelled a great deal over India, Burmah, and China, and received the medal and clasp for the Chinese War of 1860. In 1864-65, he first made photography do service in assisting the proper illustration of very important surgical operations. At this time he had under his care a case of *Elephantiasis Scroti* which he photographed carefully before operating on it, and after removing a tumour of 24lbs. weight, he again photographed the patient after he had sufficiently recovered. The fame of this operation soon brought six or seven more cases from different parts and great distances, all of which were successfully treated, and photographed in the same manner as the first, thus affording a permanent illustration of the cases both before and after cure. These photographs were sent home and presented to the late Dr. Warburton Begbie, of Edinburgh, who considered them of great importance.

At the Andaman Islands, in 1873-4, Dr. Dougall made a discovery of a very successful method of treating leprosy and other skin diseases. Some of his patients were in a most wretched condition, having fingers and toes eaten off by the disease, and here again he photographed them all at different stages of his treatment, these pictures giving incontrovertible proof of the exact changes which occurred. The great value of photography in such instances is that it gives a true and reliable representation of the cases, and affords no room for the exaggeration or romancing which might naturally occur were the sketches made only by the hand. Again, Dr. Dougall was enabled to take many fine views of the aborigines of the Andaman and Nicobar Islands, a diminutive and little-known race, very low in the social scale. He also obtained skeletons of these people, and presented the University of Edinburgh with two, and the Hunterian Museum of the Royal College of Surgeons, London, with ten, a contribution to anthropological science which was highly prized, and was acknowledged by a special vote of thanks of the college. These skeletons and photographs enabled Professor Flower, F.R.S., to publish a memoir on the osteology of the Andamanese, which was read before the Anthropological Society of London, and published with illustrations.

Dr. Dougall also made a valuable collection illustrative of the conchology of India, and photographed the shells and corals to a scale, which views were exhibited at the last exhibition of the Photographic Society in Edinburgh, and are now here for the members to examine. Passing from the purely professional advantages to be derived from photography as a handmaid to science, it may be remarked that Dr. Dougall, when at Vizagapatam, taught Nursing Rao, a wealthy and highly educated native gentleman, the photographic art, in which he very soon became a proficient operator. This gentleman has since become a member of the Royal Astronomical Society of England, and no doubt his photographic skill will be employed as a handmaid to astronomy, as he has a highly equipped observatory at his residence in India. While resident medical officer at the Court of Burmah, Dr. Dougall photographed the king's sons, one of whom is the present celebrated King Theebau, of bloodthirsty notoriety. In 1875 Dr. Dougall took a holiday to visit his friend General Sir Donald M. Stewart, now Commander-in-Chief in India, in the course of which he travelled 4,000 miles, and photographed some of the scenery of Northern India. When the Duke of Buckingham and Chandos, Governor of Madras, accompanied by the Ladies Grenville, paid a visit to the Andaman Islands as part of an extensive tour, they were collecting photographs of every place visited, and were at first disappointed at the prospect of having no views of these beautiful islands; but Dr. Dougall had a call from the Governor, and showed him his collection of views, from which he gladly selected a large number for himself and daughters. After His Excellency returned to Madras, his daughters sent a splendid large album to Dr. Dougall in remembrance of his kindness, and in appreciation of the views they received to complete the illustration of their interesting tour. Numbers of these views have been printed by the Woodbury Company from the original negatives, some of which will be shown to-night. These remarks, I think, have proved that in the experience of a single individual, a knowledge of the art of photography has greatly assisted in illustrating important medical and surgical cases, and has given an additional charm to the study of anthropology, conchology, and astronomy. They also show that a very great amount of pleasure can be enjoyed by a true artist in getting up a variety of fine pictures, and that this pleasure is enhanced by his being able to impart a share of it to others in presenting them with some of those things of beauty which are a joy for ever.

* Read before the Edinburgh Photographic Society.

Notes.

"The Photographic Studios of Europe" will be published to-morrow.

Major Waterhouse, B.S.C., the Assistant Surveyor-General of India, will shortly contribute a series of papers on photo-lithography.

A committee has been formed, with M. Davanne at its head, to collect subscriptions for a monument to Poitevin. We shall be happy to forward to the Treasurer, M. Léon Vidal, any sums that may be entrusted to us for the object in question.

To those who have not yet trusted themselves to prepare an emulsion, we commend the simple formula published to-day in No. 12 of our Elementary Lessons. It is possible to make an emulsion of higher sensitiveness than the one there indicated, but we cannot point out a more straightforward method of working to ensure success.

The *foyer* of the Prince of Wales' theatre, where "The Colonel" has been playing for the past two years, is about to be re-modelled and re-decorated. One of the chief features of the new salon will be a collection of pictorial photographs by Mr. H. P. Robinson, of Tunbridge Wells, selected from the series which received medals at the last two Pall Mall Exhibitions.

We learn that Mr. W. J. A. Grant, in the little yacht *Kara*, reached Promso, in Norway, on Tuesday afternoon, after a stormy passage. The *Hope*, with Sir Allen Young on board, which is to join the *Kara* in her search after Mr. Leigh Smith, left Gravesend yesterday. They will meet, probably, on the Nova Zembla Coast, which has been made familiar to Arctic voyagers and stay-at-homes through the medium of Mr. Grant's photographs.

A serious fire broke out at the studio of Mr. W. G. Wilson at Queen's Cross, Aberdeen, on Wednesday in last week. The Queen, who was in Scotland at the time, and has always shown a high appreciation of Mr. Wilson's delightful pictorial photographs, forwarded a telegram expressing a hope that none of his valuable negatives were injured; fortunately, the fire did not reach the storeroom where these are kept, and Her Majesty was duly informed of this fact.

Touching one of our "Notes" last week, a correspondent suggests the formation of a Pickwick Club among photographers; the members to exchange prints of such photographs as they may take in illustration of Dickens' works.

According to *Harper's Magazine*, two of our recent literary celebrities have never been photographed, viz., George Elliot, and Edwin Arnold, the editor of the *Daily Telegraph*. Certainly photographs of the author of "Adam Bede" were on sale shortly after her death, but whether they were true camera pictures we cannot say.

The portraits in *Men of Mark* will in future, we are told, be all taken by means of the electric light in Mr. Mayall's studio.

The well-known Italian photographer, Carlo Naja, of Venice, whose work is so largely purchased by travelling Britons, died on the 29th ult.

Professor Henry Draper, of New York, never lags behind in the matter of photo-astronomy; he has followed Dr. Huggins' footsteps, and successfully photographed the spectrum of the nebula of Orion.

We should have mentioned last week, by the way, that Dr. Huggins successfully obtained a photograph of the spectrum of the comet (Wells) on May 31. He found a strong continuous spectrum, but could secure no Fraunhofer lines, owing to the great relative brightness of the continuous spectrum from the comet's own light. There were no cyanogen bands visible in the ultra-violet, he tells us, but at least five groups of bright lines between F and H, both in the light of the nucleus and of the coma on the side next the sun.

Two yards of Turkey-red calico folded in three serve to immediately transform a lavatory, such as we find on most of the North Western main line trains, into a dark room. A small apartment with a well-fitting door, hanging baskets suitable for bottles, a wash basin set in the middle of a bordered pewter table, a good water supply, and several clean towels, is attached to each first-class compartment having six places.

It is generally supposed that the most exalted state of sensitiveness in gelatine emulsion is more quickly reached when the latter contains but a small proportion of gelatine at the time of boiling; but Dr. Eder has just found out that he can produce the most highly sensitive emulsion by boiling for ten minutes with the full dose of gelatine added.

Another recent observation of Eder's, according to the *Mittheilungen*, is that if a gelatine plate, after exposure, is dipped into a dilute solution of nitrate of silver, and then dried before development, a very considerable increase in the sensitiveness of the plate will be remarked. In this case the nitrate of silver obviously performs, as an accelerator, a different rôle than when present at the time of exposure.

Has any photographer tested the light of a glow-worm upon a sensitive plate? We captured two shining little creatures last week, but, unfortunately, were a hundred miles from home, and their brightness waned two days afterwards, when we desired to make the experiment. We have little doubt a quarter of an hour's sojourn upon a gelatine plate would have produced an effect, and we would ask any of our readers who may have the opportunity to carry out the interesting experiment. The glow-worm should be permitted to make its mark from the reverse side of the plate, first of all, so that the action of its phosphorescence may be placed beyond doubt.

Those who wish to develop without staining the fingers should look back to page 301, where a drawing of Mr. W. J. Williams' trigger is given. Mr. Dunmore speaks well of a similar arrangement which he recently exhibited at the Photographic Club.

Although not quite equal to M. Nadar's picture of the roofs of Paris, Mr. Cecil V. Shadbolt's view taken near Stamford Hill is undoubtedly the best specimen of balloon photography which has been done in this country. It is a cabinet picture, taken with a rapid symmetrical, full aperture, and the portion which is fairly sharp evidently corresponds with the rotation axis of the balloon.

How much there is still to improve in photo-engraving may be seen from a glance at "Academy Notes" of this year. Had the blocks been executed by the Klic process, no doubt more satisfactory reprints would have been forthcoming than are produced by the photo-etching method which is chosen, and which we have several times described in these columns. A pen sketch with Indian ink executed upon smooth white cardboard will give the best results, we may mention, by the photo-etching process.

To get a painting photographed prior to its being sent to the Academy is now an established custom, and many photographers have a busy time of it the week before sending-in day. With apparatus carefully packed in a four-wheeler, the photographer goes the round of the studios, and does his work as expeditiously as he can. The painting is fixed up in the back garden where there is plenty of light, and within a quarter of an hour—for both to painter and photographer time is precious—three or four plates have been exposed, and the photographer and his camera have disappeared once more.

The photographing of paintings is, indeed, a flourishing business now-a-days. No painter paints an important picture who does not desire to keep a copy of it, and, as a rule, orders come not only for silver prints, but for impressions of large dimensions printed in pigments. Some painters, in fact, are following the example of their French brethren, and publishing photographic copies of their pictures.

Dr. Vogel confirms our recent remark that the dryness of a gelatine plate materially influences the time of its development. "The other day," says the doctor, "I prepared some emulsion with hard gelatine, and this was declared on trial to be very insensitive. But on closer investigation, it turned out to be simply a matter of slow development, for my film, when fully developed, was found to possess quite as much detail as one of the quickest commercial plates. Only, the hard film required an immersion in the developer for six minutes, and the other but three minutes.

Slow development, when it is not too slow, is frequently an advantage, particularly in landscape work. The judicious employment of hard gelatine in emulsion making is, therefore, to be commended.

When the Astronomer-Royal makes his yearly report, the question again and again suggests itself whether Greenwich is, after all, the best place in the world for heavenly observations. Especially does this misgiving arise in one's mind when the Astronomer-Royal speaks of the photographic work and records of bright sunshine made in the midst of the thick vapour and murky clouds that come over from the Isle of Dogs opposite. Indeed, to anyone acquainted with the normal atmosphere of Greenwich Hill, and who has seen the lurid sun time after time stifled in yellow mist long before it reaches the horizon, the taking of solar photographs seems little less than ridiculous; while to tell us how many hours of bright sunshine the factories and docks in the neighbourhood have been blessed with may be of interest to those residing within the borough, but has, obviously, little scientific value. That there have been 1,301 hours more sunshine this year than last, may mean simply that the Smoke Abatement Act has been more rigidly observed in the S.E. district; and if, as the Astronomer-Royal tells us, the photographs of the sun were taken on 200 days, the fact merely proves that the borough was extremely fortunate in its freedom from fog and smoke this year. That the record of sunshine would have been greater, and the solar photographs clearer and more defined, had the observations been made in a purer atmosphere at a distance from town, no one will gainsay. There is no need for us to abolish Greenwich as a geographical station, but to constitute it a photographic observatory is worse than absurd, since the results are without that accuracy which alone constitutes their value.

TWELVE ELEMENTARY LESSONS IN DRY-PLATE PHOTOGRAPHY.

No. XII.—Making Gelatine Emulsion.

We gave it as our opinion, when commencing these lessons, that the amateur will generally find it best to purchase plates from the manufacturer. He will probably find it both cheaper and more satisfactory to do so than to manufacture them himself, unless he has at his disposal considerable time, and unless he has great patience and a happy temperament, which will enable him to bear frequent disappointment, when, after going through the tedious process of making an emulsion and coating the plates, he finds that the latter are, from some unknown cause, useless.

Nevertheless, we believe that the photographer who makes himself acquainted with the process of the manufacture of dry plates, and knows how to make an emulsion, will have a more thorough mastery of the working of them than those who have never made their own plates. There are some few who, for the love of the work, prefer to make their own emulsion. These are the real enthusiasts to whom we look to further our knowledge of photography, and with such the manufacture of plates pays, if it be only in the satisfaction they have in relying on themselves alone.

The subject of gelatine emulsions and plates is one on which volumes might, and in fact have been, written, and here of course we can but give the briefest instructions. If the photographer succeed with these, he may with advantage take up the study of the advanced works which have been written on the subject.

We do not propose to give the formula which has given the highest sensitiveness in our hands, but shall give one which has given us plates of fair rapidity, and of the very highest quality.

The principal piece of apparatus necessary for making any number of plates is a drying cupboard or box. This is a box arranged so that the plates may be placed in it in such a position that a current of air passes rapidly over the surface of all of them. There are various designs of boxes, some of which are so arranged that the current of air is heated. This is not desirable if a fairly dry place can be had for the drying-box. The motion of the air is usually ensured by burning a gas jet at the lower end of a small chimney or flue. The defect in almost all drying-boxes that we know, is that the air-passages are too small.

The other apparatus necessary is as follows:—

A large slab of plate glass, marble, or smoothed slate, levelled accurately, so that the plates can be laid on it to set. The larger the slab the better, as more plates can be placed on it at once.

A piece of coarse canvas or "scrim," such as ladies do worsted work on—say two feet square.

Several glass beakers or jam pots for mixing and boiling solutions in. The latter are preferable, as glass is very likely to be broken in the dark-room.

An ordinary hair sieve.

A vessel of such a size and shape that the sieve may stand in it, and that when it—the vessel—is full of water, the upper edge of the sieve will stand (say) half an inch above the surface of the water.

A large glass filtering funnel.

Several hock bottles. These, from their deep red colour, are useful for performing the various manipulations in.

An ordinary saucepan.

A Bunsen ring burner, on which this may stand to boil.

Let the following solutions be prepared, and each mixed in one of the jam pots.

A

Nitrate of silver	100 grains
Distilled water	2 ounces

B

Bromide of potassium	85 grains
Nelson's No. 2 gelatine	20 ,,
Distilled water	$1\frac{1}{2}$ ounces
A one per cent. mixture of hydrochloric acid and water ...	50 minims

C

Iodide of potassium	8 grains
Distilled water	$\frac{1}{2}$ ounce

D

Hard gelatine, such as that sold by the Autotype Company for dry plates	120 grains
Water	several ounces

Let B and D stand till the gelatine is thoroughly soaked as indicated by its being quite soft. Let all the water be poured off D, and let as much water as possible be squeezed out of the gelatine.

The pots containing A and B must now be placed in hot water till the solutions are at about 120° Fahr., when B is poured into one of the hock bottles.

From this time all operations must be performed in the most feeble ruby light possible.

A little of B is now added to the solution already in the bottle and the whole shaken. Small additions of B are made so that it is poured in five or six stages into A, the whole being shaken at each addition, and a very thorough agitation being given at the end.

C is added, and the solutions, now forming an emulsion, are again shaken.

The whole is poured into one of the jam pots. This is placed in the saucepan, the lid is placed on the latter, and the water brought as rapidly as possible to the boil. A loose cover of some sort should be placed over the jam pot during this part of the process to prevent condensed water from dropping off the lid of the saucepan into the emulsion. The emulsion is allowed to remain for half-an-hour in the boiling water. If, at the beginning of the process, a drop of the emulsion be placed on a piece of glass and a gas flame looked at through it, the flame will appear very red. The emulsion is said to be red by transmitted light. At the end of the boiling it will be a more or less near approach to blue in colour.

At the end of the half hour the gelatine D is placed among the emulsion, and the whole stirred to mix it. The can is then put in a cool and dark place to allow the emulsion to set. It will do so in from one to two hours on a moderately cool day, but it may be left for days if it be desired. This is the best period at which to break the process, which is somewhat lengthy to be performed at one time.

When the emulsion is set quite stiff the jam pot is dipped for a few moments in hot water. If it be inverted the emulsion will now fall out of the vessel in the same manner that a jelly for the table drops from its shape or mould. The sieve must meantime have been placed in its appropriate vessel full of water. The lump of emulsion is placed in the canvas, the whole is placed under water in the sieve, and the canvas twisted up so as to cause the emulsion to pass through it in fine shreds into the water. It must now be washed for half an hour, either by allowing water to run into the sieve, or by frequently changing the water in the vessel.

The object of this washing is to get rid of the soluble nitrates and bromide, whilst the insoluble bromide and iodide of silver—the sensitive salts—remain in the emulsion.

At the end of half an hour the sieve may be removed from the washing vessel, and placed in any convenient position with one side somewhat tipped up, so that all superfluous water may drain off. The draining should go on for at least half an hour. At the end of that time the emulsion is finished, and only requires to be filtered. We have found nothing better for this than several folds of cotton such as pocket handkerchiefs are made of.

Three-quarters of an ounce of methylated spirits or alcohol is now added, and the emulsion is ready to be used for coating the plates. The quantity will be about six or seven ounces. It may be kept in one of the hock bottles, wrapped in brown paper. A small earthenware teapot is the best thing to pour the emulsion on to the plates from. It should be very small; such an one as holds a few ounces, and is used by children at a "doll's tea party," will do. The smallness of this allows a constant check to be put on the quantity of emulsion given to the plates by counting how many are coated by each fill of the teapot.

The glass plates must be thoroughly cleaned before being coated. This may be done by dipping the plates in a 5 per cent. mixture of nitric acid and water, then rubbing them under the tap with a wet cloth, and afterwards drying with a dry cloth. If they have been coated with emulsion before, they should be left at least twenty-four hours in the dilute nitric acid, and then rinsed with hot water.

Let us suppose the plates ready to coat. The dark-room lamp is placed within a few inches of the right-hand end of the levelling-shelf, and at the back of it. To the left of the lamp is the pile of plates; to the right a glass measure or jam pot, or other convenient vessel, in which to stand a glass rod to be ready to hand. The glass rod should be about two inches longer than the breadth of the plates to be coated. Immediately in front of the lamp is placed the teapot full of melted emulsion. A plate is taken from the pile. It is placed as far forward on the levelling-shelf as possible, and in front of the lamp.

A pool of emulsion, about half covering the plate, is poured from the teapot. The glass rod is taken between the fingers and thumb of each hand, and dipped into the pool of emulsion right across the plate. The emulsion will run between the rod and the plate to each edge of the latter. By a motion of the finger and thumb of each hand the rod is lifted the smallest possible distance from the plate, and is rapidly moved first to one end, then to the other, the tips of the finger and thumb resting on the level table as a guide. This, if properly done, will cover the whole plate with emulsion; and if the plate be small—under whole-plate size—it is sufficient to slide it to the far end of the table to set. If the plate be large, the coating will not be evenly spread unless it is lifted, balanced on the tips of the fingers of the left hand, and gently rocked for a few seconds. By this method plates may, after a little practice, be coated with great rapidity. There is no need to wipe the rod each time it is used.

Each ounce of emulsion must not be made to cover more than six or seven quarter-plates or three half-plates.

The plates will "set" in a few minutes—that is to say, the emulsion will stiffen like a jelly—and will not run off the glass, whatever position it is placed in. They are now transferred to the drying-box. They will take from six to forty-eight hours to dry, according to circumstances. When dry, they are ready for use.

If a very rapid emulsion be desired, the boiling may be continued for from one to two hours, the emulsion, after washing, be rendered neutral or slightly alkaline by the addition of about twenty drops of the ten per cent. mixture of ammonia and water, and be kept for a couple of days before coating the plates. We would strongly advise, however, that the beginner confine himself to a slow emulsion.

PROCESS OF PHOTO-ENGRAVING ON ZINC OR ON COPPER BY MEANS OF BICHROMATED ALBUMEN.

BY LEON VIDAL.

This process is similar in many respects to the one which was some time ago communicated to the Photographic Society of France by M. Stroubinsky, of St. Petersburg, but in a much improved and complete form. An account of it was given by M. Gobert, at the meeting of the same Society, on the 2nd December, 1882. The following are the details, as demonstrated by me at the meeting of the 9th May last:—

Sheets of zinc or of copper of a convenient size are carefully planished and polished with powdered pumice stone. The sensitive mixture is composed of—

The whites of four fresh eggs beaten to a froth	100	parts
Pure bichromate of ammonia ...	2·50	,,
Water	50	,,

After this mixture has been carefully filtered through a paper filter, a few drops of ammonia are added. It will keep good for some time if well corked and preserved from exposure to the light. Even two months after being prepared I have found it to be still good; but too large a quantity should not be prepared at a time, as it does not improve with keeping.

I find that the dry albumen of commerce will answer as well as the fresh. In that case I employ the following formula:—

Dry albumen from eggs ...	15 to 20	parts
Water	100	,,
Ammonia bichromate ...	2·50	,,

Always add some drops of ammonia, and keep this mixture in a well-corked bottle and in a dark place.

To coat the metal plate, place it on a turning table, to which it is made fast at the centre by a pneumatic holder; to assure the perfect adhesion of this holder, it is as well to wet the circular elastic ring of the holder before applying it to the metallic surface. When this is done, the table may be made to rotate quickly without fear of detaching the plate by the rapidity of the movement. The plate is placed in a perfectly horizontal position, where no dust can settle on it; the mixture is then poured on it, and distributed by means of a triangular piece of soft paper, so as to cover equally all the parts of the plate. Care should be taken not to flow too much liquid over the plate, and when the latter is everywhere coated, the excess is poured off into a different vessel from that which contains the filtered mixture, or else into a filter resting on that vessel. The turning table should now be inverted so that the sensitive surface may be downwards, and it is made to rotate at first slowly, afterwards more rapidly, so as to make the film, which should be very thin, quite smooth and even. The whole operation should be carried out in a subdued light, as too strong a light would render insoluble the film of bichromated albumen.

When the film is equalised the plate must be detached from the turning table and placed on a cast iron or tin plate heated to not more than 40° or 50° C. A gentle heat is quite sufficient to dry the albumen quickly; a greater heat would spoil it, as it would produce coagulation. So soon as the film is dry, which will be seen by the iridescent aspect it assumes, the plate is allowed to cool to the ordinary temperature, and is then at once exposed either beneath a positive, or beneath an original drawing the lines of which have been drawn in opaque ink, so as to completely prevent the luminous rays from passing through them; the light should only penetrate through the white or transparent ground of the drawing.

I say a *positive* because I wish to obtain an engraved plate; if I wanted to have a plate for typographic printing, I should have to take a *negative*. After exposure the plate must be at once developed, which is effected by dissolving in water those parts of the bichromated gelatine which have been protected from the action of light by the dark spaces of the cliché; these parts remain soluble, while the others have been rendered completely insoluble. If the plate were dipped in clear water it would be difficult to observe the picture coming out, especially on copper. To overcome this difficulty the water must be tinged with some aniline colour; aniline red or violet, which are soluble in water, answers the purpose very well. Enough of the dye must be dissolved in the water to give it a tolerably deep colour. So soon as the plate is plunged into this liquid the albumen not acted on by light is dissolved, while the insoluble parts are coloured by absorbing the dye, so that the metal is exposed in the lines against a red or violet ground, according to the colour of the dye used.

When the drawing comes out quite perfect, and a complete copy of the original, the plate with the image on it is allowed to dry either of its own accord, or by submitting it to a gentle heat. So soon as it is dry it is etched, and this is done by means of a solution of perchloride of iron in alcohol. Both alcohol and iron perchloride will coagulate albumen; their action, therefore, on the image will not be injurious, since they will harden the remaining albumen still further. But to get the full benefit of this, the alcohol and the iron perchloride must both be free from water; it is therefore advisable to use the salt in crystals which have been thoroughly dried, and the alcohol of a strength of 95°.

The following is the formula:—

Perchloride of iron, well dried ...	50 gr.
Alcohol at 95°	100 ,,

This solution must be carefully filtered so as to get rid of any deposit which may form, and must be preserved in a well-corked bottle, when it will keep for a long time. The plate is first coated with a varnish of bitumen of Judea on the edges (if those parts are not already covered with albumen) and on the back, so that the etching liquid can only act on the lines to be engraved. It is then placed, with the side to be engraved downwards, in a porcelain basin, into which a sufficient quantity of the solution of perchloride of iron is poured, and the liquid is kept stirred so as to renew the portion which touches the plate; but care must be taken not to touch with the brush the parts where there is albumen remaining. The length of time that the etching must be continued depends on the depth required to be given to the engraving; generally a quarter of an hour will be found to be sufficient. Should it be thought desirable to extend the action over half-an-hour, the lines will be found to have been very deeply engraved. When the etching is considered to have been pushed far enough, the plate must be withdrawn from the solution, and washed in plenty of water; it must then be forcibly rubbed with a cloth so as to remove all the albumen, and after it has been polished with a little pumice, the engraving is complete.

It will be seen that this process may be used with advantage instead of that of photo-engraving with bitumen, in cases where it is not advisable to use acids. One of my friends, M. Fisch, suggests the plan—which seems to deserve a careful investigation—of combining this process with that where bitumen is employed; it would be done somewhat in the following way. The plate of metal would be first coated evenly with bitumen of Judea on the turning table, and when the bitumen is quite dry, it should be again coated with albumen in the manner as described above. In full sun-light the exposure need not exceed a minute in length; then the plate would be laid in coloured water, dried, and immersed in spirit of turpentine. The latter will dissolve the bitumen in all the parts where it has been exposed by the removal of the albumen not rendered insoluble by the action of light. But it remains to be seen whether the albumen will not be undermined in this method; therefore, before recommending the process, it ought to be thoroughly studied. The metal is now exposed in all the parts that have to be etched, while all the other parts are protected by a layer of bitumen coated with coagulated albumen. Hence we may employ as mordant water acidulated with 3, 4, or 5 per cent. of nitric acid, according as it is required to have the plate etched with greater or less vigour.

By following the directions above given, any one wishing to adopt the process cannot fail of obtaining good results. One of its greatest advantages is that it is within the reach of every one engaged in printing operations.

THE RIVES PAPER MANUFACTORY.

Five hundred and sixteen kilometres southeast from Paris, between the great silken city of Lyons and the old walled town of Grenoblo, in the department of Iseie, is located a little market town of about 2,300 inhabitants, which is of more importance to the art of photography than perhaps any other one place in Europe. I allude to the town of Rives, where is located the manufactory of the plain paper so well known to every photographer in the world, I might safely say, and bearing the name of the place I have named.

As one nears Rives by rail the peaks of tho Colline de Parmenie loom up in the distance, and presently we run along the crest of a hill which, with the mountain, forms a deep cut or ravine, in which is located the object of our visit—the manufactory of Rives paper. It is a beautiful spot, and although seemingly at our feet as we approach the station, we must drive nearly two miles to reach it. So, landing at the station, a quaint, rattletrap of a carriage is offered us by tho sturdy driver, the circumference of whose hat is equivalent to that of his stomach and appendages; and we take it for the drive. We pass through the main street of the village, and wish at every turn for our '76 camera, so plenteously did the picturesque bits present themselves.

Arriving at the office of the manufacturers, the presentation of our card at once secured us the best of attention and every courtesy the heart could desire. After our special business had been transacted, we wero shown about the premises, and the entire process of manufacture explained to us by M. Klebe, a member of the wealthy firm who conduct the immense business hore. It seems that these gentlemen also manufacture writing and blank-book paper very extensively, but for this they have an entirely separate establishment, perhaps a quarter of a mile away from the other. We were shown through this, but no description of it need be given here, so we will proceed at once to the mills, which interest us the most. As wo walked along, the great sluices which conveyed the water to the mills were seen for at least half a mile. These were all covered in, to prevent contamination by thoughtless or mischievous hands. The water is brought from a mountain lake called La Fure du lac Solodin by means of the Riviere du Beaumont, and is received at the mills in ponds or tanks. These latter are first given a hard, artificial bottom of washed gravel, which in turn is covered by layers of pebbles, which are most carefully washed before they are allowed to be placed in the tank, and before the water enters the tanks it is carefully filtered, so that it is very clear and clean, and the pebbled bottoms of the tanks may be clearly seen. But this is not the only means taken to secure the purest possible water for the manufacture of the paper. As it enters the mills it is received into separating pipes, which pour their crystal contents forth into troughs lined with thick woollen or flannel cloth, thus securing a second and most careful filtration. After this the water runs into small stone tanks lined with cement, from which it is drawn as needed for the manufacture of pulp. Now we pass on and behold the various processes followed for the manufacture of the paper, which in nearly all their details are similar to those adopted in the manufacture of the best writing paper.

Great tiers of bins were shown where tons of clean rags were stored for future use. Then came the grinding mills, the bleaching process, the washing of the pulp in circular tanks, where it was kept in motion by a system of spiral wheels of great diameter, provided with automatic blankets similar to those of an Egyptian irrigating machine. Around and around these travelled, catching up the pulp and emptying it out again in a different place, never tiring or stopping until the desired end was accomplished. Thus, too, the "size" was intermixed with the pulp, and finally it entered the tank at the end of the giant machine with its hot cylinders and jiggling cranks and sieves, which were to assist in forming the hard sheets of proper thickness, as ordinary paper is produced. The paper comes from the machine in what are called "endless rolls," and is received upon a cylinder provided for the purpose. Just before it is thus received other cylinders drop automatically down upon it for a moment. At proper distances apart, upon these, the brand of the factory is engraved, and by gentle pressure, as the roll revolves, imprints the trade-mark upon what will, when cut to size, be the margin of each sheet. After the receiving rolls are full they present to the cutting machine, where the paper is rolled off, cut to size, sent to the inspecting-room, and after inspection to be calendered. In the inspecting-room are long counters or tables, with many windows opposite. At each window sits a woman with a pile of sheets before her, and she is required to carefully inspect each one, throwing out any that are perforated or spotted. Her eyes must be those of an eagle, for her work is done rapidly. She seems to cover the whole surface of a sheet at one time, and must use a wide-angle Morrison lens in her eye and expose the sheets by means of the J. C. B. plates, aud certainly her "drop" of each sheet is "instantaneous."

After the sheets are inspected they are carried to the calendering machine. This is the most magnificent machine of the kind I have ever seen. The rolls are about 9 inches in diameter, and, I should think, about 48 inches long—long enough for two sheets of paper to pass side by side at one time. There are three double tiers of these rolls. Each tier is attended by two women, who feed and receive the sheets. Three times each sheet must submit to the very affectionate squeezo of these calenders before it is considered sufficiently glossy and hard for the rough treatment to which it must be subjected by the photographer. If it bears all this well, it is allowed the honor of a place in some honestly counted ream, and wrapped up with its 479 confrères and sent with sealed orders to one part of the world or another. America is certainly the largest market for this kind of paper, 3,600 reams going to New York during the past year—in a little less than a year, I was informed.

From the rag to the finished sheet there are nine operations, and ten days aro required to produce a sheet of paper. About 500 people are employed at Rives, and the large proportion are women. They all wear the huge wooden shoes so much used in France aud Belgium, aud the clatter of them upon the stone floor and pavements is something noisy. I saw a pair of these shoes hung up to-day, which were almost large enough for one of the receiving water tanks. All through the several departments the most conscientious care was apparent, lest something should occur to cause impurity or failure. Ten years ago we all remember that Rives paper was not only pestiferous on account of tiny metallic specks all through it, but it was so tender that one could scarcely bring it through the necessary manipulations without tearing it. All such annoyances have disappeared, and to-day papier Rives is the leading paper of the world, because it is the very best, and because the skilful manufacturers have persisted until they have produced a perfect article. My visit was very interesting to me, and well repaid me for the thirty hours it cost. A drive with Mons. Klebe ended the happiness of the visit, and then a whirl down to Brindisi, Italy, whence I took the steamer for the Orient.—Edward L. Wilson in the *Photographic Times.*

MICROSCOPIC PHOTOGRAPHY APPLIED TO CHEMISTRY.*

Although the microscope renders the greatest services to the natural sciences, the use of the instrument proves of no less value in the physical sciences, especially that of chemistry. The microscopic examination of certain substances permits in a manner of making an analysis of them with a rapidity and certainty that would not be afforded by methods based upon the use of reagents, especially as regards organic matters. If, for example, the chemist has to satisfy himself of the purity of a specimen of commercial starch, he throws a small pinch of the substance that he desires to examine into a little distilled water,

* From *La Nature.*

stirs it with a glass rod, and then transfers, on the point of the latter, a drop of the solution to a glass slide, which he submits to a microscopic examination. He can thus obtain a general view of the starch grains, which all have a characteristic ovoid form. If the adulterator has mixed with the substance a certain amount of powdered gypsum, for instance, the latter will betray its presence at once under the form of angular grains having a crystalline aspect.

Coffee, chocolate, milk, pepper, &c., thus examined under the microscope, are immediately analysed by an observer accustomed to study in this manner the different kinds of these substances, as well as the products which are most commonly used for adulterating them. It is the microscope that permits of detecting trichinæ in pork, and it is this instrument also that frequently serves for determining the nature of a salt that is observed to crystallize in a drop of water placed on a slide under the objective.

A microscopic inspection made directly as we have just indicated, however, presents the inconvenience that it leaves no durable trace of the observations. The importance of a photograph of the enlarged image of an object submitted to examination will be therefore at once understood. If a chemist has observed trichinæ in pork meat, he will thus not only be able to assert that the observation was made by the microscope, but it will be possible for him to show photographic proofs of the negative that he has obtained directly; and thus, by fixing them permanently, to multiply the material proofs of his analysis.

We recently visited the Municipal Laboratory of Chemistry, where, thanks to the politeness of Mr. Charles Girard, the director, and of Mr. Pabst, we had occasion to see in operation several micro-photographic apparatus, which are, we believe, the completest of the kind known in the way of this sort of arrangement. The system is a new one, and may be employed for microscopic studies of all kinds; so it seems to us that it will prove of interest to make it known.

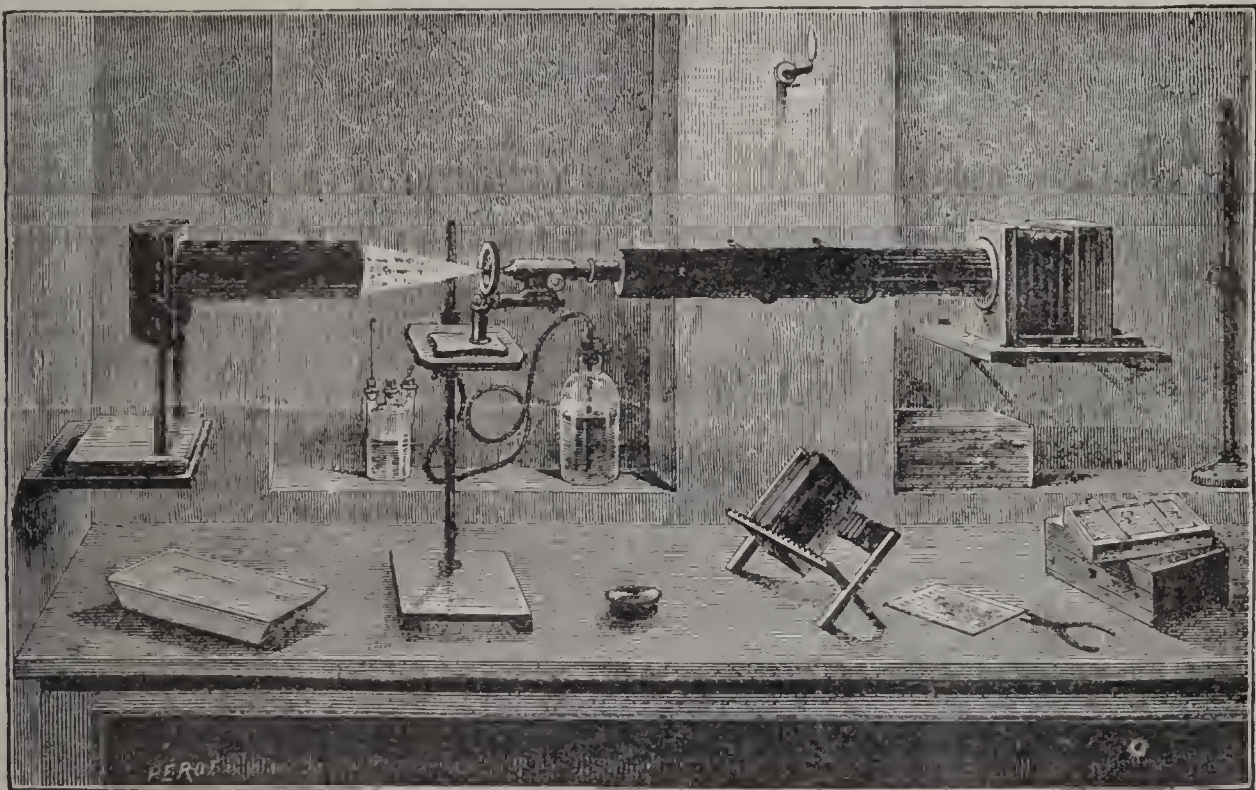
The simplest system of micro-photography consists in applying a small dark chamber directly to the eye-piece of a microscope standing vertically as during direct observation, the illumination being obtained by means of a ray of light, from an oxyhydrogen or an electric light, projected on the mirror.

The virtual image is first transformed into a real image by displacing the eye-piece. In the microscope, the image furnished by the objective forms in the interior of the eye-piece, in front of the lens, between it and its focus. If the eye-piece be drawn out so that the image formed by the objective is between the focus of the ocular lens and its centre of curvature, the image then forms on the other side of the lens and becomes real, and it may be received on a piece of ground glass. The dark chamber is then adjusted and the focussing properly done.

Another method, due to Mr. Vogel, of Berlin, consists in seeking the virtual image situated in the microscope by means of a dark chamber and an objective of short focus. We know that the image forms virtually in front of the eye-piece, at about 0·12 m. or 0·18 m., according to the magnification of the ocular lens. The photographic objective is almost in contact with the eye-piece of the microscope.

These two methods are applicable to any ordinary microscope, placed in any room whatever—work-room or laboratory.

The third system which we are about to describe, and which is represented in the annexed figure, necessitates a special organization in a dark chamber made for its operation. It permits of taking the photograph of an object in several planes, and is especially applicable for obtaining photographs of histological sections, trichinæ crystals, &c.



MICRO-PHOTOGRAPHIC APPARATUS AT THE MUNICIPAL LABORATORY OF CHEMISTRY, PARIS.

The microscope, which is placed horizontally, is represented in the centre of the engraving. To the right is the photographic dark chamber, whose objective is connected with that of the microscope by a long tube. To the left is affixed to a shelf the oxyhydrogen or electric light. The oxyhydrogen light will answer for obtaining negatives with magnifications of 300 diameters; but, beyond this, up to 800 diameters, the electric light is employed.

The apparatus under consideration is based on the principle that the pencils of light, with a great distance of conjugate focus, become almost parallel, and that the points situated in the planes contiguous to the focal plane are reproduced by points scarcely larger than those of the focal plane. The apparatus is installed in a dark room which is provided with all the accessories necessary for photographic operations, such as tanks, water-faucets for washing, &c.; and the operators who make use of it obtain excellent results by the new gelatino-bromide of silver processes.

In the Laboratory of Chemistry we have looked over a remarkable photograph album, in which were to be seen very good proofs of micro-photographs of chocolate, coffee, pepper, milk trichinæ, &c., for the analysis of which it is of interest to employ the microscope. It would be interesting to publish such photographs so that they might serve as types for the very numerous amateurs who, owning a microscope, would like to ascertain the purity of the food products that they are using. They would thus have before their eyes the exact *portrait* of the different substances free from any adulteration, and would be in a position to assure themselves (by means of easily made comparison) of the quality of the food products consumed in their house.

SCIENTIFIC RESULTS OF THE ECLIPSE.

Before the Eclipse Expedition left England, Dr. Siemens had proposed a theory of the solar atmosphere which postulated exactly such conditions as appeared to be revealed in years of least solar activity. The coincidence between hypothesis and fact was, to say the least, extremely curious, and there is no doubt that the fact that when the sun is most active the correspondence seems to vanish will have to be carefully considered. But we have learnt more touching the outer atmosphere than its changes. There has been a chemical touch added. When in 1869 its chemical nature was first investigated by means of the spectroscope, it seemed to be built up almost entirely of a substance of which we knew nothing here—a substance revealed by a line in the green part of the spectrum, at 1474 of the scale employed by Kirchhoff for his maps, which were then generally in use. In 1870 hydrogen was added to this unknown substance, if we are to interpret spectroscopic phenomena in the usual manner; and now again, with the same proviso, calcium has been added—that is to say, some lines seen in the spectrum of calcium have now been detected in the spectrum of the sun's outer atmosphere. It is now some years since the strange behaviour of calcium, when observed in the spectroscope, was noticed, and it was the first substance used to point the moral that the spectra of terrestrial substances are sometimes strangely transformed when their lines are examined among those visible in the ordinary spectrum of the sun. Thus the widest lines of all in that spectrum—the lines lettered H and K for purposes of reference—are seen in the spectrum of calcium when high temperatures are employed, though they are absent at low temperatures, when, however, a line in the blue, which is but feebly represented among the solar lines, is thick and brilliant. The observations of the eclipse in Siam in 1875 strongly suggested that the so-called calcium was really an important constituent of the lower layers, while it is now known that it plays an important part in every spot and prominence; indeed, in the spectra of sun-spots photographed by Mr. Lockyer, at South Kensington, the H and K lines behave differently from all the other lines photographed. But the point of this year's work is that this calcium has been carried very high into the solar atmosphere, where it exists in such tremendous quantity that the eclipse colouring in all its weirdness can be traced to it; and the proof that this violet light is lighting up our atmosphere more powerfully than any other is found in the fact that, in one of the photographs taken on Abney's plates, the air between us and the dark moon is shown to be of this colour. This is photographic proof certain and sure, and will remind those learned in these matters of an observation made by Captain Maclear during the eclipse of 1870. It will be seen, then, that this year's work has left its mark, both on the physics and chemistry of the outer atmosphere. We must now descend a little into the lower regions of the solar incandescent air.

Here we approach a very interesting part of the subject, but one on which it is difficult to say anything without going somewhat into detail. Up till a few years ago the idea that our terrestrial elements, such as iron, hydrogen, and the like, were anything but elements, never entered the heads of astronomers as they were daily recording solar phenomena. It was obvious that the sun was very hot—so hot that it may be said that the vapour of iron plays the same part there as the vapour of water plays here; but the possible result of the high temperature remained practically unconsidered, and our notions of the structure of the solar atmosphere were influenced by terrestrial chemistry. Hence, when it was found that the upper atmosphere consisted mainly of hydrogen, all the lines of the solar spectrum except those due to hydrogen were supposed to owe their origin to absorption of the solar light at very low levels, and close to the sun there was supposed to be a thin stratum, the work of which was so efficient in this direction that it was called the "reversing layer." But after a time, as facts were accumulated, the question whether our elements really could and did stand the temperature of the sun without breaking up into something more elementary still was fairly asked; and, as in other cases, the question had to be discussed in a scientific manner—that is, cases had to be taken in which the question could be put to the facts in such a way that, if the observations were of one kind, one view would be strengthened; if of another kind, then the other explanation would be more likely the correct one. It was pointed out some time ago that there are two very definite kinds of observations which can be made during eclipses, by which much information might be gained bearing directly upon this question of dissociation—that is to say, the question whether our "elements," as we know them, are or are not capable of existing at solar temperatures. These observations had to do, one with the "reversing layer," the other with the outer atmosphere. The challenge was of the most direct kind touching the reversing layer. It went so far as to say that the former observations had been erroneously interpreted. This, however, must not be held to cast doubt upon former observers. The contention was that the former work, dating from 1870, had been of too general a nature, and that when a small part of the field of observation was studied with minute accuracy it would be found that the general statement would be untenable, that general statement favouring the view that the elements are still truly elementary at solar temperatures. It will be seen that the issue raised then could not be complained of as lacking crispness and definiteness. What then are the facts? The facts have been exactly as they were predicted on the rival hypothesis—the hypothesis, namely, that the elements are not elementary; and in future we are not likely to hear much more of the "reversing layer." The solar spectrum, indeed, appears now to be the result of the absorptive work of an innumerable number of strata, one over the other, from top to bottom of the solar atmosphere. If we could see the work of any one of these layers by itself, it would be impossible for us, with our mere terrestrial laboratory experience, to recognise it; whereas, we do recognise the sum total, because we get, and can only get as a rule, a sum total in our laboratory experiments. Should this result be generally accepted as one of the results of this year's work a great step will have been gained. Whether accepted or not, it is quite clear that such observations as those to which attention has been directed will demand much attention when next the sun is eclipsed. Nor is this all. It is not too much to hope now that M. Thollon has so admirably succeeded in furnishing astronomers with a spectroscope which combines the maximum of dispersion and light that observations suggested by the new view may be made on the uneclipsed sun, and bring their tribute of precious facts every day the sun shines. Such work, indeed, was actually started at Sohag, and the test then afforded gave out no uncertain sound; but on this point it is not necessary to enlarge upon the present occasion, as both MM. Thollon and Trépied are pledged to use the beautiful climates of Nice and Algiers in carrying on this new survey at the earliest possible moment, and the world of science will doubtless soon hear something of the result of this new attack.

There is little doubt that, on the occasion of future eclipses, attention will be much more concentrated on the spectrum of the corona, and more specially-constructed instruments will be brought to bear on it than has been the case hitherto. We may already take for granted that the blue lines photographically recorded—in addition to H and K in the violet—will have their position determined with the greatest accuracy, and their coincidence or not with marked Fraunhofer lines will have an importance bearing upon the questions to which attention has been directed in the present letter. The work, too, has shown that the new plates are so sensitive, that it will be quite easy at the next eclipse, by means of a circular rotating plate, or some such contrivance, to record all spectroscopic phenomena, however evanescent they may be at the moment of disappearance or reappearance of the sun. Such a method will not only give us a complete history of what goes on, but will furnish us with a scale of exact reference. So science advances. Each effort, and especially the one most wisely planned, instead of exhausting the supply of new phenomena, brings still newer efforts and richer harvests in its train.—*Daily News.*

Correspondence.

A MONUMENT TO POITEVIN.

Sir,—The enclosed circular will acquaint you with the fact that a subscription has been organized by the French Photographic Society, and the Chambre Syndicale of Photo graphy in Paris, for the purpose of erecting a monument to the memory of Poitevin.

We hope that you will be good enough to co-operate, to the best of your power, as a corresponding member of the committee in England, with the work we have undertaken, and of which you, more than others, can appreciate the favourable opportunity. The committee forward you a printed form upon which to enter subscriptions, and will be glad if you will bring it to the notice of those who have taken an interest in Poitevin's admirable work.

We thank you in advance for the kindly help which we are sure you will not fail to render us.—Veuillez, Monsieur, &c.,

Davanne, President of the Executive Committee of the French Photographic Society.
Levy, J., President of the Chambre Syndicale.
Londe, Albert.
Vidal, Leon.
Audruin.
Berthaud, Michel.
Guillemot.
Stebbing.
Thouroude.
De Villechole.

MR. PLENER'S SENSITOMETRICAL INVESTIGATIONS.

Sir,—I beg to correct an error which has crept into my paper of May 26. I applied the conclusions deduced from the equation expressing the relation between the sensitiveness and the number of gradations in a sensitometer having equal differences between the transmitted light by two contiguous shades, to the sensitometer whose shades stand in constant relation λ. Nevertheless, it does not affect in the least the final conclusion I arrived at. With your permission I will shortly return to the subject.—Yours very truly, J. Plener.

Proceedings of Societies.

Thursday Evenings for Photographers.

At the meeting held on the 15th inst., the chair was occupied by Mr. J. Traill Taylor.

Mr. Cowan exhibited a negative that was intensified on the 4th of August last by Dr. Monckhoven's formula, and had been left for days exposed to the sun under a mask; there was no apparent change in the character or tone of the negative. Some of the gentlemen present had not found the result by this formula so permanent as it appeared to be in Mr. Cowan's hands.

Mr. Goodwin exhibited a dark-slide for the studio, the carrier being constructed to carry two plates side by side. This he considered a great improvement upon the old plan of taking two pictures on one plate, as it allowed them to be developed separately.

Mr. Henderson—on behalf of Mr. Atkinson, of Liverpool—passed round a "Kirkby" shutter for inspection. It was very quick working by means of a spiral spring, and opening from and closing to the centre of the aperture.

Mr. Debenham then exhibited the results of some experiments with auxiliary exposures on gelatine plates, suggested by the recently published experiences of Mr. W. K. Burton. He showed a plate that had been exposed under his multiple sensitometer, which consisted of several sensitometers arranged together for giving simultaneous exposures; the plate had on the portion covered by one sensitometer been pre-exposed to a given light for five seconds, on another portion for ten seconds, and so on; one portion was not pre-exposed at all. It was seen that the pre-exposure had made the sensitometer register higher numbers to the extent of representing a sensitiveness of twelve or more times greater rapidity. Camera exposures on a sitter did not show a greater gain than about half of the exposure, and this with some loss of quality in cases where plates had received any appreciable light during preparation; the indications of the sensitometer could not therefore be trusted as a guide for camera exposure, that is if the highest readable number were taken as the guide; but as in these pre-exposed plates several high numbers on the sensitometer came up very weak and nearly alike, it would be safer when this was observed to take the point at which the squares begin to noticeably increase in density.

Mr. W. K. Burton said that he was glad to find his conclusions verified by Mr. Debenham's results. He certainly was against the use of auxiliary exposure, and thought that the high apparent sensitiveness it conferred had misled many experimenters who thought that they had succeeded in preparing emulsions of extraordinary rapidity, whereas they had really been insufficiently guarded from light.

The Chairman, in the course of a few remarks on lenses, said that Professor Steinheil had sent him a print from a negative taken from an elevated position of a body of men marching with flags waving; the details being very sharp, and showing the extreme rapidity of the lens, which was constructed on a new principle not hitherto applied. He further stated that there was only one of these lenses at present in London, but that he hoped shortly to be able to examine it, and would then give further particulars.

Mr. Henderson found that in wet plate photography there was a gain in speed by using an auxiliary exposure only when the chemicals and bath work slow and hard, but that when the bath is in its best state there is no appreciable gain.

Mr. Mackie showed a negative that had been left without being washed after removal from the hyposulphite, and which in a few days had completely disappeared.

Mr. Henderson showed a bitumen picture taken about sixteen years ago, by the following process; *i.e.*, rub Brunswick black and bichromate of potash well together in a mortar, coat on mica, expose through the mica, and develop with turpentine; the picture had not apparently faded.

Mr. Collins said that some years ago a patent was taken out for producing pictures with Brunswick black alone, using turpentine to develop.

Mr. Brown passed round a piece of ready sensitized paper, preserved since January 1881 by being kept rolled tight and enclosed in a tin tube.

Edinburgh Photographic Society.

The eighth ordinary meeting of this Society was held in 5, St. Andrew Square, on Wednesday evening, 7th inst., Mr. John Lessels, president, in the chair.

The minutes of the previous meeting having been approved, the following gentlemen were duly elected ordinary members:—Messrs. J. H. Edwards, John Middlemas, John Donald, James H. Hamilton, Thomas Hobday, Henry Woore, and Alexander Ballantyne, M.D. Dr. Siemens was unanimously elected an honorary member of the Society.

Thursday, 6th July, was fixed for the annual picnic, the place selected being Dirlton.

A paper by Mr. Wm. Dougall was read by Mr. Henderson, "On Photography as a Hand-maid to Medical, Surgical, and Other Sciences, and as a Pleasant Recreation for a Cultivated Mind" (see page 359).

After a short discussion, in which Mr. Bremner said that photography performed an important part in the educational work of the Edinburgh Royal Infirmary, a paper was read by Mr. John M'Kean, entitled, "The Modern Photographer, His Power and Appliances" (see page 357), illustrated by practical demonstrations.

Dr. Hunter exhibited an immense number of calotype photographs taken in Burmah thirty years ago. They exhibited the marvellous details of the architectural remains in a most graphic manner.

One hundred carbon prints from negatives by the late Dr. Dougall, and presented by Mr. Wm. Dougall, were distributed by ballot to the members present.

Hearty votes of thanks to Mr. Dougall, Mr. M'Kean, Dr. Hunter, and the Chairman, terminated the proceedings.

Talk in the Studio.

Photographic Society of Great Britain.—The next Technical meeting of this Society will take place on Tuesday next, June 27th, at the Gallery, 5a, Pall Mall East, at 8 p.m.

The Royal Observatory, Greenwich.—We are glad to hear that the Astronomer-Royal has resolved to adopt the Morgan Argentic-gelatino-bromide paper in the Observatory, for recording observations of magnet, thermometer, and electrometer. It is certainly a wise step of Mr. Christie.

Balloon Photographs.—At the meeting of the Balloon Society, held at the Lecture Room, Royal Aquarium, on Friday last, Mr. Shadbolt, of Chislehurst, exhibited a photograph taken from a balloon during an ascent on Whit Monday from the Alexandra Palace. The photograph bore a very favourable comparison with the one previously exhibited by the President of the Balloon Society, of the river Seine, near Roueu. The photographs showed the district near Stamford Hill, taken from an altitude of about 2,000 feet. The exposure was made with an ordinary flap shutter, and the lens used was a Ross 8 by 5 rapid symmetrical.

The University Observatory, Oxford.—The Savilian Professor of Astronomy, Director of the University Observatory, has issued his annual report, which was preseuted to the Board of Visitors on the 1st inst. It is mentioned that a somewhat elaborate memoir is now printed in the *Transactions* of the Royal Astronomical Society on the applicatiou of photography to delicate celestial measurement. The inquiry into the relative motions of some forty stars in the Pleiades has been brought to a successful conclusion, the results agreeing generally with those recently deduced by M. Wolf, of the Observatory at Paris, who employed a very different instrumeut and method. A complete survey of the relative brightness or magnitudes of all the stars in the northern hemisphere reputed to be visible to the naked eye has been commeuced, aud it is hoped that before the date of the next report, all the stars brighter than the fifth magnitude, some five huudred in number, will have been measured. The report touches also upon the discordauces between the observed degree of brightness of Comet 1882 *a*, with the results deduced from theory. The expenditure for the purposes of the Observatory has, it is stated, been under the amount provided by Convocation; a sum of £600 per annum is available for three years from December last, and this the Savilian Professor considers will probably suffice for the future efficieut maintenauce of the Observatory, the only difficulty that might arise relatiug to uecessary repairs, &c., of the preseut instruments, or the addition of new oues that may be needed.—*Nature.*

A Phosphorescent Mineral.—At a meeting of the Sau Francisco Microscopic Society, H. G. Hanks, State Mineralogist, read the followiug interesting paper: "Some time since D. B. Huntley, of the Geological Corps of the Tenth Census of the United States, brought to the State Mining Bureau a mineral, with the statement that it had shown certaiu peculiarities which led the miuers to call it by the rather startling name of 'Hell Fire Rock.' The property known to mineralogists as phosphorescence is uot confined to one mineral species, nor is it very uncommou. But in this specimen it is so strongly marked that there is some excuse for the refusal on the part of some of the miners to work in the mine. When striking their picks iuto this formation, flashes of light were seeu, which they regarded with superstitious alarm. The locality in detail is the Shenandoah Mine, Snake Creek District, Wasatch Co., U. T. A chemical examination shows this mineral to be au impure dolomite. It is interesting not only from its remarkable phosphorescence when rubbed with any hard substance in the dark, but from its beautiful crystalline appearance uuder the microscope, and the ease with which it can be reduced to a crystalline powder, even by crushiug it between the fingers. In Cleveland's Mineralogy we fiud it stated that some varieties of dolomite are phosphorescent in the dark, either by friction or when thrown on a shovel which had been allowed to cool just before the point of redness. The lights being turned down, Mr. Hanks produced the phosphoresenee beautifully by scratching the specimen with a knife-blade. It was of bright reddish yellow or orange colour; and it was clearly seeu how a miner could be agitated by striking such infernal material in his subterranean walks.—*Detroit Free Press.*

The Telelogue.—The name of the wiuner of the Grand Prix de Paris was made kuown to a number of persons assembled in the Tuileries Gardens, within four minutes of the runniug of the race at Longchamps, by means of the telelogue, a new invention of Captain Gaumet. This is not unlike the old-fashioned system of couveying intelligence by means of semaphores, specimens of which still exist in different parts of this country. The name of the winner was spelt out in large silver letters upon squares of black taffetas placed in an apparatus above the persidential tribune. The word thus spelt was read by the aid of powerful field glasses by persons stationed at the Trocadéro, and was transmitted by them in the same manner to the centre of Paris. We described the telelogue some months ago in "Notes."

The Alexandra Park Photographs.—The *Referee* says:—"The Whit Monday photographs were very successful—too successful in the opinion of certain married gentlemen, who weut to Muswell Hill to visit a sick friend, after the manner of Mr. Tubbs in 'Pink Dominos,' and who were spotted in the groups by their too curious wives. Instantaneous photography is all very well, but if it is to bring about trouble in this way the sooner it is put down by Act of Parliament the better."

To Correspondents.

All Communications connected with Advertisements and Business to be addressed to Messrs. Piper & Carter, *"Photographic News" Office, 5, Castle Street, Holborn, E.C. Advertisers are requested to make all Cheques payable to* Messrs. Piper & Carter, *and crossed "Union Bank, Photographic News Co. Account."*

*** We cannot undertake to return rejected communications.

*** By a mistake on the part of our engraver an error was made in one of the sketches illustrating our article on lenses in last week's issue. An air space was shown between the two glasses forming the front combination of the globe lens. These should have been shown as cemented together.

Mr. Spink's Shutter.—Mr. Spink writes as follows in answer to the letter inserted in the News on this matter:—"Mr. Volk does not assert that he would have made that or any other shutter had I not called on him and described what I required; his letter concedes all I claim, viz., the opening and closing from and to the centre behind the lens, and the fans moving parallel to the front of the camera. Of the utility of these points photographers will be the best judges. The mechanical arrangement for opening aud closing are means to an end, and could have been devised in various ways; as it now stands it has undergone certain modifications since leaving the hands of Mr. Volk, and it is capable of further improvement. As to the last part of the letter, it is unusual for those engaged in trade to execute work entrusted to them 'without fee or reward,' and it was not so in this case; payment was tendered to Mr. Volk, and declined by him—and with good reason."

A. A.—The sulpho-pyrogallol sold by the Platinotype Company.

Captain Turton.—It is quite right as it stands.

Gelatinous.—Captain Abney's new book on "Emulsions in Photography" is most suitable for your purposes; our publishers will send it iu return for 3s. 3d. in stamps.

W. E. D. Jones.—Thank you for the little print; it is certainly expressive of "joy." Your experience of "sulphite of soda" in development is one more in its favour; Mr. Berkeley's sulpho-pyrogallol (Plantinotyye Co.) we have also used with considerable success.

P. H. Davies.—See Mr. Wilkinson's article on page 298 of the present volume.

Alpha.—1. It is difficult to account for your objections to use a reflector; but if you can overcome your prejudice so far as to employ a large folding towel-horse covered with white paper, your difficulties will disappear. 2. Your suggestion may be of some value, and shall be considered.

A. S. S.—1. Yes, but it is better to use it fresh, and not make the addition. About one-sixth of its weight. 2. Do not attempt to make a saturated solution, as the commercial preparation is extremely variable; and, moreover, the solution rapidly undergoes change.

A Bisset Thom.—Thank you for the suggestion.

W. Weston.—You should obtain Abney's "Instruction," and Eder's "Dry Plates," both of which are published at our office.

H. Spink.—It is probablo that the addition in question would somewhat retard the action of the developer, but we would advise you to make the experiment.

J. Lucas.—1. Use about four times as much as you would have employed in the case of ammonia. 2. Rather longer. 3. Yes.

J. W.—1. Individual taste steps so much into the case as to render any advice on our part of little value, and the mere following in the footsteps of others will certainly not lead to any results of considerable value. 2. No such book exists. 3. In almost every case there is some such point.

J. P. S.—The glass plates should be uniformly ground on one face, the fine emery, known as "flour emery," being used. 2. A very convenient method is to make up a moderately strong solution, say 30 grains to the ounce, and add it as required. 3. Another name for sulphuric acid. 4. Not just at present.

J. Upholme.—1. It is one of the most useful methods at present known; but unless you intend to thoroughly enter into the matter, and are prepared for many failures during the early stages of your work, you had better not make a change.

THE PHOTOGRAPHIC NEWS.

Vol. XXVI. No. 1243.—*June* 30, 1882.

CONTENTS.

TRANSFERRING THE COLLOTYPIC IMAGE TO WOOD, AS A GUIDE FOR ENGRAVER.

The fatty image obtained by the collotypic method, or other similar proceeding, has long been recognized as fulfilling in the most satisfactory manner the requirements of the wood engraver. When the fatty image is transferred to artists' canvas, a basis for painting on is obtained which is far preferable to a silver image or any picture of a film-like nature, as, for example, a carbon print. We have already given directions for the preparation of fatty pictures on paper which are suited for direct transference to the wood; but when work of the highest class is desired, it is better to prepare a collotypic plate, and, after a few prints have been obtained, to transfer the most suitable of these to the wood or the canvas.

Gemoser, of Munich, has recently given directions for carrying out this kind of work, and those of our readers who have occasion either to make photographic pictures on engravers' blocks or on artists' canvas will do well to give the method a trial.

As regards the preparation of the collotypic plate, our readers will find full particulars in the News, the Year-Books, and the "Studios of Europe": or the simple directions for Major Waterhouse's photo-collotype process, as detailed in Abney's "Instruction in Photography," may be followed with success by any careful manipulator.

The wood block is first prepared with a mixture of fresh white of egg and fine zinc oxide, this pigment being sold in London under the name of "satin white." These materials are rubbed together so as to form a uniform cream, a very small proportion of mucilage of gum-arabic is added, and the preparation is well rubbed over the surface of the block, either with the finger or a small cork rubber; the most convenient way being to describe a series of small circles over the face of the block with rubbing the mixture. When the surface of the block is well saturated with the albuminous preparation, a long-haired camel's hair brush, or a badger softener, is used to give uniformity to the layer of pigment; and the thinner and more uniform the coating, so much the better will the ultimate result be.

The collotype plate is inked up with the ordinary lithographic colour, and the impression is taken on a sheet of the usual coated india transfer paper, as sold at the lithographic material stores; but the transfer paper should have been previously damped by being allowed to remain for about ten minutes between slightly moist sheets of blotting-paper. The impression having been now obtained, should be laid between sheets of damp blotting-paper, care being taken that these lie quite smoothly and without folds; and in ordinary cases, it is well to allow at least half-an-hour in order that the coating of the transfer paper, which consists mainly of flour paste, may become thoroughly softened.

The well-dried wood-block is now rubbed on the face with a tuft of cotton-wool, and the damp transfer is placed, face downwards, in position; after which the whole is passed two or three times through the press. Should the paper adhere so tightly as to make it difficult to strip it off the block, the back should be slightly damped with a sponge.

When the image is to be transferred to canvas as sold ready prepared for the use of artists, the process is simpler, as the canvas requires no further treatment, and the fatty image adheres even more readily to the painted canvas than to the wood block coated with a mixture of zinc oxide and albumen as described.

It is quite easy, by following out a similar method, to transfer collotypic pictures to finely-ground plain or opal glass, unprepared wood, marble, celluloid, or other similar surfaces, and very pleasing effects may be attained by mounting such pictures as panels in various articles of furniture.

By-the-Bye.

ON PHOTOGRAPHIC SOCIETIES.

Whatever may be said on the subject of photographic societies, it is certain that the progress of our art science is not delayed for the want of them. Indeed, the number of bodies that take photography under their wing is without parallel in any other calling. At the present moment, no doubt, there is unusual activity displayed, as has been the case for two years past, by reason of the revolution, as it has been termed, consequent upon the general adoption of gelatine plates; but apart from this, the disposition of photographers to meet together and to aid one another has always been most marked. Some societies have come and gone and again made their appearance, while there is hardly an instance of a body disappearing entirely, unless to strengthen some other more important association. If the North London Society, to take an instance, has vanished, those of its members who are still alive and well, and continue to practise the art, are yet found supporting other bodies with unabated vigour; while it is not so long ago that the appeal was made in these columns to resuscitate the old institution once more.

In the metropolis at the present moment there is no lack of opportunity for the exchange of ideas among photographers. Not only is the Parent Society, or Photographic Society of Great Britain, as it has been called of recent years, still in the full vigour of life and health, but it has of late added something to its importance by the holding of supplementary gatherings, termed Technical Meetings, where the conversation has been more general, and the reading of formal papers dispensed with; so that during the season there is a fortnightly meeting here, at which members and their friends are welcome either to take part in discussion, or listen to the experiences brought forward. The South London Photographic Society—South London only in name, as most of our readers know—is again another energetic body, holding its meetings once a month, where the technical aspects of photography are usually more in favour than the theoretical, and, as a consequence, highly esteemed by practical photographers. Next, there is the Photographic Club, where, once a week, both theoretical and technical questions are vigorously discussed, and where, as in the South London Society, demonstrations and lantern displays are not infrequent; and finally there are the so-called "Thursday Evenings" at Ashley's Hotel, partaking also of the nature of discussions and demonstrations.

The above do not even exhaust the associations in London for fostering the progress of photography. There is the Amateur Photographic Association, over which His Royal Highness the Prince of Wales presides, in which photography as an art is more especially considered, while pure science in photography, as a matter of course, receives attention both by the Chemical and Physical Societies, and by the Royal Society. In our large cities throughout the kingdom photographic associations are found on every hand. That of Edinburgh boasts, we believe, the largest number of members, not only of any society in Great Britain, but in the whole world. Glasgow owns a busy society, and there is one still further north at Dundee, of whose energy we have recently had good proof. The steady work of the Manchester Photographic Society is continually before us in the shape of valuable papers, and the same may be said of the Liverpool Society, which has of late distinguished itself by several important contributions to photographic science. The Bristol Society takes high rank, if it were only by reason of the magnificent exhibition brought together under its auspices in the West of England some months ago; while of the other associations in Sheffield, in Newcastle, in Bolton, in Cheltenham, in Yorkshire, and in Oldham, signs of vigorous activity are decidedly apparent. Cambridge University has of late started a Society that bids fair to do good work. The Photographic Society of Ireland, which has been re-established—for there existed already in 1854 a society in Ireland—has lost no time in making amends for its suspended animation, and under the presidency of Dr. Emerson Reynolds has become one of the prominent societies of the kingdom.

Thus there are at this moment a full score of societies or associations occupying themselves in this country with photography—a number which far exceeds that in any other land. France musters but five or six all told, notwithstanding the fact that her population so greatly exceeds our own; and Germany, though it puts a better face on the matter, numbers no more than thirteen, with a population twice as large as the United Kingdom; Austria is represented by one society—a large one, it must be confessed—at Vienna; Belgium has two societies; Holland, Russia, and Switzerland one apiece.

The reason of this is not far to seek. In this country there is a large number of amateurs—both ladies and gentlemen—who do not merely dabble in photography, but take up a prominent position therein; indeed, in our exhibitions, the medals or awards are given indiscriminately to professional and amateur exhibitors, without raising the least remark. It has become a matter of course for all to compete in the same class and upon the same footing, and it is, we repeat, nothing unusual to see as many high-class awards go to the amateur as to the professional. Such a thing would be regarded as very exceptional on the Continent, and hence we may take it that, in this country, photography is practised much more widely as a pastime than among our neighbours on the other side of the Channel. There is no jealousy here, for the simple reason that no dispute is likely to arise about the intrinsic value of amateur and professional work; indeed, in selecting a jury of awards in this country, the matter never comes under discussion. Men are proposed because of their position in this respect or that; but the circumstance whether they are amateurs or professionals never seems to enter into the question of selection. In a word, with us, amateur photographers, notwithstanding their number, have taken very seriously to their pastime; they not only follow it as an art, but they study it as a science.

To this is due in a great measure the flourishing condition of our societies. Some of the bodies to which we have referred are denominated "Amateur" Associations, but whether they be so or not, it is the assistance given throughout the country by amateurs that has contributed greatly to the success of our associations at home. The gelatine process, as also the many dry plate processes that preceded it, were with but few exceptions brought forward by amateur photographers, who elaborated the methods so well because to them it was a labour of love. Of course their experimental work has been supplemented by the invaluable aid which experience gives, but the professional photographer has rarely the time, even when he possesses the ability, to develop new ideas and carry out plausible theories. With us the amateur—often, as we have seen, an accomplished artist and a subtle chemist—joins hands with the professional worker, and, labouring intimately together, they bring forth good fruit. But it is usually the former who takes the initiative, and to whom we owe, therefore, much we have learned not only recently, but in the early days of collodion and collodion dry plates.

It is the manufacturer, possibly, who could tell us most accurately the number of amateur photographers in this country; but the lists of members in the various societies are sufficient for our purpose in pointing out the source of energy that characterises most of the photographic associations. The president is almost invariably an energetic amateur, whose whole exertions are devoted to the progress of photography. The honorary secretary, the other executive officer, is also a non-professional photographer as a rule, so there is here another guarantee that the art and science aspects of photography are the primary consideration. We are far from deprecating the discussion of commercial photography, but, on the contrary, believe that meetings held by professional photographers with this object would be productive of good, in the same way as the Syndicate at Paris considers the commercial aspect of the question; but the two objects are distinct, and for the present we have merely the matter of photographic progress in view. In considering this we ought always to remember that to the amateur photographer of Great Britain the progress of our art is in a great measure due, and fortunate indeed is it for us that in this country photography should be cultivated by so numerous and wealthy a class.

The "At Home" next week will be "Picture-making with Mr. H. P. Robinson at Gwysaney Hall, North Wales"; the following "By-the-Bye" will be "With the Camera in the Tyrol."

ON ETCHING FLUIDS.—No. III.

BY MAJOR J. WATERHOUSE, B.S.C.,
Assistant Surveyor-General of India.

Mordants for Zinc.

The comparative cheapness of zinc would give it an advantage over copper or steel for engraving and etching with the graver or point, but it does not seem to be recommended for these purposes. It is hard to cut with the graver, and, though it bites easily, it is not suitable for fine work. Another defect is that it will not stand a long impression; but this may be overcome by surfacing the plate with copper. The principal uses of this metal for printing purposes are for surface printing or zincography in the same manner as lithography, and for the process of biting in relief, and zincotypography or Gillotage, now so largely employed as a substitute for wood blocks. It can also be engraved very delicately in the same style as engraving is done on stone through a coating of gum.

The etching fluids for zinc are of two entirely different kinds: first, mixtures of gum and weak acids used for preparing plates for zincographic printing in the lithographic press, or for the preliminary inking preparatory to being bitten in relief by the Gillotage process; and secondly, mineral acids, more or less dilute, used for biting in relief and ordinary etching.

Zincographic Etching.—This kind of etching is more a preparation of the plate for printing than engraving or biting, the object being merely to fill up the pores of the metal with gum, and prevent it receiving printers' ink from the roller elsewhere than on the lines of the drawing.

The solution most commonly employed for this purpose is the mixture of gum and decoction of galls, in use at the Ordance Survey Office, Southampton, and given by Sir Henry James in his work on *Photozincography.* It is prepared as follows:—4 ounces of Aleppo galls are bruised and steeped in 3 quarts of cold water for twenty-four hours; the water and galls are then boiled up together, and the decoction strained. The gum-water should be about the consistency of cream. One quart of the decoction of galls is added to 3 quarts of the gum-water, and to the mixture is added about 3 ounces of phosphoric acid, which is prepared by placing sticks of phosphorus in a loosely-corked bottle of water, so that the ends of the sticks may be uncovered. The oxidation of the phosphorus produces phosphoric acid, which dissolves as fast as it is formed.

The etching solution should only just mark a piece of plain zinc.

In Richmond's *Grammar of Lithography* the following modifications of this formula are given:—

Decoction of nutgalls	$\frac{3}{4}$ pint
Gum water as thick as cream ...	$\frac{1}{4}$,,
Phosphoric acid solution	3 drachms

Boil $1\frac{1}{4}$ ounces of bruised nut-galls in $1\frac{1}{4}$ pounds of water till reduced to one-third, strain, and add 2 drachms of nitric and 4 drops of acetic acid.

Richmond recommends, however, the use of simple decoction of galls without acid, and gumming-in after etching.

Knecht, in Roret's *Manuel de l'Imprimeur Lithographe,* gives the following containing copper, but this I find gives an unpleasant dark tone to the zinc:—

Gallic acid	1 centigramme
Water	1 litre
Gum arabic...	4 grammes
Nitric acid	2 milligrammes
Sulphate of copper ...	4 ,,

Sulphate of copper	50 parts
Rock alum	40 ,,
Sulphuric acid	20 ,,
Gum arabic	60 ,,
Water	1000 ,,

Husnik gives the following, also used by Hannot at the Depôt de la Guerre, Brussels:—

Gum arabic	40 parts
Sulphate of copper	2 ,,
Gallic acid	5 ,,
Nitric acid	$\frac{1}{2}$ part
Water	1000 parts

Motteroz uses gum-water acidulated with a few drops of muriatic acid, so that it will not visibly bite the plate—or better, decoction of nutgalls.

Moock gives:—

Water	100 grammes
Gum arabic	15 ,,
Nitric acid	2 drops
or muriatic acid ...	4 to 5 ,,
Solution of nutgalls	10 grammes

Scamoni has the following, by Garnier:—Boil about $1\frac{1}{4}$ ounces of bruised gall-nuts in a pint of water, till reduced to $\frac{1}{3}$, filter, and add 2 drops of nitric acid, and 3 to 4 drops of muriatic acid. For very fine work this may be weakened with water. It is applied for about a minute, then washed off, and the plate gummed.

Zincotypographic Etching.—In biting zinc plates in relief, the acid generally used is nitric, of different degrees of strength according to the nature and state of the work.

After the transfer is made, the plate is etched with one of the foregoing preparations, then inked-in and dusted with finely-powdered resin, which adheres only to the lines. This procedure is followed after every biting, the plate being warmed to melt the resin and inky coating, so that it may run down between the lines and protect them from the undercutting action of the acid.

Kruger, in his *Die Zinkogravure,* recommends, for the first relief etching, nitric acid 30 to 40 drops to 100 grammes of water, applied for five minutes. For each subsequent etching 8 to 10 drops of acid are added for each 100 grammes of water, and the time is increased, by degrees, from five to fifteen minutes. For the final etching of the broad lights he uses:—

Muriatic acid	4 parts
Nitric acid	1 part
Water	16 parts

To soften down the ridges between the lines the plate is inked and dusted as before, and etched with dilute nitric acid at 5 per cent. applied for about a minute, and the inking, dusting, and etching repeated as often as may be necessary.

According to Husnik, the first two bitings are given with 1 part of nitric acid to 40 of water, the first biting lasting two minutes, the second four to five minutes. For the third biting the acid is used double the strength, and applied for five minutes. The acid is made stronger for each successive biting.

Moock (*Impression Photographique aux Encres Grasses*) gives a first biting with nitric acid at 2 per cent. for two or three minutes, adding about the same quantity of acid for five successive bitings, gradually increasing the time. After the first five bitings, the plate is thoroughly cleaned, strongly heated, well inked again with a harder ink, and re-bitten with acid as strong as the last used; the operation is repeated for four more bitings, using less heat, and biting less and less each time. These last bitings are for smoothing off the edges of the lines.

In his "Instruction in Photography," Captain Abney gives the following process:—

Having made the transfer in the usual way, and dusted it with resin, flood the surface of the zinc plate with a 10-grain solution of sulphate of copper, which precipitates copper on the uncovered parts, and forms a copper-zinc couple. It can then be etched with very dilute acid.

Hydrochloric acid	1 part
Water...	500 to 750 parts

This is contained in a rocking trough kept constantly in motion. The first etching takes about twenty minutes. The plate is then washed and inked, dusted and coppered again, and then etched with acid twice as strong, the operation being repeated as often as may be necessary.

The following method is somewhat similar, though, in this case, the acid bites the parts not covered by the copper.

A zinc plate, coverd with varnish, and etched with a point, is treated with a neutral solution of copper, which deposits copper on the lines. The varnish is then removed, and the plate etched with muriatic acid, which bites the zinc, leaving the copper untouched. As soon as a perceptible relief is obtained, the plate should be inked and bitten in the ordinary way.

A very excellent method of biting zinc in relief is by galvanism. Roret's Manual—before quoted—gives two methods by Dumont and Devinceuzi.

In Dumont's Method the plate, having been inked in, and dusted with resin, has a copper conducting wire attached to it, and is then placed in a wooden frame parallel to a copper plate of the same size, at a distance of about twelve inches, and the whole is plunged into a bath of sulphate of zinc. The zinc plate is connected with the carbon pole of a Bunsen battery, and the copper plate to the zinc pole. A weak current is allowed to act, and the sufficiently-bitten parts are stopped out from time to time.

M. Devinceuzi's process is similar to the above, and, from trial, I know works very well.

The plate, having been rolled up with a strongly-resinous ink, is slightly etched with very dilute sulphuric acid, to clean the surface, and is then plunged into a solution of sulphate of copper at 15° Baumé (about 70 grains to the ounce), in connection with a plate of copper of the same size, placed about one-fifth of an inch away from it. The plate is taken out every minute or so, to remove the copper, and at the end of from four to five minutes is sufficiently bitten to yield good impressions from a chalk original. A drawing with a pen may require seven to ten minutes.

Before leaving this part of the subject, it may be mentioned that, in the processes for biting with nitric acid, it is essential to keep the acid in constant motion, and in some establishments the strength of the acid is maintained during the biting by allowing nitric acid to fall drop by drop from a bottle or other vessel placed above the trough.

Deep Etching.—For simple etching on zinc, Seymour Haden recommends one part nitric acid to three of water; or

Hydrochloric acid	10 parts
Chlorate of potash	2 „
Water	88 „

Dissolve the chlorate of potash in half the water—boiling—and mix the hydrochloric acid with the remainder. The two solutions are added together for use.

Kochler (*Lalanne's Etching*) says one part of nitric acid to eight parts of water is equal in effect to equal parts of acid and water used with copper for the same length of time.

A. Martin uses one part nitric acid to two of water.

Kruger (*Die Zinkogravure*) gives:—

Sulphate of copper	2 parts
Chloride of copper	3 „
Water	64 „
Muriatic acid	8 „
also	
Nitric acid	1 part
Water	40 parts

M. Gourdon has proposed a curious process of photo-engraving on zinc, founded on M. Merget's discovery that if zinc be covered by precipitation with certain metals, it is only bitten by nitric acid in the parts left uncovered, whilst, on the contrary, dilute sulphuric, muriatic, acetic, and other acids will bite it only in the parts covered by the other metal. Thus if zinc is covered in parts, as by writing, with a thin coat of powdery platinum, the parts covered with the platinum may be etched with sulphuric acid diluted with 7,000 parts of water. If gold be substituted for platinum, sulphuric acid diluted with 5,000 parts water will etch it. Silver requires 3,500 parts water; tin, 1,500; antimony, 700; bismuth, 500; lead, 400.

M. Gourdon takes an ordinary silver print, fixed, but not toned, and well washed, and transfers it, face downwards, on a plate of zinc. It is moistened on the back, first with ammonia, and then with a solution of cyanide of potassium, pure, or mixed with carbonate of soda. After a while the silver image will be regularly transferred to the zinc, and can be etched with very dilute sulphuric acid to form an engraved plate.

Boivin plates a zinc plate with silver, treats it in the dark-room with an alcoholic solution of iodine, washes it, and passes over it a solution of tannin or pyrogallic acid, and dries.

The plate is exposed to light for a few minutes under a cliché, and then plunged in the dark into an electro-gilding bath attached to the negative pole of the battery.

Those parts of the plate where the light has acted on the iodide will take a coating of gold, while the other parts will refuse it. The iodide of silver is dissolved with cyanide of potassium, and the plate is then bitten, the gold parts forming a reserve.

Moock etches zinc with one or two Daniel's cells, the plate to be etched being in a separate trough containing dilute nitric acid at 3° B., and attached to the copper pole of the battery, while the conducting wire from the other pole dips about an inch into the acid. The etching takes an hour or two, according to the subject, and, if necessary, parts can be stopped out when sufficiently bitten.

According to Scamoni, sulphuric, nitric, muriatic, and pyroligneous acids all etch zinc, but must be well diluted with 20 to 30 parts of water.

Mordants for Brass and Bronze.—Niether brass nor bronze seems to be much used for book-work engraving. According to Kruger, the mordants for brass are much the same as for copper.

For surface printing on brass in the lithographic manner, Roret's Manual gives—

Gum arabic	8 parts
Nutgalls	2 „
Nitric acid	1 part
Phosphoric acid	4 parts
Water...	30 „

For etching bronze, the following is given in Roret's *Manuel du Graveur*—

Pure nitric acid at 40°	100 parts
Muriatic acid at 20°	5 „

Notices.

The Photographic Studios of Europe. By H. Baden Pritchard. (London, Piper and Carter.) 2s.

We subjoin the introduction to this work:—

The practical worker is very seldom a writer. He not only lacks time and opportunity to record his experiences, but generally underrates their value, and does not think them worth recording. This fact comes home very forcibly to those connected with photographic journalism, and to it is due the contents of this volume. Having found again and again the practice of photographers so different to the teachings of text-books and periodicals, we resolved upon a house-to-house visitation among the principal studios of Europe, determined to write down great things and small alike, as they came under our observation, and so produce a record of practice. At first we feared that friends on whom we called might possibly resent our visit, and for this reason we made it a rule to intimate straightway that "if you have anything you desire to keep secret, do not mention it, and it will not get into print;" but we may say at once that the caution was never taken seriously, and we did not once fail to get a straightforward answer to any of our questions.

Our object in compiling this book has been two-fold: to produce a readable volume, and at the same time to afford practical information. It is not for an author to say how his book shall be read, but if we might offer a suggestion, it is that our "Studios" may be perused as they stand, first of all; and it is with this view that we have adopted a lighter and more colloquial style than that usually to be found in handbooks. The reader will thus obtain a general view of the contents, and when he desires afterwards to refer to the practice of different men in different operations, the information is readily found by reference to this introductory chapter. As he will perceive, we have tabulated the information under nine headings, to wit, the Reception Room, the Studio, the Dark Room, Apparatus, Processes, the Negative, Mountants, Residues, and Miscellaneous; and we have further placed the name of the photographer against the number of the page, so that our reader can refer to the practice of one authority or the other as he pleases.

Let us suppose the reader desires to learn something of collotype or Lichtdruck printing. Under the heading of Processes, and *Printing, Collotype*, he will find the names of the authorities given, together with the pages where the information is to be found. Here are not only all the formulæ and the manipulations involved, but they are the formulæ and manipulations actually made use of by the chief authorites, and which have been found by experience to be the best. The whole practice, as we have personally viewed it in the studios of such men as Obernetter, Albert, and Löwy, is put before the reader as plainly and concisely as it is in our power to do. Or, take a more simple subject, that of mounting. In five minutes the reader may refer to the practice of half a dozen of the chief ateliers in Europe, and adopt either one or other of the modes of working as pleases him best.

We are well aware that our work is incomplete. The alternative was before us of postponing the publication of this volume until the series of representative studios was more perfect, or publishing forthwith such information as we had gathered together during the past two years. We decided upon the latter course, for the reason that our writings already fill one goodly volume, and that some little time may elapse before we have an opportunity of visiting Russia and Southern Italy, where several studios of note are to be found. In our next edition of the "Studios of Europe" we hope to include a description of these and several others; but as it is, we do not think our readers will complain of lack of enterprise. Where a studio of special interest was to be found, we have permitted no difficulties to stand in the way of seeing it. Whether the establishment was within the span of a London cab-drive, or beyond the reach of railways, we have visited it, if it were worth visiting, and the fact that a distance of something like fifteen hundred miles lies between Messrs. Valentine's studio at Dundee, and that of Herr Koller in Pesth, is proof sufficient that our information was not obtained without some labour and fatigue.

We have pointed out that it was with a view to watch photographers at work that we undertook these practical essays; but we are in hope the professional photographer will be able to make use of our volume, beyond learning of the formulæ and manipulations of successful men. The arrangements of the reception-room, the rules and regulations in vogue with sitters, the prices charged for portraits, the sending out of proofs, and matters that concern the business of the photographer generally, have received particular attention, and we cannot but think that many will derive useful hints from the information thus brought together. As to the construction of the studio and dark-room, we have noted points from which many cannot fail to profit, and those engaged in building a new studio, or in re-arranging an old one, should derive benefit from our notes on the subject. The good work of the photographers we speak of in these pages will be known to our readers, and, no doubt, the latter will be able to perceive in our account, now and again, certain indications as to the manner in which this good work is obtained. All must, perforce, learn something; every one who reads of an improvement on his own mode of working will be gratified, no less than those who, cognisant already of what these pages tell them, will be confirmed in the proud knowledge that there is nothing other photographers can teach them.

MUYBRIDGE ON THE ATTITUDES OF ANIMALS IN MOTION.*

I think you will agree with me, that it will be unadvisable to detain you by a long lecture on animal mechanism. I think you will prefer seeing the result of my investigations to hearing a discourse on anatomy and physiology.

The attempts to depict the attitudes of animals in motion probably originated with art itself, if, indeed, it was not the origin of art; and upon the walls of the ancient temples of Egypt we still find pictures of, perhaps, the very earliest attempts to illustrate animal motion. But artists of all ages seem to have followed peculiar grooves in this matter, and to have adopted uniform notions as to the movement of animals. How inaccurate these notions have been, I shall endeavour to demonstrate to you this evening. I will commence, however, by showing you the apparatus by which the photographs were made; you will then better understand the pictures themselves. Here is the apparatus, consisting of an ordinary camera, in front of which is a strong framework, inclosing a couple of panels, each with an opening in the centre, sliding, one up and one down. In connection with it is an electro-magnet, which, on completion of a circuit of electricity, causes a hammer to strike and release a catch which holds the shutters in position; the back shutter is then drawn upwards by a strong india-rubber spring, and the front shutter is simultaneously drawn downwards. Here is a photograph of three shutters in position, one showing the panels before exposure, one during exposure, and a third after exposure. The next picture shows the arrangement in front of the cameras. Here are a series of strong threads stretched across the track, each of which being pressed forward, causes two metal springs to touch, and thereby completes the electric circuit. These threads are arranged at a distance of 12 inches from each other, and as the horse passes along he thrusts the strings, one after the other, completes an electric circuit, which operates the shutter of the particular camera which he is passing at the moment.

Twenty-four cameras are arranged parallel with the direction of the animal. The next picture shows the entire photographic arrangements. The track is covered with india-rubber, to prevent dust flying from the horse's hoofs; and there are here five cameras arranged in a semicircle, the object of which I will explain presently. The result is this:—A horse, in its progress over the track, comes in contact with these threads successively, and is photographed in the position in which he happens to be when he strikes the thread; then he moves 12 inches, and of course assumes another position, and is so photographed, then another 12 inches, and so on; in this way we have several positions assumed by an animal during an entire stride. The time of exposure, I may say, is the $\frac{1}{5000}$ of a second.

Here is a scale I have drawn out, but which it would take me nearly an hour to explain, illustrating the position of a horse's feet during the various strides, the walk, the trot, the gallop, and the pace; if anyone feels sufficient interest in the subject to inquire more thoroughly into it by-and-bye, it will afford me a great deal of pleasure to explain it.

Now, as I have spoken of the faults of artists, I must show you what those faults are. Here are some pictures of horses walking, from different sources, with some of which you are no doubt familiar. One is from Egypt, where they seem to have had two modes only of illustrating the motion of an animal, one the walk, the other the gallop. Here is one walking, with all four feet on the ground at once. As a general rule, indeed almost always, they are going from left to right. You will notice that the lateral legs are represented as moving synchronously, both left legs touch the ground at the same time, and both right legs. Here are other examples of Assyrian and Greek art; a Roman of the 1st century and one of the 8th century, also a Norman horse from the Bayeux tapestry, a German horse, and one by Flaxman, which is the only correct one of the series. I would particularly call your attention to a representation from the column of Theodosius, where you see two mules, in one of which the hind legs are precisely in the same position as those of the mule in the next illustration, whilst the fore legs are totally different. Now a mule or a horse always walks in the same way, so that if one is right the other must be wrong.

Here are photographs of a horse in the act of walking. A horse, while walking, is alternately supported on three feet and on two, and the two are alternately diagonals and laterals. Some very eminent authorities have asserted that a horse, while walking, has never more than two feet on the ground at the same time; but he has always two—that is the characteristic of the walk—and invariably three, four times during each stride, two hind legs and a fore leg, alternately with two fore legs and a hind leg. This horse, you observe, is standing on the right laterals. The most common fault of artists in representing the walk is to mistake the laterals for the diagonals; it arises, I am satisfied, from carelessness and lack of observation. Whenever a horse or any other animal has two suspended feet between two supporting legs, those two suspended feet are laterals, never diagonals. You find them in pictures, engravings, and even in sculpture, quite as frequently represented one way as the other; but they are invariably laterals—that is, when they are suspended *between* two supporting legs. When supported on diagonals, suspended feet are outside the supporting legs. Here is a horse walking, photographed simultaneously from five different points

* Read before the Society of Arts.

of view, according to the arrangement of the cameras I referred to just now. Next, we have a photograph showing the regular series of positions taken by a horse while walking. Of course, in every thousandth part of an inch, a horse really gets into a different position, but these are all the positions of a stride which are worth illustrating.

Next we have the amble; and first I show you some specimens of Egyptian, Assyrian, Etruscan, and Modern Italian art. They are none quite correct, but they approach more nearly to the gait which is ordinarily called the amble than any others I have found. I do not know whether this gait is properly understood or appreciated in this country, because horses are not trained to it, but Spanish horses are invariably taught it. It is faster than a walk, but not quite so fast as a trot, and is an easy, sliding motion, alternately on one foot and on two feet. In this, as in the walk, the horse is never entirely off the ground; in all other gaits the weight is off the ground entirely during a portion of the stride, but in these two he is never clear of the ground. He is alternately on one hind foot, then on two laterals, then upon one fore foot, then on the diagonals, then on a hind foot again. The succession is very curious: first on one foot, then on two; the two feet being alternately diagonals and laterals.

When these photographs were first made, some experts had doubts as to their accuracy. We have here a little instrument called the zoöpraxiscope, with which we can throw the various positions in rapid succession on the same spot on the screen, and thus produce apparently the real motion; and you will readily understand that if any of the positions were incorrect, it would upset the experiment altogether.

Next we come to the trot, and, as before, I first show you some examples of ancient and modern art. There is Marcus Aurelius on horseback; but that is not a real trot, because in a trot the motion of the diagonals is more synchronous than is here represented. The best example of a trot I have been able to discover of mediæval times is from a stained glass window in the Cathedral of Chartres. There are two from the Louvre, representing Louis XIV. and Louis XV. None of them are quite correct, but none have such glaring faults as one by a very celebrated artist, Rosa Bonheur. She is, perhaps, one of the greatest artist of modern times; grand in colouring, splendid in drawing, a great observer of nature; but, unfortunately, she did not pay sufficiently strict attention to the positions of animals in motion. This is a very celebrated picture, and the horse is supposed to be trotting pretty fast. Now, one fore leg is extended backwards, really beyond the centre of gravity of the horse. It would be utterly impossible for him to bring it forward in time, at the rate he is going, to support his body, and he would be obliged to fall down—he could not help it.

Here are a series of photographs of a horse trotting at about ten miles an hour, showing all the various positions at the different periods of the stride. Now, to me it seems almost incomprehensible; but, until these experiments were made, it was a question with some very experienced horse-drivers whether a horse was entirely clear of the ground during a trot. Some imagined that he always had one foot on the ground, though I cannot see how it was possible for them to come to that conclusion. Even at a moderate rate, in trotting, the weight of the body is entirely unsupported by the feet, though they may drag along the ground at a certain portion of the stride, no matter how slow the pace. This being about ten miles an hour, the horse is entirely clear. Here, again, is a horse trotting at the rate of a mile in two minutes twenty seconds. One thing I would call attention to is this, that, when a horse's foot strikes the ground, the leg is always straight; it is never in a bent position. Though you find some eminent artists illustrate a horse striking the ground with his leg bent, it simply is not possible. Another thing is, that he always strikes the ground with his heel first; never with his toe. Here is another horse performing a moderately-fast trot, about eight miles an hour, and making a stride of six feet six inches. Here is another trotting very fast—one mile in two minutes eighteen seconds, the fastest time ever accomplished being a mile in two minutes ten seconds. There is also a peculiarity observable with regard to the position of the pastern. When striking the ground it is vertical, but it immediately sinks so as to become almost horizontal. Now, we will try the trot with the zoöpraxiscope, and you will find the motion is perfectly produced. Next we come to the canter, which is rather a peculiar gait. It differs from the gallop in many respects, and notably in this, that whereas in the gallop the horse will leave the ground with the fore feet, as also he does in the canter; in landing in the gallop he lands first on one hind foot, and then brings down the other hind foot, so that he will be on two hind feet at the same time, and throwing his fore feet forward; in a canter he will land on one hind foot, and the next foot to touch the ground will be a fore foot; then he will bring down the other hind foot, and then the next fore foot. That is the invariable order of succession in the canter; but the hind foot will follow the fore foot so rapidly that it is utterly impossible for the eye to follow the succession of movements. Here we have a series illustrating the canter. You see he leaves the ground on the fore foot, as is invariably the case with either the canter or the gallop. That is another singular fact that artists have not noticed, and they have been led into the very egregious error of imagining that a horse, while galloping, left the ground with the hind foot, and landed on the fore feet. A horse, while galloping, is always in the air for a certain portion of time; but it was always supposed that, in galloping, he would leave the ground with the hind feet, and land with the fore feet; whereas the reverse is always the case.

We now come to the fastest of all gaits—the gallop. Here is the Egyptian representation, which, with very slight variations, is the way in which Egyptian horses galloping are always represented; the hind feet are down, and the fore feet in the air. The Assyrian is not much better, but the Greeks evidently understood the motion of a horse better than a great many of the moderns; and this is very nearly the position in which a horse would be, having just landed after a flight through the air. He has struck the ground with his hind feet, one hind foot being behind the other. Here is another from the column Theodosius; here is a Norman example from the Bayeux tapestry, and here is one by some Italian artist of the 4th century, in which we find a position of the gallop exactly reproduced. Here is one by Albert Durer; this is the conventional gallop; and, with all due deference to the artists who have palmed it off on the public as being a representation of a galloping horse, I must say it is really absurd, because it is utterly impossible for a horse to get into that position. Here are some ancient pictures, one from the ruins of Angar Wat, in Cochin China; a Japanese, which is tolerably correct; and a very curious one, copied from a painting on the rocks on the banks of the Yenisi by the Tartars. This shows how artists of different ages and different countries have all agreed in representing nearly the same conventional position of the gallop.

While on the question of the absurdity of this position, I may remark that where there are ten horses it is a concentrated absurdity—it is ten times as absurd—because if it were possible even for one horse to get into that position, it would be certainly the height of improbability for ten horses at the same instant of time, all to be in the very same position; yet here is a picture by a distinguished artist, Mr. Herring, a very celebrated painter of horses. He has painted ten horses all fully extended in that conventional position. The public may have demanded that, and he painted that picture in that way. It is necessary that the public and the artist be educated together. Here we see a photograph of a free gallop, with a horse just about alighting on the ground still in the air. When the horse is in the air it is not with his feet stretched out as far forward as they will go, and the two hindmost in the same way, but they are curled up invariably in the way you see them in this photograph. That horse is now in the air, about to alight on the hind foot. In another one, you see him alighting on the hind feet, and of course, there are intermediary positions between these; and this where he is about to leave the ground with one forward foot. Those connected with the turf are well aware that, when horses break down, they always break down with the fore feet, and never with the hind feet, or very rarely. It was a mystery why that should be so, but here is the key to it; the immense amount of work that a race-horse has to perform with his fore legs is fully equal, in my judgment, to that with the hind legs. Here are all the important positions which a galloping horse will assume in making a complete stride. In its particular features each stride really differs from another. If you take one of the swiftest race horses, and measure his stride, you sometimes find one inch, sometimes two, and sometimes half-an-inch variation in the length of the stride; it depends on various little things, but this is a representative stride. Here is another, with a little longer stride—19 ft. 9 in.—in a stride of 25 or 26 feet. We might have information different to that we have obtained.

Now we come to the leap. This is the horse rising preparatory to clearing the hurdle. The hind feet are on the ground for the last time before making the spring, and you notice that one is much in advance of the other—a few inches; sometimes it is more than that. They are hardly ever at precisely equal distances from the hurdle, and on coming down, you find a greater variation. I may say that these pictures are entirely untouched; they are exactly as they were made in the camera; there is no interpolation by any artist, or any imagination. Here the horse is coming down; one fore leg you see is nearly straight, the other is somewhat curved, because he has not had time to bring it out, probably; it will be perfectly straight when he touches the ground. Here he is landed, and you notice that one pastern is almost horizontal. That is the position in which a horse invariably strikes the ground. Here we have an entire consecutive series taken from a distance of about twenty feet in front of the hurdle. There is more variation in the leap of the horse than in almost any other movement. Sometimes he will leave the ground at a distance of twelve feet from a hurdle 3 feet 6 inches high; at other times he may probably not leave the ground until 3, 4, or 5 feet of the hurdle. It depends a great deal on the disposition of the horse. Here is a series illustrating his position after he has cleared the hurdle, showing the method by which he picks up his feet, and regains the gallop, after having made the jump. This is a complete stride, and we can follow the horse here from the time he leaves the ground with his feet until he lands on his fore feet. I will now illustrate this movement with the zoöpraxiscope. Here are some photographs of the dog. In fact, some people might mistake that for a horse, because the position is somewhat like the conventional horse gallop. The motion of the dog is very peculiar. Here he has alighted on one foot, changed it to the next fore foot, and then he leaves the ground with the fore feet. In the next you find him entirely in the air, his feet all doubled up under him; he then comes down on his hind feet. Then he brings the next hind foot down, and leaves the ground again, so that he is in the air twice during a single stride—once with his body curled up, and the other when perfectly extended. I do not think that fact has ever been commented on by a writer on natural history. Here is a photograph of two dogs running a race; they were photographed together; one was a faster dog than the other, and you see how he gradually overtakes his competitor.

Next we have the ox; here are two oxen from the column of Theodosius, and they are both correct. There is one peculiar feature in the walk, of which I should like to tell you. Artists ought really to be close observers of animal movements, but it is rare to find an artist who can tell you the manner in which an animal will walk. There are two artists here, and they have not been able to tell me. There is one invariable rule with regard to the walk, so far as my observation has extended, and that is that the succession of footfallings are with any animal precisely the same; whether a dog, a horse, a monkey, or the giraffe, they are all the same. Assuming you commence your observation with the left hind foot, the next foot to touch the ground would be the left fore foot, followed by the right hind foot, and that again by the right fore foot. That order, so far as I am aware, is universal. I would not be positive so far as all animals are concerned—the hippopotamus, for instance—but, so far as I have had an opportunity of judging—certainly, so far as I have photogsaphed—it is do. You may think it a very easy thing to watch an animal, and see how it walks, but it is very difficult. There is as much difficulty in watching the massive movements of an elephant as the more light and rapid movements of the horse. I am not quite satisfied in my own mind yet whether an elephant is upon diagonals during a walk or not; I know he is on laterals, but during half-an-hour's observation I could not really positively say whether he was supported by the diagonals alone or not. With the hippopotamus I know that to be the case, but I almost question really whether an elephant in walking is supported entirely by diagonals. Here again we have a picture of an ox, by Rosa Bonheur. This is a very celebrated picture in the Luxembourg. Those two oxen are represented in a manner that no oxen would ever think of getting into. You might get a cord, and pull their feet into that position, but it would be strongly against their will. There is another one here by the same artist which is more nearly correct, but not quite.

Next we have a series of photographs of an ox walking, and the same principle holds good. The succession is the same. The trot of the ox is pretty much the same as that of the horse. The next is a wild bull; he was really wild enough for a Spanish bull fight; we had to build a long lane in order to get him to run straight, and we had three or four men ready to catch him in case he should make for the cameras. The bull gallops pretty much like a horse. Next we have a set of photographs of the pig. I thought I would attempt the pig, not that I hoped to gather much information from his movements. The principal event of our experiment was the difficulty we had in inducing him to go forward; of course we followed the old principle of drawing him backwards.

Next I have a set of photographs of the deer. Some writers on animal movements have compared the gallop of a horse to that of the deer, but there is a considerable difference. We see that the deer takes somewhat the conventional style of the horse in galloping. The gallop of the deer is hardly a gallop, it is almost a series of bounds. The deer does leave the ground with the hind foot, and lands on the fore foot, which the horse does not.

Now, we come to the movements of mankind. This man is walking pretty fast, a seven foot stride. With regard to the walker, we all know that he lands on the heel; but in taking a run, if you ask any athlete in what manner he runs, I think he would tell you that he would not alight on the heel, that he would alight on the ball of the foot. They are generally very confident that in running they never come down on the heel. That is the opinion of the runner himself, I think, in nine times out of ten, and it was with very great difficulty after this man had run, and had seen these pictures, that he could convince himself of the fact that in running he always came down in this manner. It is the same with the man as with all other animals—as far as I am aware, they always come down on the heel. Here is a photograph of a long jump of 16 feet, without any particular attempt to jump high. Here is one of a man clearing a hurdle four feet high. You would think that clearing a hurdle of that height, if it were possible for him to come down on his toes, and so break the force of the concussion by springing, that he would do so. But you see here where that man's toes are. He comes right down on the heel, and that is the only way in which he could come down. The man finds his springs in his knees when jumping; the horse finds them in his pasterns. [The various movements in running and jumping were then exhibited in the zoöpraxiscope.]

In the next photograph we see men performing athletic feats, particularly feats of strength. They are on too small a scale to show the play of the muscles. But I have a series on a larger scale of men wrestling, in which the action of the muscles is very well shown. This series of exposures was made in a slightly different way. Of course, the men in wrestling were pretty much in a small circle, and, therefore, different means had to be adopted for regulating the successive exposures. The cameras were all concentrated on one point, and an apparatus was constructed to cause them to receive the exposure at stated intervals of time, instead of distance. Here are photographs of a twisting somersault; next a flip-flap, the movement which is made preparatory to making a back somersault; and here is a back somersault. I will show these in the zoöpraxiscope. Of course, the construction of this instrument requires the movements to be effected more rapidly than a man in performing the same result would naturally do. The horse on which he is standing, instead of making two strides, would probably make three or four before he turned the second somersault. But in order to show that, it would require a disc of 10 feet circumference.

At the request of my friend, Professor Marey, of Paris, I gave some attention to illustrating the position of birds, but I cannot say I was very successful. The movements of the wing are so extremely rapid, and it is a small object any way, so that the information we have obtained from the movements of birds I cannot congratulate myself upon; however, here are a few of the results. There are only two nations, that I am aware of, in which the artists have ever thought of illustrating birds with their wings downwards; of course artists must know that birds' wings go down, but I suppose that they imagine it is inartistic to draw them in that way. The ancient Egyptians would frequently illustrate their birds with the wings downwards, and the other nation is the modern Japanese. You frequently find, in Japanese books, birds illustrated with their wings downwards. I show you these few photographs of birds, but perhaps they are of more value for art than for science.

I have now some illustrations of groups of horses galloping. These really are more difficult to make, because they were made in the open fields without any of the apparatus which I have described. There are also a few picture subjects, showing groups of horses, which are, perhaps, more interesting to the artist. Lastly, I will show with the zoöpraxiscope a picture, which we may call Rotten-row. (This was a picture of a number of horses, dogs, and men, showing the various motions of running and trotting.)

Notes.

Mr. Mendelssohn, of Newcastle, has opened a studio in South Kensington.

Mr. B. J. Edwards has been awarded the gold medal for instantaneous photography at the Alexandra Palace, and Mr. F. G. Williams, whose wonderful picture of "Ramsgate Sands" will still be remembered, has received the silver medal.

We are compelled to postpone until next week our "Concluding Remarks" to "Twelve Lessons in Elementary Dry-Plate Photography." When this final chapter has appeared, we shall commence the "Twelve Lessons in Elementary Photographic Chemistry" for our younger readers.

A certain number of the Palais Royal shopkeepers have agreed together to employ incandescent electric lamps on their premises, sharing the expense of an engine and Gramme machine between them. This, we take it, is a start towards household illumination by electricity—the beginning of the end. If the inhabitants of a square or terrace make up their minds to it, they can have electric lighting as cheaply as gas.

Lord Rosse's reported statement that faint detail cannot well be copied by photography is scarcely likely to have been uttered, since his lordship is both a scientific and practical photographer. We had an example of how much better the camera can appreciate faint detail than the eye, only the other day. A carte-de-visite received in a letter was photographed, with the result that the copy showed across its face very distinctly certain handwriting, which had been pressed in contact during the transit of the picture in the letter; and yet on the original the writing marks were so faint as only to be seen on close examination.

At a recent meeting of the Vienna Photographic Society Dr. Trapp gave some advice as to the preparation of durable sensitized paper. He recommended the use of a silver bath of 1:15 strength, to which a few drops of a concentrated solution of nitrate of ammonia are added. The ammonia is put in gradually; a precipitate is formed, but this soon dissolves again, and nitrate of ammonia is added until the precipitate refuses to disappear. This bath remains white for a very long time, and sensitized paper three weeks old shows scarcely any signs of discolouration.

It is a singular circumstance that while in London pyrogallic development is in high favour at the principal studios, in Paris, oxalate development is almost invariably used in the chief ateliers. A Parisian to whom we pointed out the circumstance lightly remarked that it might be but a question of taste, like the flavour of a *sauçisson*, some preferring it seasoned with garlic, and some without; still we cannot help thinking there must be another reason.

"British painters frequently carry with them a hand-mirror or toilet glass in which to reflect the composition they are painting, as an aid to their work, while French landscape painters affect the Claude glass—a slightly concave mirror—which is brought into requisition more particularly when choosing a subject. The landscape in miniature is studied in the Claude glass, and if the composition pleases in these circumstances, it is chosen." So writes a correspondent, who adds: "Do you not think the Claude glass might occasionally be used by the landscape photographer with advantage?"

With the approach of the holiday season we propose to write a series of "By-the-Bye" articles on Continental rambles with the camera. Switzerland we shall leave out of the question, since it is a well-known play-ground, and confine our attention to "The Tyrol," "Norway," "The Pyrenees," "The Italian Lakes," and "Thuringia." Since we have personally visited these spots—many of our readers will remember the holiday sketches we exhibited at the Photographic Society in 1877—we are sanguine about making the articles in question of practical use to the tourist-photographer.

A German photographer advertises the preparation of photographs on glass for etching with sand-blast; it may be well to point out, therefore, that thin carbon photographs upon glass resist the action of sand blast very well. If you desire to produce an image or design upon a ground of matt glass, the design in carbon has simply to be transferred to a glass plate, and this, sent to a sand-blaster, will be returned to you with the ground-work roughened. A jet of sand has been projected against the glass, and the sand particles have cut the glass surface all over, except where protected by the carbon print.

An ingenious patent, by the way, has just been taken out in America for making use of sand-blast in connection with the recovery of gold from sand and tailings of mines. Mercury and gold quickly make an amalgam, as everybody knows, and, in consequence, it is generally the aim of gold-miners to bring mercury into contact with gold-bearing minerals. The last suggestion on this score is to blow the sand particles containing gold against a wall of mercury, maintained in position by centrifugal force. Every atom of gold is thus attached by the mercury, and a ton of sand may in this way, it is said, be freed from gold in twenty minutes.

"No sketching permitted near the Fortifications," is familiar enough to the readers of Murray, and if a sketch-book is regarded with suspicion, we may be quite sure our Continental friends would not allow a camera in the vicinity. This is our reply to "Gelatino Amateur," who is contemplating a tour in Germany with dry plates.

It is not so long ago that Mr. William England was arrested on the Rhine, and marched off between two spiked helmets with all the pomp and circumstance of a spy.

But this was at the beginning of the Franco-German war; and no doubt if "Gelatine-Amateur" takes care to keep out of sight of the fortifications of Metz, Strasburg, Ehrenbreitstein, and the like, he will not be molested by German officials.

We heard the other day of a fashionable photographer whose clientèle was so extremely exclusive that it numbered only a very few of the highest families in the land; indeed, so exceptionally high-class was his business growing year by year through the exclusion of the less august, that he bade fair to end triumphantly by getting rid even of his most select sitters, and taking no portraits at all.

There is in Paris a company for providing horses and carriages and servants either for sale or hire at the shortest notice. A visitor arriving in the gay capital who desires an equipage complete has but to pay a visit to the office, make his choice from a number of photographs, and in a couple of days the original of the photograph is at his disposal. Here is a Victoria, with a showy horse, handsome harness, and smart coachman to be purchased as it stands for 4,000 francs (£160), and here a barouche and pair, with coachman and footman already on the box and fit to start at any moment, for 11,000 francs (£440). You may even purchase a sledge for the winter, for here is a swan-shaped conveyance elegantly mounted, which looks the perfection of a snow equipage in the photograph, that may be purchased for a handful or two of Napoleons.

Dr. Schnauss is busy translating "The Photographic Studios of Europe" into German, and the edition will be published very shortly; the French edition, of which the well-known Paris firm, Gauthier-Villars, will be the publisher, is also in active preparation; while the New York edition appeared this week under the auspices of Messrs Anthony and Company.

In the sculptor libel case, Mr. Belt mentioned last week the great assistance photography rendered in the work of modelling. As our readers are aware, the late M. Claudet took out a patent for a process of photo-sculpture, while Mr. Woodbury was very clever at producing bas-reliefs in plaster of Paris by his photo-relief process some years ago. The sculptor should look at his photographs either through a monocle, or make them into transparencies, if he wishes to see them to the best advantage for his work; and he should, moreover, secure as many portraits in profile as he can.

Those who adopt the recently-revived suggestion to use solid paraffin for rendering paper negatives or pictures transparent, will thoroughly appreciate the fact that the paraffined sheets are not liable to become brown with age; but the greatest care should be taken to select a sample of paraffin which is hard and quite free from the semi-fluid constituents so often present.

"From yesterday's debates in London and Paris, to the latest enquiries into the habits of earthworms, or the last photograph taken of the sun," was the Duke of Albany's summary of the contents of our newspapers in his speech at the Press Fund dinner on Saturday; from which we may infer that the latest work of Charles Darwin and the recent photographic observations of the sun in Egypt have had particular interest for Prince Leopold. The latter, indeed, though he presided at a literary banquet, is well-known to be an adept in science; he is a member of the Royal Institution and of the British Association, and is thoroughly conversant with chemistry and photography.

American photographers are already in treaty with Mrs. Langtry for sittings during her visit to the States. She is to appear on the New York stage in November next, and Mr. Abbey, who has secured her services, gives her rather higher terms than he gave Madame Sarah Bernhardt. Hence we may expect that the Jersey Lily will demand more for her photographic rights than did Madame Bernhardt, to whom Sarony, it is said, paid several thousand dollars for sitting exclusively to him.

There will be no need for any reconnoitring on the part of our sailors, should war unfortunately break out in Egypt. Photographs of the Port of Alexandria, of the mouth of the Canal, and indeed of much of its banks, are already in existence, and at the service of Sir Beauchamp Seymour, who commands our fleet; and photographs obviously, from their accuracy and exactness, are peculiarly useful as military sketches; nothing escapes the keen eye of the camera, let the observation be taken ever so hastily.

ON THE COMPARATIVE RESTRAINING POWER OF POTASSIUM AND AMMONIUM BROMIDES.

BY ARNOLD SPILLER AND BROUGHAM YOUNG.

In giving formulæ for developers, it is usual for most photographers to prescribe a definite quantity of soluble bromide, taking for granted that ammonium and potassium bromides are equally powerful restrainers. Wishing to determine whether any difference really existed between the two, we instituted a series of experiments. Our first object was to make up an exaggerated developer—that is to say, one that contained a large amount of ammonia with plenty of soluble bromide; the following solutions were, therefore, prepared:—

A.—	Ammonia ·88...	1 drachm
	Potassium bromide	60 grains
	Water...	1 ounce
B.—	Ammonia ·88...	1 drachm
	Ammonium bromide	60 grains
	Water...	1 ounce
C.—	Pyrogallic acid	16 grains
	Citric acid	8 ,,
	Water...	1 ounce

Two developers were made up—the one containing half a drachm of A, one drachm of C, and one ounce of water; and the other containing half a drachm of B, one drachm of C, and one ounce of water. Two gelatino-bromide films were exposed under a sensitometer, and developed—one with the solution containing potassium bromide, and the other with the developer containing ammonium bromide. On taking the films from the developing solutions, we found that which had been developed in the presence of potassium bromide showed No. 25, while the other, which had been restrained by the ammonium bromide, showed from 13 to 15 on the sensitometer; thus proving that the difference of the restraining power of the two bromides is considerable.

Having thus found that a difference actually existed between the two restrainers, we set about to determine the comparative restraining power of these two alkaline bromides, and, with that object, made up the following solutions:—

D.—Ammonia ·88	...	$\frac{1}{2}$ drachm
Water	...	1 ounce
E.—Potassium bromide	...	15 grains
Water	...	1 ounce
F.—Ammonium bromide	...	15 grains
Water	...	1 ounce

The following three developers were made up:—

No. 1.—D	...	30 minims
C	...	1 drachm
Water	...	1 ounce
No. 2.—D	...	30 minims
E	...	30 ,,
C	...	1 drachm
Water	...	1 ounce
No. 3.—D	...	30 minims
F	...	30 ,,
C	...	1 drachm
Water	...	1 ounce

We then exposed three films behind the sensitometer, and developed them with solutions Nos. 1, 2, and 3 respectively, and, on examining them, the film treated with No. 1 showed 15; No. 2, 5; No. 3, 3; therefore, we concluded that potassium bromide possesses only three-fifths the restraining power of the corresponding ammonium salt.

To verify our result, we made up two other solutions—one being similar to No. 3, but the other contained fifty minims of the solution of potassium bromide, instead of thirty, as in the former case. Two films were exposed behind the sensitometer, as before, and treated with these two solutions, when fig. 3 showed itself on both films simultaneously.

We have also experimented with the ferrous-oxalate developer; but, as might be expected, there was only a slight difference apparent with the two bromides, it being in the same ratio as the different percentage of bromine in the two salts, viz., 7 : 8; although, for some unaccountable reason, the image appeared first in the oxalate developer, restrained by ammonium bromide; but the other soon overtook it.

In summing up, we have come to the following conclusions:—

1. That there is a wide difference between the restraining power of ammonium bromide and potassium bromide with pyrogallic-acid developers.

2. That potassium bromide has only three-fifths the restraining power of ammonium bromide with the aforesaid developer.

3. That with ferrous-oxalate developer the difference is practically *nil*.

STRAY NOTES ON DRY PLATES.

BY J. PLENER.

On a former occasion, while examining the relation between the sensitiveness and the number of gradations in a plate exposed under a sensitometer with constant difference between the transmitted light by two contiguous shades, we found that they stand in inverse ratio to each other. Besides, it can be easily otherwise demonstrated that the number of gradations changes with sensitiveness. Let us take two good plates of different sensitiveness and expose them under a sensitometer. Suppose the first plate gave N°m for the densest, and $m+n$ for the faintest tint, so that n will be the number of gradations. The corresponding numbers for another plate we designate by m_1 and m_1+n_1. The corresponding deposits in good plates being equal, we have two equations:

$$\alpha stim=\alpha s_1tim_1, \text{ and } \alpha sti(m+n)=\alpha s_1ti(m_1+n_1),$$

hence

$$\frac{m+n}{m}=\frac{m_1+n_1}{m_1}, \text{ or } \frac{m_1}{m}=\frac{m_1+n_1}{m+n}$$

From this we see that n_1 cannot be equal to n, or that the number of gradations is different in two plates of different sensitiveness. The above conclusion applies to the case when we gradually uncover a plate to the action of the standard light, as M. Janssen did; or to the sensitometer of Mr. Mucklow and Spurge, constructed on the principle $n-n_1=C$, where n and n_1 represent the light received by two divisions, and C is a constant. But we had no right to apply it to the sensitometer in which the transmitted light by two contiguous shades stand in relation λ. We can prove it thus. Let us take again two good plates and repeat with them all the same as above, then we receive

$$\alpha sti\lambda^{m}=\alpha s_1ti\lambda^{m_1} \text{ and } \alpha sti\lambda^{m+n}\alpha s_1ti\lambda^{m_1+n_1}$$

hence we have—

$$\lambda^{n}=\lambda^{n_1}$$

This shows that n is equal to n_1, or that with the sensitiveness the number of gradations has not changed. It can be easily seen that if we had changed at the same time the light i, the number of gradations would remain the same. Consequently for a given λ the number of gradations does not change, as we supposed, but remains always constant for the good plates. It is only in the bad plates, the quickest as they exist now, and the slow ones, that the scale of gradations is lengthened or shortened through the disappearance of close proportion between the deposit on one side, and the light and sensitiveness on the other. Therefore, from the number of gradations we can judge of the quality of the plate, provided we know the number a good plate ought to have. To obtain the last we must expose and develop a good plate, and count the number of gradations in it. But at the outset we must have means to choose a good plate. This subject we have treated on a former occasion; now we wish to add that it is unnecessary to construct all the scale of perceptible gradations. If we take only four shades, viz., white, and next to it, black, and next to it, which is a very easy matter to provide, and photograph these four shades, then the plate which would reproduce them would have reproduced, of course, all other shades had they existed. It follows from all the above that when we have constructed the tablet of a sensitometer, the definition of the quality of plate will present no difficulty at all. The same cannot be said as regards the sensitiveness, because the fine λ would require much experimenting and calculation. We wish to mention here some theoretical considerations concerning the matter.

In the construction of sensitometers, all the difficulties centre in determining for one, and no matter of what type, sensitometer the rigorously true value of λ, and the number of gradations n. We think that this is by far the easier to do for a sensitometer of the type of Mr. Mucklow's. If, instead of drilling the holes, some slits of equal and due breadth were cut in the top of each division, and their total lengths were made such as to stand in two contiguous divisions in a constant relation λ, then λ being known, and n found by exposing a good plate, we would have had all that is wanted. Thus all the difficulties would be thrown off the shoulders of the photographer, and we do not doubt that the errors of engineering would be smaller than those of any photographic observation. Suppose, even, that in verifying we had discovered an error, then nothing would be easier than to correct it by lengthening or shortening the slits. It is evident that in such a sensitometer λ and n will remain constant, no matter what may be the character of incident light. Suppose that, while exposing, we covered this sensitometer with a coloured glass, which cuts off some of the rays, so that, instead of the original light used for verifying λ and n, we have now for incident light $L\lambda$, it comes to the same as if we had changed the source of light. The transmitted lights by two divisions will be respectively $L\lambda_1\lambda^n$ and $L\lambda_1\lambda^{n+1}$, but its relation will remain always equal to λ. Therefore, with this sensitometer, which we will call No. 1, we can use any standard light, as the obtained relative sensitiveness will be the same with any light.

Now let us examine sensitometers à cliché, which we will call No. 2. It is immaterial for our purpose to know of what material the tablet is made, whether of sulphur, tinted gelatine, or paper. It will have only a bearing on the question of durability, and we do not intend to investigate this question. We suppose we have the tablet already constructed, and only want to find λ, and calculate the numbers of relative sensitiveness. We proceed thus: take a good plate, expose it under the tablet to the light we wish to use as a standard, and count the number of gradations n. To calculate λ, we make use of the formula—

$$n\log\lambda = n_1\log\lambda_1, \text{ or } \log\lambda_1 = \frac{n}{n_1}\log\lambda$$

Where n and λ belong to the sensitometer No. 1.

While examining the sensitometer No. 1, we asked ourselves what will become of λ if the standard light be changed? We must consider such a case for the sensitometer No. 2. From the experiments of Becquerel it follows that λ varies not only with the transmitting medium, but also with the source of light. Consequently, for each source of light taken as a standard we may receive different series of numbers for calculating the relative sensitiveness. But will the relative sensitiveness of any two plates be the same in each case when calculated from different series of numbers corresponding to the different standard lights? Should such be the case, we might take any light as a standard, and, no matter what kind of light we might use in the studio, we could always rely upon the time calculated for exposure.

Let us see. Suppose we have exposed two different plates under the tablet to a certain kind of light, and got the numbers which indicate the lights received $\lambda^{1n}{}_1$ and $\lambda_1^{n_2}$. The relation of these two lights we designate by $\lambda_1^{r_1}$. The same two plates when exposed under the sensitometer No. 1 would have for relation of lights received λ_r, and we know it will be equal to $\lambda_1^{r_1}$. Now if we designate by $\lambda_2^{r_2}$ the relation of lights received when the plates are exposed under the tablet to a different kind of light, we again know that $\lambda_2^{r_2}$ will be equal to λ^r, consequently $\lambda_2^{r_2}=\lambda_1^{r_1}$. What is true for any two kinds of light is true for all; therefore, any kind of light may be used as a standard, and the relative sensitiveness, as indicated by sensitometer, will be always the same. But if we have the numbers calculated for a certain kind of light, we must of course use the same light as the standard.

Till now we considered only one kind of good plates, viz., the plates upon which the spectre of a given light produces always an impression whose different shades stand in a constant relation. We had in view only the changes in the standard light; but suppose the relation between the shades of spectre's impression has changed?

At first we remark that by the interposition of two differently coloured glasses between any two plates we can establish between the shades any proportion we desire. On the other hand, we know that such an interposition does not change λ in the sensitometer No. 1, therefore we can use the latter for the above plates with safety.

To see whether for these plates λ will change in the tablet, we cannot interpose the coloured glasses between the sensitomer and the source of light, because it might be tantamount to the change of the latter, therefore we put the glasses between the tablet and the plates. It is evident that in such cases λ will not be changed, and the identical proportion of shades established. Consequently the tablet may be used, too, for the plates having different proportions between the shades of the spectral impression.

To sum up the above, we say that in the construction of sensitometers the principal difficulty centres in determination of the rigorously true value of λ and n for first sensitometer, and then the λ and n for all other sensitometers will be most easy to calculate. These first λ and n will be the standard λ and the standard n, and once determined they will be imperishable. Every one who possesses a sensitometer of the type λ might calculate for it the numbers of sensitiveness from the standard λ and n, and from the number of gradations his sensitometer gives. To spare the trouble of calculation, tables might be printed, giving the numbers of relative sensitiveness corresponding to each number of gradations.

Besides this, we have seen that the sensitometer of Mr. Mucklow will have the same numbers of relative sensitiveness for all standard lights and for each kind of plates, while the sensitometer à cliché might have different numbers for each standard light; but the numbers of the latter do not depend upon the character of the silver compound in the plates, and do not change with it for different kinds of plates.

As all our calculations are based upon the number of gradations, it is very important to know how the densest tint is to be found. If we divided each division of the tablet into three parts, and gave to each part different thickness, so that the divison (say) 15 would have in the middle 16 thicknesses, and two other parts respectively 14 and 16, in this case we should have two divisions for the observation of the difference between two shades, thereby the chance of a mistake would be lessened.

For the same purpose M. Janssen's method may be good. It consists in the superposition of two plates in reverse order of their numbers, in such a way that all numbers should have equal transparency. It is evident that the number of gradations will be the number of shades overlapped in both plates + 1.

ON THE SENSITIVENESS OF THE SILVER HALOID TO THE SOLAR SPECTRUM.

BY DR. H. W. VOGEL.*

ABOUT a twelvemonth ago I published a paper on the sensitiveness to light of silver bromide, in which I showed, as the result of experiments, that finely-divided silver bromide in collodion is affected by different rays of the spectrum than those to which the same substance in gelatine, or in a mixture of collodion and gelatine, is sensitive. From this I came to the conclusion that the medium in which the silver bromide is suspended exerts a material effect on its behaviour under the solar rays.

More recently Captain Abney has taken a number of photographs of the spectrum on the bromide, chloride, and iodide of silver, and also mixtures of these salts; and he concludes that the substance in which these haloids are emulsified has no effect on the sensitiveness, since the maximum of sensitiveness with the same salt lies at the same point of the spectrum, no matter what substance is used as the medium in which it is suspended.

Apparently, Captain Abney was not aware of my own investigations—at all events, he does not refer to them; but he maintains that the results obtained by other observers which do not bear out his own views are due to imperfect instruments (direct-vision prisms, he calls them) which absorb a large portion of the violet and ultra-violet portion of the spectrum, so that the maximum action lying in these regions does not appear. Now, this explanation, though it may be true in certain cases, cannot apply

* *Photographische Mittheilungen.*

in every instance. In my own case, most of my experiments are carried out with a perfectly colourless prism of flint glass, the same that I employ in photographing the ultra-violet rays of the hydrogen spectrum.

Abney has also overlooked the variations in the action of particular parts of the solar spectrum, the existence of which I had proved, and which I had shown to be due to the varying transparency of the atmosphere for the different colours; these variations produce very remarkable differences in the action of the spectrum, under what are apparently precisely the same circumstances.

Facts like these must, of course, be taken into consideration when comparative experiments are made as to the action of the solar spectrum on different sensitive substances. Such experiments ought to be, if possible, simultaneous, or at least so close together in point of time that variations in the position of the maximum may not be able to produce any effect. Variations of this kind are most noticeable in the case of the violet and ultra-violet rays, and are less often observed in the case of the less refrangible rays, although even there they are not wanting.

Now, as regards the sensitiveness of a substance with respect to any particular coloured rays, its power of absorption plays a very important part. Only those rays act chemically on a substance which are absorbed by that substance. From photographic observations of the spectrum, it is known that the absorbing power of a body is much influenced by the nature of the substance in which it is dissolved, or with which it is incorporated; for instance, carmine and purpurine dissolved in water have a quite different index of absorption to that which they have when dissolved in alcohol. Now, with this change in absorbing power, there is a corresponding change in sensitiveness, so that it is by no means indifferent whether sensitive substances are incorporated with gelatine or with collodion. It is true there are some dye-stuffs whose absorbing power is independent of the solvent (indigotin and methyl-violet dissolved in water or in alcohol are cases in point); but such substances do not form the rule. How great may be, under certain circumstances (not always), the influence of a substance on the sensitive body with which it is mixed, is shown most strongly by my observation that silver chloride and bromide, when stained with certain dyes which absorb red, and also yellow and green light, are sensitive to those otherwise not very actinic rays.

My reasons, therefore, for doubting the correctness of Abney's observation, according to which the maximum of sensitiveness of the chloride, bromide, and iodide of silver does not depend on the medium in which they are suspended, do not appear to be without foundation. Naturally, differences like those which exist between Abney and myself cannot be settled by theory, but only by experiment; I therefore did not hesitate to repeat my former experiments, although I had by me the plates taken during my previous researches.

Equally, of course, in the examination of these plates there is room for differences of opinion. The intensity of a plate generally increases gradually towards the maximum, so that there may be doubt as to its exact position, since the intensity for a certain distance appears to be much the same. In order to obtain certainty on this point, I adopted the plan of exposing spectra for different lengths of time, beginning with an instantaneous exposure. It is also possible under favourable circumstances to obtain only one imprint of the light near the maximum point; besides which I observed the behaviour of the plate during development, since the maximum point comes out first; I also carefully examined finished plates, and among them those which had been over-exposed, in which the maximum point first manifests itself by so-called solarization. Under any circumstances, the position of the maximum point must be determined with great care. Sometimes plates exposed for a shorter time, sometimes those exposed for a longer time, are best fitted for the determination of the maximum point, a circumstance which may be explained by the fact that at the commencement the action remains the same over a tolerably broad strip of the spectrum, and the position of the maximum is only shown by the circumstance that the action near it proceeds more rapidly than in the other parts.*

The following are the preparations with which I carried on my experiments:—

1. *Silver Bromide in Collodion.*—This compound I prepared either by sensitizing in a pure silver bath, collodion plates containing bromide of cadmium or bromide of ammonium, or by adding directly the silver salt to the collodion, thus obtaining an emulsion by the ordinary method, either with an excess of silver, or of soluble bromide salt. The table below shows the results obtained with different durations ef exposure:—

Image Bearer.	Preparation.	Extent of the spectrum.	Maximum.
Alcohol and Ether Collodion	AgBr produced in the silver bath, then washed and dried	438—407	410—434
	Do. do.	443—397	
,,	AgBr emulsion with excess of $AgNO_3$	452—393	410—438
		420—438	420—438
,,	Do. do. of AmBr ...	446—397	408—438
,,	Do. do. of $AmBr+NH_3$	400—452	407—438
Alcohol and glacial acetic acid collodion	Emulsion with excess of Br	446—404	410—430
	Do. do.	455—393	410—430
	Emulsion with precipitated NH_3AgNO_3 16 hours ...	450—397	410—438
	Do. do., ripened	667—390	407—438
,,	Do. do., fresh	446—403	410—438

In order to discover whether the addition of gelatine dissolved in glacial acetic acid, which mixes readily with collodion, produced any effect, I made the experiment, the result being as follows:—

Extent of spectrum ... ... 446—400
Maximum ... ... 410—430

From these results it appears that, in all cases, the maximum action lies between the lines *h* and G, and occasionally a little beyond G; that the action between these two extremes is in general tolerably equal, but perhaps a little stronger than at G; and that the nature of the details as to preparation—that is to say as regards excess of the silver salt or of the alkaline iodide, or employment of different kinds of collodion, or mixing with gelatine—produces no effect on the spectroscopic result; in fact, the image of the spectrum taken on bromide of silver emulsified with collodion is well marked by its own special characteristics.

(To be continued.)

PHOTOGRAPHS MOUNTED ON GLASS.

BY GEORGE BRADFORDE.

There is always something that can be done in a photographic studio during the dullest of times. After the turn of the day, when the air is sharp and the wind keen, when the wayfarer seems to creep further into his clothes,

* I may observe that I had not failed to bring my results to the notice of Captain Abney before I published them. Our correspondence led to an approximation of our views, in that he maintains the position of the maximum in the case of AgBr (nearer to F than to G), only for the direct chemical action without development, and that he draws attention in his drawings (Nos. 30 and 32) to the difference of the position of the maximum on "grey" and on "white" bromide. An exchange of plates between us showed that Abney had in the majority of cases only used two exposures on the same plate, while I had generally taken six or seven spectra on one plate with different durations of exposure in order to arrive correctly at the position of the maximum. Abney's gelatino-bromide and collodio-bromide plates agree with mine, and so do his gelatino-chloride plates; but his collodio-chloride plates differ very considerably.

showing nothing of his physiognomy but a pair of watery eyes and a blue nose, despite the great glare of the spring sun, when the furniture of the studio shows frightfully seedy, then commences the dull season. The curtains and shutters have to be looked to, the show-cases and specimens want changing, the negatives require storing and catalogueing; or, as I have sometimes found it, the dull time will fall upon us like a blessing, thereby giving us time to overtake our negatives after a busy spell, and get them prepared for the printer, uninterupted save by the moist and woe-begone sitter that generally does make his appearence on such unpropitious occasions, thus leading our yahoos to suggest the possibility of their being next of kin to a born idiot.

Still I have found a prolonged dullness come in the spring, when the most industrious photographer, with all his ingenuity, could find no improvement to be made in the studio, and no sitters to improve his finances. It is at such a time that thoughts of reducing the charges take serious hold of one, especially when Jones, in the next street, declares that he was never so busy; that, in fact, if it continued, he must have extra assistance. If you are credulous enough to believe Jones, and foolish enough to reduce your prices, I may safely say, you are next door to ruined, and have played into Jones's hand to a nicety. "Poor Smith!" Jones exclaims to his customers, "doing nothing—forced to reduce his prices—thought it would come to that." And his customers go and tell their friends that they thought so likewise, and Smith, through not being wise as a serpent, finds out the truth of the old adage, "Give a dog a bad name, and hang him."

Smith's best policy, in place of reducing his prices, was to try by some legitimate plan to increase his weekly takings—in short, to raise his price instead of lowering it —to obtain 15s. per dozen in place of 10s. Had he put himself to the trouble to enamel a few specimens and make good use of a plausible tongue, I have no doubt he would have succeeded in every alternate case; and again he could have made use of paper negatives and give a variety of backgrounds, thus inducing the sitter to extend or pay more for his order.

It was such a time as I mention above with us about four years ago, when we saved the ship, so to speak, by bringing a fresh novelty under the notice of our customers; *id est*, mounted photographs upon glass, rendered transparent and coloured on a second glass fitted behind, the result being a marvellously highly-finished miniature. To the uninitiated they appeared to be as patiently worked upon as the very finest miniatures upon ivory; there was no fear of losing the likeness; you could work in any colour of background, but our general picture was a vignette with a delicate blue shading. Full length cabinets of children vignetted, and the colours carefully blended, presented a *tout ensemble* of prettiness and innocence that never failed to charm the hearts of the parents, and helped to fill our empty coffers.

The glass we used was slightly convex, some oval and some square. The ovals suit best for vignettes or single figures; the square for groups or full-length figures. It is best to look out a pair to fit before you proceed to mount your photograph—*i.e.*, see that the second glass that carries the colour fits the first glass, so that it will not lie against the photograph. This being settled, the next step in the *modus operandi* is to get a rather over-printed picture, toned and fixed in the ordinary way, and proceed to mount it upon the glass, face downwards, on the concave side. This can be done with gelatine, or very finely-strained size; but we preferred, for different reasons, a paste composed of two parts starch and one part cornflour. To ensure perfect adherence to the glass, and expel all the superfluous paste, a squeegee must be vigorously and swiftly used, first placing a pad of blotting-paper of two or three thicknesses over the picture. Having seen this important part thoroughly accomplished, you set the picture aside to dry spontaneously, prior to using the medium to render it transparent. There was, and perhaps is, an advertised medium composed of paraffin and white wax; but we could never get them clear or transparent enough by it. If the pictures were allowed the least cold while taking them out of the melted medium, the wax set hard and fast, making it necessary to have another dip. Our medium was refined castor oil. This we warmed in a pan to a little over blood heat (if too hot it will stain the pictures), and then poured it over the pictures as they lay spread out in a porcelain dish, leaving them there to soak over night.

In the morning take them out and rub them clean with a rough cloth, when, if everything has gone right, they will be found to be beautifully transparent and ready for the second glass. To facilitate the applying of the colours. stick them both together top and bottom with a piece of gummed paper, thus the second glass is kept in its place. As you have to use the brush in the same manner as the pencil in retouching by looking through the picture, I believe a retouching desk would be an admirable support while applying the colour; we only used our hands, with a piece of white paper for a reflector on our knees. The colours (oil and turpentine) having produced the desired effect, the second glass can be removed, and the eyes, lips, and hair touched up slightly on the transparent print. I would advise as little as possible of this work, as the oil is apt to make the colour run; still, a little, if carefully done, brightens and sharpens the picture. The next thing to be done is to carefully run strips of gold-beater's skin round the edges of the two glasses, back up with a piece of white cardboard, and they are ready for the case or frame.

With the greatest of ease a smart hand can turn out four cabinet pictures in a day, and about six C.D.V.'s. For the cabinets we received £1 11s. 6d., and for the C.D.Vs. 15s. One word of caution *in re* the applying of the colours. Do not lay them on heavily; the more delicately they are blended the better the result. It is merely a matter of taste whether it is a success or vulgar failure. For the shaded backgrounds of vignettes use your finger in a circular motion, and mix the blue with white so as to give a sunny brightness to the picture, and at the same time help to relieve the image.

OPERATORS' SPECIMENS.

BY "CLIFF."

The question of operators' specimens has been creating no small stir in the photographic world of late. The subject is a vexed one, and well worthy of ventilation. On the one side it is urged that an operator, being paid for his services, has no right to expect prints, as specimens, from the negatives taken by him for his employer. On the contrary, it is stated that very few photographers will engage an operator without previously seeing at least one or two samples of what he can do. One gentleman states that he should have no objection to *lend* prints to his operator; and the question then arises as to what is the liability of the operator in the event of the lent specimens being lost in the post, or dishonestly retained by the person to whom they are sent.

I am personally of opinion that specimens are practically valueless; a little consideration will show what I mean. An advertisement appears in the columns of this journal for a first-class operator, and possibly some twenty or thirty gentlemen out of engagements apply for the vacancy. Now, each of these gentlemen may be used to first-class work, and able to turn out really good pictures; yet their specimens are not approved. Why is this? It is, I take it, owing to the varied idea as to what is, or is not, really first-class work. A picture may be a perfect art gem, and yet the photographer to whom it is sent as a specimen often rejects it, owing to some peculiarity of style, or of lighting, incidental to all the photographs turned out from the studio at which the sender is then operating. The receiver is used to a certain kind of work, possibly equally good as the rejected sample, and yet of a totally different character. In such a case, how much better would it be simply to ask a reference as to abilities, and to give a trial. The chances are ten to one that the applicant, had a trial been afforded, could at once have fallen into the style of work required, instead of receiving one of those politely-worded notes with which we are all so familiar, and which inspire us with much the same feelings as must animate the breast of the would-be poet who receives back his verses marked with the touching legend, "Declined with thanks."

Then, again, as "there are black sheep in every fold," so are there unscrupulous photographic assistants, who do not for an instant hesitate to use specimens with the production of which they personally have had no connection whatever, and, in many cases, gain situations over the heads of far more skilful workmen, who have been honest enough to submit their own work. The head of a well-known firm of portraitists once informed me that he always asked for specimens previous to engaging an operator; but stated, at the same time, that he did not look upon them as samples of the applicant's work, but rather as criterions of his taste in selection; he therefore expected every specimen shown him to be really first class, as he simply judged them as samples of work by various operators, the lighting, posing, and *toute ensemble* of which were considered by the persons showing them to be really first class.

I am firmly of the opinion that the sending of specimens should be given up, and that a reference be given instead, and such being the case, no really efficient operator would object to a trial of his abilities, for once having seen the class and style of work required of him, he is much more likely to give satisfaction. This would compel every man to stand on his own merits. If specimens are sent, they should be accompanied by a written guarantee that they are the applicant's own work, his own posing, his own lighting, &c.

If specimens are asked for, I do not think any employers would object to allowing their operator to have, say, half a dozen prints from negatives taken by him in different styles, or, supposing they did object to give them, surely he might pay for them. Six specimens are, I take it, quite sufficient to submit in any case, and the cost of that number—say two promenades, two cabinets, and two cartes—would not be sufficient to ruin an operator in receipt of any salary worth mentioning. In opposition to this it may be alleged that an operator out of berth does not content himself with answering a single advertisement, and that, therefore, a single set of specimens is not sufficient for him. I think, however, that this is quite a mistake; granted that he answers three or four advertisements, it would be useless sending specimens with the first application. Let him write first and see if the salary he requires is likely to meet with the views of the advertiser, and if he is otherwise suitable for the berth; then, all things being right, let him forward his specimens, with a request that they be returned speedily. Of course there are some persons (as I have pointed out in a previous article) who never think of returning specimens sent them. To quote from a well known play, "I have personally suffered from the depredations of these sharks," and I do not disguise the fact that it is partly owing to this that I so object to the sending of specimens at all.

I have been trying to think of a remedy for this state of things, and the only one I can think of is, after writing and asking for the return of the pictures, if they do not come to hand, the operator might insert an advertisement in the NEWS, something in this style: "Mr. Bromide will feel extremely obliged if Messrs. Nitrate and Chloride will kindly return at once the specimens of his work forwarded to them on the 14th inst." This would be pretty sure to bring back the pictures, and the fear of exposure would prevent others from keeping back photographs to which they have no right.

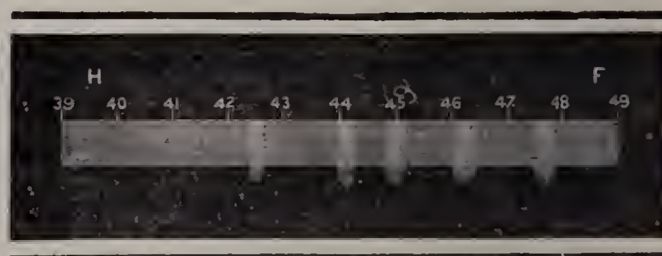
ON THE PHOTOGRAPHIC SPECTRUM OF COMET (WELLS) I., 1882.

BY DR. WILLIAM HUGGINS.*

ON May 31 I obtained a photograph of the spectrum of this comet, with an exposure of one hour and a quarter. On the same plate I took a spectrum of *a* Ursæ majoris for comparison. The comet's spectrum on the plate consists of a strong continuous spectrum extending from about F to a little beyond H. I am not able to distinguish any of the Fraunhofer lines in this continuous spectrum. The slit was rather more open than was the case in photographing the spectrum of the comet of last year; this would make these lines less distinct, but the lines G and H are well seen in the star's spectrum taken under the same conditions. We may therefore conclude that the part of the comet's original light which gives a continuous spectrum is much stronger relatively to the reflected solar light in this comet than was the case in the comet of last year, and for this reason the Fraunhofer lines are not distinguishable.

Observations of the visible spectrum had already shown that the comet differs remarkably from the hydro-carbon type common to all the comets, some twenty, which have appeared since spectrum analysis has been applied to these bodies.

The photographic spectrum shows, as was to be expected, that this essential difference of spectrum exists also in the more refrangible region. The very strong ultra-violet group assigned to



cyanogen is not to be seen on the plate, and the bright groups between G and *h*, and between *h* and H, do not appear to be present.

The head of the comet was in sharp focus upon the slit, and the continuous spectrum with defined edges corresponds to the nucleus which in this comet was very distinct. In this continuous spectrum at least five separate places of greater brightness are seen, which very probably represent groups of bright lines, though they are not sufficiently distinct in the photograph to admit of resolution. That this interpretation is correct, seems probable, from the circumstance that these groups, as shown in the diagram, project beyond the strong continuous spectrum on one side. This side corresponds to where the light of the coma, on the side of the nucleus next the sun, falls upon the slit. We learn, therefore, that the light of this part of the coma consists for the most part in this part of the spectrum of these groups, as here on the plate only an exceedingly faint continuous spectrum can be seen.

It is not possible to measure with any useful accuracy the beginnings and endings of the groups, as they are too faint at these points. Measures as accurate as the circumstances would permit have been taken of the brightest parts of the groups. The wave-lengths of these brightest parts are:—

$$\left.\begin{array}{l}\lambda\ 4253\\ \lambda\ 4412\\ \lambda\ 4507\\ \lambda\ 4634\\ \lambda\ 4769\end{array}\right\}$$

In the visible spectrum the bright lines of sodium appear to have been strong, and it may be that some of the light of some of the groups may be due to this substance.

Prof. A. Herschel and Dr. von Konkoly showed long ago that the spectra of the periodic meteors are different for different swarms, and it does not seem surprising that we have now a comet, the matter of the nucleus of which under the sun's heat

* Substance of note read before the Royal Society, June 15, 1882.

shows an essential chemical difference from the long series of hydrocarbon comets which have appeared since 1864.

Mr. Hind has kindly furnished me with the distance of this comet from the sun at the time the photograph was taken. The comet was then 42,380,000 miles distant from the sun, while the comet of last year was 69,420,000 miles when I obtained the photograph of its spectrum.—*Nature.*

Correspondence.

A DRY-PLATE DEVELOPER.

Sir,—A long experience with the various developers having satisfied me that a simpler and equally satisfactory formula could be devised, after considerable thoughts on the matter, and carefully-made experiments, I have devised the following, the working of which has been pronounced perfection by many. I, however, forward it with the only desire of its being of use to the photographic community, and hope it may prove a boon to my fellow-workers.

To come to the point, the formula simply stands thus:—
In a Winchester, full of rain-water, put—

Sulphite of soda	½ ounce
Citric acid...	30 grains
Bromide of potassium	2 drachms
Liquid ammonia (*forte*)	6 ,,

To develop a quarter-plate, take one ounce of the above, in which put one grain of dry pyrogallic. The picture will develop rapidly, and with full density, at one operation.

With this developer it will be found that all the qualities conferred by the sulphite of soda, as used hitherto, are obtained without any of the drawbacks usually met with, the deep shadows bare glass; in fact, all the appearance and valuable qualities of a wet plate. G. H. Martyn.

ALBUMEN IN EMULSION.

Dear Sir,—I do not find in any directions for making bromo gelatine dry plates any mention of the use of albumen in conjunction with gelatine. Having tried a batch of plates I find it most satisfactory, as it appears to give great cleanliness, freedom from spots, and clearness to the shadows; it also appears to greatly assist the setting, and there is no sign of frilling in those I have made. I do not know if it will affect the keeping qualities, I have not had time to ascertain. If this is any use, I shall be very pleased.—I am, sir, your obedient servant, H. Spink.

PS.—I presume there is albuminate of silver formed. Do you think the sulphur would be injurious in any way?

[We can only, like Mr. Spink, leave it for time and observation to determine.—Ed. P.N.]

THE LIGHT OF THE GLOW-WORM.

Sir,— Seeing your suggestion in this week's News, of trying the effect of the light from a glow-worm upon a gelatine plate, I made the experiment last night. The worm was placed on the reverse side of the plate, in the centre, where it remained stationary for about five minutes; it then walked forwards to the left side, then back into the middle, where it remained some minutes again. I then took it off, and developed the plate, which I send to you. The marks are very distinct. You will observe where it remained stationary in the centre of the plate, and it also shows plainly where it passed over, which proves beyond doubt the action of its phosporescence upon the plate.—Trusting this may interest some, I am, your truly,

A. N. Langdale.

[The curious record of the glow-worm's march which our correspondent sends shows all gradations from the lightest shades, which evidently correspond to its quickest pace, to complete opacity. The two dense patches, which evidently correspond to the resting-places of the worm, show traces of the reversing action of light, as the central portions are not quite opaque.—Ed. P.N.]

Proceedings of Societies.

Bristol and West of England Amateur Photographic Association.

The first excursion meeting this session was held on Saturday, the 17th inst., the place selected being Castle Coombe, Wiltshire. The day opened beautifully fine, and in pleasing contrast to the style of weather which the Society had for its meeting last session.

The majority of the members taking part in the excursion met at Clifton Down Station, and proceeded by the Midland Railway to Bath, where it had been arranged for a brake to be in readiness to convey the party to Castle Coombe, a charming, old-fashioned village about twelve miles from Bath. The first part of the drive was through Somersetshire, and as the brake ascended the somewhat high hills, the beautiful panorama of the valley of the Avon was every moment increasingly laid open to view. With the well-built and clean, though quiet, city of Bath on the one hand, and the large hills (through one of which the Box Tunnel pierces), rich in verdure, on the left, with the river running between the trees, the prospect, when looking back, is very charming, and made a most agreeable commencement to a drive which throughout was thoroughly enjoyed.

At Bath two more of the party were picked up, and, after driving some distance, another member was met, and the party was nearly complete.

After driving some miles a very quaint old cromlech was passed. It was composed of four massive stones, one in each of the counties of Gloucestershire, Somersetshire, and Wiltshire, the fourth being laid on the top of and joining the three others. Although the remainder of the journey was through some fine panoramic scenery, and passed many objects of interest, such as an exceptionally grand cedar, and a very handsome grove of beeches, none of the members "unlimbered" their "traps," preferring to wait till Castle Coombe was reached. This was accomplished about twelve o'clock, and after a call on the vicar (who, like most vicars, was only too pleased to show the beauties of a most interesting old church), and another on Mr. Lowndes, the owner of the beautiful estate at the place, arrangements were made for spreading the contents of a most massive and ponderous luncheon hamper. Mother earth supplied a fit table for such a weighty meal, and the members without an exception commenced to "coat" their interiors, at the same time "cleaning the plates." During this most interesting operation, all the members seemed perfectly agreed that both the "wet" and "dry" processes were indispensable, although some (but very few) persisted in not using the "beer preservative."

Well, the broken plates having been made away with, stray pieces of paper collected and stowed away (for they were not vulgar excursionists), and the fragrant weed lighted up, cameras were "stood" (that is, put on the stands), and work earnestly commenced. The first exposure took place upon a very pleasing view of the quaint old village street, with the river Box and old bridge in the foreground. This made a very good subject, the place being quite a sample of old English villages, there being at the top of the gently inclining road a very old and picturesque cross. After this, some of the party exposed some plates upon a small bridge spanning the trout-inhabited stream. Just outside the village, another general move was made for the most beautiful and picturesque grounds of Mr. Lowndes, through whose kindness the pleasure of access thereto was afforded.

No estate and residence, either for situation, design, or laying out, could be more charming than that of Mr. Lowndes at Castle Coombe. Standing in front of a grand slope, at the top of which are Roman remains, is the finely proportioned and artistically designed mansion, a rich parish around it, with the river Box artificially widened into ornamental water, making a picture of the grounds and house on its surface; from the house to the old church is a private, secluded, and cool drive, and on a slight eminence at the side of the house, and approached by graceful steps, stand the conservatories, &c. All is so richly embedded in verdure, that nature and artifice seem to conspire to make it certainly as delightful a residence as one can easily imagine. It is needless to say that in these grounds the members made many a "shot." But time was rapidly going on, and after the old cross had been subjected to the keen eyes of "rectilinears," the return drive was commenced.

A slight digression was made, the party calling at Colne Vicarage, where the Rev. J. Strutt Bird, one of the members, had kindly prepared tea. Prior to commencing this gentleman's hospitable meal, the church was inspected, and the restoration much admired. Ascent to the belfry was also made, and, with permission, attempts made to get an insight into bell-ringing.

A pleasant half-hour was then spent with the kind host, and, after many mutual good wishes, the party drove off amidst, figuratively speaking, "blue-fire and rockets," and the first shower of the day, which, with the exception of some little wind, had been in every way most enjoyable, the arrival in Bristol taking place at about ten o'clock.

Thursday Evenings for Photographers.

At the meeting held on the 22nd instant, Mr. Shadbolt's balloon picture was exhibited, and provided subject-matter for some discussion. By taking a measurement of the distance between the railway metals, and knowing the focus of the objective used, it became possible to calculate the height of the balloon when the exposure was made, and this was found to be practically identical with the altitude as determined at the time by barometric observation.

Mr. Cowan showed his changing tent or box as arranged for gelatino-bromide work, the compactness and convenience of the arrangement being generally commented on.

Mr. Coles showed negatives which had received about three times the correct exposure, and had been restrained during development by potassium bromide and citrate of soda respectively; the result being especially satisfactory when the last mentioned salt was used.

Talk in the Studio.

On the Determination of Chlorine in presence of Bromine and Iodine.—By G. Vortmann.—MM. C. L. Müller and G. Kircher have recently published in the *Berichte der Deutchen Chemischen Gesellschaft* certain experiments on the behaviour of peroxides with chlorides, bromides, and iodides in presence of free acetic acid. On the faith of these experiments they maintain that the author's method of separating chlorine from bromine and iodine (*Berichte*, xiii., 325) is not trustworthy. A full description of the process appears in the May number of the Vienna *Monat'sheft*, and in the meantime the author seeks to explain how MM. Müller and Kircher have arrived at results differing so widely from his own. As regards the fact that on boiling potassium chloride, lead peroxide, and acetic acid a perceptible escape of chlorine, and consequently a loss of hydrochloric acid, occurs, his observations agree with those of the chemists just named, provided the concentration of the acid exceeds 5 per cent. He has observed, however, that not a trace of potassium chloride is decomposed if acetic acid of only 2 to 3 per cent is used, and the evaporation is conducted upon the water-bath, even when the evaporation is repeated five or six times; under which circumstances potassium iodide is easily decomposed, and potassium bromide less readily, but still in small quantities, completely if the evaporation is repeated two or three times. The same holds good with the action of manganese peroxide acetic acid upon potassium bromide. Whilst acetic acid at 2 or 3 per cent. decomposes potassium iodide in presence of manganese, peroxide very easily the first or second time of evaporation, the same mixture has no action upon potassium bromide, and acetic acid at 10 per cent. must be used to liberate even traces of bromine. The author promises to publish the details of analyses showing that his method is not merely accurate, but in many cases very convenient.—*Berichte der Deutchen Chemischen Gesellschaft.*

M. Charnay's Discovery.—The *World's* correspondent at Mexico reports, May 4, the arrival there of M. Désiré Charnay, bringing photographs of the newly-discovered city on the left bank of the Usamasinta River, in Chiapas, near the frontier of Guatemala. M. Charnay believes this town was built by colonists from Palenque, because the ruins of the temples and houses, the inscriptions on the monuments, the sculpture and ornamentation are identically the same with those in Palenque. The discoverer of this ancient city has named it "Lorillard," in honour of his New York patron.

To Correspondents.

All Communications connected with Advertisements and Business to be addressed to Messrs. Piper & Carter, "*Photographic News" Office, 5, Castle Street, Holborn, E.C. Advertisers are requested to make all Cheques payable to* Messrs. Piper & Carter, *and crossed "Union Bank, Photographic News Co. Account."*

*** We cannot undertake to return rejected communications.

J. T.—Success is very doubtful in such a case, but a prolonged immersion in a weak solution of cyanide will occasionally prove effectual. The tendency to frill may be overcome by mixing the solution with one-fourth of its volume of methylated spirit.

W. O. Clark.—The sensitizing bath is far too weak for the sample of paper in question. Increase the strength to the extent of twenty grains, and add a few drops of carbonate of soda solution. This reagent should be added until a cloudiness is produced which does not disappear on thoroughly stirring the solution. Filter, or allow the solution to settle before using the bath.

Mealy.—The previous answer applies also to your case, as you appear to be using a paper of similar quality.

C. Banfield.—1. It is quite unfit for use at present. 2. About seven shillings per pound. 3. Not unless considerably diluted with water. 4. Any soluble chloride will answer, but the sodium compound is ordinarily used on account of its cheapness. 5. Add about six drops of liquid ammonia to each ounce of water.

Little Nemo.—The theory you suggest appears to us untenable, as there would certainly be no more likehood of sulphide of silver being formed at the points referred to. If the prints were not sufficiently agitated in the wash water, it is quite possible that the hyposulphite may have been less perfectly removed from immediately under the air-bells. Next time you notice the appearance of the air-bells, you might cut the print in two; one portion being washed by gentle displacement of the water, so as not to disturb the bubbles, and the other being thoroughly rinsed. A map of the air-bells should be made for comparison with any faded spots which may ultimately appear. In order to expedite the fading of the experimental prints, they should be placed in a damp cellar.

T. C. Bradshaw.—If you write to Mr. Philip Magnus, of the City and Guilds Institute for the Advancement of Technical Education, Gresham College, London, E.C., you will receive a syllabus giving full details.

A. B. C.—The only institution of the kind is the Photographers' Benevolent Association, 181, Aldersgate Street, London, E.C.

R. Offord.—We have forwarded the letter.

G. G.—1. Prolonged soaking in a strong solution of alum. 2. Full particulars are given on page 133 of our last volume.

A. Read.—That which you mention is quite as good as any in the market.

H. T. Hall.—The incrustation no doubt consists of metallic silver, and it can be readily removed by treating alternately with a solution of iodine in iodide of potassium and a solution of potassium cyanide.

Patience.—1. Certainly not until you set to work in a more systematic manner. 2. The nitrate is to be preferred, as it is much more soluble. 3. It is not intended that you should use a looking-glass, but merely some white surface, as a screen covered with paper.

C. Ovenden.—1. The markings arise from the use of collodion which is too thick, and if you dilute with a mixture of ether and alcohol (rather more ether than alcohol), you will no longer be troubled. 2. The bath is probably alkaline; add one drop of nitric acid to each pint, and try again. 3. It is sold in the druggists' shops under the name of grey powder, and there is every reason to believe that the greater part, if not the whole, of the mercury exists in the metallic state.

J. Mc J.—It was certainly not less than twenty years ago; we will, however, ascertain particulars, and write to you.

John Clement Smith.—Your failure doubtless arises from the carelessness with which you have preserved the solution. When made up it should be completely protected from the air.

S. J. R.—You may regard one part dissolved in eighteen parts of water as a saturated solution.

Charles Bellman.—An article on the subject will probably appear next week.

Simpleton.—Your customer will certainly act very unwisely if he signs such an agreement, as you would then have the power to continually draw him into expensive litigation if he were not in a position to comply with the unreasonable provisions of Clause 6.

Iberian.—1. It is merely a solution of bitumen or mineral pitch in light coal oil, but a small proportion of india-rubber is often added in order to give it toughness. 2. Merely dissolve it in strong alcohol. 3. About sixty grains to each ounce.

Sulphur.—1. Yes; but not just at present. 2. Extremely improbable.

THE PHOTOGRAPHIC NEWS.

Vol. XXVI. No. 1244.—*July* 7, 1882.

CONTENTS.

ELECTRIC LIGHTING FROM A PHOTOGRAPHIC POINT OF VIEW.

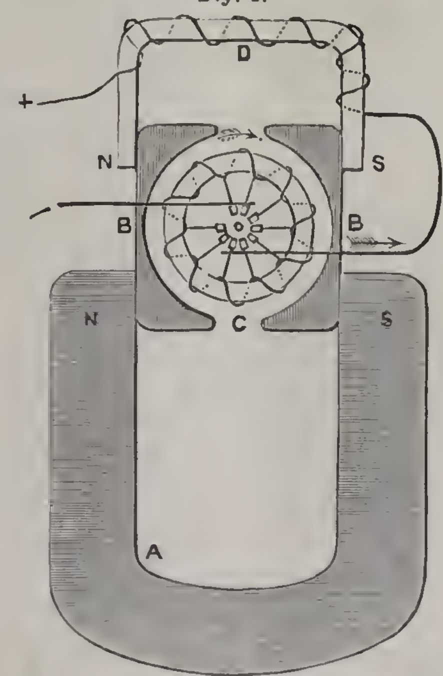
We have, from time to time, laid before our readers particulars of progress in electric lighting as bearing directly or indirectly on the work of the photographer, and nearly a year ago we referred to the Pacinotti machine as having been mainly instrumental in bringing about the present condition of electrical activity. Not only did Professor Pacinotti anticipate, by the construction of his now celebrated machine, the so-called dynamo or regenerative principle, as enunciated seven years afterwards by Siemens and Wheatstone, but he gave to the world the first magneto electric armature in which the magnetic changes are progressive rather than sudden, a condition of affairs which not only enables us to obtain a current of absolute equality and constancy, but also much of the heating which ordinarily results from the quick reversal of magnetism in soft iron is obviated. For these reasons, and more especially on account of the diminished heating of the rotating armature, the Pacinotti machine has been found to be by far more effective than the older machines constructed with the ⊢⊣ armature of Siemens. Although the *Nuovo Cimento*, which contained a description and drawing of the Pacinotti machine, found a place in several of the public libraries of Great Britain, and fell into the hands of most scientific men, it appears that very few appreciated the importance of the invention, and probably not half a dozen models of it were made in this country until M. Gramme constructed the Pacinotti machine on a much larger scale than had been attempted by the original inventor, and called prominent attention to its industrial value. It may interest our readers to know that about fifteen years ago M. Gramme assisted Mr. Woodbury in the arrangement of a magneto apparatus and Lenoir gas engine, used in the production of the electric light for photographic purposes at his premises in Brompton, and after this M. Gramme remained for some time helping Mr. Woodbury in the manufacture of his gelatine reliefs. This was, however, before the commercial advent of the Pacinotti machine.

Gramme, after having devised several new commutators, so far modified the commutator or collector of the Pacinotti machine as to replace the alternately placed strips by parallel conducting rods mounted somewhat like the staves of a barrel or tub; but the experience of more recent times seems to show that Pacinotti's original method of so alternating the strips as to ensure the contact of each brush with two successive studs or strips is preferable, and calculated to reduce sparkling at the commutator. We see a return to Pacinotti's original commutator in the Brush machine, while the Weston machines are made with slightly bent strips, and a similar end is attained by the use of two brushes on each side of the commutator, as exemplified by the Hefner Altneck machines.

In October last we detailed some particulars as to the use of the Swan incandescent lamp for photographic portraiture, and described a number of experiments in which an ordinary or full-sized Swan lamp was used in conjunction with thirty cells of Grove's battery. We mentioned at the time that the lamp could not be satisfactorily worked by a small hand gramme (Pacinotti) machine, with which we tried it. Since the time referred to the smaller, or five-candle, Swan lamps have been introduced into the market, and it was found that the hand-machine in question would work from three to five of these when arranged in parallel circuit; in fact, this was shown not long ago at a meeting of the Society of Arts; while on the occasion of one of Mr. W. H. Preece's juvenile lectures at this institution the same hand-machine was used to generate a current by which more than 500 buttons were electro-plated with silver in a few minutes.

In order to render the machine in question more effectual as an electric generator, we determined to try the effect of a small electro magnet so placed as to form consequent

Fig. 1.



A, compound permanent magnet; B, B, jaw pieces; C, five-inch Pacinotti ring; D, electro magnet. (One of the commutator strips, with its conducting wire, has been omitted from the diagram).

poles with the permanent magnets of the machine, and the result proved so satisfactory that it became possible to produce a sufficiently actinic light for ordinary portraiture by the current produced when the motive power is no more than can be generated by easy turning with one hand.

The diagram (fig. 1) represents, in a manner which will be sufficiently intelligible to any one familiar with electrical matters, the machine with the additional magnet; and the machine in this form may be regarded as standing between a magneto machine and a dynamo machine. Non-electrical readers must understand that the representation of the wire is intended only to indicate the manner of coiling, not the amount used.

The advantages of the arrangement in question will be understood if we point out the way in which a current arises in a dynamo machine. When the armature is turned, a weak current is generated owing to the residual magnetism of the field magnets, and this current circulates round the field magnets in such a direction as to tend to increase their activity. If, however, the resistance in the exterior circuit is very great, it may happen that the intensity of this current is below that minimum which should suffice to induce an amount of magnetism corresponding to the residual magnetism of the soft iron field magnets. In this case the dynamo is practically inactive, as the cumulative principle does not set in. If, however, the speed of the armature is so far accelerated as to bring the intensity of the current above the before-mentioned minimum, the cumulative action will set in; or the machine may be put into full action by temporarily reducing the external resistance. It follows, from the above considerations, that there is a certain external resistance, which will serve to prevent any given dynamo machine from starting into full action for each rate of speed, and this limiting resistance will be higher as the coercive force of the metal of the field-magnets is greater; but, as the coercive force of the field magnets is raised, the machine approximates more and more nearly to a magneto machine, and is so much less serviceable as a pure dynamo or regenerative machine. The apparatus figured above unites in itself the principal advantages of a magneto machine and dynamo machine. When the armature is made to rotate, and the external circuit is left open, a considerable difference of potential arises between the poles, although this is, of course, not so great as would have been the case if the soft iron of the electro-magnet were not so placed as to form a keeper to the permanent magnet; and this initial potential is sufficient to ensure the efficient action of the machine even when a very high resistance is included in the circuit. When a five-candle Swan lamp is placed in circuit, and the machine is turned with the full force of one hand, the lamp is almost immediately destroyed, the thread breaking, and volatilized carbon being deposited on the inside of the bulb; but, by working the machine at a lower rate of speed, any required temperature, from a low red heat, upwards can be readily maintained.

By keeping the carbon thread at a temperature somewhat short of that required for its rapid destruction, a highly actinic and intense light is produced, and this is so effectual as a photographic illuminant, that when the lamp was placed at a distance of four feet from the sitter, a bust portrait was readily obtained with an exposure of from two to three seconds, a 1B lens being employed. Here we have an advance of nearly twenty times, as regards rapidity, on our previous experiments; and instead of thirty cells of Grove's battery, a machine which can be easily turned with one hand is used. Several determinations gave us from 200 to 300 as the candle power of the lamp during the experiment. It will be understood that under these circumstances the incandescent lamp will not remain effective for a very long time; but several experiments indicate that on an average from fifteen to twenty portraits may be made with each five-candle lamp as at present sold. Considering, however, that in most cases the rupture of the thread took place at a weak point, and long before the whole of the filament had become considerably attenuated by the volatilization of carbon, there is every reason to hope that as the manufacture of the lamps is improved, two or three times as many exposures may be reckoned on from each lamp.

At the present time, it is evident, from various estimates which have been made, that the cost of incandescent electric lighting is approximately equal to that of gas lighting; or that the difference is, at any rate, not very great. If it could be made practicable to work incandescent lamps at a high temperature, as in the case of our experiments, the cost of incandescent lighting would immediately fall to about one-fortieth that of gas, as the high incandescence does not require a correspondingly increased comsumption of electric energy. It is, however, difficult to conjecture as to what body, considerably more refractory than carbon, and yet a sufficiently good conductor, we may hope to make available; but problems seemingly more difficult than this have been solved by modern research.

Assuming that the incandescent lamps are finally sold at fifteen pence each, each exposure will cost rather under one penny; but if, at the same time, the durability of the lamp is increased, the cost will be notably lessened.

It must be remembered that the experiments we have described were performed with the small, or five-candle, Swan lamp; but, by using the larger lamp, and a proportionately powerful current, there can be little doubt that still more satisfactory results might be obtained.

Mr. Peter Mawdsley—who was with us when some of our experiments were carried out—suggested that in many cases it might be advantageous to employ a powerful gas light to lower the intensity of the shadows cast by the electric light.

It appears to us that the incandescent lamp, actuated by such a hand Pacinotti machine as we now describe, would form a very suitable arrangement for optical lantern work.

The subjoined cut represents an arrangement which we

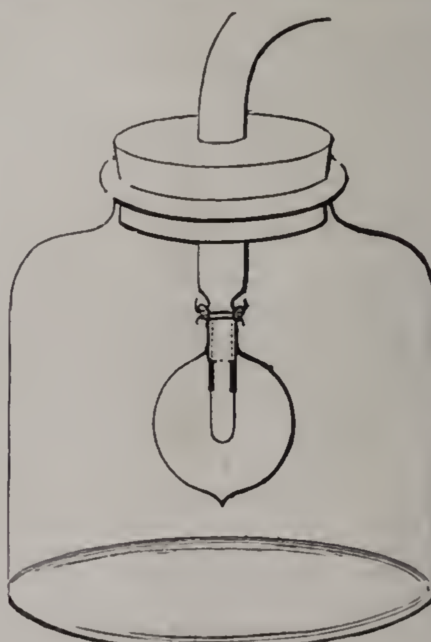


Fig 2.

found convenient for mounting Swan lamps, the conducting wires passing through the cork of a wide mouth bottle. The bottle forms a protection against fragments of glass, should the lamp fly on the powerful current being suddenly passed through it.

The same arrangement would probably be a most convenient one for the non-actinic incandescent lantern, a ruby or orange bottle being employed.

We hope, before long, to be in a position to give our readers some useful information regarding the use of the Planté secondary battery as a means of producing a light for photographic purposes.

SILVER BROMIDE IN GELATINE AND COLLODION EMULSIONS.

Every photographer longs for the day when he can purchase a fluid emulsion as sensitive as our present dry plates, and as convenient to handle as our old friend collodion. It is a problem on which many of our photo-chemists have worked hard and patiently, and none more so than Dr. Vogel, of Berlin. Few, indeed, outside our photo-chemists, appreciate fully the difficulty that lies in the way of securing this panacea. It is a double difficulty, according to our Berlin colleague, and anyone who reads his last researches on the subject, which we here append, will at at once understand its gravity. The blue-sensitive bromide of silver, the form we desire to produce in our plates, can, Dr. Vogel assures us, only be formed in an aqueous solution--not, therefore, in collodion; while, if we proceed to prepare it separately, and then add it to collodion, we are little better off, for gelatine itself enhances the sensitiveness of bromide of silver, as Eder and Vogel have already shown.

But to come to Dr. Vogel's own remarks, which appear in the *Mittheilungen.* He says:—In May last I published an account of various kinds of bromide of silver I had produced. My experiments led me to state that the bromide of silver in gelatine emulsion, which hitherto has been termed green (Abney tells us it is grey by transmitted light), should, by reason of its behaviour under the influence of the spectrum, be called blue-sensitive bromide, because it is most highly sensitive to blue rays. This blue-sensitive bromide of silver, so far as we know at present, is only produced by its precipitation in aqueous solutions in the presence of an excess of an alkaline bromine salt.

Precipitation in a collodion emulsion never produces this particular form of bromide, even after lengthened heating, or adding of ammonia.

Bromide of silver, produced in collodion emulsion by the precipitation of a soluble bromine salt with a silver salt, is of a different character; it is most sensitive to the violet rays, and is thus markedly different from the blue-sensitive bromide of gelatine emulsion.

Whether the violet-sensitive form of bromide can be transformed into the blue-sensitive bromide without the presence of gelatine, I am doubtful; my experiments so far do not seem to point to this conclusion, and for this reason it is that I think the attempts to produce a collodion emulsion as sensitive as a gelatine emulsion will be fruitless. More likely does it appear that the solution of the problem will be brought about by separating the blue-sensitive bromide of silver from gelatine emulsion, and mixing it with collodion. I have already made experiments in this direction, with the view more especially of studying the properties of blue-sensitive bromide of silver apart from gelatine. The separation I effected after the manner that has been described by Dr. Lohse.

The results of my researches have been that I found on adding silver to an emulsion that the most sensitive form of bromide can be formed in the presence of a very minute quantity of gelatine. I took twelve grammes of ammonium bromide and one gramme of gelatine, dissolved these in one hundred grammes of water, and effected the precipitation when warm (temperature 155° Fahr.) with twenty grammes of silver. The resulting bromide of silver emulsion was, after boiling for one-and-a-half hours, divided into two portions; to one half of it was added three grammes of gelatine, and then plates were coated with it, which on development were found to equal the best English plates in sensitiveness. The other half, very poor in gelatine, was treated with ten cubic centimetres of glacial acetic acid, and permitted to stand in a warm locality. In twenty-four hours the bromide of silver was precipitated. In the same fashion, it was treated afterwards with three changes of water to wash it, and finally rinsed with alcohol to remove the last trace of dissolved bromide. The resulting finely-divided silver bromide was of a greenish colour, and closely adherent. To compare it with the ordinary bromide of silver formed in collodion emulsion, some of it was shaken up in a collodion composed of pyroxylin, glacial acetic acid, and alcohol (similar to the collodion in Vogel's emulsion), and in this way a homogeneous emulsion was produced, with which plates were coated. In these films the bromide of silver had preserved all its original character; that is, it was most sensitive to blue rays (wave-lengths about 450). The plates, moreover, were in daylight much more sensitive than ordinary collodion emulsion plates, although they were rather inferior to the gelatine plates prepared with the first half of the emulsion—another proof of the sensitizing action of gelatine itself, which I have before referred to.

The bromide of silver in question separates itself faster from the liquid than the violet-sensitive bromide of ordinary collodion emulsion, a proof of the higher specific gravity of the former.

The difficulty of reducing the bromide in presence of a chemical developer, which I showed to exist in collodio-gelatine emulsion, was also apparent in the collodion mixture. The tendency of the silver bromide particles to adhere together and to form a compact mass was also very marked, and great difficulty was experienced in shaking up the mixture. Moreover, in fixing, a much longer time was necessary to dissolve the bromide in the hyposulphite solution, an operation that lasted half an-hour.

At Home.

PICTURE-MAKING WITH MR. H. P. ROBINSON, AT GWYSANEY HALL, NORTH WALES.

The smock-frock and flapping sun-bonnet, so indicative of English village life, are rapidly disappearing before the advances of railway and school-board, and artists will soon despair of meeting with homely-clad models to give life and light to the sweet scenes of woodland and pasturage that abound in our island. Already the painter has to search deeply for forgotten nooks, where outlying hamlets have not yet been contaminated altogether by the innovations of town life; and he deems himself fortunate indeed if the knee-breeches and cotton night-cap of past generations are still found in possession of "the oldest inhabitant," and examples of female attire are seen free from vulgar frippery and the suspicion of "town-cut." If the "eye" of a picture is to be a figure, or group of figures, it is necessary to have suitable models, and this holds good, whether the picture-maker is painter or photographer.

Mr. H. P. Robinson's photographs are known to all of us, and they are known, too, as earnest attempts to compete with the painter in making pictures. Compete, perhaps, is scarcely the word, for Mr. Robinson is not so foolish as to suppose he can vie with the accomplished landscape painter; but he strives to produce a picture, by the aid of the camera, which shall please by reason of its art merits, while possessing photographic qualities of value to boot. If he does not produce works in colour, he gives us pictures full of charm, full of meaning, and full of life and beauty. He does not merely search the woods and fields for views, directing his camera at them with what taste and judgment he possesses—he does something more. His aim always is, like that of a painter, to carry out some idea that tells its own story, and how he proceeds to do this we shall try to tell in this brief article.

Mr. Robinson carries a pocket sketch-book. In this is roughly limned any pose he may see, or that may be suggested to him in general observation. Whether it is in the streets, in a room, in the fields, he notes the points of any agreeable pose. The position he observes may not be quite satisfactory, but by altering a few lines in his sketch he can make it so. The figure he sees may be too old or too plain. It matters not; when he selects his model, he can alter this. What he desires is an idea for a picture, and as soon as he perceives one it is noted down.

But he can do more than make rough preliminary sketches of figures in this way; being a photographer, he can pose a model in his studio, and thus proceed further with his study. He arranges his model according to his note-book sketch, and by altering the lighting, changing position and expression, make half-a-dozen different "suggestions" for a picture. The chosen "suggestions" in the form of little silver prints are then put away in the sketch book, and here they remain until the time and opportunity arise for making a picture.

To put the matter quite clear before the reader we have taken one of Mr. Robinson's outline "suggestions" from his pocket sketch book. Here it is.

It is the sketch of a picture to be called "Goodbye." When Mr. Robinson has chosen a spot to his mind, he will pose his models suitably, and realise his picture. Another outline sketch is "A Merry Tale," showing simply half-a-dozen girls sitting down in a woodland path, one narrating, and the others enjoying the narrative. Our readers may soon have an opportunity, in all probability, of seeing how far Mr. Robinson has been successful in the fulfilment of his work in this case. This third sketch, again, is to be executed in a park-like landscape, the picturesque group of figures here shown gathering ferns to be posed in the foreground.

This sketch-book, full of suggestions, is in Mr. Robinson's pocket when we accompany him with a few chosen painter friends to Gwysaney. Gwysaney Hall is a shooting-box of a near relative, Mr. F. H. Gossage, J. P., of Liverpool, and although there is no shooting at this time of the year, there is still plenty to attract, and plenty to enjoy. An old-fashioned stone-built mansion, with queer latticed windows and rough walls tinted red and green with lichens, stands at the top of a green hill, as if on a pedestal. On three sides the solid old mansion is fringed around with the green and black foliage of oak and fir, with blooming rhododendrons, red and pink, with clustering rose bushes, and sweet-scented briars; while on the fourth face you enjoy a clear unbounded view of pasture, lake, and woodland. At your feet stretches a smooth green slope of parkland, across which silver-furred rabbits furtively scamper; stately trees dot the verdant sward here and there, while further contrast is afforded by dense patches of foliage that deck most of the hill-tops with luxuriant greenery. To the right, deep in a shadowed dell, is a silvery pool, haunted by teal and wild duck, while afar in the distance on the left the shining Dee is seen, a broad band of light that can be followed almost to its mouth. The blue Welsh mountains rise far round to the right of the picture across the wooded valleys, while the quaint town of Mold, with its square church tower, is seen through a niche in the brown hills.

Not less attractive is the interior. Wainscoting of shining brown oak is in every room, and quaintly-carved presses and furniture that have lived through centuries. Here, on the first floor, in this oak four-poster—so black and shining, it looks like burnished ebony—the Lord Protector once slept; while tradition says Charles II., whose portrait hangs below, also occupied the same chamber. That there are ancestors frowning from the dark walls need scarcely be stated, any more than the fact that one of the big, dimly-lighted dormitories is invested with mystery, and supposed to be haunted.

Most of the pictures Mr. Robinson exhibited last year at Pall Mall were completed at Gwysaney. "Her Ancestor" was taken in this very room of dark brown panels, where Mr. Robinson has now set up his camera again to get a picture in the Angelica Kaufmann style. Here is both a sketch of his model and a photograph of his model in his pocket-book, and here, too, is the model herself ready dressed for the part she is to play. The picture has been thought out from beginning to end, and in ten minutes from this, it will be taken. Our friend has simply to place the model in its surroundings, to see that his idea is carried out as he projected, and the thing is done.

The room is admirably adapted to his purpose—that is why he has chosen it. At the back of his camera is a big bay window of clear glass, fifteen feet across, that lights the room admirably, while a second smaller window which comes into the picture supplies supplementary light, and adds much to the pictorial effect. The walls are five feet thick where this little window is, so that Mr. Robinson can show you the strongly-lighted embrasure of the casement, without showing the light itself.

He gives an exposure of twenty-five seconds, using, of course, a gelatine plate. It is a 15 by 12 picture, and he employs Dallmeyer's rapid rectilinear. With a quick eye he notes certain shining points in the room, and either removes them or covers them up. "One matter is particularly important," says Mr. Robinson, "in these interiors; you must always see that your base-board is perfectly level."

We note two other points in Mr. Robinson's manipulation. One is that his dark cloth never slips off the camera. Near one edge of the cloth, sewn on to the binding, is a piece of elastic webbing, making a loop through which the lens is slipped when the cloth is thrown over the camera. The cloth is then always in its place. But the elastic band does not alone do this; it fulfils a yet more important function. The employment of very sensitive plates has caused photographers to be very careful of their apparatus, and Mr. Robinson has found that the Waterhouse diaphragms he is using admit light sometimes sufficient to fog his pictures. For this reason he takes care that his dark cloth during exposure shall always cover the slit in the lens above the diaphragm, and this is done effectually by means of the rubber webbing we have alluded to. In response to Mr. Robinson's invitation, we examined his camera when capped, with and without the cloth clasping the lens, and the admission of light was to be remarked at once. We cannot, therefore, too strongly advise photographers to follow Mr. Robinson's example in respect to his dark cloth arrangement.

The other point we noticed was in connection with the withdrawal of the slide when it comes to exposing the plate. Mr. Robinson uses the modern arrangement, whereby the slide is withdrawn bodily, but to be quite sure there shall be no entry of light during the operation, he makes use of a broad velvet sleeve, through which he pulls the slide. By adopting these two precautions he always secures clear and bright negatives with the most sensitive emulsion.

You ought to know so well what you want, and what you mean to do, that when you set up your camera indoors or out-of-doors, there shall be no delay in taking the picture. So thinks Mr. Robinson; and for this reason he goes to work without a camera in the first place. Having certain "suggestions" for pictures in his sketch-book, he looks about him for subjects to help him carry them out. A rustic bridge, a brook, a tangled thicket, a corner in the wood, whatever may be the subject that strikes him, he notes it as a suitable scene or background for a picture. He makes up his mind, in a word, how to carry out the various ideas he may have, and so it comes about that when he takes his camera in hand, he can, accompanied by his attendant models, secure half a dozen good pictures in the course of a still and sunny morning.

Every painter possesses a model wardrobe—not theatrical frippery, but worn garments of unconventional character—and the photographer who would make pictures must needs have the same. The best costumes are those purchased direct from country people "off their backs," so to speak, and there is no artist who has not at some time or other been compelled to bargain for a garment. As we have said, the peasantry in England unfortunately are now-a-days rarely seen in their old-fashioned costumes, and hence, if you desire to compose a picture, whether you are painter or photographer, you must be in the possession of suitable costumes wherewith to clothe your models when you have found them. Mr. Robinson makes use of coffee (an ordinary decoction of it) for tinting many of his white costumes, and rendering them more amenable to photography.

Making photographic pictures is pleasant work, so far as we can judge. The merry models—a troupe of laughing girls in picturesque costumes—run helter-skelter across the park, full of gaiety and fun, now scaling fences, now jumping ditches. Fortunately Mr. Robinson has a liking for lightsome pictures, and if his "merry tale" is not a success, we undertake never to pass another opinion. If there is genuine fun reflected in it—and we believe every spectator will say so—it is because the conception of the picture is not less good than the carrying of it out. There is laughter in all degrees depicted in the picture; it runs right up the scale in the girls' faces, from a smile to a scream.

"Come and see my dark-room," says Mr. Robinson. To change half a dozen 15 by 12 plates at a time, obviously requires some care; but Mr. Robinson does it without the least misgivings in the extemporised laboratory he has here provided. It is a room containing a single table, and having a door that opens into a passage, lighted from end to end, and not with a cross light. There is a double casement in the room, but half of it has been blocked up with thick brown paper, of which Mr. Robinson carries a plentiful supply. The other half of the window, measuring twenty-four inches by eighteen inches, is covered by two thicknesses of ruby fabric. This affords protection enough if the sun is not shining directly on it; in that case another ruby sheet, together with a sheet of yellow paper, are added. "There is nothing like darkness," says Mr. Robinson; "you can then take your time over these big plates, and need not hurry." But it is under the door that the most injurious light is apt to enter, and, to prevent this, our friend makes use of brown paper again. On the threshold he simply lays a piece of this pliant material, so folded that an upright edge one inch in height runs the whole breadth of the doorway. The door shuts against this ridge, and stray daylight is effectually shut out. A strip of brown paper may also be fastened against the door-post, should the precaution be necessary. "Brown paper is one of the most useful articles a travelling photographer can carry," sums up Mr. Robinson.

Working pictures of large dimensions necessarily involves much heavy baggage, and we note as one item that the five dozen plates with which Mr. Robinson has provided himself are contained in a case the weight of which is marked on the outside—1 cwt. 1 qr. 5 lb.

The "By-the-Bye" next week will be "A Tour in the Tyrol with a Camera."

SEASON PHOTOGRAPHY.

BY ALEXANDER BULEY.

It is a remote, out-of-the-way lace indeed, that is not represented by or known to photography; and let the place be ever so much out of the way, although circumstances will not permit of a resident photographer, he is nevertheless a known character, for what place is there having a name that does not know the itinerant photographer?

There is the fashionable watering-place, in which are several establishments fitted up regardless of expense, and where the inhabitants alone ensure a business, leaving out the visitors altogether. Such places are, no doubt, season places, but it is not of such that I intend writing. I have in my mind's eye a place that is very beautiful indeed, and a place that I wish I could do justice to descriptively. It is away from the haunts of men, and, comparatively speaking, is to the general tourist unknown. But out-of-the-way places like this are gradually unearthed, and, what with the railroad and the press, they get more and more known in time. Unlike the fashionable watering place, here you depend entirely upon the visitors for custom, and they are not here to-day and gone to-morrow; it is a little worse—they are here to-day and gone to-day. I have had some experience of the class who get photographed at these places, and it is curious to remark how they treat you as though you and all your belongings were liable to leave the place perhaps an hour after they have driven off. Hence, they say in a very significant manner, "Upon receipt of the photographs I will send you P.O.O." I used to think I ought certainly to have the money first; that I was the stationary party, and they were the fleeting folks, who came from goodness knows where, their addresses being some lodging house at the nearest watering place. As a rule, I have always let them have their own way, and I am glad to say I have lost very little by so doing; my losses being traceable to quite another source.

When I started photography in my quiet season place, I did it with the idea of supplementing my income; so after building a studio, furnishing it, and procuring the necessary apparatus, the next thing to do was to engage an efficient operator, having other work to do myself. How devoutly I wish that all operators were proprietors, and all proprietors able to do their own work!

My first operator I took as a partner, share and share alike. The result was not satisfactory—at all events, not to one of the partners. The hotel, with its beautiful grounds, in which we photographed our groups, pic-nics, &c., was too near, far too near, for the health of my next operator. Then, after two or three years of much worry and little profit, I at last got one who was able, quiet, intelligent, gentlemanly, and a teetotaller: he left me for something much better than photographing. Then I determined to do without one, and take my chance of doing what I could in between whiles. It was here that I realized to the full the benefit and luxury of gelatine dry plates—always ready, never hurrying for fear the plate would spoil, and always knowing that the chances of the group moving were reduced to a minimum through the rapid exposure I could give. The most difficult folks to photograph are those ladies who are everything that art and dress can do to make superb, but who are never less than a certain age. To such the camera is a most uncomfortable detective; it is like the strong-minded party who considers it a duty to speak the truth, the whole truth, and nothing but the truth, in season and out of season. She complains that the photograph makes her look stouter than she is, and goes on to say that up till then she certainly thought she had a neck as well as head and shoulders. What are you to do? You know perfectly well that the photograph is a good one—a good likeness and in good position—and had she been twenty years younger, and with the twenty years of accumulated fat removed, she would have been charmed with it. But you can't tell her so.

Fortunately, all the customers at a season-place are not stout old ladies; there are bevies of beautiful girls, full of fun and frolic, with their attendant swains. And how well they know how to pose themselves. One would almost think that they knew they were beautiful, and had really studied how they looked best. They are a picture now; but will they keep still? Oh, gelatine, I have much to thank thee for! Not that stop, the next size larger, and two out of every three are unconscious that the work is accomplished.

Another group I like to have is the parson and his choir. That group is made up of men and boys, with a few friends thrown in. One reason why I like them so much is because, photographically speaking, they are always so well under control; another is because they always seem to me to enjoy themselves so thoroughly. They are not quite so easy to pose as the pretty girls before mentioned; but that done, they make a happy group. The jolly parson runs and jumps and tumbles with the youngsters, and takes his real pleasure out of the pleasure he gives to them. He has his pet, too. In that curly-headed little chap, posed somewhere between the parson's knees, you recognise him. He was playing leap-frog just now on the green, and making huge efforts to leap over the parson's back, but never succeeding. He, of course, is looking at the camera, his face all wonder and pleasure. There is generally another picture to take of the friends, with the boys left out, so that I look upon the parson and his choir with especial favour. There is not much actual studio work in this season-place, always excepting the servant-girl, who thinks as much of the property chair and the curtain being in the picture as she does of her portrait; and the gentleman who tells you in strict confidence that he will "come up some *night* after milking's over, and have one done something like this here." It is practically all out-door work, mostly done in this romantic garden, with its leafy bowers, its grottoes, its shady walks and sparkling fountains, through all of which a stream meanders, cooling the air around.

There is, however, one other source of work and profit to the season photographer, which is the photographing of drags, tandems, &c. This, of course, has to be done just as they are about to start, and the driver is on his box, whip in hand. This kind of photography is not always of the easiest. In the first place, it cannot be done—as I have said—till they are about to start, when the light is nearly gone. Again, horses just about to *return*, feeling the coachman is on his seat, are impatient to be off, and you must be careful what you are about. Once more, and for the last time, let me praise thee, O gelatine! for my more than friend, those prancing, anxious steeds succumb to thy marvellous power.

SOME NOTES ON THE DEVELOPMENT OF DRY PLATES.

There has been a singular difference of practice between French and English photographers in their treatment and development of dry plates. In the manufacture itself England was certainly first in the field, and dry plates had come into extensive use here long before the Continental photographers had grasped the conveniences and the extraordinary merits of well-prepared gelatino-bromide emulsion.

The photographic profession seems to be singularly prone to a "follow-my-leader" style in conducting their business, and this is illustrated by the manner in which they have, as a body, gone in the groove originally ploughed out, by sticking most pertinaciously to the development of gelatine plates with pyrogallic—pyrogallic in many forms and with many modifications, but still the original, all-powerful pyrogallic. At one time almost all the dry plates used in France were exported by English makers, and it was only the absolute and total failure of our English makers to supply their French clients, as well as their home ones, that threw the French trade, not into the hands of a Frenchman, but into those of an energetic and clever Belgian—to wit, Dr. Von Monckhoven. He, as a sound chemist and thoroughly practical man, soon saw that his account lay in making the development of his dry plates easy to the Frenchman—not only easy, but pleasant. He knew that a French operator does not like staining his fingers, trying his eyes by measuring minute doses of bromide or of liquor ammonia, so in his instructions he boldly threw pyrogallic over altogether, and insisted upon ferrous oxalate, which had just at that time come into vogue in England.

Dr. Von Monckhoven put his French clients into the ferrous oxalate groove, just as our first English makers put their clients into the pyrogallic groove, and both nations have, as a rule, stuck to their respective grooves, the only difference being, that whereas the Frenchman has a process which is simple, easy, and cleanly, the Englishman has adopted one which is neither simple, easy, nor cleanly.

But it may be said, and is said: "Oh, but you have not the power over the negative with ferrous oxalate that you have with pyrogallic; you cannot possibly produce such fine results!" Well, the sayer of these things has probably not seen the splendid work of Walery, of Van Bosch, of Reutlinger, and of hosts of other first-rate photographers, not only in Paris, but in the provinces, and who none of them ever touch pyrogallic.

Everybody knows that the majority of the dry-plate negatives taken up to this time in England are stained. Is the stain an advantage? Does it add anything to the quality of the resulting print? By no means; it is as ugly to look at as it is prejudicial to the progress of business. See how it retards the printing; how much more time and labour—which means money—does it take to get the work out of hand! Why, then, is it used? Simply because we are accustomed to use it, that is all. But English photographers don't like a stained negative, after all, and so the pyrogallic must be tinkered up with something to prevent it staining. Mr. Berkeley finds that sulphite of soda will enable a plate to be developed without stain; so the pyrogallic is still kept on, and sulphite of soda comes in to play its part in the comedy. Many try it, and the diversity of opinion about its merits is not a little remarkable; but it does one thing—it prevents staining; but that does not seem to be certain, as one gentleman found it gave green fog; but, as there seemed to be a concurrence of opinion that the fog was somewhere else, this idea may be put aside. So sulphite of soda is a remedy for yellow stain. But has anybody tried what else it will do? Has anybody pointed out how it slows the development? Let anybody put a plate into his camera, or expose it in his sensitometer, if he has one, and then cut it in two, and remark that, if he develops one-half with the pyro-sulphite formula, and the other half with ferrous oxalate, he will promptly discover that he would be able to develop three plates with the latter whilst he was coaxing up one with the former, and that, in all probability, he would get more detail and good quality with the ferrous oxalate than with the pyrogallic, with a total absence of stain, and have in every way a better result.

"But," we are told, "you have no power over the ferrous oxalate developer." That is entirely a mistake; if your picture is supposed to be over-exposed, a trace of bromide will retard the action of the developer to any extent that may be desired, and give golden opportunities for coaxing a faulty plate into decent printing quality. Still, pyrogallic has its uses; in the competition to supply the market with cheap plates, some makes are very low in price—so low, in fact, that to give good glass, a sufficiently thick coating of bromide of silver, and pay sufficient wages to secure skilful and trained labour, is impossible—that is to say, impossible with any notions of a profit hanging to the transactions. Now as nobody works without some hope of reward in the shape of pounds, shillings, and pence—at least, commercial dry-plate makers do not—there must come some profit from somewhere, and it comes from the difference in cost between cheap and inferior glass, and good glass; it comes out of the saving made by a thin, stinted coating, as against a good and sufficient one; it comes out of the wretched payment made for plates prepared anyhow, and plates prepared by careful hands earning good wages. For cheap plates pyrogallic has its advantages; by its means a thin plate may be coaxed up into something that will pass muster, and if it takes three times as long to print, why it is all in the day's work.

But is the ferrous oxalate development as easy as it is stated to be? A description of the best way to go to work will show that it is simplicity itself. Procure two large common jugs, over the tops put two pieces of common coarse muslin, or strainer, so that they hag into the jug; now put a quantity of neutral potassium oxalate into the one, and a quantity of protosulphate of iron into the other, fill the jugs up with warm water, leave them to get quite cold, and the two are ready for use—take care to have always some undissolved crystals left in the bags. Before commencing to develop, mix a sufficient quantity for the day's work, in the proportion of one part of the iron solution, stirred into four parts of the oxalate.

To develop, simply put the plate into a shallow tray, and send the developer over it at once; the details will soon begin to appear, the plate gradually grow up to density; when sufficient, take it out, raising it with a quill pen pushed under the edge, or a piece of wood cut to an edge, and rinse well under the tap. Then—throw the developer away and commence afresh? By no means! Put another plate into the same developer; it will take a shade longer, because it is impossible to eat one's cake and have it; and equally impossible to use a developer and not take something out of it; but a second and a third plate can be developed in the same solution just as well as only one.

But, to do the thing properly, get a vertical dipping-bath, fill it with ferrous-oxalate developer, and simply put the plates in, one after another. A couple of people, with half-a-dozen baths, could develop about a gross of plates in an hour, and never have a failure. Surely nothing can be more simple and easy than this.

There is one advantage, however, which pyrogallic has over ferrous oxalate, and that is, pyrogallic exercises a tanning influence upon the film, and therefore a film is less likely to frill with pyrogallic than with the oxalate; but this is remedied at once by putting the plate for a minute in Mr. Cowell's solution of—

Alum	2 parts
Citric acid	1 part
Water	10 parts

This will make the film perfectly safe, and eliminate the only possible objection that can be made to this cleanly, easy, and simple method of developing dry plates with the ferrous-oxalate developer.

One other advantage has been nearly overlooked, and that is, that plates developed in this way take the pencil for retouch much more kindly than those developed with pyrogallic; there is a delicate tooth upon them which makes working very easy and pleasant.—*Autotype Notes.*

AN EXHIBITION OF PHOTOGRAPHS IN NEW ZEALAND.

In speaking of the Exhibition at Christchurch, New Zealand, the *Otago Daily Times* thus criticises the photograpic section:—

In this branch of art the exhibits, although not very numerous, comprise a fairly representative collection from different parts of the Colony, and an opportunity is afforded of comparison with the work of two leading Melbourne photographers. Several specimens are also shown from English studios, but these can scarcely be placed on the level of equal criticism with the Colonial productions, seeing that they have for the most part been executed for commercial purposes, and have not received the same amount of finish as has been been bestowed upon the latter class. We allude more particularly to the exhibits of the London Stereoscopic Company, which, although good, are by no means fair average specimens of Home work. It is to be regretted that in so large a building the management has not thought it advisable to set aside a space exclusively for the photographic exhibits, which would in that case be easily available for inspection and comparison. As it is, the idea that has been followed appears rather to be to utilise the various frames for the purpose of decorating any blank space there may be, entirely irrespective of classification. The visitor, in consequence, stumbles unexpectedly upon photographs in the course of his peregrinations, and has probably forgotten whose they were, and what they were like, before the next collection meets his eye in some out-of-the-way corner. It was originally intended to set aside one of the octagons in the New Zealand portion of the building for the reception of photographs; but this idea has not been carried out, only two exhibitors having placed their frames there.

Among the English productions most worthy of attention is an exhaustive series of views by Messrs. F. Frith and Co., of Reigate, Surrey. These are not confined to any particular locality, but include a long list of places and objects of special interest throughout England and the European Continent, and are, as works of art, far and away better than what can be found in nine out of ten of the studios of English landscape photographers. The interiors of many of the most celebrated cathedrals throughout Europe have been reproduced with specially good effect, the arrangement of light in almost every instance being extremely striking. One view, in which Messrs. Frith have been more than ordinarily successful, is the celebrated "Salon d'Apollo in the Louvre," an apartment the gigantic dimensions and elabourate decoration of which will be remembered by many Continental travellers. This, among some hundred specimens of the same class of work, may be singled out as a fair sample of Messrs. Frith at their best.

Amongst the English exhibits may also be mentioned some portraits shown by Mr. H. Chatteris, of Christchurch, from the studio of J. E. Mayall, London and Brighton. These photographs possess the novelty of having been taken by electric light, and are interesting as an example of the utility of this for photographic purposes. It is safe to say that no ordinary spectator would recognize in them any deviation from the usual process. They are soft—perhaps remarkably so—and as distinct as could well be desired. Mr. Chatteris has also specimens of instantaneous photography.

To turn to Colonial productions, we have from Messrs. Lindt and Co., and Tuttle and Co., of Melbourne, excellent collections; the latter sending enough frames to fill an entire bay which has been allotted to them. These consist principally of photographs (boudoir size) of celebrities on the dramatic and operatic stage, and leave very little to be desired in any direction. It is difficult, indeed, comparing their work with that of Messrs. Lindt (which, by the way, is placed in a totally different part of the building), to arrive at any decisive opinion as to their relative merits. The latter show, perhaps, on the whole, greater nicety of finish, and include, moreover, specialities—such as enamelled portraits and specimens of instantaneous photography.

On turning to New Zealand, however, it is but fair to say, without the slightest partiality, that it suffers in no way by comparison with older countries in this particular branch. There is no reason, on reflection, why it should, as the light during a great portion of the year is such as to satisfy the most fastidious artist. For portraits, Messrs. Morris and Frost, of Dunedin; Hemus and Hanna, of Auckland; and P. Schourup, of Christchurch, are the principal exhibitors. Mr. Schourup fills a large case and frame with work that really invites a very lengthy inspection, but where he chiefly commands admiration is in specialities—such as permanent carbon photographs on opal, and in the artistic display of colouring that is made. His are almost the only specimens of coloured photography in the building, but it is safe to say that no one would in any case have succeeded in wresting the palm from him in this respect, had an attempt been made. A careful comparison of the other three exhibitors leaves not much margin for choice, the work of all being excellent. The two frames shown by Mr. Morris, however (which are hung on either side of the entrance arch), have, on the whole, taken precedence in public favour—and deservedly, we think. They show not only softness and depth of tone, but an elaborate finish that is not surpassed, if indeed it is equalled, by any exhibitor in the building. Those sent by Mr. Frost, which are found some distance away in the Auckland octagon, save in this latter item, are by no means unworthy of comparison. They represent the best work that we have seen from his studio, and are certain to meet with favourable attention. A novelty is also on view here in the shape of several portraits enlarged by a new process, in which, considering that this is its first introduction into the Colony, Mr. Frost has been singularly successful. The process, which we cannot profess to have entirely mastered, has the effect of producing an enlargement the exact counterpart of the original, but resembling at the first glance a lithograph rather than a photographic picture.

In the way of landscape photography, a series of good views of the Lake country are sent by Messrs. Hart, Campbell, and Co., of Invercargill; whilst Mr. Burton, whose proficiency is well recognised, has hung in the concert-hall a collection of photographs of the Purakanui cliffs, showing the line of railway completed and when in progress. These, we believe, were executed for the Government, and have received all the skill and attention that always mark Mr. Burton's work.

Notes.

An International Exhibition at Berlin is talked about.

A company of Royal Engineers at Chatham has received orders to hold itself in readiness for service. The men include proficients in photography, telegraphy, lithography, printing, and other technical arts.

The Berlin Photographic Society has followed the example of the Society of Great Britain as regards extra meetings; a series of social Thursday evening assemblies being announced for the Autumn recess.

Mr. Jones, of Plaistow, finds that a very simple method of preventing halation is to rub the back of the plate with glycerine, and then to lay on a piece of black velvet rather smaller than the plate. If this method is as effectual as that of Dr. Fol, there is a decided gain as regards simplicity.

A strange revelation was made in court last week touching a prisoner brought up for sentence. The chief warder of Wandsworth prison stated that the delinquent in question had "refused to allow himself to be photographed, and had been flogged in consequence, in accordance with the prison regulations." If the prison rule now insists upon the photographing of prisoners immediately after conviction in their ordinary attire, it is a very wise one, for such portrait is far more valuable as a record than the regulation picture of a convict in his grey suit, with cropped head and shaven jaw.

There is rarely any difficulty about photographing the prisoner at the end of his punishment. Practically, no man or woman serves full time, but in some cases is permitted freedom many months before the expiration of the sentence. But this indulgence is only granted if the prisoners obey the regulations, and one of these is to the effect that they shall be photographed shortly before release.

That wonderful phenomenon, known as the mirage, is a sort of sea-serpent in the world of science. It appears year after year, and is described with vivid exactness by all who witness it, and yet one never seems to get at the rights of it. Sir David Brewster has described the why and wherefore of the phenomenon; he ascribes it to refraction due to unequal temperature of different atmospheric layers; but it is a thing that must be taken a good deal upon trust. According to *Nature*, Sweden sees more of the phenomenon than we do, whole landscapes, cities, and castles, with moving objects, being sometimes reflected on the sky for hours.

Only last month a mirage of this kind was observed over the lake of Orva. In the heavens were reflected "a number of large and small steamers, as if plying on the lake, and from whose funnels even the smoke could be observed to rise. Later on the scene changed to a landscape, the vessels now taking the form of islands in the lake, covered with more or less vegetation, and at last the mirage dissolved itself in a haze. The phenomenon, which lasted from four to seven o'clock p.m., is said to have furnished a most magnificent spectacle." When somebody has been able to secure a few photographs of the "magnificent spectacle," there will be less incredulity felt on the subject of the mirage.

Speaking of literary *ré-unions* in Paris, the *Daily News* the other day gave some examples of the gossip that goes on, and it is interesting to know that *litterateurs* are looking anxiously towards photography as a ready means of illustrating their works. "You hear," says our contemporary, "the company exchange a lively cross-fire, in which such words as 'Helio-gravure,' 'Photo-gravure,' 'Gillotage,' and 'Woodburytype,' are the smallest projectiles thrown. It is a burning question, for we are to have a charming little pastoral scene of Moreau done for the next annual, and by what process is it to be done?"

When referring to Mr. Grant's Arctic voyage, we mentioned the fact that a circle of Polar observing stations were in course of establishment by various European nations. The arrangements for these are now complete. A few weeks hence a complete ring, consisting of twelve scientific stations, will be formed around the North Pole, and they are to be in operation from August 1st of this year to September 1st of next. The British station is to be established at Fort Rae, on the Great Slave Lake, in British North America, Captain Dawson, R.A., being in command of it.

The observations, which will be strictly carried out through all the dark and perishing cold of a Polar winter, include Arctic meteorology, magnetism, and astronomy. They will begin simultaneously at all stations, and be carried out on a system agreed upon by all nations taking part in the arduous work. America has stations in Discovery Harbour, where Sir G. Nares wintered in 1875-6, and at the most northern point of Alaska. Russia has established herself in the extreme north of Siberia, where the ill-fated *Jeannette* expedition was found; Austria goes to the north-east of Iceland; Denmark to Greenland; Holland to North West Siberia; Sweden to Spitzbergen; Norway to North Cape; and Germany to Davis' Straits.

It is pleasant at a moment like this, when many of us are preparing camera and dry plates for a tour on the Continent, to learn that in Belgium, at least, travelling Britons enjoy a better character than formerly. Englishmen used to be so wrapped up in their country that they could do nothing but breathe England, think England, and talk England. Our contemporary, the *Bulletin de l'Association Belge*, seems to bear testimony to the contrary; they never do it now

But then, it is only fair to say, he is delighted with all the world, and has an idea that a Belgian may well pass for a Frenchman, since the former does not think and talk Belgium on his travels. In a word, he would have us believe there are no such beings as Cockneys now-a-days beneath or beyond Bow Bells.

It is suggested that photographers should utilize their old hyposulphite baths for cleaning tarnished silver or plated articles; mere immersion and friction with a cloth being required, while the old bath is made richer in silver at the same time. The use of an old cyanide bath for a similar purpose is objectionable on account of its poisonous qualities.

Mr. Charles Watkins, whose portraits of theatrical celebrities especially, have made his name a household world for a score of years past, died on Monday in last week after a two months' illness. Mr. Watkin's work was always well done, and it is not so long ago that a negative of the Prince of Wales in Masonic costume, he had taken, was sold to Messrs. Marion and Co. for £180, and this, too, after a large number of impressions had been taken from it. Mr. Charles Watkins was more known in the theatrical world than among photographers; but he was "good company" everywhere, and won troops of friends by his amiable, light-hearted bearing.

Magnetical observations will soon be resumed at the Paris Observatory in subterranean chambers which have been, says *Nature*, excavated in the newly-annexed grounds. These observations will be self-registering by photography, in conformity with the instruments established by M. Mascart at the Collège de France. Direct observations will also be conducted with the old instruments which were used by Arago, which were famous for his prognostications of Auroræ, at a period when, the electric telegraph not having been invented, many days elapsed before the arrival in Paris of news from the northern parts of Europe.

Opinions are rapidly changing on the subject of photographing paintings. Mr. Bingham, who was one of the cleverest men in this most difficult branch of photography, was compelled to migrate to Paris some years ago for the simple reason that there was no work for him to do in this country. Fifteen years ago an exhibitor at the Royal Academy would not permit his picture to be photographed under any circumstances; now there is scarcely a painting on the walls that is not reproduced by photography. According to *Truth*, the principal pictures in the gallery at Buckingham Palace (where there is one of the choicest collections of Dutch paintings in the world) are about to be photographed by the representatives of a Berlin firm, who have obtained permission from the Queen through the good offices of the German Crown Princess.

There is a project for attaching to each of our Coastguard stations and light-ships a few carrier pigeons, or rather homing pigeons—for the so-called carrier is an impostor, and could not fly a dozen miles to save its life—for the purpose of conveying intelligence in times of danger. In France, homing pigeons have been a Government institution ever since the siege of Paris, when they carried the micro-photographic despatches out of the capital so successfully. Indeed, if "pigeon conveyance" is to be established by Government in this country, it would be well for our Post Office to learn something about the preparation of these micro-photographic despatches as well; knowledge might prove useful one of these days.

Photographs upou porcelain! Sleeve-links eight shillings a pair; pipe-bowls, five shillings; serviette rings, five shillings; tombstone plates with suitable inscription and initials in black and gold, by agreement; beer glass tops, five shillings; ash-trays, five shillings; card baskets, five shillings; letter-weights, nine shillings, &c., &c. Thus, in the price-list of an energetic firm in Frankfort which seems to provide photographers with everything, from lessons in the art of retouching, to Mr. Woodbury's luminous photographs.

TWELVE ELEMENTARY LESSONS IN DRY-PLATE PHOTOGRAPHY.

Conclusion.

In conclusion we have but little to say. We have endeavoured in our "lessons" to give as clear and as practical instructions in the various manipulations connected with negative making and printing as possible. It must be understood, however, that few rules or instructions appertaining to photography are absolute; they are all varied by circumstances. All that can be done by written instructions is to guide the intelligence of the beginner. When he ceases to be a beginner, he should depend on his own intelligence and faculty of observation more than on any instructions.

Let the beginner not be discouraged by failure. Failures he is certain to have. Even the most experienced fail occasionally, the majority more ofteu than they are willing to allow; and if they do not always succeed, it is unreasonable for the tyro to expect to do so. Nevertheless, he should aim at perfection, and should not be satisfied till he reach it. Let him remember that at least in landscape work no amateur need despair of reaching the highest degree of perfection. Amateurs and professionals compete continually against each other, and the former as often as not carry off the palm.

The young photographer should, from the first, exercise his faculty of observation, and note the most minute departure from received rules. There are few departments of science in which there is so wide a field for investigation as in that of photography, and even the veriest tyro, if he observe closely, may add his mite to the mass of knowledge, which has been built up, for the most part, of such mites of observation freely given to "the brotherhood" by those who have made them. Frequently, a fact noticed by one comparatively inexperienced in photography may give the hint to a more experienced investigator, who may make good use of it.

Another thing to be impressed on photographers is that they should not fear to give others the benefit of their observations merely because it is possible that similar observations have been made before. It is sufficient that a fact is not generally known or appreciated to justify its publication, and the oftener it is published until it is appreciated, the better.

We have before remarked that, if the beginner can get the help of a photographic friend, he will find his first labours much lightened. We would now urge upon him that, whenever he has begun to feel his way, he should, if possible, join one of the numerous photographic societies which there are in the country. Let him not suppose that he will meet with ridicule or contempt on account of his comparative ignorance. We were for some time ourselves deterred from joining a photographic society for such a reason; but, on attending the first meeting, all our fears were dissipated. The terrible "professional" whom we had dreaded to meet we found to be a most kindly individual, willing—nay, apparently anxious—to give what aid he could to anyone who asked advice or assistance from him. In this respect we believe photographers are different and superior to most other professional men. An amateur architect, or engineer, or doctor would by no means meet with the same kindly reception from professionals at the gatherings of their societies that the amateur photographer does at the gatherings of societies composed chiefly of professional photographers.

Finally, we repeat our advice, that the reader, while he is still unfamiliar with the various manipulations, follow to the letter our instructions; but that when he begins to feel his way, he trust to his own intelligence as his great guide. If he do so, we are sure that from the time the first succeeds in producing by development *something* on his plate, till the time when he has arrived at such perfection that he need not hesitate to hang his pictures on the walls at photographic exhibitions side by side with those of the first photographers of the day, he will feel that every step in advance which he makes is a triumph, and will find his work—or play, as he likes to consider it—a more absorbing and delightful one than almost any other that he could have taken up.

Let him bear in mind that every operation is but a means to an end (the end being the picture), and that *any* means that conduces to the end is permissible.

We would fain carry him on to more advanced branches of the art-science; we would with pleasure instruct him in the various methods of producing permanent prints, and in the delicate manipulation of vignetting and combination printing from two or more negatives; in the mysteries of enlarging, and in the thousand and one various manners in which the end—a picture—may be produced from the photographic beginning—a negative; but such is without our limits, and we recommend those who wish to go deeply into the matter to read diligently any of the several excellent and complete manuals or text-books on photography which exist.

We believe that we have filled a little gap in photographic literature—that we have produced the first set of instructions for working modern dry plates which presupposed no knowledge of any other photographic process.

ODD JOBS.

BY THE AUTHOR OF "LOOKING BACK."

No. 10.—A Grave Subject.

What is it that has not been photographed? From a lamp-post to a love-letter; from a spirit fresh from the unknown world to the great sea serpent; from a housemaid's broom to a three-masted ship—all have had their turn before the camera. Lions and horses on the rampage; trains going like greased lightning; obstreperous convicts; "found drowned" and corpses in private life by the thousand. The latter is the craze that astonishes me. It shows as deep a morbid hankering, in my estimation, as those who travel miles to look at a house where a murder has been committed, and go away happy if they can secure a bit of plaster or a chip of brick off the ill-fated house. How the relatives can bear to look upon these photographs I cannot understand, unless they have a peculiar love for the horrible. For my part I cannot see the necessity of photographing the dead at all. If the departed were truly beloved, nothing that may happen in this world can ever efface the dear features from the mind's eye: it needs not a cold, crude photograph representing the last dreary stage of humanity to recal those lineaments. Indeed, I should imagine it would in time lead to the forgetting of the pleasant smile or the lightsome laugh, and supply, in place, a ghoul-like resemblance of anything but a pleasant nature. Then look what cold blankets these photographs prove! If a pleasant party is assembled and the family album produced, just observe how the fun collapses when one of those buried subjects turns up! Do what you like, the rest of the evening has a shadow on it. Perhaps they serve the same purpose now as the mummy did at the Egyptian feasts, but——yes! we would rather not, thank you!

There is one kind of photograph in connection with the dead that the most fastidious can find no fault with, and that is, photographing the memorials in God's Acre. That there is something sad even in a tombstone, no one can deny; yet a tasteful design, a touching epitaph, the green sward, the flowers planted by those loving hands, rob the picture of the ghastliness that accrues to the corpse, let it be ever so pleasant, as the Mrs. Gamps and Harrises always declare them to be. Along with other things, I have had my share of work in grave-yards. It is a strange sort of work. I never met with the party yet that did not strongly object to having any of the surrounding tombstones introduced into the picture—no, not a particle of another. They must have it by itself, and show a space around, as if it were a select tomb in the world.

I remember the first tombstone I went to photograph. It had something to do with a family squabble over the tenantry of a farm. What was fun to me might have been death to them; but the spring morning, with its cheering, bracing air, the fresh buds peeping from the hawthorne hedges, and the birds carolling around, made that "grave subject" a holiday for me.

Not long ago I was in Sussex, and received orders to get our dark tent ready, and a dozen 8 by 10 dry plates, and start for the country to photograph the new tomb memorial erected over the remains of the second wife of one of the richest wine merchants in London. Everything being ready, I started alone, as I considered that I could manage such a steady "subject" easily without help. When I was shown the "token of love" placed by the bereaved over the ashes of the dear defunct, I was a little more than astonished. It was of colossal proportions, and all of pure Parian marble. Six angels supported the leaf of the tablet, whereon were inscribed in sorrowful terms the names, births, deaths, and marriages, of his departed spouses, intermingled with quotations from Scripture. Above this tablet rose a splendid draped figure of a female, her left hand hanging by her side, and grasping a scroll with the warning words inlaid in gold, "*Tempus fugit!*" while with her right hand she pointed to Heaven.

There was no doubt this wine merchant had put up a splendid advertisement. On one side was a dark cypress; behind was one of those blood-red weeping willows. I saw that I could make nothing worthy of it until the sun had two hours passed the meridian, so I thought I would have a look through the churchyard.

It is a curious place to find fun in; yet, in a queer corner, I found a dark grey stone in wonderful preservation, that made me at once turn back for my camera. In the corner where this stone was, the grass grew over a foot in length. I had to go and stamp it down so as to get all the inscription. I had to pick off the moss and the green fungi. I exposed a dry plate two seconds, and, singular to say, some of the words I could not make out upon the stone, I was able to make out distinctly on the plate: the plate is thin, and unless very carefully printed, gives a hideously black print. I have often remarked how much detail a dry plate will show when held against tissue paper, looking for all the world as if it would make a print that nothing could equal, and when put to the test, the fine detail disappears, and the deceptive thing gives you a black and white result that is really most galling. This grey stone was in memory of a "John Stone, aged 70," and the epitaph ran as follows :—

"My sledge and hammer lie reclined ;
My bellows, too, have lost their wind,
My fire extinct, my forge decayed,
And in the dust my vice is laid.
My coals are spent, my iron gone,
My nails are driven, my work is done."

Not bad for a village blacksmith !

By-and-bye I returned to study the light on the "job" I had come upon. I sometimes take a pipe when I am at out-door work, and, feeling so inclined, I thought I could not do better than to light up ; so, seating myself upon a flat tombstone, I puffed and stared at the dazzling monument, until I was fain to wheel myself round to ease my eyes. When I did so, I found that I was facing a part laid off for children. The nearest of these little mounds to me had a small dome-shaped black board, with white letters upon it. For some time I could not make out the letters, the glancing of the sun upon the £1,000 worth of marble having dazzled my eyes. At last I made out the two simple words—"Little Johnnie." I involuntarily glanced back at the marble that marked the spot where the wealthy man's wives lay, and then at the little board under which "Little Johnnie" lay, and asked myself what difference it would make to me whether I lay under a canopy of marble, erected through the pride that springs from a full purse, or a board like "Little Johnnie's," placed there through the love that springs from a full heart. Yes, a great difference, and, foolish-like, I chose the latter.

I exposed three plates upon the grand sarcophagus three seconds, six seconds, and eight seconds. The first plate brought forth the details in the tombstone, the feathers in the angels' wings, the inscription on the tablature, and the light and shade on the great figure, splendidly ; but the surroundings were a blank. The next was better as regarded the foliage, and worse as regarded the marble. The third was the one printed from, and, like almost every other subject we may have with a great contrast, it had to be dodged in the printing.

I may mention that I had a row with the wine merchant over his wives' grave ; he very unceremoniously gave me a box on the ear for not dusting the base stone before commencing operations. Mr. Editor, you have never seen me in the flesh to my knowledge, but you have sundry pictures of me that may lead you to suppose that I would not even take a Xmas box without giving one in return, so you will not be astonished to hear that the wine merchant in a very short time regretted his hastiness. He never mentioned the circumstance, and gave a good order. So much for my "grave subject."

HISTORICAL NOTICE OF THE ORIGIN AND PROGRESS OF THE COLLODIO-BROMIDE PROCESS.

BY B. J. SAYCE.*

Some months ago our Hon. Secretary suggested that an exhibition of early work in collodio-bromide might be of interest to those who have only within recent years joined the ranks of amateur photographers. Circumstances then prevented my complying with his request ; but I trust this evening to place before you what will show the progressive stages of the now-called "emulsion process" with collodion, but for which, to convey an idea of its principles, I coined the word "collodio-bromide" in my first description of the process. Before going directly to the subject indicated in the notice convening this meeting, let me briefly trace back to nearly thirty years ago—when I, as a boy, made my first essay in photography.

There were in 1853 amateurs who, notwithstanding the introduction of collodion by Archer, were actually working the slow waxed process, and others who showed the best results, and excellent they were (for especially may be mentioned Mr. Carr's fine collection of Roman views), who employed the albumen process, which, though slow and troublesome to work, is, nevertheless, very hard to beat for gradation of effect, but will scarcely comply with our present demand that photographs shall show life and atmosphere. In producing these it is, or ought to be, our endeavour that they shall not be artificial ; but in this respect our old friend albumen signally failed, for the skies were represented by white paper, the negatives at that point being painted over, and cloud negatives had not come into fashion to furnish effects which might, perchance, belong to lands other than that in which the picture was taken. We have most of us seen photographic prints in which skies, utterly foreign to the subject, have made an imposing show, but have been untrue to nature.

Professional photographers in 1853 were still working the Daguerreotype process, at a charge from one guinea and upwards per impression ; but among amateurs there are those who are ever to the front of the march of improvement, and these began to take an interest in Archer's discovery. Good work was done in the production of collodion negatives a generation ago, but beginners, as a rule, were satisfied with what were then, and perhaps are now, called "positives," but which were really only weak negatives backed up with black varnish.

Before dismissing this topic I will ask you to notice a print from a waxed-paper negative taken earlier than 1853 by Mr. George Thomas, and a print from a collodion negative of the year 1853, now on the table. I well remember that in the spring of that year (stocked with a quarter-plate sliding-box camera, a portrait lens, and a single slide) my first plate was sensitized. Mark well, that prior to collodion, all sensitized surfaces were *dry*, namely Daguerrotype, calotype, and albumen. After collodion appeared we had plates covered with preservative to keep a short time, but yet to be used *moist*—for example, the "honey process," which, if my memory does not play me false, was the method by which Mr. Maxwell Lyte took an impression of a moving figure somewhere about 1853.

We had soon a gallant band of amateurs who produced rapid and excellent results on dry plates prepared with collodion containing a grain or so of resin to the ounce—a very simple and reliable formula requiring no preservative. Those who were members of the Liverpool Photographic Society, from which we are an offshoot, made a reputation in this branch in days when the manufacture of everything but the paper and the glass was compulsory, and the work of him who would follow photography. Let me mention the names of Mr. Jones and Mr. Dutton (of Birkenhead), Mr. J. A. Forrest, Mr. John Glover, Dr. Cauty, Mr. Berry and Mr. Corey (of Liverpool), as belonging to that little regiment of our pioneers in dry-plate collodion photography, and then arrive at my subject proper.

My first hand-book informed me that the sensitive surface was iodide of silver. Now, I happen to know that this substance could be produced *without* the intervention of an iodised collodion and a nitrate of silver bath, and it appeared to me, when I sensitized my first plate in this manner, that the means of arriving at the sensitive surface were more troublesome and dirty than need be, and that the result necessary ought to be more simply accomplished. I mentioned my ideas to a friend (a chemist of experience), and he said :—"You can't do it ; the iodide cannot be held by the collodion sufficiently long to coat a plate evenly." I accepted his verdict as that of a senior, and worked through those troubles with a bath under which many have broken down, until I had come to regard it as a good friend, if managed rightly, but as one of a peculiar disposition which required constant humouring.

So attached was I to it that the first paper read before this Society, in this room, was one by myself on the subject of "The Nitrate of Silver Bath," and I praised it as capable of doing its duty—"like a Briton." But we little know what changes are in store for us, and from working with a forty-grain bath and bromo-iodised collodion for dry plates I advanced to sixty grains and *entirely-bromised* collodion.

In this direction, but unknown to each other, were experimenting also Major Russell and the late Mr. John Glover, the first Secretary of this Association. When comparing notes with the latter at our introduction he mentioned that he had got good results with the bromide alone, and that Major Russell and he had been in correspondence on the same subject. We agreed that it was rapid and admirably adapted for foliage. Mr. Glover,

* Read before the Liverpool Amateur Photographic Association.

however, did not pursue it very closely, but Major Russell followed it up and produced his valuable "Appendix" to his work on "The Tannin Process," in which bromised collodion and a strong bath were brought to a workable process.

I place before you a negative of the Channel Fleet in the Mersey, taken in September, 1863, on a bromised collodion dry plate, instantaneous exposure with a Grubb's D single lens, six inches focus and a quarter-inch stop, as showing of what that process was capable.

Perhaps you may have considered that I have been rambling from my text, but such has really not been the case; for it was this very working with bromised collodion which led me to construct the formula by which the first collodio-bromide negative was produced, the print from which is now exhibited.

The idea of making a sensitive collodion cropped up in August, 1864, in a conversation which has been alluded to in an article on "The Origin of Collodio-Bromide," and it suddenly flashed across my mind that, when working with bromide of potassium as a wash to retard development of bromide plates, I had noticed that bromide of silver was much more flocculent and lighter than the iodide, and it occurred to me that it was capable of being suspended in collodion. Suspension of the iodide had been attempted some time previously, and for this I believe a patent had actually been applied for, but was abandoned as impracticable.

Referring to the tables for the combining equivalents of bromides of cadmium and ammonium with nitrate of silver, I wrote out the formula by which the first negative was taken. This you will find in my note-book as :—

Ether and alcohol, each	½ ounce
Pyroxyline	2 grains
Bromide	3 ,,
Nitrate of silver	4 ,,

I had been using a collodion containing six grains of pyroxyline for my sixty-grain bath, but I thought it would be necessary to reduce this to facilitate the flowing of the emulsion, and you will see that, compared with my later formulæ, the quantity of bromide of silver was also kept low, and for the same reason.

The first negative was taken on Saturday, September 3, 1864, with emulsion prepared August 31, 1864. The press copy letter book (which I exhibit), contains the impression of the letter addressed by me, on September 6, 1864, to Mr. J. Traill Taylor, on handing him the first print in illustration of my article on "Photography Without a Nitrate of Silver Bath," signed by B. J. Sayce and W. B. Bolton.

The second formula was published with my signature only, on September 16, 1864. I show the negative and print alluded to; the negative is marked No. 2. This emulsion contained eight grains of bromide and eight grains of nitrate of silver. It worked cleanly, but was slow. Increasing the bromide and silver I made many experiments, but still worked with little pyroxyline.

The third formula was—

Bromides	6 grains
Silver	8 ,,
Pyroxyline	2 ,,

and the negative and print of the inn and "stocks" at Walton show how it answered.

I finally settled upon an emulsion composed of—

Bromides	8 grains
Nitrate of silver	11 ,,
Pyroxyline	6 ,,

The negatives of Grasmere Church were so produced, and I have been informed that these (which I exposed in the early summer of 1865) gave the stimulus for the first trial of the infant process to members of this Society, which was the cradle of collodio-bromide, and still contains names of those who were its nursing fathers.

The large photographs by our friend, Mr. Osmond R. Green (one of which, the view from Pont-y-pair, Bettws-y-Coed, is now before you), were by the formula of the Grasmere Church negatives.

I will just invite your attention to a 10 by 8 negative taken in July, 1865, during an excursion of this Association to Corwen, on the invitation of its then President, the Rev T. B. Banner; also to a print of the runic cross in Gosforth Churchyard, which was taken on 1st August, 1865. At this period an attack of illness closed my association with collodio-bromide, and separated me, not only from further pursuit of my hobby, but also from meeting in this room with those friends who were always ready to welcome my early efforts with hearty encouragement, which I now most gratefully acknowledge.

Colonel Stuart Wortley soon accelerated the exposure. I venture, with his permission, to show two instantaneous photographs taken on collodio-bromide films. My only approach to the rapidity of wet collodion in this emulsion process was when it was used *wet without preservative* and with *iron development*. I will now show a negative, taken in ten seconds, in June, 1865, under conditions which would have required the same time from a wet plate prepared with the bath.

This ends my connection with emulsion photography, and, with restored health, I welcome the gelatine process, and recognise how great have been the strides since the days when I was more eager to try what *could* be done than to obtain pictures.

INSTANTANEOUS SHUTTERS.

BY CHARLES R. PANCOAST.*

With the introduction of photographic plates having a high degree of sensitiveness, and the consequent desire for rapid exposures, comes the possibility of making pictures of moving objects in such a small space of time as to depict them, as it were, stationary. To do this requires a mechanical contrivance by which the light admitted to the camera through the lens can be controlled.

Having always had a predilection for instantaneous photographs, and having experimented largely with wet collodion with only passable results, I was among the first to employ gelatine plates for this purpose. My first experiments with these were made some two years ago, but not having the proper appliances, were far from satisfactory. They demonstrated to me, conclusively, that in gelatine the instantaneous worker had found a boon. Since then, I have devoted considerable time to the subject, and will give a description of some of the apparatus necessary.

Regarding lenses, I might say that any lens giving good definition and moderate depth of focus, and having stops as large as $f7$ or $f8$ will answer perfectly. My experience has been that for marine views a stop of $f10$ is sufficiently large, while for animal and landscape studies stops of $f7$ and $f8$ are better suited, the ratio between the stops $f7$, $f8$, and $f10$ being as 49, 64, and 100.

Without entering into a discussion as to the proper position in which an instantaneous shutter should be placed, I consider that the best effect will always be obtained where the shutter is situated directly in front of the plate, as then, during the brief time in which the light is acting, the lens can do its full work. Such an arrangement would require an especially constructed camera, and be at once cumbersome and inconvenient.

Of the shutters which are attached directly to the lens, I will make three classes, namely, drop, flap, and rotary.

The simplest of the drop shutters consists in having a slot cut through the lens mounting, directly in front of the stop, in which a piece of sheet metal having the proper shaped opening can pass entirely through. This is open to the objection that, aside from mutilating the lens mounting, there is no way of controlling the exposure. I have constructed a form of drop shutter, which is attached to the front of the lens, and in which I have endeavoured to overcome nearly all the faults inherent to shutters of this class.

This shutter is constructed on the drop principle of Col. Stuart Wortley, and consists of a wooden frame, having at the edges two rabbeted strips, these with the frame forming a groove, in which a hard rubber slide fits neatly, yet sufficiently loose to move with perfect freedom. At one end of the frame is a circular aperture, equal in diameter to that of the lens. A wooden block attached to this frame, and fitted with a set screw, clamps the shutter to the lens.

At one side of the frame is a lever, one end of which being pivoted to it, the other engages on a pin in the slide. Near its fixed end is attached a spiral spring which, acting through the lever, gives the slide the requisite impetus, depending on the tension of the spring.

At the bottom of the frame are two springs, one of which takes up the jar of the slide, and the other automatically locks it, to prevent any rebound.

To afford a quick and certain method of releasing the shutter, a pneumatic trigger is provided, consisting of a brass case, in which is a flexible rubber diaphragm. A small rubber tube connects this case with a rubber ball; this, on being compressed, forces the diaphragm against a lever, which frees the sliding shutter.

* Read before the Photographic Society of Philadelphia.

This pneumatic arrangement is made in a careful manner, and so very sensitive that the slightest pressure suffices to make the exposure.

From the description of this shutter it will be seen that it is adapted to work equally well in either direction, horizontally, or at any angle; the maximum rapidity, however, being attained when it is placed vertically.

In all drop shutters operated by gravity alone, the slide in falling will have a constantly accelerated motion, hence the foreground receives less exposure than the sky. This can be avoided, in a measure, by using a spring to operate the slide, which will gradually lessen in strength as the slide moves. In many cases it is desirable to shield the sky, especially when cloud effects are wanted. This may be done by an auxiliary sky shade, or having a shutter like the one I have just described, in which the slide has a triangular-shaped opening, and is caused to move horizontally. An ingenious form of shutter described in an English contemporary accomplishes this end in a novel manner, but which has a serious defect in construction which will undoubtedly give rise to a jar at the moment when the lens is wholly uncovered. This apparatus consists of a disk pivoted at one side and connected by a toggle joint to a weight or spring in such a way that the pull of the weight or spring will raise the disk and immediately lower it. The sudden reversal of motion when the disk has attained its maximum height must certainly tend to shake the instrument.

For small lenses, the double-flap shutter designed by Mr. Partridge is one of the most convenient, and in some respects superior to the drop. For stereoscopic work it is without a superior, as both lenses are exposed alike.

Rotary shutters must necessarily be made large and cumbersome, and have, I think, few good qualities in comparison with those before described, although many good results have been obtained with them.

One fact I have noticed which, I think, has an important bearing in making photographs of rapidly moving objects. It is, that where the shutter moves in the same direction as the object, a much sharper picture will be obtained than if it moves at right angles to the line of motion. For this reason a shutter capable of working in any direction is preferable to a simple drop.

The rapidity of an instantaneous exposure is largely dependent on the rate at which the object is moving. This can readily be approximated after a little practice, and enables one to form a better idea of what exposure will be required. As a rule, it will be found that so-called instantaneous exposures will range from $\frac{1}{10}$ to $\frac{1}{60}$ of a second.

For example, the image of a vessel moving at the rate of 10 miles per hour, at a distance of 500 feet from the camera, would, in the $\frac{1}{40}$ part of a second, have moved about $\frac{1}{200}$ of an inch on the ground glass (supposing the lens to have a focal length of 8 inches). This would be sharp enough for all practical purposes. If this same vessel was moving at the rate of only 5 miles per hour, then the movement of the image would be $\frac{1}{400}$ of an inch.

As it is very desirable to measure the rapidity of an instantaneous shutter, I have devised a piece of apparatus which will answer the purpose, and give practically correct results. It consists of a revolving disk of white card-board, having a broad black line drawn from the centre to the circumference. Surrounding this disk, but stationary, is a scale graduated in feet and inches. The whole apparatus being placed in a strong light, the disk is made to revolve at a known rate, and a photograph made of it with the shutter whose rapidity is desired. The exact amount of movement will be shown by the line on the disk, which will be blurred for the distance it has travelled during the exposure. For example, a disk having a circumference of 10 feet, being caused to revolve once in a second, would give a point on the periphery a movement of 10 feet per second. If the exposure was $\frac{1}{40}$ part of a second, the black line referred to would be blurred for 3 inches, as shown by the scale.—*Philadelphia Photographer.*

Correspondence.

MORE ABOUT BURETTES.

SIR,—In reading "By-the-Bye" for June 16th, I saw you advocated among other things the use of test-tubes, beakers, burettes, &c. I should like to know that such things could be found in every photographer's chemical room, but I find they are generally more conspicuous by their absence. However, what I more particularly wish to say has reference to the burette as a ready and certain means of ascertaining the amount of silver in any given solutions containing that metal.

Those who have used the "argentometer" for the last quarter of a century will not, I am afraid, be converted to the better and more accurate method you have suggested; but from those who have a less experience there is reason to hope for the adoption of the burette.

I need scarcely point out the advantages of studying applied chemistry, but I would remark that the better acquaintance we have with the chemistry of photography, the less vexation we shall endure; our status (that, we sometimes hear a good deal of) and our work will be much improved.

In describing the method of Gay-Lussac, it should be mentioned that although it is as accurate as any other, if not the most accurate, there are certain precautions necessary, and great care must be exercised in the determination, owing to the heavy character of the precipitate which falls in large clots taking unacted upon silver nitrate within its recesses; also the supernatant liquor will be found to contain both silver nitrate and sodium chloride in suspension.* To obviate these sources of failure the vessel containing the precipitate must be frequently shaken. When no further precipitate is formed upon adding sodium chloride, one drop of the silver nitrate should be added, and the operation repeated until the supernatant liquid is quite clear, and not until then is it safe to take the reading of the burette (see "Thorpe's Quantitative Analysis," page 281).

In Sutton's work on "Volumetrical Analysis," page 190, a method is described as used in photography, thus:—Dissolve 43 grains of pure sodic chloride in 10,000 grains of distilled water. Each decem (=10 grains) of this solution will precipitate 0·125 (*i.e.* $\frac{1}{8}$ grain) of pure silver nitrate; therefore if 1 fluid drachm of any silver solution be taken for examination, the number of decems (or 10 grains) of salt solution required to precipitate all the silver will be the number of grains of silver nitrate in each ounce of the solution. (*Note.*—Sutton proposed using the term decem as an equivalent to the decimal cubic centimetre, 10,000 grains or 1,000 decems being equal to 1 litre or 1,000 cubic centimeters.)

Another method is described by Sutton under the same heading, which in the hands of persons not expert in analysis is more likely to give satisfactory results, viz., the use of the indicator, potassic chromate. It is necessary to have a standard silver solution of the same chemical power as the salt solution; this is made by dissolving 125 grains of neutral silver nitrate in 10,000 grains of distilled water; both solutions will then be equal, volume for volume.

It should be noted that by this method the silver solution to be tested must be previously neutralized with sodic carbonate.

Example:—To 1 drachm of silver solution to be tested, 100 decems (= 1,000 grains) is added, 3 or 4 drops of potassic chromate solution put in, and the silver solution delivered from the burette, until the blood-red colour of silver chromate is just visible. Suppose 25·5 decems have been added, let that number be deducted from the 100 decems of salt solution, 74·5 or 74½ per ounce will be the result.

Perhaps the most suitable method for photographers would be the determination by means of ammonium thiocyanate, using ammonia ferric alum as the indicator. The greatest degree of accuracy may be obtained by this method, using acid solutions, which are more frequently met with in practice than neutral or alkaline.

Instead of using one burette, it will be found more convenient to attach two on a suitable stand. An upright pillar, with a cross-beam, is generally used for the purpose.

* [Our correspondent doubtless alludes to the remarkable circumstance that a stage is sometimes arrived at when either a soluble chloride or silver nitrate will cause turbidity.—ED.]

One burette should be marked "Silver," the other "Thio," to prevent mistakes. Two standard solutions should be made, as recommended by Sutton. The silver solution should be made by dissolving 1·7 grammes of silver nitrate in 100 cubic centimetres of distilled water, the object being to standardize the ammonia thiocyanate solution. There being some difficulty in getting this salt dry, it will be found better in practice to make a larger quantity, and I would suggest that 19·8 grammes be dissolved in 1 litre of distilled water; both solutions will then be decinormal strength. Fill the burette marked "Thio" with the latter solution; run off 10 c.c. silver solution into a clean beaker or other vessel, add 5 drops of dilute nitric acid (1·5), a simliar quantity of a 10 per cent. solution of ammonia ferric alum, then cautiously 10 c.c. from "Thio" burette. If the above solutions are correctly prepared a perfect reaction should have taken place, and upon finally shaking the beaker, there should be a pale pink colour retained. If more or less than 10 cub. cents. have been added, the correction must be made by adding either more of the salt or distilled water. The amount is easily determined by figures. After correction (if necessary), the silver (standard) solution should be run off for future use, and the burette re-charged with the silver solution to be tested, when the operation before mentioned is to be repeated; this time a less quantity may be used, say 5 cub. cents. of silver solution. It will be seen that in standardising the "Thio" solution, each cub. cent. is equal to ·0017 grammes of silver nitrate; therefore, if 5 cub. cents. of solution to be tested require 20 cub. cents. of "Thio," each cub. cent. of silver solution contains ·0068 grammes of silver nitrate, or 6·8 grammes per 100 cub. cents. of solution.

The metric system given here may easily be converted into English weights, if desirable, so the standard solutions may be made in grains, instead of grammes. After Sutton's plan—as given above—I have used this method for negative and positive printing baths with great success, and never found the reading of the argentometer to agree with it. The more work the baths have had, the more startling is the difference; and upon repeating the test on fresh portions of the same solution, I found no variation. In one case, lately, in testing a positive bath, the argentometer indicated 46 grains strength; but the "Thio" test proved $31\frac{33}{100}$ only, or (say) $31\frac{1}{3}$ grains per fluid ounce. In another case the negative bath registered 33 grains per ounce; but, on applying the "Thio" test, it was found to contain very little over 22 grains per fluid ounce of silver nitrate. If any one doubts my assertion, let him procure a pair of burettes, and try the experiment for himself.

W. M. Ashman.

OPERATORS' SPECIMENS.

Dear Sir,—I should most sincerely like to see the matter of operators' specimens settled in some satisfactory manner. At any rate, I think if a few of the operators were permitted to tell their grievances through your paper they would perhaps be better dealt with. I have suffered very sorely from having my specimens kept. I am in one of the first houses of the day, so you can guess my specimens would be good. Twelve months ago I wrote in answer to an advertisment, sent six C.D.V.'s, and photograph of self. My letter was answered asking if I could do out-door work. I sent eight cabinets of groups, &c. (out-door), but never heard any more. I threatened the man, and received no reply. Four times the same year I was served thus, so you can guess how I was fixed—no specimens of work left. The same dealing applies to some of the employers. I have found that unless you get pictures by underhand means, you never can get a specimen to show. Fancy a photographer without a specimen of his own work to look at—no views to put on his own walls. I am willing to pay even full money, but no; an operator must not have such a thing as a photograph. Like the greengrocer, he is supposed to get tired of the fruit by continually stuffing. Once I went out on a holiday, borrowed my employer's camera and stand, bought my own plates, and developed under my employer's nose, using his chemicals, then gave him the negatives, and could not afterwards, for love or money, obtain a print from one out of thirteen negatives cabinet size. Is this not infamous? I have taken negatives I would pay ten shillings to get a print of. Besides, does it not cultivate the mind to see good photographs? How much might a retoucher gain by studying a well-lighted and artistically worked-up head! I have paid two shillings many a time for a London celebrity, when I could have got one of my own equally as good.—Yours truly, W. E.

Proceedings of Societies.

South London Photographic Society.

On Saturday last the first outdoor meeting of the season took place, and was followed by a tea at the "Bull and Bush," Hampstead Heath; nearly two dozen members being present. As is usual on such occasions, but few cameras were brought into the field, it being generally preferred to devote the afternoon to an unencumbered ramble and conversation.

After tea some of the members took a ramble over the Heath, and they found the numerous notices and cautions issued by the Metropolitan Board of Works to constitute by far the most prominent objects; no less than ten of these ugly-looking notice boards being simultaneously visible from one point of sight. Other members joined in such amusements as were provided in the grounds of the "Bull and Bush," quoits and bowls being foremost.

It should be mentioned that Mr. F. A. Bridge, who is now acting as honorary secretary, occupied the chair at the tea, and Mr. Mawdsley occupied the vice chair. Great satisfaction was expressed with respect to the arrangements made by the landlord.

Thursday Evenings for Photographers.

At the meeting held on the 29th ult., Mr. A. Haddon in the chair,

Mr. W. M. Ayres exhibited some very fine enlargements from negatives of the moon, taken by Dr. Common, of Ealing, with Eden's telescope.

Mr. Brown exhibited a quantity of pyrogallic in solution (strength, 1 oz. to 109 ozs. of water), to which citric acid had been added, but without apparently adding to its keeping qualities, as it was much discoloured; he had since added sulphite of soda, but without any apparent effect. He also showed another bottle containing a much more concentrated solution, and to which the sulphite of soda was added when first made; this was not nearly so much discoloured.

Mr. Henderson found that the more concentrated the solution, the better were its keeping properties.

Mr. Brown exhibited the results of a series of experimental trials with various intensifiers; he had tested Dr. Eder's new formula in all three stages, and also Dr. Monckhoven's cyanide of silver formula. The plates had been cut in halves, and one half of each kept from the light, the other halves being exposed to the sun for about three weeks. With Dr. Eder's formula in the first two stages the plates had *darkened*, but in the third or brown stage there was very little change, the exposed portion being very slightly *bleached*. That treated with Dr. Monckhoven's formula had changed, most of it being much darkened.

Mr. Mackie said he had found it very useful, after removing a negative from the developing solution, to slightly rinse and then immerse it in a weak solution of hydrochloric acid, which dissolved out the pyrogallic stain previous to placing it in an alkaline solution of hyposulphite; he had never found plates subjected to this treatment frill, and the hyposulphite solution was kept colourless.

Mr. Debenham said that recently, in moving a plate over a splash of emulsion on the slab while coating, he had noticed a distinct phosphorescent flash caused apparently by the friction.

Mr. Henderson said that Mr. Cobb had called his attention to a number of sparks in an eartheuware jar when stirring emulsion contained therein with a glass rod, and on repeating the experiment in a dark place he had noticed that a large number of the sparks, quite enough to effect an emulsion, were emitted, which he attributed to frictional electricity.

The Chairman thought that the sparks were not caused by electricity, but by the conversion of mechanical energy into heat.

The discussion adjourned from last meeting on varnishes was then resumed.

Mr. Coles said he had washed seed lac till the water was highly coloured, then dissolved separately some of the washed and unwashed lac, and in the resulting varnish could detect very little difference in colour.

Mr. Barker said that if a quart bottle was about half filled with the rough lac, a piece of gum thuss about an inch square being added, and the bottle filled up with alcohol, and the whole allowed to stand for fourteen days, then well shaken up, the soft spongy portion would fall to the bottom, and the varnish might be poured off bright and clear.

This being the last of the Thursday evening meetings (the next being the first of the new association) the Chairman then, on behalf of those who had attended them, presented Mr. Henderson with a chemical balance, as a small token of their esteem, and a souvenir of the many pleasant evenings spent in that room through his hospitality. In a short speech he alluded to the gratifying manner in which photographers had answered to Mr. Henderson's invitations. He might, he said, compare the minds of a certain portion of the photographic fraternity to a super-saturated solution of a salt ready to give up on the introduction of a suitable nucleus the excess over what it ought to contain; Mr. Henderson had in a sense represented that nucleus, and the results had been seen every Thursday evening. He concluded by expressing the hope that the London and Provincial Photographic Association, which was the outcome of these meetings, might prosper and eventually become, as its promoters desired, the most popular photographic society in London.

Mr. Henderson having briefly thanked the subscribers for their kind expressions, the meeting adjourned.

Liverpool Amateur Photographic Association.

The monthly meeting was held at the Free Library, on Thursday, the 29th ult., Mr E. Roberts (President) in the chair.

The minutes of the May meeting having been read and confirmed,

Mr. B. J. Sayce read a paper entitled, "Historical Notice of the Origin and Progress of the Colodio-Bromide Process (see page 395).

Mr. J. A. Forrest, as the oldest photographer in the room, expressed his pleasure in listening to Mr. Sayce's interesting paper, and alluded at some length to Mr. Berry's discoveries with regard to bromide of silver, and to Mr. W. B. Bolton's labours, in conjunction with Mr. Sayce, in the discovery of collodio-bromide emulsion.

Mr. W. H. Wilson, who had been a member of the oldest Liverpool Photographic Society, did not think that Mr. Sayce had ignored the labours of Mr. Berry, in claiming to have inaugurated the use of bromide of silver in emulsions, and said that it should not be forgotten that the merit of the invention of emulsion processes belonged to the Liverpool Amateur Photographic Association.

Mr. H. A. Wharmby remarked that, in 1865, he had procured bromized collodion from Mr. Berry, but had understood from him at the time that it could not be used photographically.

Mr. Forrest said that he had in his possession photographs produced by Mr. Berry with his bromized collodion.

Mr. Wilson thought that iodide was combined with the bromide in the collodion in question.

Mr. Sayce having made some remarks in reply to the criticisms on his paper,

The Hon. Secretary proposed a vote of thanks to Mr. Sayce, for his very valuable and interesting communication to the Society, which was seconded by Dr. Kenyon, and carried unanimously.

The Rev. H. Palmer proposed that the summer meeting on the last Thursday in July should be held at his house at Wallasey, and be preceded by an excursion on the river, with the view of a comparative testing of the usefulness of the various instantaneous exposers in use among the members.

The proposal was carried.

The Hon. Secretary exhibited some negatives, and prints from them, sent by Messrs. Morgan and Co., to show the usefulness of their new adaptation of gelatino-bromide paper to negative purposes. One of the negatives handed round had been waxed; but it was noticed that prints from this did not seem to have the advantage of those from unwaxed negatives. All seemed to be equally good and of the highest excellence.

Mr. J. H. T. Ellerbeck asked if the paper exhibited was the ordinary gelatine emulsion paper supplied by Messrs. Morgan and Co., or some specially prepared for negatives. He (Mr. Ellerbeck) remarked that the idea of transferring the film from the paper to glass for printing purposes had been suggested by him to Messrs. Morgan and Co. many months back, and he hoped that it would eventually be successfully carried out.

Tho Rev. H. J. Palmer said that, unfortunately, Messrs. Morgan and Co. had forwarded no particulars whatever as to their mode of exposure, development, &c., and that, therefore, he could not give any information on these points.

The Hon. Secretary gave a demonstration of the comparative value of various remedies for blistering of gelatine films. A plate coated with decomposed gelatino-bromide emulsion was cut into several portions. One of these was heated to a considerable extent; a second was plunged into a saturated solution of sulphate of magnesia; and a third into a saturated solution of alum. They were then exposed together to the action of the developer for some time. The portion which had been placed in the Epsom salts remained entirely free from frilling; the heated film blistered very slightly in one corner; but the alum-treated portion of the plate seemed to be affected by the evil most of all. A remarkable result was noticeable in the portion of the plate which had been treated with Epsom salts; whereas the other plates speedily discoloured under the action of the developer, this film remained white.

The Hon. Secretary stated that the baking might be used before or after exposure without affecting the sensitiveness of the plate, and that the Epsom salts might be applied with perfect safety between exposure and development.

Dr. Kenyon said that he had tried the saturated solution of Epsom salts with invariable success.

A voto of thanks to the Hon. Secretary was proposed and carried for his invitation to the members to his house for the next summer meeting, and also for his useful demonstration.

Mr. Phillips exhibited a new and very ingenious instantaneous exposer on the ball-and-socket principle, and also a beautifully-made instantaneous shutter for two stereoscopic lenses, slightly different from that exhibited at the last meeting.

Mr. H. Greenwood passed round a print from a negative taken by Mr. Cecil V. Shadbolt from the car of a balloon. This created much interest, as the first successful photograph produced under such circumstances.

Mr. E. Phipps exhibited a fine enlargement on Morgan's paper, and afterwards worked upon it artistically in black and white.

Mr. Sayce furnished a most interesting historical exhibition of negatives and prints in illustration of his paper. Among the most noticeable of his exhibits were the first negative taken by an emulsion process; a magnificent collodio-bromide print, 20 by 15, of the firs at Bettws-y-Coed, taken direct by Mr. O. R. Green; and some instantaneous sea views, taken on collodio-bromide plates years ago, by Colonel Stuart Wortley.

Dr. Kenyon and the Rev. H. J. Palmer showed some fine prints taken at the last excursion to Port Llewyd falls.

The meeting, which was largely attended, then separated.

West Riding of Yorkshire Photographic Society.

The above Society held its first outdoor meeting of the season on the 7th ult., at Ripon, for Fountains Abbey. There was a good muster of members and their lady friends, and a number of cameras, varying in size from quarter-plate to 12 by 10, presented a business-like appearance. Pending the preparation of breakfast at the Unicorn Hotel, several gentlemen exposed plates at the Cathedral from various points of view.

Having partaken of breakfast, conveyances were in waiting to drive to the Abbey. A slight shower of rain falling sufficed to lay the dust and render the drive particularly delightful and exhilarating.

On reaching the Abbey grounds the members at once dispersed, like Dr. Syntax, in "Search of the Picturesque," which fortunately lay all around them. Over a dozen cameras were at once at work, making it a difficult matter to go about without coming in the range of somebody's lens or tumbling over their tripod legs.

The sun shone brightly, the grounds and woods were at their gayest; indeed, a more delightful day it was impossible to imagine. About 130 plates were exposed by the various operators, after which they all met at the lodge, where a group of the whole party was taken, and were driven back to the "Unicorn" for a knife-and-fork tea. After taa an hour or two was passed in looking round the city, and then the party assembled for the return journey.

The excursion was one of the most successful the Society has held, and it was decided to have another in August. A special meeting was arranged for exhibiting the day's work.

BOLTON PHOTOGRAPHIC SOCIETY.

AN out-door meeting was held at Whalley, on Saturday, the 24th June. The first place visited was the Church, where, as soon as the members had got their cameras in position, an individual demanded who had ordered them to photograph that church, and further intimated that "if they did not depart, they might be made to." He, however, finding the party were not very greatly impressed by his authority, finally drawled out the customary whine "to remember the clerk and sexton," and confidentially informed them he was agent for an artist, and had some pictures of the church to sell. It is almost needless to remark they "did not remember either the clerk or sexton." The Abbey was also visited, and afterwards Stronghurst, where Mr. Taylor photographed the members. After a substantial tea at the Aspinall Arms, the party returned by the 8 p.m. train.

Talk in the Studio.

SENSITIZED PAPER.—Mr. Valentine Blanchard has favoured us with a few sheets of his sensitized albumen paper. We employed a lime toning bath for it, which we believe Mr. Blanchard recommends, and were gratified to find the printing was everything that could be desired.

DEATH OF MR. CHARLES WATKINS.—Our readers will be sorry to hear that Mr. Charles Watkins, who attained a deservedly high reputation as a portraitist, died on the 26th ult., at his residence in Camden Town, after a painful illness which extended over a period of more than eight weeks.

THE ELECTRIC LIGHT AT STAFFORD HOUSE.—The Duke of Sutherland has set a good example in adopting the electric light for the illumination of his residence in St. James's. Incandescent lamps on the Lane-Fox system have been installed in the grand staircase, banqueting-hall, and picture gallery, with very fine effect. The lamps have been fitted to the existing brackets and candelabra as far as possible, but additional lustres have been added, especially in the picture gallery. There are some 250 lamps in all, fed by six B Gramme machines, which are excited by the current from one E Gramme machine. The field magnets of the B machines are fed in series; but the revolving rings are coupled in multiple arc. The resistance of the external circuit, plus the lamps, is only 0·6 ohm, the lamps being connected in parallel arc, and leads having a strand conductor equivalent to a solid rod of copper ⅝-in. in diameter being employed. The speed of the machines is about 1,000 turns per minute, and they are driven by a Marshall engine of 20-horse power nominal. All the generating apparatus is located in a shed placed in the garden to the west of the house, and skirting the Green Park. The lamps displace some 8,000 candles, and cannot be injurious to either gilding or statuary. This fact, together with the undoubted sanitary advantages of the incandescent light, cannot fail to hasten its introduction into mansions where valuable works of art are treasured and large assemblages are held. The Duke of Sutherland's example will doubtless soon befollowed.—*Engineering.*

THE OXIDATION OF FERROUS SULPHATE.—E Johanson, writing in the *Analytische Zeitschrift*, points out that ferrous sulphate becomes oxidized all the more readily when the external air is carefully excluded. This phenomenon he explains by assuming that the ferrous sulphate exercises an ozonizing action upon the oxygen of the air, which then reacts so much the more strongly upon the ferrous sulphate the less it is diluted.

THE DETECTION OF FUSEL OIL IN ALCOHOL.—A. Jorissen adds 10 drops of colourless aniline oil and 2 to 3 drops of hydrochloric acid to 10 cub. cents. of the alcohol to be tested, when a red colouration is indicative of the presence of fusel oil.

A SIMPLE INCANDESCENT LAMP.—"La lampe soleil," or the sun lamp, as it is called, from the likeness of its rays to solar light, was successfully tried on Saturday last in the vaults of the Royal Exchange. This lamp is the invention of MM. Clerc and Bureau, of Brussels, and is so simple in its action as to require no regulating mechanism. It consists of a square block of marble or dry limestone, having two holes pierced into it from above. The holes slant together until they nearly meet just within the base of the block. Into these holes are inserted the two carbon rods forming the poles of the arc, and the current traversing the partition of calcareous stone between their points heats it to incandescence, and thus a soft white light is emitted from the bottom of the block. This light is remarkably steady, and is very suitable for picture galleries. It was used to light the picture gallery in the recent Paris Electrical Exhibition, and is now employed in the foyer of the Grand Opera House, Paris. The limestone is calcined by the current, and the carbons feed themselves by gravity as they are consumed. The ugly shape of the lamp is certainly against its use, unless it be sufficiently well screened from view, but its simplicity is decidedly in its favour.—*Nature.*

To Correspondents.

STUDIOS.—The "Photographic Studios of Europe" will be published in German by Ed. Liesegang, of Düsseldorf.

BRIGHTON.—We are very glad to hear you say so.

B. B.—Take the stains out with a little iodine solution, dissolving a few flakes of iodine in a solution of iodide of potassium. After applying this to the fabric, rub with hyposulphite of soda solution, and the spots will disappear.

PINCHBEC.—Abney's new work on Emulsions includes everything you are likely to want.

ALPHA.—1. We cannot answer. 2. The sulpho-pyrogallol sold by the Platinotype Company.

TRIPPER.—Next week. We shall commence with the Tyrol, and then proceed with the others.

H. W. F.—There is a retouching school in Leipsic, and one is forming in Berlin, but we know of none in France. If either of the former would suit, we can send you particulars. Three months' tuition should be ample if you have previous knowledge.

HOPEFUL.—We have no doubt that the patches arise from the local presence of hyposulphite, either arising from contact with dirty fingers or other contaminated objects.

J. BRICKSON.—You might write to Messrs. Johnson and Matthey, of Hatton Garden.

J. W. BARRY.—When ice can be obtained, it is by far the cheapest and most convenient refrigerating agent; but when ice cannot be obtained, the following may be used:—*Powder No.* 1.—1 part powdered sal. ammoniac, 2 parts powdered nitre. *Powder No.* 2.—Ordinary crystallized washing soda reduced to a coarse powder. No. 2 powder should be kept in a well closed tin, and when a freezing mixture is required, equal bulks of the powders are mixed and dissolved in a volume of water about equal to the bulk of the powders.

CONSTANT READER.—The details have not been published.

GROSVENOR.—Exposure for a few hours to the temperature referred will do no mischief, provided that no great amount of moisture is present; but our experience does not extend so far as to say what would be the result if the action of heat were continued for a prolonged period.

H. ORTON.—1. The glass plates should be ground by working two of them together with fine emery and water between. 2. No; use tin foil. 3. An ordinary camel's-hair brush. 4. Without, by all means. 5. You can get it made at any large India-rubber works.

JOE.—Use a stronger bath, or less iodizer in the collodion.

W. BRADNEE.—Such pictures copy better than one would expect, and experience has shown that it is best not to attempt to revive the image.

J. C. J.—Although we know of several who practise it as a business, we cannot say with certainty that there is anyone prepared to give instruction. We post you some notices which may help you in finding what you require.

W. E. D. JONES.—1. No. 2. Very slightly damp. 3. So much depends on the condition of the coating that it is impossible to fix any definite period, but one corner might be cautiously lifted from time to time. 4. About one part in ten parts of water. 5. Yes, you should make use of a tolerably vigourous print. 6. Thanks.

W. C. S.—1. The third on your list will be most suitable for all round out-door work; but if you can make up your mind to have two objectives, you had better obtain No. 1 and No. 5. 2. It is not an inherent defect, but is due to careless workmanship.

T. Y. SINCOX.—Certainly one of the worst samples we have met with, the coating being not only uneven and full of thin places, but also in an advanced state of decomposition.

A READER.—It is due to the presence of common salt, and your best course will be to soak in water for some hours, and then dry.

POSITIVE.—1. Not unless the water is slightly acidified. 2. Yes.

THE PHOTOGRAPHIC NEWS.

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CONTENTS.

SULPHITE OF SODA IN THE ALKALINE DEVELOPER.

Sulphite of soda as an adjunct to the alkaline developer may be said to have passed its time of probation, and its use is now an established custom with numbers of photographers.

It need not surprise us on this account to know that with many it is still a matter of doubt whether or not the innovation is altogether for good, and to hear the most contrary opinions expressed in the matter; to hear one loud in its praise, whilst another has nothing but evil to say for it; to hear one say it causes, another that it prevents, green fog; to hear one state that a stock solution mixed with it is practically everlasting, whilst another will have it that it deteriorates in a few days. In the case of far more old-established customs than that of the use of sulphite in the developer, we find the same difference of opinion. The reason is not far to seek. It is to be found in the tendency, far too common, to generalize from individual cases. A man, for example, finds a certain modification of developer suited for the particular make of plates which he is in the habit of using. He straightway proclaims to the world that this one developer is *the* developer for all plates under all circumstances. We have been in the habit of using sulphite in our general work for the past month or two, and with decided advantage. We have, however, besides this, made a set of experiments to determine whether the advantage which we find with some plates is to be found with all. We used various commercial plates, and also plates made by ourselves by different formulæ.

We have used the sulpho-pyrogallol made by the Platinotype Company, and have also mixed solutions with a commercial sample of sulphite.

Before giving the result of our experiments, we may state, for the benefit of any who have managed to keep their ears and eyes closed to all the talking and writing which Mr. Herbert Berkeley's discovery has brought about, that the object of the use of sulphite in the developer is to prevent the brown stain which is so common in gelatine negatives developed by the alkaline method, and that it is recommended that four grains of sulphite of soda should be used to each grain of pyrogallic.

We may also state that the following objections have been urged against its use. It has been said that it produced chemical fog; it has been said that it produced green and red fog; that it greatly increased the time taken for development; and that it was the cause of thin and weak printing negatives.

We found that in all cases the use of the sulphite resulted in improvement of colour; that is to say, that negatives developed with the sulphite did not show the yellow tint which those developed without did when the alum bath was not used. At the same time, we must say that by the use of the acid alum bath we were able to get, in the case of many plates, quite as good a colour without the sulphite as with. This was not so in all cases, however; some plates show a very obstinate tendency to yellow stain which is not to be cured by alum and citric acid, whether used before or after fixing.

As regards the objections urged against the use of Mr. Berkeley's developer, we may say that we have found all of them to hold good to a certain extent *with some plates*.

In the case of one batch of plates of our own make, which gave perfect negatives with the ordinary developer, there was dense chemical fog when using the sulphite. These plates contained chloride, and this may have something to do with the matter. The most noticeable drawback to the new developer is certainly the tendency to produce colour fog. With plates which have no inclination to green fog, sulphite will not produce it; but when there is an inclination, it will greatly aggravate it, and will even produce red fog, when green fog only would make its appearance with the ordinary developer. It must always be borne in mind, however, that colour fog, so long as it is confined to the green variety, has little influence on the printing qualities of a negative; whereas the yellow stain, which is prevented, has.

That there is any great increase in the time taken for development when sulphite is used we have not found, nor that there is any difficulty in gaining density; but in connection with this last it must be borne in mind that in a sulphite developed negative there is not that density which shows in the print whilst it is invisible to the eye which is the peculiarity of ordinary pyrogallic developed negatives, and which often enables us to get passable results from negatives which at first appear hopelessly thin.

The conclusion which we have arrived at with regard to the use of sulphite is, that it certainly is a new power in the hands of the photographer, and that with the majority of plates good is to be gained by the use of it. We can, at least, commend it highly to those who have difficulty in getting negatives of good colour without it.

It has been said that a pyrogallic solution mixed with sulphite of soda loses its power as a developer after a time. We have not found it so, nor can we see any reason why it should be so; but, should it turn out that there is any truth in the statement, we should recommend that the following method of using the salt, which we have found in every way satisfactory, should be adopted. We are in the habit of using a 10 per cent. solution of each of the three principal ingredients of the developer, and of mixing the final solutions from them. We now suggest that these be mixed as follows:—

A.—Pyrogallol	1 ounce
Citric acid	1 drachm
Water	up to 10 ounces
B.—Bromide of ammonia	1 ounce
Water	up to 10 ounces
C.—Strong ammonia	1 ounce
Sulphite of soda	$2\frac{3}{4}$ ounces
Water	up to 10 ounces

Here we have the pyrogallol preserved by citric acid, as in Mr. Cowan's formula, and we have quite enough acid to neutralize the alkalinity of the so-called "neutral" sulphite. In the ammonia solution we have enough sulphite of soda to make just about Mr. Berkeley's proportion in the final developer when an average amount of ammonia is used. At the same time, we do not have the sulphite in contact with the pyrogallic till when the mixture is about to be poured on to the plate. A minor advantage is to be found in the fact that a less near approach to a saturated solution of sulphite of soda is necessary. In one case, on making up an ounce of sulpho-pyrogallol to ten ounces with water, we found that, on leaving the bottle in a very cold place, a considerable quantity of the sulphite of soda crystallized at the bottom.

SOME INFLUENCES OF MOISTURE ON PHOTOGRAPHIC WORK.

FEW agencies work so much mischief to the belongings of the photographer as dampness, his apparatus, materials, and finished work suffering in turn; and although in certain cases the injurious effects of moisture make themselves more felt during the cold weather, there are frequent instances in which the mischief caused by the accidental presence of moisture is considerably exaggerated by the warmth of the weather—as, for example, when fungoid or other growths result from the dampness of bodies of organic origin.

With respect to mischief caused to apparatus, damage to cabinet work stands foremost, and there are few photographers who have not had occasion to mourn over dark-slides and cameras which have become disjointed, swelled, and been rendered almost useless, as the result of being stored in a damp place. When any piece of cabinet work has become swelled by the action of damp, it is most important not to dry it too rapidly, and to take care that the drying shall proceed as equally as possible from all sides. A good coating of French polish is a remarkable protection against damp, and any piece of apparatus which has not been French-polished may be rendered much less subject to absorb moisture by treatment with a mixture of beeswax and oil of turpentine. Lenses often become considerably deteriorated by prolonged exposure to a moist atmosphere, the surface of the glass becoming disintegrated, and partially losing its polish; but some samples of glass are much more liable to become acted on than others. Cupboards or boxes lined with extremely thin sheet lead are very well adapted for the conservation of photographic apparatus; but it must not be forgotten that the same precautions which serve to exclude external moisture also prevent the escape of internal moisture; hence it is most necessary to make sure that articles are dry when stored away. Unless albumenised paper is kept in a thoroughly dry place, a slow decomposition of the animal matter is tolerably certain to take place, resulting in the formation of certain sulphur compounds, which exert a very prejudicial influence on the work of the printer, and in all probability render the prints far less permanent than might otherwise have been the case. Albumenised paper, after having been thoroughly dried, should be preserved in cylindrical tin boxes provided with lightly-fitting lids. Carbon tissue is even more liable than albumenised paper to deterioration by damp, and the greatest care should be taken that it is thoroughly dry before it is stored away in the usual cylindrical tin cases. In some instances, damp causes the tissue to become generally insoluble, this being more especially the case when earthy substances and metallic oxides have been employed in pigmenting the gelatine; while in other cases insolubility sets in locally; the result of this being that small clots of insoluble gelatine are found distributed over the finished picture. In this latter case, the insolubility arises from a fungoid growth, which can easily be detected on the surface of the unsensitized tissue. The influence of moisture on sensitized carbon tissue is now well known, the tissue becoming increasingly sensitive up to a certain point, after which a fatal insolubility sets in. The impression of light on exposed carbon tissue, if kept in a damp place before development, becomes so far intensified that, by availing himself of this continuating action, the carbon printer may obtain satisfactory results with less than one-fourth of the exposure which would be required if development immediately followed exposure; but the results are not so certain when the continuating system is adopted. Many saline bodies which are not deliquescent under ordinary circumstances—as, for example, potassium bromide or sodium chloride—absorb a variable amount of water from the atmosphere if they are carelessly kept, and the work of the photographer is thus often stultified and upset without his having any idea as to the real cause of the error.

Dampness undoubtedly exercises a remarkable influence on the fading of prints on albumenized paper; and moisture accompanied by warmth will still more accelerate the fading of prints; hence the advantage of enamelling or waxing the silver print on the surface.

Many apparently contradictory experiences of photographic workers may be explained, and become easily comprehensible, when the disturbing influence of moisture is taken into account.

By-the-Bye.

CONTINENTAL RAMBLES WITH A CAMERA.

A TOUR IN THE TYROL.

ALBERT SMITH was wont to sing the praises of the *Continental Bradshaw* very sweetly, but many things have altered since the days of Albert Smith. Unfortunately Bradshaw, like Murray, has altered very little, and hence it is that they have been left far behind in the race for popularity.

Baedeker replaces Murray now-a-days in the case of nine travellers out of ten, and if *Bradshaw's Continental* edition is not eclipsed by *Hendschel's Telegraph*, this is only because the latter is published in the German language, and its advantages are not yet fully appreciated. One example will suffice to show how thoroughly Hendschel caters for the traveller. At the end of the volume he gives a series of circular tours in Mid-Europe; the towns or spots through which the traveller may pass are mentioned, and the price of the circular ticket, so that an intending tourist sees at once whether a tour will suit him or not. But it is not a question of a dozen tours to choose from, or even a dozen dozens; there are something like five hundred different tours set down in Hendschel, in which every combination of places of interest is included. The plan, indeed, seems to have been drawn up by a mathematician, it is so exhaustive. You have simply to make up your mind what places you desire to visit in your journey out and home, and then a little study of Hendschel will show that if you secure, say, No. 44 ticket, series D, this will take you the whole round without trouble, and at a fare about one-third less than that ordinarily demanded.

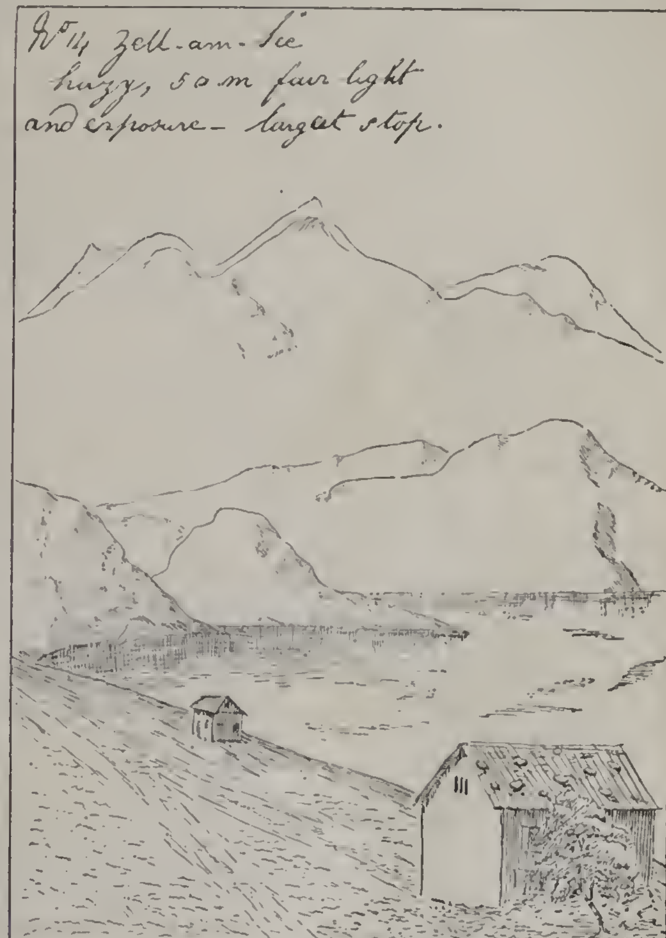
We are bound for the Tyrol at this moment, and a glance at a railway map will show that the most direct route is via Cologne and Munich. Cologne is reached in half a dozen ways—one of the best now-a-days is that by way of Flushing—and, once there, we advise the purchase of a circular tour ticket to Munich. From early morning to late at night is required for the journey from Cologne to Munich, even by express, so two days at least have to be sacrificed for travelling. The Custom officials are not troublesome at Cologne, and you will not be worried with them again until you arrrive at the Austrian frontier in the Tyrol itself.

From Munich—we must get quickly over the ground now, or our space will be wasted in preliminaries—we have still a short railway journey to perform south; we take tickets for Zembach, a station one hour this side of Innsbruck, the capital of the Tyrol, and are set down at the mouth of the valley of the Ziller, or Zillerthal, whence we can proceed on foot, or in a trap, without difficulty, to begin our journey.

With dry plates, a light half-plate camera, and two or three in the party, there is no reason why the photographic apparatus should not be carried personally in addition to a light knapsack; for a long country road is easily got over by a lift in a trap, while in mountain climbing the guide naturally takes the greater part of the burden upon himself. We ourselves have always adopted this plan, and only in the case of the professional photographer, who moves with much apparatus and a large supply of plates, is a special conveyance necessary. On the subject of packing plates, changing, &c., we have already spoken in a previous "By-the-Bye;" so merely premising that we carry in a pouch ready to hand our double-dark slides (two or three as the case may be) ready filled for the day's work, we make a start forthwith. Six plates in a tourist journey is ample for a day's work, and sometimes four suffice very well, for it will be found, practically, that half an hour is taken up on an average at each exposure, and as you have, moreover, your distance to walk in the day, two to three hours is the utmost you can devote to photography.

Leaving Zembach—the little white village resting in a broad green plain at the junction of many valleys—we direct our footsteps due south. A quaint old monastery, enclosing a big, grass-grown quadrangle, stands at the head of the Ziller valley, the road leading right through it. It is a charming pastoral scene around—soft pasturage and green hill-sides on every hand. Dotted over the plain, here and there, are clustering villages, their tapering green spires rising sharply above grey cottage roofs and clumps of trees. The same soft charm prevails as we enter the valley—a pleasant contrast to the grander and wilder nature of much of the Tyrolese scenery. The village streets are of the quaintest. The wooden architecture of the cottages—their boarded roofs weighted with immense stones, for security's sake—is wrought in a most elaborate style, and the balconies under the over-hanging roofs are often masterpieces of wood-carving. Crowning each farmhouse is a conical belfry, sometimes fashioned in a most ornamental style, and enhancing the general appearance of the structure; in fact, the châlets here are more Swiss than those in Switzerland, if one may say so, while the villagers, especially if you see them in their Sunday best, are delightfully picturesque; in fact, they seem to have assumed *opéra-comique* costumes, they are so smart and gay. The tall sugar-loaf hat and knee-breeches are before you, the gaudy red braces and coloured stockings of the well-known Tyrolese type; while the women, with their short skirts and neatly-braided hair, add further to the theatrical nature of the picture.

At Schlitters, the first picture is taken. We select the picturesque village street, taking the view diagonally, which permits us to include a quaint wooden belfry, and also allows us to get under an overshadowing roof, which screens the lens admirably. There is a little too much exaggeration of the road and of the side of the building under which the camera stands; but this may be corrected when it comes to trimming the print. While we compose our picture and focus, a friend roughly sketches an outline in his pocket-book, so that we have something to remember the scene by when it comes to development. This is very convenient, for, after a month's interval, you frequently forget the nature of your subject altogether; and, before you know what you are doing, a delicate horizon may be spoilt by pushing development too far; or details in the shadows of a village picture lost through not permitting sufficient action. To the sketch is added a remark as to sufficiency of exposure, the time, and any other memoranda that may be deemed desirable. Here is an example of what we mean, which has been copied from our note-book by the phototype process. It is a sketch of Zell-um-See, to which we shall come presently. A helping com-



panion is invaluable to the tourist-photographer in many ways, as the latter soon discovers when he first begins to work in a foreign land; he not only saves one's time, but one's temper as well. However, in the Tyrol, and particularly in the Zillerthal, the tourist will find the simple village people exceedingly pleasant and companionable.

The first day's walk may be to Zell, where there is a capital inn, the "Post," this village being the principal one in the valley. A fine view of the rushing stream, half river, half torrent, with Zell among the trees lying beyond, just when the village is first sighted, is likely to make the photographer halt a second time, unless he has not exposed a second plate already upon one of the road-side skittle-grounds, without which no hostelry is complete in this part of the country. Sometimes the playthings are of the most primitive kind, a slender fir trunk cut into lengths furnishing the skittles, while the first best round stone from the mountain side serves for a ball.

Except at Innsbruck, there are no grand hotels in the Tyrol, and in this, it presents a marked difference from Switzerland. The inns are for the most part post-houses, with a room for humble guests on the left ("Gast-stube"), and another on the right of more pretensions, usually called the "Speise-saal." These Tyrol inns are very comfortable, and are, moreover, right reasonable in their charges; only, of course, there are not the conveniences nor the advantages (and disadvantages) that the modern hotel affords. The Zillerthalers are very proud of their musical capacity, and you cannot stay an evening in the villages without hearing their plaintive zither melodies, or some of their mountain jodels. The waiter is an unknown personage in the Tyrol; but a trim waitress in laced boddice and short skirt, with a courier bag hanging to her girdle to receive the money, takes his place. The waitress is usually a performer on the zither, and during the intervals of waiting will sing you "die Berge von Tirol," if you behave yourself, accompanying herself on the zither. We have a picture of Julie of the "Post," playing the zither in a balcony overlooking the rushing Zembach; it is a very bad photograph, but we value it highly, for all that.

Still ascending the valley, we reach Mayrhofen. One of the picturesque châlets surrounded by orchard land is here chosen as a fit subject for the camera, and while our friend keeps the landlady talking in the doorway, we manage to secure her portrait into the bargain. It now becomes steep climbing, but as we have left all heavy baggage behind at Zell, and only carry our photographic kit, we get on as well as ever. There is no road beside the foaming white stream, only a tortuous footpath, that winds in and out among gigantic boulders, now passing under threatening masses of overhanging rock shaped like monster grottoes, now leading under trees through shady recesses, full of luxuriant undergrowth, the most beautiful fern gardens that can be imagined. There is not a breath of air to stir the delicate stems, so we take a picture of the green paradise then and there, a photograph that turns out one of the most successful of our tour.

In two hours the Carlssteg is reached, almost the head of the valley, a rough covered bridge thrown across the foaming Zembach, as it rushes through the rocky mountain gorge. The scenery is grand and wild in the extreme; tremendous masses of detatched rock fight with the cascade at every turn, and sheer precipices on either side constitute the upper part of the valley a dark-shadowed defile of magnificent proportions, through which are seen the lofty white peaks of some of the Tyrol giants.

Of course, we obtain a view of the Carlsteg, although it is some time before we can get a safe place for the tripod on the brink of the stream. There is a rush of cold air—a blast it might almost be termed—that is a considerable source of danger to our zephyr apparatus, but by carefully loading the same with heavy bits of granite, picked up at the edge of the torrent, it is at last secured with tolerable safety.

One matter in the day's journey is always a little worrying to the photographer. His day's supply of plates, let it be four or six, he naturally desires to make the best use of; now he may be too chary in the morning in making exposures, or, again, he may be too improvident. When evening arrives, and he is at his journey's end, with one or two unexposed films in his pouch, he thinks how well he would have done to photograph that cascade or wonderful mountain gorge he passed in the morning. On the other hand, if he has lavished all his plates early in the day, the chances are he meets with some tempting subjects in the afternoon when his wallet is empty of virgin films. Now of these two evils we hold it best not to save up one's plates. In the first place, the morning light is usually the best of all lights for photography, and if you meet with subjects that appear good, if you expose your plates, you have the satisfaction, at any rate, that you have wasted none of them. You have had your own way, and that is something.

We return to Zell, and start early across the Plattenkogl Pass to Krimml, where the finest waterfalls in Germany are to be found. The pass is not a high one—between 6,000 and 7,000 feet—but we take a guide to the top to help us with our packs, and make quite sure of the way. A Sennerhütte, or shepherd's hut, up here serves to make a capital little photograph, which forms a pleasant souvenir as well, for we are entertained by its owner with brown bread, cream cheese, and cool milk *ad libitum*, in right Royal fashion, hospitality that comes very grateful after a hot and laborious climb.

More useful than an unlimited supply of dry plates to the tourist-photographer, he should remember, is a never-failing stock of good humour. Travellers, and pedestrians especially, should always bear this is mind, especially towards the end of the day, when they are weary, or when matters go "contrariwise," as Mrs. Gummidge would say. Keep your own counsel, travel steadily, take little with you, start off in good time, and leave your cares at home, is the advice of an old traveller, Philauder Von Sittewald; or, as it runs in the original German:—

Wer reisen will,
Der schweig fein still,
Geh steten Schritt,
Nehm nicht viel mit,
Tret an am frühen Morgen,
Und lasse heim die Sorgen.

(*To be continued.*)

PHOTOGRAPHY IN AND OUT OF THE STUDIO.

A Photographic Assistants' Association—Photography and Electricity—The Chevalier von Hesse's Photographs—Tobacco-Smoke Photographs.

A Photographic Assistants' Association.—Remembering the number of photographic associations which already exist, we hesitate about suggesting another. And yet there is decidedly room for such an association as we have in our mind's eye. We refer to the necessity there appears to be for a Society of Photographers' Assistants. It is obvious that none of the present societies exactly meet the wants of the assistants. While the objects of such a Society would be essentially progress in photographic science, there are yet many fruitful topics in professional practice which only those engaged in photography as a means of livelihood could adequately discuss. The admission of amateurs, therefore, would be scarcely admissible. Such a society need not, in the least degree, partake of the nature of a trades-union. The practice of the present day compels the principal of a photographic studio to devote himself more and more to the artistic details of the picture; the mechanical manipulation must be left to the assistant. Hence it is to the assistants that one must, to a great extent, look for points of practical experience, which, after all, are the most important stepping-stones to reliability. In Berlin there is a Photographic Assistants' Association, and if Berlin finds an association of this kind necessary, surely London and the provinces ought. Of course the exact form of such an organization can only be settled after reflection and discussion We merely throw out the idea in the hope that some one may be able to shadow forth something that will not only be practical, but practicable.

Photography and Electricity.—It should be gratifying to the photographic profession that two of its members, Mr. Swan and Mr. W. Crookes, should have taken so high a position in regard to investigations as to lighting by electricity. The world has seen what Mr. Swan can do; Mr. W. Crookes has yet to exhibit the capabilities of the lamp which bears his name. We notice there has been a little difference of opinion between Mr. Crookes and the Board of the Electric Light and Power Generator Company, to which Mr. Crookes was consulting electrician. It would seem that Mr. Crookes had offered his lamp to this Company, who, the Chairman stated at a recent meeting, were advised not to purchase it until they had opportunities for testing its powers of endurance; and these opportunities were not afforded. Without knowing Mr. Crookes' side of the question, we presume that after being appointed consulting electrician, and feeling sure of the qualities of his lamp, he looked upon this "advice" as implying a want of confidence; and if this should be so, it is not surprising to find that he offered his lamp to another company of which he has become director. At the meeting referred to, it was stated that Mr. Crookes was receiving from the Generator Company a salary of £600 a-year, and had been engaged for two years. In the course of a discussion, Mr. Crookes justified the sale of his lamp to the other company, and intimated his readiness to resign his position as consulting electrician. We have referred to this matter because the fact of Mr. Crookes and Mr. Swan being both practical photographers should encourage the profession to hope that at some future time they might be led to devise a special lamp for photographic purposes.

The Chevalier von Hesse's Photographs.—We have this week had an opportunity of inspecting the photographs, now exhibiting in the map room of the Royal Geographical Society, of the Chevalier E. von Herse Wartegg, who has just returned from a scientific journey in Mexico, New Mexico, and Arizona. The majority of the photographs have been taken on 15 by 12 plates, and, apart from their interest geographically and topographically, are excellent specimens of photography. The figure subjects are of necessity more entertaining than the landscapes to the general observer; but there are many points in the latter which make them notable. The puebla of Zuni is the city to which the Chevalier has paid most attention, and, from the photographs one gets a very good idea of the habitations of the natives. Zuni is literally a city of the plains; all is arid and bare, and not so much as a stunted bush is to be seen. At first sight the city appears to be in a half-finished condition—in fact, simply a collection of scaffold poles and square hovels. On closer inspection, however, the scaffold poles turn out to be rudimentary ladders, which are highly necessary, as the houses are built one on the top of the other. Besides single figure subjects, such as a woman polishing pottery, Moki rabbit hunters, native weavers at work, and others, there are a couple of photographs of dances, in which the performers are all women. Here, unfortunately, owing to the size of the plate, and presumably to the fact that wet plates were used, one fails to get an idea of the dance. An instantaneous process could alone do justice to such a subject, and gelatine plates the Chevalier appears not to have had. To the student of ethnology these photographs should be of the greatest possible interest. In this particular study a great future is open to photography. It is only by comparison that the scientific man can deduce theories, and as it is perfectly impossible for him to visit every part of the globe, the photographer performs a valuable service in collecting specimens on whose truth there cannot be any doubt thrown.

Tobacco-Smoke Photographs.—A photographic toy—not very novel, by-the-bye—has made its appearance in the cigar shops of the Continent. With a cigarette mouth-piece you also purchase a number of photographic papers about the size of a postage stamp. Taking one of these stamps, you place it over a lateral orifice in the mouth-piece, and a sliding piece is drawn over it. You then indulge in a whiff, take out the piece of paper, and, presto! it has an image upon it. The process is thus explained by *La Nature*. A small photograph, prepared on chloride of silver paper, as usual, but without toning or fixing, is put in a solution of bichloride of mercury, when it fades and disappears. The bichloride of mercury changes the photograph partly into white chloride of silver, and partly into proto-chloride of mercury, also white, making the image invisible. The image may be brought back by action of hyposulphite of soda or of ammoniacal vapours, and tobacco-smoke, as containing the latter, does very well. Easy enough when you know how.

RECENT ADVANCES IN PHOTOGRAPHY.

BY CAPTAIN W. DE W. ABNEY, R.E. F.R.S.*

IN beginning this course of Cantor Lectures, I make this presumption—that amongst my audience I have those who have commenced photography but recently; also, those who commenced photography about the time I did, say twenty years ago; and that there are very few now who practise those old processes which our forefathers, if I may use the expression, were accustomed to manipulate. I may also say, that I have reason to believe that amongst my audience there are some who know very little of photography at all. I must try and do the best I can to address myself to all. It is a difficult thing; but I hope those to whom I am not exactly fitting my remarks at the time, will remember that I am addressing others, who I also have to consider. I thought, perhaps, it might be useful to go over the very oldest processes with which photography started; and when you recollect that photography is not very old—in fact, is a chicken compared with some of the sciences—and yet that there are very few who can remember its discovery, I think it may be of interest if you see worked out practically before you these very early processes to which I refer.

The first germ of photography was when Scheele investigated the action of light on silver chloride, and found that it discoloured it. It was subsequently found that this discolouration of the chloride was due to a liberation of chlorine from the chloride of silver. In 1802, eighty years ago, Wedgwood read a paper before the Royal Institution, in which he described a method of taking profiles, and also copying painted pictures, by means of what we should now call photography. These profiles were taken on paper washed over with silver nitrate. In other words, the profile of the person to be portrayed was thrown against sensitized paper, in a strong light, and the outline was photographed or made visible by the strong light acting outside the profile. Of course it produced a white profile on a black background. About the same time that Wedgwood read this paper, Sir Humphrey Davy was practising this process, and he found that silver chloride was preferable to silver nitrate. He also found that if he used white kid as a basis of what I will call the photograph, he got a stronger impression than if he used simply paper. In 1814, twelve years later, Niépce devoted himself to studying the action of light upon asphaltum, and he worked out a process which up to this day is still used, and which I shall not refer to more particularly now, as I shall hope to do so in a subsequent lecture. He developed the process which was then called heliography, which consisted in the production of a picture in bitumen on a metal plate, the light causing the oxidation of the bitumen or asphaltum, and rendering insoluble or less soluble those parts which had been acted upon.

In 1827, Niépce came to England, and endeavoured to introduce the results which he had obtained, to the notice of the Royal Society; but, owing to the process being a secret one, the communication was not received.

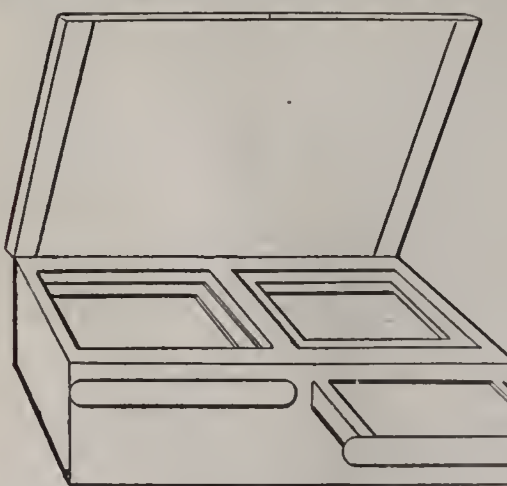
In 1824, Daguerre, a name to be remembered, a French painter, began similar experiments in the same direction, and, in 1829, he and Niépce entered into partnership to work out that which eventually received the name of photography. Now, Niépce has left it on record, that in his bitumen pictures he had one considerable trouble; he found that, instead of the lines of an engraving being represented by black stains on the white metal, the lines were represented by white metal on black bitumen. In order to overcome this difficulty, after coating the silver plate with his bitumen, and developing it by dissolving away the unaltered parts, he treated the metallic silver plate beneath with any ingredient which he might choose, and amongst others, he has left on record that he treated it with iodine, and then rubbed off the bitumen. This, in the case of an engraving, would of course give dark lines on a white background. Here we have the first introduction of iodine and silver together.

Now, we cannot suppose that two such shrewd observers as Niépce and Daguerre could have used this combination of iodine and silver without noticing that it was altered by light; and I may say that there are a number of grave grounds for considering that this was really the origin of the Daguerreotype process, which consists, as you know, in the treatment of a silver plate primarily with iodine, and subsequently with other substances, to cause sensitiveness. Daguerre and Niépce must have noticed the alteration by light in the silver iodide which they had formed on the silver plate, but up to that time of which I am talking, they had not discovered the secret of what we now call deve-

* Delivered before the Society of Arts.

lopment; and when we come to consider the early history of photography, it is a most remarkable fact, that the two first modes of development were discovered, if I may say so, by flukes. The discovery of the development of the Daguerrean image was as follows:—He, Daguerre, had been trying to reduce the exposure of iodide of silver, in order to get an image in a reasonable time. Instead of exposing his plate for a quarter of a hour or an hour, he wished to obtain an image in one or two minutes, which, to him, would have been very quick. Many months were passed in these apparently fruitless researches, until one day he placed one of his iodised plates, which he had exposed to light for some short time, in his chemical cupboard. Now, in that chemical cupboard were a variety of bottles of all descriptions. He had worked hard, and as chemists know perfectly well, when a man is working at research, there is usually a collection of all sorts of chemicals. He placed his Daguerreotype plate in the cupboard over night, and, to his astonishment, next morning, when he opened the cupboard, he found that he had a fully-developed Daguerrean image. This was a discovery which he immediately turned to account. He exposed other plates, shifting first one bottle, then another, and by this process of elimination, at last he was able to find that it was an open bottle of mercury which had caused the development of the image. This was really, I believe, the true history of the Daguerreotype process, so far as the mercurial development was concerned. It was considered a very short exposure in those days if you sat five or ten minutes in the sunlight to have four portraits taken. We have changed all that now, and I dare say before this course of lectures is over, not only five or ten minutes will be considered a long exposure, but perhaps $\frac{2}{100}$ of a second will not be considered short.

I have the pleasure to-night of introducing to your notice an old worker of the Daguerreotype process, Mr. England. He has kindly consented to show the whole manipulation of the process from beginning to end, thinking it might interest what I may call a juvenile audience, for juvenile I suppose most of you are, as regards photography. Mr. England has left me to do the talking, and therefore I must do the best I can to explain the operations which will be gone through. We have a little box,



Daguerreotype developing box.

divided into two parts, in one of which is placed iodine, and in the other is placed what is called bromide of lime, that is to say, caustic lime impregnated with bromine. You will find that, first of all, having polished it, he will place the plate over one of these apertures—over the iodine; the iodine vapour will be allowed to play upon it a certain time, and then he will shift the plate over to the bromine, and thus he bromises the silver. He will finally give it another touch of iodine vapour, and the plate will be ready for exposure. Mr. England has taken the trouble to polish these plates beforehand, since their polishing is one of the chief difficulties of the Daguerreotype process. The fact is, the plate requires the most elaborate polish, such as even a silversmith can scarcely give them. One of these plates he will now place over the iodine, and for two minutes allow the iodine to rise and attack the silver. (Mr. England here explained that the first process is to bring the plate to a deep yellow colour, by means of the iodine, and then to place it over the bromine.) In the first place, it is necessary to be able to see the colour, so that a reflector is placed on the one side of the sensitizing box, the other being open. By this artifice, the plates may be viewed, and the colour of the Daguerreotype plate can be watched, till it has attained a deep yellow colour. It is passed on, to be acted on by the bromine, and that is continued until it attains a rose colour. It is a little difficult, by artificial light, to see the exact colour; this process was seldom worked by artificial light, and, therefore, one may be misled by false colour.

We propose, between us, to take a Daguerreotype picture. Now, the operation of sensitizing is very nearly finished. It has been treated with iodine, and then with bromine, and now it is having a final submission to iodine. The plate Mr. England prepared has now been exposed one minute; Mr. England is rather doubtful about the sensitiveness of the plate, but I am afraid, myself, it is rather over-exposed. Mr. England is now going to develop the picture, and he will do so by the use of mercury. He has here the original mercury box with which he was accustomed to manipulate. He will hang it against the wall, and light a small spirit lamp under a bowl of mercury beneath it. The mercury fumes will rise through an orifice into the box, and so on to a plate; he will watch it from time to time, until it is developed, when we will show it to you. [A copy of an engraving was here taken whilst illuminated by the electric light.]

I should like you to understand exactly what takes place in the Daguerreotype plate when it is exposed and developed. On the surface of the plate we have a mixture of silver iodide and bromide, but, for simplicity's sake, I will suppose that there is simple silver iodide on it. When light acts on such a compound, the action is to split up the silver into a salt, which we call silver sub-iodide, and the iodine is liberated, $Ag_2 I_2 = Ag_2 I + I$. The iodine is taken up by the silver plate at the back of the sensitive film. To develop the picture, mercury vapour is caused to condense on the sub-iodide, and leave the iodide intact. Amongst some pictures which Mr. England has kindly brought, we have an instantaneous view of New York Harbour, taken about twenty-five years ago; and I doubt very much whether there are any wet plate instantaneous pictures equal to that; from age it has become a little bit tarnished, but otherwise it is a most perfect picture—the size is about 5 by 4 inches. I have a transparency taken from this, and one from a negative, also in the possession of Mr. England. This last is a portrait of Daguerre, taken by himself. This is interesting as showing one of the very earliest Daguerreotypes known.

The next process is the Talbotype process. In Talbot's original process, chloride of silver formed the basis, and from that sprung our silver-printing process of the present day. But the great improvement he made was by the introduction of iodide of silver. I may mention that he introduced this in January of the same year in which Daguerre introduced the Daguerreotype process in France—namely, in 1839. The outline of the Talbotype process is as follows:—First of all, he gave a wash of nitrate of silver to plain paper (some papers answered better than others); this he dried, and then washed over it the iodide of potassium, so forming iodide of silver; then dried the paper, and again washed over it the nitrate of silver. Such a paper was found sensitive enough to take camera pictures. But how about the development? Curiously enough, the development of the Talbotype picture was discovered in an independent way by the Rev. J. B. Reade. He was practising with the solar microscope, and copying certain objects. One afternoon, having given his paper, which he had washed over with gallic acid, a short exposure, he was obliged to leave it for the night. Next morning he found that his image was fully developed. That gave him the idea of the development of what was called the latent image. Talbot introduced this mode of development into the calotype process. This calotype process was the subject of litigation, and the claims of the Rev. J. B. Reade to be the discoverer of the gallic-acid development was disputed. I do not wish to enter into the legal question as to who was the discoverer; my own opinion is that Mr. Reade should have the credit which belongs to the discovery. From the negative pictures so produced an unlimited number of portraits would be made by what we call the ordinary silver-printing process. A Daguerreotype, on the other hand, could be only reproduced by electrotype, and Mr. England has kindly lent me such a reproduction, which can be examined afterwards. I propose, however, to show you how Talbot was able to make a picture on paper. I intended to have taken a camera picture by the process, with the aid of the electric light; but I find it will take up too much time. I have here a negative with some Talbotype paper upon it, prepared as described. I will expose this to the light from a bit of magnesium wire, and then will develop it in the way in which that development was practised in the old time. I have a solution of gallic acid, which I place in a little dish, and with it will mix a solution of nitrate of silver and acetic acid. The acetic acid is meant to retard the action of the gallic acid, to prevent the reduction of the silver before the development takes place. I should say the usual method of using the paper was as follows:—A final wash of gallic acid and silver nitrate was given it, and it was then exposed while damp in the camera. This is what I intended to do, but the minutes steal on us so very rapidly, that I have been obliged to leave out the wash of gallic acid and silver, and to give it a rather longer exposure behind a negative, and thus I shall produce a positive on development. The undeveloped picture is now placed on this piece of glass, and now I proceed to develop it. The glass is placed on a stand, and the light from the lantern, after passing through orange glass, is allowed to

Stand for developing paper pictures.

illuminate it. The lines begin gradually to appear, and they must now be visible to you all. I continue brushing over the picture the solution of gallic acid and nitrate of silver with acetic acid, and it becomes still more visible. A paper process is a most fascinating process, because you can dabble about, and do exactly what you like; it is not like the gelatine plates of the present day, which you have to leave to come out mechanically. With paper, if you want to bring it out a little better detail in one place there you can dab it out; and if you want to keep it back you can put a little water over the place. There is no process like the paper process to please an artist; not that I profess to be an artist, but, belonging to the Science and Art Department, I have a sort of art instinct, I suppose. I think you can see that the image is very fairly out now. In the old days, I dare say it would be considered passable for a beginner, not that I am a beginner, because I practised it in India; but it is a long time ago since I did so. So much, then, for the Talbotype process. Now, what is the meaning, I would ask you, of that development. It is a curious thing that a small exposure to light should cause an image to appear. I will ask Mr. Woods to throw on the screen something which perhaps will illustrate how development arises. This morning I was in my laboratory, and I saw lying on the bench a feeble negative which I had badly developed, and which I had fixed with hyposulphite of soda. On taking it up, I found the salt had crystallised over the surface in a most beautiful manner, and I do not think I could point out to you anything which would give you a better idea of what development is than those crystals whose images you see on the screen. When you have silver precipitated from a solution by any means whatever, you have it always in a crystalline form, and as all crystals possess polarity, so crystals of silver possess polarity; and where one silver particle is deposited, there another silver particle will deposit, exactly in the same way as those crystals of hypo-sulphite of soda follow one another in regular course in those beautiful feathers. Thus, then, I looked upon it as a physical development; we have a crystalline action going on during development, and nothing else. The iodide of silver is altered into sub-iodide, and this, like the pole of a magnet, attracts the precipitating silver, and from that time, where the silver is deposited, other crystals of silver are deposited. That is what I call physical development.

(*To be continued.*)

PHOTOGRAPHING IN THE CAVERNS OF LURAY.

One of the most interesting and entirely successful series of photographs which we have seen for a long time has been made by Mr. C. H. James, in the interior of the caverns of Luray near the town of the same name in Virginia.

The pictures will undoubtedly do much towards creating a widespread interest in this wonderful natural curiosity, which is just beginning to be known, but which offers, according to the unanimous opinion of those who have visited it, a richness and variety of the stalactite and stalagmite formation unsurpassed in this country, besides other features peculiar to itself alone.

In the course of a long and interesting conversation with Mr. James, we expressed the desire of sharing what we heard with our readers; to which he very readily and kindly assented.

The outfit was of a solid and practical character, though not a very extensive one, and comprised a 7 by 9 box with an 8-inch Ross portable symmetrical lens, and a 5 by 8 stereo box with two sets of lenses, the most useful being a pair of Dallmeyer's quick-acting 4½-inch single view lenses; the shorter focus doublets being found to give rather too much angle, and to work too slowly. A notable point here is the fact that almost all the exposures were made with the smallest stops of both the lenses; this was necessary from the long reaches comprising both near and distant objects, both of which had to to be in a sharp focus, and were undoubtedly more trying to the lenses than an ordinary open view or architectural subject.

Focussing was no easy matter, and was accomplished by means of a lighted candle set upon some spot carefully chosen; the focus being drawn upon the flame itself.

The illumination under which the exposures were made was furnished by the powerful Thomas-Houston electric lights, with which all the more frequented parts of the cave are supplied, and which are accompanied by a telephone wire communicating with the engineer in his room at the distance of nearly a mile from the cave's mouth. The power of each light was estimated at three thousand candles, and in all cases where the character of the subject required more than one of the lamps, the greatest care was taken in the management of the secondary illumination; the principal or strongest light being supplied with a screen or partial reflector of white paper immediately behind it, so that the light was somewhat broken up and modified in character, and devoid of the extreme harshness so often seen. Mr. James attributes much of his success, particularly the delicate half-tone in which his negatives abound, to this simple plan. The secondary lamps, after being brought to bear upon very dark spots, were allowed their full power, so as to give all the detail possible. Mr. James spoke of the deceptive appearance of the electric light, and he estimates its actinic power to be fully three times its visual, for in many cases where little or nothing could be seen on the ground glass when focussing, a comparatively short exposure gave negatives full of softness and gradation, even in spots where the prevailing colours were yellowish-brown and red.

The damp atmosphere of the cave proved rather trying to the woodwork of the cameras, and at first the lenses showed a tendency to sweat; but this was got rid of by wrapping them up in a thick cloth while above ground, and after descending letting them rest for fully half an hour before undoing the parcel.

It is hardly necessary to say that gelatine dry plates were used exclusively. Two well-known makes were taken, and a pyrogallic acid development was depended upon throughout to the exclusion of ferrous oxalate. The sensitiveness was estimated from six to ten times wet collodion, and, owing to the feeble light, after-intensification was resorted to in nearly all cases.

Mr. James spoke in high terms of Mr. Carbutt's formula for developer here given:—

No. 1.

Pyrogallic acid	1 ounce
Bromide of ammonium	1 „
Citric acid...	60 grains

Dissolved in 10 ounces of water.

No. 2.

Aqua ammonia	½ ounce
Water	2 ounces

These are stock solutions.

To develop, take six ounces of water, and add half a fluid drachm of each of the above stock solutions, and if more density is required, add from four to five grains additional dry pyrogallic. The citric acid is of great value in any stock solution of pyrogallic in preserving it clear and free from discolouration. The plates were strengthened by the ordinary formula of bichloride of mercury followed by ammonia, but Mr. James insists upon the necessity of laying the plates in an alum and citric acid bath before applying the mercury, otherwise stains and unevenness are sure to arise. This is conclusive proof of the value of alum as a hypo-eliminator.

The choice of subject and arrangement of light were of course the main difficulties to be surmounted, the chemical operations offering nothing remarkable. And that they have been most successfully overcome, all will agree who have the opportunity of looking over this beautiful collection of nearly forty stereos and thirty 7 by 9 views, which were brought home by Mr. James as the fruits of two months' labour in the bowels of the earth.—*Philadelphia Photographer.*

Notes.

Mr. J. T. Taylor sails next week for America; he will take part in the convention of photographers which meets in Indianopolis about the middle of August.

Lieutenant S. M. Maycock, R.E., succeeds Lieutenant Darwin in charge of the Military Photographic School at Chatham.

Mr. Maxwell Lyte will continue the duties of honorary secretary to the Photographic Society of Great Britain, which he took up at the last meeting of the Society, on the sudden departure of Lieut. Darwin for the Colonies.

Another electric light exhibition is to be held in November, this time at the Westminster Aquarium, the whole of the building being devoted to the purpose. The exhibition is to demonstrate "practical electric development," and will include, therefore, many interesting improvements that have been made of late.

Good studios fetch good prices in Germany. That of Herr Weisbrod, in Frankfort-on-Main, was sold on the first of this month to Hanfstaengl, of Stuttgart, for 60,000 marks (£3,000). It is not every photographer who has £3,000 to pay away, but then Herr Erwin Hanfstaengl, it appears, has a clever wife, who is engaged at the Frankfort Opera House at a salary of £1,250 per annum.

It is a pity the navy does not recognise photography officially. The earthworks, chiefly of sand, at Alexandria, seem to have resisted the heavy artillery wonderfully well, and our sailors are said to be very disappointed at being able to make so little impression. Photographs, therefore, of these land batteries after the firing would be exceedingly valuable and instructive, for we know very little just now about defending ourselves from modern artillery. The pictures would show what measures are effective, and what ineffective, in keeping out the big thunderbolts hurled from our heavy cannon.

Fortunately, many naval officers are apt photographers, and there are doubtless several cameras in the fleet at this moment. At the Royal Naval College at Greenwich some attention is paid, it is true, to photographic chemistry, but officers desiring to become practically efficient must look after themselves. The torpedo explosion pictures exhibited last year at Pall Mall by Lieut. White, R.N., of the *Polyphemus*, afford ample proof that there are good photographers in our navy.

A party of gentlemen, numbering exactly a score, dined at the Manchester Hotel on Tuesday, for the purpose of welcoming Mr. J. T. Taylor, who is in this country on a brief visit. The chairman, Mr. Stuart, in a kindly speech, bore testimony to the esteem in which Mr. Taylor was held in this country, and expressed a hope that in his new home in America he would be not less highly appreciated.

We mentioned last week a statement in *Truth*, that the principal pictures in the gallery at Buckingham Palace were to be photographed by the representatives of a Berlin firm. The work is being done by the well-known house of Braun et Cie., Dornach, who have also received permission to avail themselves of the Royal Art Treasures at Windsor Castle, Balmoral, and Osborne. The reproductions will be printed in carbon, and it is this fact, indeed, which largely influenced the Queen to afford the necessary facilities.

The Autotype Company, we are glad to hear, have made arrangements with Messrs. Braun et Cie. for the sale in Great Britain of the copies of these pictures in the Royal collections. The selection from the pictures in Buckingham Palace is likely to be a popular issue from the conspicuous merit of the paintings of the Dutch school, and the fact that no copies of these master works have been hitherto attainable.

Mr. P. A. Taylor asked for an explanation last week in the House about the flogging of a prisoner in Wandsworth Gaol who refused to be photographed, and the hon. gentleman was told, amid much laughter, that the penalty incurred by a convict for not submitting himself quietly to the camera was ten strokes with a birch rod, and this punishment had been inflicted. Mr. Taylor evidently had a professional beauty in his mind, and did not quite realise the situation.

The Paris correspondent of the *Daily Telegraph* praises very highly an equestrian album of M. J. Delton, who has taken pains to obtain portraits of the more fashionable riders in the Bois de Boulogne. He calls his album the "Tour du Bois." We have not seen M. Delton's pictures, but it is only a few months ago that we called our readers' attention once more to the attractive nature of equestrian pictures, when describing the Atelier Adèle in Vienna. There are ten times as many cavaliers and lady riders to be seen in the Row every season than are met with in the Bois or the Prater, and yet we permit Paris and Vienna to go far ahead of us in the matter of equestrian photography.

Herr Perlmutter, indeed, of the Adèle studio, threatens to come over here to do such portraits himself if we cannot make up our minds to them. A lady or gentleman possessing a valuable horse is much more anxious to have a photograph of it than of herself or himself, and if equestrian portraits are more difficult of execution, the results are usually more pleasing. There is the making of a picture in a horse and his rider, but you cannot say this of a rider alone, very often. In any case, it is a subject well worth the serious attention of London portraitists, and yet, since the days of Disderi, it has been woefully neglected.

Since M. Nadar is said to have spent the sum of 30,000 francs (£1,200) in obtaining his balloon photographs of Paris, the £40 which the Municipal Council of Paris have placed at the disposal of the æreonauts of that city for going on with the work does not seem a very large amount. The further attempts at balloon photography are to be made from captive balloons.

M. Nadar's balloon pictures, which won the admiration of Wheatstone, were secured upon three-inch plates, with the briefest exposure. The most successful was obtained at a height of 1,000 feet. The enlargements, measuring something like twenty inches, we have seen, and although the pictures are hazy from the flood of light entering the camera, the main buildings of Paris and heights around are rendered with much distinctness. M. Nadar told us that the principal difficulty to be overcome in the work was the gyrations of the balloon.

The French chemist, Dessan, has made a discovery in respect to the action of light that is likely to prove very important. He has found that oxygen may be converted into ozone by the action of light rays. In making his experiment, Dessan employed very pure oxygen; it was contained in a glass globe, which, together with the other apparatus, was carefully covered with black paper to prevent the admission of light. In these circumstances the oxygen did not betray the presence of ozone, but, after the rays from a Drummond oxy-hydrogen lamp had shone upon the oxygen for twenty-five minutes, ozone was distinctly shown to be present on testing with iodide of starch.

According to military journals, it is the men in the first army corps who are nominated for active service in Egypt, and, thanks to stricter regulations of late with regard to men and *matériel*, an army corps is soon put on a war footing. The guns and transport for such a body, which should muster 36,000 men, are not only in store, but maintained in efficiency down to the smallest detail. Thus, besides the proper number of baggage, ammunition, and ambulance waggons, the equipment includes telegraph waggons and telegraph wire for immediate use, surveying apparatus, printing and lithographic waggons, together with a waggon devoted solely to photography in the field.

The telegraph waggons, printing waggons, and photographic waggons are convenient little offices on wheels, drawn by two or four horses as the case may be. The staff of field photographers usually consists of a serjeant-photographer and half-a-dozen non-commissioned officers and Sappers who have gone through a course of instruction at Chatham. The work of the field photographer consists chiefly in the taking of reconnaissance photographs and reproducing plans and drawings; and so well supplied is the photographic waggon with everything, from camera to clips, and from pyroxilin to pyro., that a Sapper may step out of the Chatham laboratory into the field waggon without suffering the loss of a single requisite.

The Technical Photographic School at Salzburg has issued its yearly report. The school can afford space only for thirty students in its laboratory and work-rooms, and not only were these fully occupied, but twenty applicants for admission were refused for want of room. Photography, retouching, photo-lithography, zinc-etching, Lichtdruck or collotype, and photo-enamelling are the subjects taught, both theoretically and practically. The institution appears to be a great success in all respects.

"Toggenburg," a German novel by Paul Lindau, deals with a practice—to be found only in the pages of a novel, we suspect—sitters have of appropriating any portraits that take their fancy in a photographer's reception room. The action in the novel is to this effect: A gentleman has his portrait taken for the sole purpose of entering a certain studio and enquiring the name of a certain young lady whose picture hangs in the show-case. During the posing he asks the name of the lady, and, having learnt it, thus proceeds.

"You must lend me her portrait for twenty-four hours; I'll do nothing wrong with it."

"I can't do that under any circumstances. At least, I dare not lend you a hand in the matter; but, of course, many photographs about here do happen to get lost somehow or another. . . . ."

"All right, then, lend me a pair of scissors, and just make an entry that I want three dozen of my portrait, do you hear; I will manage the rest."

The photographer handed a large pair of scissors, and then busied himself deeply at his desk. Gustav availed himself of the opportunity, cut the picture neatly out of the book, and, coolly pocketing it, went his way.

TWELVE ELEMENTARY LESSONS IN PHOTOGRAPHIC CHEMISTRY.

Introduction.

Before entering upon these lessons, we propose giving, in the first place, an outline of what they will comprehend, and our reasons for taking up the consideration of the subject. We have often had enquiries addressed to us as to the best means of obtaining a knowledge of practical chemistry sufficient to thoroughly understand the science of photography. In advising on this head, we have generally recommended the student to consult one or other of the various manuals of chemistry. It has, however, long been felt that in the different works at one's disposal there is a lot of matter quite unnecessary for the average photographer to charge his memory with, and it is with this view that we have undertaken to select the information and supply the deficiency by bringing before our readers a series of articles on practical chemistry as applied to photography. In doing so we shall explain everything in as simple language as possible, and always define technical terms before applying them. Although the lessons will be mainly devoted to practical chemistry, the theory of the reactions will be also explained so far as space will permit. The following are the subjects that will be treated of :—

Apparatus; photographic chemicals and re-agents—their properties, impurities, and mode of manufacture; qualitative analysis of such chemicals as are likely to be found in a photographic laboratory.

Preparation of pyrogallic acid, hydrokinone, gold, silver, and platinum salts, gelatine, pyroxyline, and collodion.

Estimation of silver nitrate, gold chloride, pyrogallic acid, bromides, chlorides, and iodides, ammonia and hyposulphite of soda.

Treatment of gold, silver, platinum, and oxalate residues.

In the valuation of chemicals, the processes known as the "volumetric" will be described, as they require a less delicate balance, and are generally quicker performed, and give more accurate results.

The principle of these volumetric methods depends on the gradual addition of a solution containing a known weight of a substance that will re-act on the chemical to be tested, using an indicator to show when the necessary action is completed. Take, for example, the determination of commercial silver nitrate: one gramme of the sample is dissolved in water, and a trace of potassium chromate is added, sufficient to give a blood-red colour (this is the indicator). Now add, drop by drop, from a suitable measure, a solution of sodium chloride (one cubic centimetre of which contains ·00585 gramme of the salt) till the red colour has disappeared, showing that all the silver present has been converted into chloride of silver. On reverting to the measure glass, it is found that fifty-eight cubic centimetres of the solution of sodium chloride have been used; therefore—

$$58 \times \cdot 00585 = \cdot 3408.$$

But one gramme of absolutely pure silver nitrate will decompose ·344 gramme of sodium chloride; thus—

$$\cdot 344 : \cdot 3408 :: 100 : x = 99 \cdot 07.$$

Consequently, the sample contains 99·07 per cent. of the pure salt. Of course, it must be understood that further details of the method will be described in a future article, the object being to illustrate the principle on which volumetric processes depend. It will be noticed that in the description we have used the terms "gramme" and "cubic centimetre," our intention being to adopt the Continental mode of weights and measures known as the "metric system" in calculating quantitative analyses, as it is now used almost entirely by scientific men throughout Europe, and we think it would be a great advantage if English photographers adopted the same system, thus effecting a great saving of time in troublesome calculations, and understanding at a glance the formulæ given by the Continental photographers.

We will explain shortly the metric system. The unit of all measurements is the mètre (29·37 inches), which is said to be the ten-millionth part of the meridian between pole and equator; this measure is divided into decimètres, centimètres, and millimètres, or millimeters, as they are called in this country.

The unit of weight is the gramme (=15·43 grains), which is the weight of a cube of pure water at 39° F., whose sides measure exactly one centimeter; thus a cubic centimeter, or c.c. of water equals a gramme. The chief measure for liquids is the volume occupied by a thousand c.c., and is termed a litre.

We hope that the above remarks, and their fuller application as we proceed, will go far to induce photographers to replace the old-fashioned grain weight and fluid ounces by the more convenient and scientific system now in course of general adoption.

FRENCH CORRESPONDENCE.

New Studies by M. Marey—Phototypography of M. Rousselon and M. Laforta—Sylvestre's Glyptography—Shutters of Dr. Candize and MM. Trompette and Bournier—Photocalcography by M. Montagna—M. Bolagny's Method of Removing Gelatine Films—M. Fourier's Gelatino-Photography—French Edition of Mr. Baden Pritchard's "Studios."

New Studies by M. Marey.—M. Marey, whose remarkable works on the study of the movements of birds on the wing are known to our readers, has just communicated to the Photographic Society of France the results of new experiments made on living objects in motion. While acknowledging the great work accomplished by Mr. Muybridge through the application of photography to the study of animal movements, it seemed to him possible to arrive at more scientific results, and more easily to be compared, by taking on one plate a successive series of the same subject at rapidly-succeeding intervals (say at one-tenth of a second). In Muybridge's case the animal to be studied was run in front of a white wall divided into equal spaces by black lines. Cameras were placed at equal distances from each other, and the exposure was regulated by instantaneous shutters worked electrically. The animal put in motion, by straining a thread across its path, caused the exposure to take place, and, consequently, the plates bear each a different position of the animal in a different place. Of course, the motion of the animal may be accelerated or slackened in speed between the two tensions of thread, in which case the successive impressions do not give an absolutely correct result. M. Marey prefers to use but one camera and one sensitive plate. To be able to fulfil these conditions, a kind of awning is erected, lined with black, having only a side opening, in front of which the object is led; and as from the black no actinic ray can be reflected on to the plate, the object—whether bird, horse, or dog—comes out light. The lens is covered by an instantaneous shutter having a continuous motion, allowing at each tenth of a second a little crack to open; in front of this is a drop shutter having a pneumatic handle. The observer gives the signal, and the moment the animal in motion arrives within the field of vision of the lens, the drop-shutter is opened, and not shut till the subject has reached the other extremity of the field of vision. By this means the plate, once developed, shows a series of images taken at one-tenth of a second interval, and easily to be compared with one another with the view of analysing the pheuemenon of motion. M. Marey has shown me a series of different views thus executed, and by the help of which he will with greater precision than ever be able to determine the laws of motion of the different animals in creation, commencing with man.

Phototypography.—We have always looked forward to the time when photocollotypes would reach the perfection of photo-engravings. M. Rousselou, who, we have seen, obtained such splendid results in photo-engraving in intaglio at Asnières, told me at a conference held several months ago, when we spoke of the possibility of arriving at greater perfection in typographic negatives, that he had almost attained that perfection; and, in fact, we have just received specimens of phototypography from him which surpass in delicacy of modelling anything we have ever seen of this kind. Of course, to be able to print from such negatives, it is necessary to use hot-pressed paper, and good rollers and ink; good results cannot be expected from coarse-grained paper, rollers dented and uneven, and bad ink. We are none the less happy to be the first to have seen and pointed out this new and remarkable progress in the graphic arts. M. Laporta, a Spanish lithographer, has made signal progress in work of the same kind, but less complete. A film of bichromated gelatine is spread over a plate, which is exposed under a negative, and treated with hot water to obtain pronounced reticulations. A coarse image results, which is transferred to zinc; it is then bitten, and a phototypographic negative is obtained, but of too coarse a texture for small subjects. We are convinced that the collotype process would form an excellent base of operations for leading up to the formation of typographic negatives. This idea has been realised by M. Sylvestre some days ago, in a Parisian illustrated journal, *Le Contemporain*, on the first page. We have bought the number in question, but a closer inspection shows that it must have been produced from two processes, typography and phototype. M. Sylvestre has called this glyptography, or *impression by engraving*; but until more ample information is given, we believe it to be simple phototype.

Shutters of Dr. Candize, MM. Trompette, and Bournier.—The course of rapid shutters is still uninterrupted, and Dr. Candize has one in which the cap is placed between the two lenses. It consists of a revolving cylinder in which certain segments are wanting. When the complete portions are in front of the objective, it forms a shutter; when only the skeleton segments, light is admitted. It is complicated, and is surpassed by many others. Still, Dr. Caudize is said to have photographed with it while travelling by rail at full speed. MM. Trompette and Beurnier have produced a shutter which is nothing but a movable diaphragm between the two lenses of the objective moved by pneumatic action. The objection to it consists in the necessity of having a lens specially constructed to receive it.

M. Montagna's Calcography.—M. Montagna, editor of the *Reivista Fotografica* at Brindisi, has thought of a process named by him calcography, somewhat resembling that of Mr. Charles Petit. A sheet of granulated tin is placed upon a glass plate, under a pellicle in relief, similar to that required for Woodburytype, and pressed. The tin reproduces the impression in relief, and forms a sort of typographic negative. Mr. Charles Petit used paper which was embossed in relief by the gelatine mould.

M. Bolagny's Method of Removing Gelatine Films.—M. Bolagny always strips his gelatine films off the glass. The plate is first covered with French chalk before receiving the film, then, after development and fixing, it is covered with glycerined gelatine, and allowed to dry; by cutting the edges, the negative is taken off readily.

M. Fourier's Gelatine Photography.—M. Fourier points out a process which we have ourselves indicated for transferring photographs to sheets covered with gelatine by the powder process. He dusts on a fine powder capable of tanning the gelatine, and then it is possible to print off from portions of the surface thus acted on. It resembles M. Otto's black auto-copyist method from photographic prints. The powder employed is a mixture of alum and nitrate of uranium reduced to almost impalpable powder, coloured black with lampblack.

French Edition of Mr. Baden Pritchard's "Studios."—Our esteemed Editor, we are glad to see, has just published his interesting collection of the "Studios of Europe." It gives us great satisfaction to be able to announce that our special publisher of photographic works, M. Gauthier-Villars, has prepared the French edition, which is to appear directly. Such complete detail as Mr. Baden Pritchard has given on the studios of the principal towns of Europe cannot fail to interest the photographic world. LEON VIDAL.

NOTES ON LEVELS.

BY DR. STOLZE,*

SINCE the advent of gelatine emulsion into the every-day work of photography, the general practitioner has had occasion to make frequent use of the level; hence some information regarding it may be of use.

The level depends on the general principle that an air-bubble, when in a closed vessel otherwise full of a fluid, will always take the highest place. Whether we deal with the circular level, the glass top of which is slightly arched or domed, or the ordinary tube level, the same principle of greater sensitiveness in proportion as the inner curvature is less, holds good. When, therefore, the radius of a level is spoken of, the radius of a circle corresponding to the inner curvature of the tube or dome is understood, and it is interesting to trace the relation between the radius of a level and its sensitiveness. For ordinary gelatino-bromide work it suffices to use a level having a radius as short as 1·146 metres, while those levels used for astronomical work must be much longer as regards radial length; an instrument which indicates six seconds requiring a radius of 68·755 meters, and one indicating two seconds must have a radius of no less 206·265 meters. Shallow curves like these are difficult to grind, and such levels are necessarily expensive.

The circular level is in some respects a convenient instrument, as it is easy to verify it by slowly rotating it over any even surface, and noting if the bubble always remains in the same position in relation to the centre. Should it not be true, the under surface of the brass casing must be ground down by friction on a sheet of emery cloth or other abrading surface until the adjustment is perfect. One notable defect of the circular level is the continual tendency of the included alcohol to evaporate, a condition of things which appears to be unavoidable, as glass and brass expand by heat at unequal rates. Hence the bubble constantly increases in size until the instrument becomes valueless, unless it is re-filled. In order to do this, the screw which closes the instrument is taken out, and the instrument is filled with alcohol by means of a fine pipette, after which the whole is slightly warmed either by means of a spirit lamp, or by partial immersion in hot water. The aperture is then tightly closed, and as the level cools, and the spirit contracts, a small bubble, which should theoretically contain only alcohol vapour, becomes visible inside; but in actual practice some air is always present.

Good tube levels are more accurate than circular levels, and they may therefore be used when large plates are to be coated with thin films, and the best contain ether rather than alcohol. In almost every case adjustment screws are provided, so that the instrument may be exactly set to truth when required for use. In general it is, however, more convenient for the photographer to employ good circular levels than tube levels, as these latter are liable to be temporarily thrown out of adjustment by unequal heating.

* Abstracted from the *Wochenblatt*.

THE BIRTH OF THE PHOTOGRAPHIC LENS.

BY DR. J. M. EDER.

IT is a well-known fact, observed over three hundred years ago, that in a darkened chamber or box into which light is admitted through a small opening there is pictured upon a white screen a representation of objects outside the aperture. The farther the intervening object, the

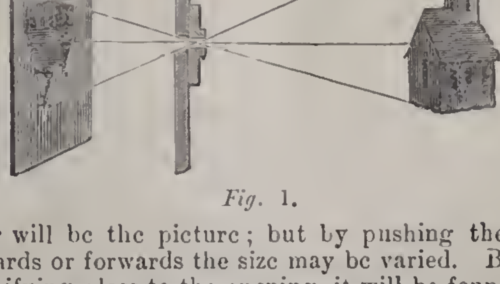


Fig. 1.

smaller will be the picture; but by pushing the screen backwards or forwards the size may be varied. By fitting a magnifying-glass to the opening, it will be found that at a certain distance it will be more sharply defined, and by changing the position of the screen the effect blurred.

The result obtained by enlarging the hole is indistinct in outline.

In fig. 2 the diagram shows how the enlarged aperture gives a hazy definition.

Fig. 2.

In the camera without a lens, no matter how far the the objects are from the opening (A A′, B B′ C C′, fig. 3), they always appear distinct upon the screen, at whatever distance it is placed. Unlike a lens, therefore, there is no focussing point for varying distances. In 1855 Berry is

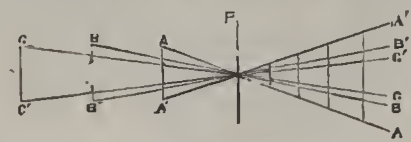


Fig. 3.

reported to have taken a landscape with an aperture of $\frac{1}{30}$ of an inch, and in America a portrait is said to have been taken by this means.

According to Emerson, a picture taken with the commonest glass lens is far superior to any using the simple aperture; as for the latter, with the most sensitive wet collodion plates, from three to seven minutes' exposure are necessary. To obtain clear definition, ·0001 inch opening is requisite. It is certainly possible to produce sharp pictures with a camera having, instead of a lens, a small round hole, the diameter of which is only $\frac{1}{5556}$ of the focal length, if such a term may be used. Nevertheless, Spiller's latest experiments show that the application of a camera without lens to photography is not practicable. For instance, a house in full sunshine being the object in front of a camera with 1.4 mm. aperture and 26 c.m. distance between it and a gelatine plate, gave, after eight minutes' exposure, a very blurred picture; with 0·5 mm. the definition was sharper, but the exposure was lengthened to one hour.

Lenses may be divided into two distinct kinds, viz., convex lenses, which are thicker in the centre than at the edge; and concave, having the centre thinnest. Fig. 4 shows sections of various forms of lenses employed in the construction of optical instruments, including portrait objectives. 1 is a double convex; 2, a plano-convex; 3, a concavo-convex, or converging meniscus; 4, double concave; 5, a plano-concave; and 6, a diverging concavo-

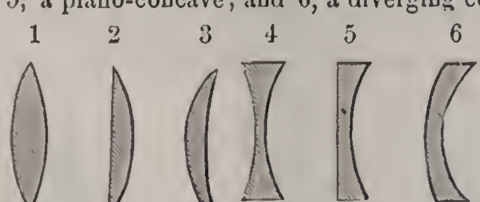


Fig. 4.

convex, or meniscus lens. In most lenses the focal length of the outer rays is less than that of the central rays, These differences of focal length, acting upon pictures. make them indistinct, as the rays do not converge to one point, but spread over the disc. Again, in these simple lenses, another cause of indistinctness results from the varying degrees of refrangibility of different colours. The violet rays are more refracted than the red. By taking a distance less than the focal length of rays of medium refrangibility, a picture is formed of a white disc having a red border; while, by reckoning a greater distance, a blue-violet band encircles the white. Observations on these appearances have been made by the Abbot Franciscus Mourolykus, 1575; Keppler, 1604; and Dollond, in 1758. Achromatism is prevented by employing crown and flint glass, heavy and light flint glass, or heavy and light crown glass.

In the sixteenth century Johann Baptist Porta used a plano-convex lens as objective, the convex side of which was fixed outwards towards the view, and it was behind a screen having an opening equal to from $\frac{1}{20}$ to $\frac{1}{30}$ of the focal length (fig. 5). A sharp picture resulted, equal to $\frac{1}{5}$ of the focal length in size. The diaphragm being moved

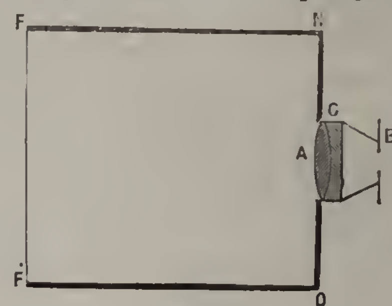


Fig. 5.

in front of the lens, the picture was larger, but the outer edges gave distorted forms, as shown in fig. 6.

B (fig. 6) is a plano-convex lens, with flat side turned towards the object, the diaphragm C being placed in front. The flat-receiving surface at O′ shows the outer lines more curved as they approach the edge. By reversing the position of diaphragm C (as in fig. 7), the outer lines of the square appear to be curved outwards.

Fig. 6.

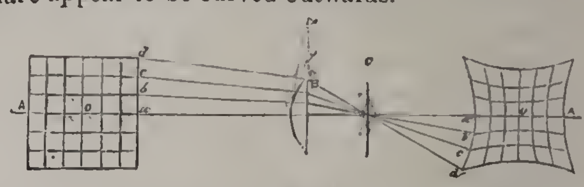


Fig. 7.

Wollaston altered the form of the lens. He used a concavo-convex meniscus having the concave surface exposed towards the object. The focal length varied from twenty to thirty inches, and altogether the meniscus gave a much larger and sharper picture plane. This kind of lens used with a diaphragm of $\frac{f}{30}$ was employed at the time of the discovery of the Daguerreotype in 1839. The objection to this single view lens consisted in the difference existing between the chemical and optical foci; that which appeared sharp on the focussing glass gave an indistinct impression on the plate.

In 1840, the French optician Chevalier constructed an achromatic photographic objective by cementing a double convex crown glass lens to a plano-concave flint glass lens. Professor Steinheil and Kobell in 1839 cemented telescope objectives for photographic purposes. The old view lenses all partake of this form, the outer plano-concave flint glass being turned towards the object, and the crown glass convex towards the focussing glass. The picture is equal to about one-third the focal length. The diaphragm was usually placed before the lens as shown in fig. 6. The tube B contains lens A close to the flange; at C the tube is narrowed, and the smaller one, E, is inserted having the diaphragm at F; D is the cover. Daguerre used a simple achromatic lens of three inches diameter, and in 1839 required an exposure of twenty minutes. Townson made larger lenses, and made more accurate corrections in the foci, so that Draper, in New York, took the first portrait in 1840. As the exposure was from ten to twenty

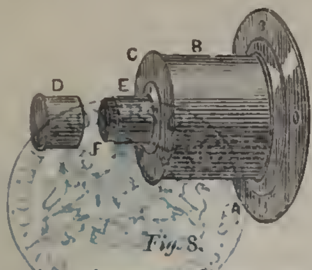


Fig. 8.

minutes in duration, hazy outlines resulted, as no one could remain in a free and unconstrained position so long.

At that time, according to the proposal of the French optician, Baron, a lens was wanted, the focal length of which was to be twice the size of the plate, the diameter of the diaphragm to be $\frac{1}{7}$ of the focal length.

At the present time a simple lens is required to produce a larger picture, and is further stopped down in proportion; but as light must be sacrificed, they are almost entirely used for landscape, and otherwise they are greatly excelled by doubled objectives.

The achromatic concavo-convex meniscus allows the use of larger diaphragms, and gives the pictures more brilliancy and relief on account of greater lighting power. In the Grubb lenses, as the spherical variation is not corrected, the opening must be altered. This form of lens consists of a crown glass meniscus, concave surface outwards, fixed to a diverging flint glass. It has the same expansion of view, but shorter focal length than the preceding. Grubb patented it in 1857, but the patent expired in 1860. These single view lenses are still largely used for landscape work in England, Germany, and France. Those known as Waterbury lenses are single view lenses having a permanent diaphragm of $\frac{1}{5}$ the diameter, and nickel-plated mountings. Their name is derived from the town Waterbury, Connecticut, where the factories of their manufacturers, the Scovill Company, are situated.

In 1857 Burnett endeavoured to change the simple lens into the form of band lenses. A strip from $\frac{1}{3}$ to $\frac{2}{3}$ of an inch in width was cut out in order to avoid the distortion by the admission of nearer objects, also at both ends of the strip a stereoscopic action took place by two pictures of an object coming together.

With the intention of reducing distortion to the slightest possible amount, and to give the lens the widest angle, Dallmeyer gave the simple lens a more pronounced meniscus form, and brought the diaphragm closer to the lens. Had he retained the early system of objectives, his aim would have been attained at the expense of sharpness of definition at the edge; it was therefore necessary to adopt a new optical construction. To the two lenses, one of crown glass and the other flint, Dallmeyer added a third, made of crown glass, the refractive index of which was somewhat different to the first. These cemented together form a single objective, the concave side being turned to the object to be reproduced. The rotating diaphragm is placed in front of the lens at a distance equal to its diameter, the smallest opening being $\frac{f}{30}$. The chief advantages derived from Dallmeyer's single view lenses are that with an aperture of $\frac{f}{20}$ a circular focal plane of 72° is perfectly sharp; while with $\frac{f}{30}$ the angle of vision is increased from 85° to 90°. The picture plane of the objective is very large for the longer side of the picture, which is always rectangular, is greater than the focal length of the objective, while with all lenses of earlier construction it was at most two-thirds the distance. This is a great advantage in landscape photography, as not only is the foreground well defined, but also the distance is rendered in practically correct perspective, although when used for architectural purposes the outer lines appear slightly curved.

The picture plane is more even than in the preceding lenses, and therefore the result is more brilliant in effect, owing to the chemical focus reducing slightly the angles of the rays converging to the axis.

Much unnecessary work is done by the wide-angle double objective, as some aplanatic lenses are superior in every way. In order to obviate the difficulty arising from having different lenses with various-sized tubes, a great number are made of the same diameter.

In 1881, W. K. Burton made use of single-view lenses reversed (that is, having the flat side towards the focussing glass for portraits, working with gelatine plates), and found them answer admirably when extreme rapidity of exposure was not necessary. These must not be compared with a portrait objective of equal focus, the largest field covered being equal to half the focal length; neither are they so clear as the aplanatic, but give softness, which is so desirable. Portrait lenses give detail in dark drapery with brilliancy and clearness, which is to be expected from six reflecting surfaces instead of two. Under favourable conditions, a picture—on gelatine plates—may be produced in a room in ten seconds, and in a studio in from two to five seconds, with a single-view lens.

A landscape, having rather a large angle of vision (40° to 45°) requires a portrait lens to be more stopped down, to give the necessary detail, than a single-view lens of shorter focal length and greater rapidity.

REGNARD'S INCANDESCENT LAMP.

THERE has for a long time been sought a process for obtaining a bright light which should permit of projections being easily made. In places where electric lights exist the thing is very simple; and it is also easy in places where there is gas, but then oxygen being necessary the apparatus became quite difficult to arrange and move about. But in all localities where even gas does not exist it becomes absolutely necessary to dispense with a method of teaching which, it is generally agreed, is an excellent one.

Quite recently the Minister of Public Instruction requested a special commission to design for him an apparatus that might be readily used in primary schools for making projections. The result of this commission's examination is that even if simple apparatus for projecting be not wanting, we are very far from having luminous foci sufficiently intense for obtaining somewhat enlarged images.

Dr. Regnard has conceived the idea of obtaining a very brilliant light by burning a mixture of air and vapour of petroleum on a platinum gauze. There results from this an intense heat, which raises the platinum wires to a white heat, and thus produces a light about half as bright as that of the oxyhydrogen light. The apparatus is very simple, consisting of an ordinary Bunsen burner terminating in a litttle cage of platinum wire. Instead of supplying this burner with gas, there is forced into it a mixture of air and petroleum vapour, according to a process known for a long time, and utilized recently by the numerous inventors of thermo-cauters. A simple kitchen bellows or a syringe bulb is quite sufficient to set up the necessary current of air. In order to throw all the light in one direction the Bunsen burner may be covered with a tube having a flaring orifice, like the bell of a trumpet, covered very accurately with a net-work of platinum wire. In order to obtain an extremely brilliant light whenever the blowing is done, it is only necessary to regulate the flow of the gaseous mixture by the ring of the burner. If, instead of using a bellows, the current of air be forced by a pneumatic machine or tromp, quite a number of lamps may be supplied and made to give a light having the aspect and power of incandescent electric lamps for rooms, factories, &c., in places where no gas exists.

Dr. Regnard's lamp is based on the Bourbouze burner, but is superior to that in not requiring the use of illuminating gas. It has another very great advantage, and that is that it costs almost nothing, and even when operating at a maximum the expense is only a few cents. per hour. It will prove of service to physicians for making laryngoscopic and otoscopic examinations.

If it be desired to give the apparatus greater constancy and make it serviceable for regular lighting, we suppose it would be necessary to go to a little more expense and increase the size of the carburetter in order that the impoverishment of the petroleum may not make itself too quickly felt. This may be accomplished by causing the air to bubble through one of those large flasks found in all drug stores, and into which there will be put nine or ten pints of the liquid. Such a flask may be placed under the table holding the apparatus, or even further off.

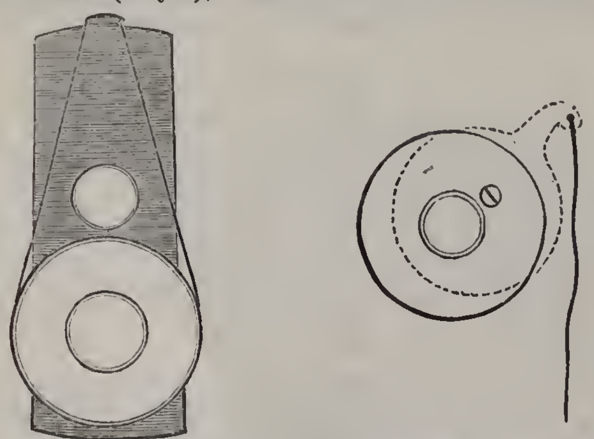
If it be not desirable to perform the blowing with the hands, there may be disposed under the table a large blowing apparatus that anyone can construct by loading with a weight a bag filled with air. If the bag is tolerably large the lamp will be enabled to operate for several hours without any attention being paid to it. The petroleum product to be put into the carburetter is the ordinary benzine of commerce.—*La Nature.*

Correspondence.

SIMPLE INSTANTANEOUS SHUTTERS.

Dear Sir,—I enclose rough prints of photographs taken on the open sea by two forms of instantaneous shutter which might be handy for some of your readers.

The picture of ship in full sail was taken between South America and the Cape of Good Hope by a Ross' rapid symmetrical (8 by 5), in which I had cut a slit opposite



Rapid Symmetrical. Portable Symmetrical.

the diaphragm or stop slit. A piece of brass about 5 in. by 1 in. passes thus right between the lenses, this strip being provided with a hole in the centre; an india-rubber band round the lens completes the apparatus.

The other shutter was made by substituting a disc of brass with a hole in it for the rotating stop, and a string fastened on to a small projection can be pulled nearly as fast as the quickest plates require; or, if wanted, a slip of blackened paper with a hole in can be used to stop it down.—Yours, Herbert Green.

[The first described arrangement recalls Mr. York's idea of using a drop shutter between the lenses of a portrait combination.—Ed. P. N.]

THE FERROUS OXALATE DEVELOPER.

Dear Sir,—I notice in your last number an article taken from "Autotype Notes," advocating the ferrous oxalate developer in preference to pyrogallic acid, and giving an easy method for the preparation of the same.

Allow me to second the writer of that article.

For the last two or three months I have developed all my plates with ferrous oxalate, and I am so pleased with the ease and certainty with which it can be worked that I fully intend to continue to do so.

My method of working differs but slightly from that given in the article referred to, with the perhaps rather important exception that I almost invariably commence developing with a small quantity of potassium bromide in the developer, and that I find the addition of a few drops of a very weak solution of sodium hyposulphite, as recommended by Captain Abney, has a very marked effect in restoring the energy of a worn-out developer, or in bringing out detail in an under-exposed plate.

By this means I have often developed six or more half-plates with between two and three ounces of developer. The negatives develop quickly and evenly, and ample intensity is readily obtained.

Perhaps the only thing to guard against is an alkaline sample of the potassium oxalate, which should invariably be tested, and, if necessary, be neutralized with oxalic acid.

When I find a plate to have been over-exposed, I stop the developer as soon as the details are out, fix, and then intensify with mercury and ammonia.

Hoping that the few details above may induce others, who have not yet given this mode of development a trial, to compare its merits with those of pyrogallic acid,—I remain, yours truly, Alex. Campbell Swinton.

[Our correspondent sends us half-a-dozen admirable out-door studies as an illustration. They are fully detailed in the shaded parts, yet well gradated and vigorous.—Ed. P.N.]

Proceedings of Societies.

Sheffield Photographic Society.

The ordinary meeting of this Society was held at the Freemasons' Hall, July 4th, Thos. H. Morton, M.D., President, in the chair.

The minutes of last meeting were confirmed.

A letter from Mr. Cecil V. Shadbolt was read, giving an account of his recent balloon ascent, and a photograph taken on that occasion was submitted to the members; it excited much interest and some discussion.

The Chairman proposed, and Mr. Hatfield seconded, that a vote of thanks be given to Mr. Shadbolt for his communication, and congratulated him on his success.

Circulars relating to the forthcoming Cornwall Polytechnic Society's Exhibition were placed upon the table.

Mr. Dakin exhibited negatives developed by ferrous oxalate, showing well the remarkable clearness in the shadows and freedom from fog secured by this process, even when development was prolonged.

Dr. Morton made some suggestions on packing negatives; although apparently a trifling subject, care was needed in handling and storing. With exposed plates, when travelling he thought it a good plan to take the plates from the double slides and place them in pairs facing each other with a fold of clean white blotting-paper between the upper and lower edges, then slip them into paper bags which were numbered, or could have description written with pencil on the back, and afterwards replace in the original card-packing box. The envelopes he made were of thin but tough wrapping paper.

Mr. Millward brought several good pictures, the result of recent excursion to North Wales.

Mr. Hatfield moved that the question of the Society's exhibition be considered at next meeting.

Messrs. T. Firth and G. V. Yates were deputed to make arrangements for an out-door excursion to "Rivaulk Abbey", on the 12th inst.

The meeting then adjourned.

Edinburgh Photographic Society.

The Edinburgh Photographic Society held their annual picnic at Dirleton, one of the most lovely spots in Scotland, on Thursday, the 6th of July. The party, numbering nearly seventy ladies and gentlemen, representatives being present from Glasgow, Hardwick, Liverpool, &c., after luncheon supplied in a spacious building kindly granted by Mr. Guild, of Castlemains farm, visited the gardens and grounds of Dirleton Castle, where five operators set to work and took views of the various points of interest, as well as groups of the whole party, which were accomplished under favourable conditions. Dinner was served by Mr. John Pillans, of Edinburgh, Mr. J. Lessels presiding.

After the usual loyal toasts, Mr. Lessels proposed "Prosperity to the Edinburgh Photographic Society," which was duly honoured. Mr. Tunny proposed "The Health of the President and Executive Committee," commending them for the very satisfactory arrangements made for the comfort of the company. Mr. William Dougall proposed "The Ladies," which was replied to by Mr. Louden. Mr. J. M. Turnbull proposed a vote of thanks to Mr. Guild for his kindness in giving such ample accommodation for luncheon, dinner, tea, and dancing. Mr. Guild suitably replied, and expressed the pleasure it gave him to add to their comfort, as the weather was so uncertain.

After dinner the company assembled in one of the parks, and a number of suitable prizes for races and walking matches were competed for. A blindfold barrow race afforded much amusement to all present.

After tea the party joined the train at Dirleton Station at 7 p.m., having spent a very enjoyable day of varied amusements. The arrangements were under the superintendence of Messrs. W. Dougall, J. M. Turnbull, John Simpson, J. Crighton, W. Hume, T. Wardale, jun., and the Secretary.

London and Provincial Photographic Association.

The first ordinary meeting of this Association was held at Ashley's Hotel, Covent Garden, on Thursday, the 6th inst., Mr. W. M. Ashman occupying the chair.

Mr. Henderson exhibited two experimental negatives by Mr. Phillips, of Fareham. They were taken under exactly the same conditions—one being developed with the ordinary pyrogallic and ammonia solution, and the other with the same strength of pyrogallic and ammonia, and the addition of sulphite, the latter being badly green fogged.

Mr. W. K. Burton was of opinion that the sulphite caused green fog.

Messrs. Debenham and Brown found its use slow the development.

Mr. Coles found that plates which, when developed with the sulphite formula, were green fogged, were often not so when the sulphite was not used.

Mr. Burton enquired if any one present could corroborate Mr. Brooks' assertion, that a stock solution of pyrogallic and sulphite will not keep, but, after a few days, loses its density-giving powers?

Messrs. Mackie and Rieman had found it undeteriorated after some considerable length of time.

Mr. Brown said it had been stated that the substitution of common washing soda for ammonia in the developing solution was a cure for green fog; and he produced two plates, one developed with the ordinary pyrogallic and ammonia solutions, the other with the soda formula; he found that although there was no green fog, its place was taken by a yellow one.

Mr. Henderson preferred the use of caustic soda or caustic potash.

Mr. Cowan produced four plates, illustrating the restraining action of citrate of potash; the first three were exposed alike (six seconds), No. 1 being developed with a normal pyrogallic developer; No. 2 with the same developer, 2 drachms of a 60-grain solution of citrate potash being added; No. 3 with only 1 drachm of the citrate solution added. No. 4 was exposed thirty-six seconds, or six times as long as No. 1, and developed with the same formula as No. 3, the result being no perceptible difference between it and No. 1. He also exhibited a piece of mosquito netting, such as he used for straining emulsions; it was a very fine mesh, and cost 2s. 9d. per yard square.

Mr. Henderson said he had recently handed two plates prepared according to his formulæ to a large maker who had tested them against the most rapid commercial plates in the market, and stated that with $\frac{1}{8}$ of the exposure necessary for the commercial plates Mr. Henderson's was over-exposed.

Mr. Collins passed round a sample of seed lac varnish; he said there was a large sediment, and consequently great waste in preparing it.

Mr. Henderson thought that if the varnish was forced through wash-leather, it would be found to filter very fine and clear.

Photographers' Benevolent Association.

The Board of Management of this Association held its monthly meeting on the 5th inst., at 181, Aldersgate Street.

The minutes of the previous meeting having been read and confirmed,

The Secretary submitted his half-yearly statement, which showed that the improvement made last year in the Association was being continued this year, the subscription from ordinary and honorary members being in excess of those of previous years.

Messrs. B. Moil (Kimberley, South Africa) and E. Wyse (London) were elected as ordinary members of the Association.

A cheque for one guinea was also received from W. T. F. M. Ingall, as a subscription to the funds.

The Board, after dealing with other business, adjourned.

Dundee and East of Scotland Photographic Association.

The annual holiday and out-door meeting was held on the 7th ult., when a party of upwards of one hundred and fifty ladies and gentleman drove in open carriages from Dundee to the beautiful Den o' Airlie, passing *en route* through seme twenty-two miles of delightful country; a most pleasant day was spent, an occasional shower or two varying the proceedings. Numerous cameras were at work at landscapes and groups. Substantial dinner and tea were well provided and duly discussed, and the party returned in the evening well pleased with the day's outing.

An extra meeting of the above Society was held on Thursday, July 7th, in Lamb's Hotel, the President, Mr. J. C. Cox, being in the chair.

After the Hon. Secretary had read the minutes of the last meeting, which were duly approved, Mr. James Sturrock and Mr. W. B. Davidson were unanimously admitted members.

The President read a letter from Glasgow anent proposed exhibition, and several communications were read by the Secretary.

Some excellent photographs, the results of the out-door meeting at the Den of Airlie, were shown by Mr. J. Geddes, Mr. J. Robertson, and Mr. A. C. Lamb. A most satisfactory list of contributors of papers for the winter session was made out, including the President, Vice-President, Treasurer, and others, and the winter session is expected to be both agreeable and profitable. The usual vote of thanks to the chair closed the meeting.

Talk in the Studio.

The Recent Alexandra Palace Award.—One of Mr. B. J. Edwards' two pictures, for which the gold medal was awarded, having been found to have been taken before the appointed day, the gold medal has been given to Mr. G. F. Williams; Mr. T. G. Horsey taking the silver medal, and Mr. W. T. Wilson the bronze medal. Mr. Edwards wishes us to state that one of the two pictures which were selected by the judges as the best was not intended for competition, but was simply inserted to fill up a space in the frame, which space would otherwise have been vacant owing to an accident to one of the negatives taken on Whit Monday.

The Bristol Review.—We have received, through the kindness of a Bristol friend, the second number of this readable periodical. It is a shilling quarterly, printed in good type and neatly bound. The present number contains ten different papers, some of them of considerable interest.

Electricity at the Crystal Palace.—It is proposed to hold a second electrical exhibition at the Palace during the coming autumn and winter, the exhibits to consist principally of arrangements to be used in connection with electric lighting; but in order that gas lighting may be compared with electric illumination, modern appliances for utilising coal gas will be included.

French Equestrian Portraits.—Mr. J. Delton, who has devoted so many years to bringing to a rare perfection the art of photographing equestrian subjects by his instantaneous process, has just achieved a marked success in his charming album of the "Tour du Bois," in which many of the best-known riders, military and civil, not to mention many fair horsewomen, with their steeds, are depicted in the pleasant alleys of the Bois de Boulogne with a fidelity which nothing can surpass. This is simply the first instalment of a series of work of a similar character that will make up a collection which will be prized by the fashionable world, whose morning rides in the shady avenues of the famous wood form by no means the least agreeable incident in the round of the Parisian day.—*Daily Telegraph.*

Pirating Photographs.—The persons who have recently been pirating photographs are being vigorously prosecuted and punished. The great celebrity portraits of Oscar Wilde, Sarah Bernhardt, and Patti, for which large sums were paid to secure the exclusive right of sittings in this country, have been copied photographically and lithographically in immense quantities, one firm having sold about 600,000 lithographic copies of Oscar Wilde alone, which very naturally lessened the sale of the originals, and consequently resulted in great loss to the enterprising photographer. Several cases have already been settled, and an important test case now is in the courts. Some of the pirates actually had the audacity to print the word "copyright" on their publicatious. A great service is being rendered the fraternity by Mr. Sarony in prosecuting these people, for nearly every photographer of any noto has suffered more or less from the same cause.—*Anthony's Bulletin.*

Physiological Action of Light.—Recent investigations by Tissoni and Fileti appear to thoroughly prove that the proportion of hæmoglobin contained in the blood of animals diminishes notably when they remain for a considerable time in the dark; but full exposure to the light causes the proportiou of hæmoglobin to rapidly increase.

Vitrified Typographic Printing on Glass or Porcelain.—J. B. Miller uses an india-rubber stamp charged with a mixture of fat oil (oil of turpentine, resinified by exposure to the air) and French oil of turpentine. The impression is then dusted with a finely-powdered vitrifiable pigment, and fired iu the usual manner. This method would doubtless be available for phototypic work on glass or porcelain. The (so-called) over-glaze colours should be used.

Summer and Winter.—Mr. J. Vaughan, of New Wandsworth, forwards us a neat little album containing a series of views elegantly mounted upon loose cards. Some of them—the wintry scenes more particularly—are executed with much taste and judgment.

Mansion's Colours.—Mr. J. Solomon has been good enough to send us some pretty pictures coloured by means of "Mansion's colours," for which he is agent. The pigments are said to be particularly suitable for photographic colouring, by reason of their transparency.

An Artificial Moon.—Mr. A. Stewart Harrison writes, in *Knowledge*:—"Take a soup plate and slightly grease the surface with lard or oil; distribute irregularly iu varying thicknesses about a tablespoonful of so-called granulated citrate of magnesia. Take a basin, pour in enough water to fill the soup plate; shake into the water about two-thirds the quantity of fine freshly-burnt plaster of Paris, which will sink at once; pour off nearly all the superfluous water; stir two or three times with a stick or spoon, so as to mix irregularly the paste; then pour it on the powder in the soup plate. The water in the plaster will cause an immediate disengagement of carbonic acid gas, which will rise in bubbles of various sizes through it in irregular patches; the plaster almost immediately setting, the shape of the outline of the bubbles and the walls of them become fixed, and, as a result, a most startling resemblance to the cratered surface of the moon is produced. If a photograph of this be taken with a strong light, the resemblance becomes so perfect as to deceive almost all who are not professional astronomers. I believe that a little sugar, or syrup, or gum in the water would produce larger craters, but I have not tried this." To this the Editor appends the following:—"As we have for several years used illustrations of the moon's surface formed by Mr. Harrison in the way described above, we can vouch for the accuracy of his statements."

To Correspondents.

*** We cannot undertake to return rejected communications.

T. W. H.—The best and quickest way to Berlin is by the Flushing route in twenty-four hours. Write to address we have given for particulars.

Bromide.—1. Our Publishers securo the registration for a fee of 1s. 6d. each picture. Neither size nor the nature of the subject affect the registration. 2. You seem to think that if you register the portrait of an individual you secure some right over any subsequent portraits which may be taken of him. This is not the case, as you have only property in your own photograph. 3. No. 4. A picture from each negative must be registered.

J. L. M. C.—Write to Mr. Spink, Western Road, Brighton.

Hector Colard.—On page 628 of our volume for 1880.

Weaste.—The material of the negative belongs to the photographer, but the copyright in the picture to the customer.

Constant Reader.—They are, as a general rule, far more permanent than ordinary silver prints; but under the circumstances you would do well to supply carbon prints.

F. Cowley.—1. About six or eight times. 2. In such a case an aperture equal to one twenty-fifth of the focus will be generally satisfactory; but experience alone will help you with respect to the second part of your query, as there is nothing like a constant ratio. Still, to give some idea, we may perhaps give you the numbers $\frac{3}{4}$, 1, and 3 as representing the relative times of exposure. 3. Probably from one and a-half to two minutes.

R. Thompson.—1. We believe they can be obtained through any wholesale dealer in photographic materials. 2. No.

Henry Spink.—1. We fear that there is no remedy, and that the stock of old collodion is practically useless, except for copying, or for cleaning plates.

L. F. Simkins.—1. Under the circumstances a much larger aperture must be used. 2. Double the quantity of pyrogallic acid.

George Davy.—We are now experimentally investigating the matter, and we hope shortly to publish full details.

Glasgow.—Almost every manufacturer makes the statement, but it is not true, for all that.

J. Johns.—1. It is quite useless, and must be replaced by new. 2. Quite safe as long as you heat in a water-bath. 3. It is extremely corrosive when in a concentrated form, but when it is largely diluted no danger is to be apprehended.

Beginner.—Considering that you have been endeavouring to fix your prints with glauber salts or sulphate of soda, it is not to be wondered at that you failed altogether. The salt you require is sodium hyposulphite, or, as it is porhaps more systematically called, sodium thiosulphate.

F. Roberts.—1. When a tough film is required, as in the case of film negatives, it is usual to mix about one part of castor oil with 200 parts of the collodion. 2. Magnesia may be used instead of lime, and your best way will be to obtain some of the nativo carbonate of magnesia, known as magnesite, and thoroughly calcine it at a red heat; after which suitable cylinders may be cut out of the compact magnesia.

T. K. J.—There are pretty clear indications that your dark slides admit light at the joints.

B. B. Wilkinson.—A quarter-plate lens, without name, can generally be purchased at a pawnbroker's for six or seven shillings; and a person who can recognise a good lens without actually trying it may often obtain a very good instrument. On the other hand, it not unfrequently happens that the bargain-hunter finds his purchase absolutely valueless. 2. It very rarely pays to have a broken glass replaced.

Gold.—There are some who hold such views, but we would not advise you to undertake experimental work in this direction.

Young Printer.—The bath not being strong enough, the albumen dissolves. Add an additional 10 grains of silver to each ounce, and try again.

C. P. Morgan.—You will find full particulars in the Year-Book.

Many answers are unavoidably crowded out.

THE PHOTOGRAPHIC NEWS.

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CONTENTS.

THE DRYING OF GELATINOUS FILMS.

A FEW years ago the general photographer had but little occasion to devote attention to this subject, gelatine being but seldom used in every-day work, excepting by the carbon printer, or those engaged in the various methods of photo-mechanical printing. Now all is changed, and the expeditious and convenient drying of gelatinous films is one of the most important points in connection with the photographic practice of the present time.

The drying of the freshly coated gelatine emulsion plate, and the desiccation of the finished negative, are the only operations which require special study from the general photographer's point of view; while a few points must be incidentally considered as bearing on the work of the carbon printer, or on the phototypist.

General experience points to the necessity of drying gelatino-bromide plates slowly, and at a low temperature; but these conditions can only be fulfilled in the most complete manner by employing air artificially dried by some desiccating agent, such as chloride of calcium.

Several effective drying cupboards, constructed for use with hygroscopic substances, have been described from time to time in our columns, that devised by Professor Herman Fol being very convenient, and, moreover, easy to construct. Chloride of calcium offers many advantages over sulphuric acid or quick lime as a drying agent, as it can easily be restored to an effective condition by half an hour's baking in an ordinary kitchen oven, and it is not, as quick lime, liable to give off dust-like particles, while it is free from the specially corrosive properties which characterise sulphuric acid. Chloride of calcium, when its solution is evaporated by baking in an ordinrry oven, takes the form of a sponge-like mass; this form being especially convenient, as a large surface is exposed to the air, and is consequently operative.

When a thick film of bichromatised gelatine is to be dried, as in the case of tissue intended for use in making reliefs for the Woodbury process, it is generally necessary to have recourse to chloride of calcium as an absorbent of moisture; each sheet of tissue being supported, coated side downwards, over a layer of the chloride contained in a metal tray; and in most cases several of these trays are constructed to slide into a casing, so that the whole arrangement resembles a chest of drawers in miniature. An arrangement of this kind we have found to be extremely useful when it has been a matter of importance to dry either freshly coated plates or negatives with rapidity, ten minutes being sufficient in either case, provided that care is taken to use the chloride of calcium in good condition as regards sponginess and dryness. The plate should be supported about one-fourth of an inch from the surface of the chloride of calcium, but it is scarcely necessary to remark that the chloride of calcium must never come in actual contact with the surface of the plate.

Some years ago Mr. Foxlee proposed an ingenious method of rapidly drying either freshly-coated plates or negatives, and his method is also applicable to other cases in which it is necessary to dry gelatinous films rapidly. The plate is soaked in alcohol, or, indeed, ordinary methylated spirit, for a few minutes, part of the moisture being thus removed by the alcohol, little or none of which is itself absorbed by the film. The alcohol is next blotted off by a piece of clean bibulous paper, after which the drying may be finished by the application of a gentle heat. Exposure to a moderate temperature—say 130° to 150° F.—is not injurious to an unexposed film at this stage, it being a known fact that, as the proportion of water in such a film diminishes, an increasingly high temperature may be employed without mischievous consequences. The so-called "methylated finish," which is in reality a dilute solution of certain resins in methylated spirit, must not be used instead of the pure methylated spirit.

When negatives are to be dried, there is a decided gain in removing all loosely adherent water by means of blotting paper, as recently suggested by the Rev. Mr. Bird, and the advantage of this proceeding has long been fully recognised by carbon printers and phototypists. Any person who adopts this method, and uses ordinary care, will find it to be of considerable practical value; but it is scarcely necessary to suggest that the blotting paper should not be smoothed down on the plate by the hand, as the warmth may cause adhesion; and the under, or web side of the blotting-paper should alone be brought into contact with the film, or fibres may remain behind when the paper is stripped off.

THE DEVELOPMENT OF GELATINO-CHLORIDE AND GELATINO-BROMIDE PLATES, AND ON GREEN FOG.

BY CAPTAIN W. DE W. ABNEY, R.E., F.R.S.

DURING my recent visit to my almost annual resort, the Riffelberg, near Zermatt, in Switzerland, I have learnt something which may, perhaps, be of benefit to your readers during the coming summer and autumn. My object in making so early a visit to a place which is usually sought during the next three months, was to make certain spectroscopic observations at a high altitude, and as near midsummer day as possible. These investigations have, however, nothing to do with my present article; suffice it to say that a residence at a height of 8,500 feet above the sea for between a fortnight and three weeks has been most delightful, surrounded as we were by pure air, with a barometer standing about twenty inches, and with the hill sides below the snow line covered with Alpine flowers of almost every hue and description.

My work necessitated the transport to this spot of several hundred plates of all descriptions, and supplies of collodion emulsions; but the plates to which I wish principally to refer were the gelatine plates which I took with me, these being pure bromide, bromo-iodide, and chloride plates, some of all sorts being taken for the spectroscopic work, and also for views. This is the first time abroad that I have developed many gelatine plates, and I only did so this time since, for the spectroscopic observations, it was necessary to know what was impressed on the plates, and then one naturally developed an occasional landscape. A very simple tent, weighing two or three pounds, was sufficient to work in comfort, in a room I secured for photographic purposes: it is something like Mr. Werge's tent, I believe. It had a large window covered with two thicknesses of ruby cloth, and the light coming through this could be dimmed by nearly closing the shutters, or by placing orange paper over the window. For ordinary gelatino-bromo-iodide plates, the unshaded window could be used with impunity, as it could with the chloride, though, of course, not for those plates which were sensitive to the very low parts of the spectrum.

Development of Chloride Plates.—I think we certainly are making an advance in the development of chloride plates. Several dozen of these were exposed and developed during my stay, being used both for spectroscopic work and also for landscape work. Up to the present time I have employed the ferrous citro-oxalate developer, which is admirable in its results; but at the Riffel it struck me that alkaline development might be more readily worked. I certainly tried this development before, and failed with it, but a slight modification renders it available for these plates. The emulsion employed was pure chloride of silver, prepared with an excess of common salt, and rendered slightly acid by hydrochloric acid, boiled for a quarter of an hour, and washed in the usual manner. (This method of preparation I have described elsewhere.) For the ultra-violet end of the spectrum these plates are slightly more rapid than rapid bromide plates when developed as follows:—

No. 1.—Pyrogallic acid (dry)

No. 2.—Potassium bromide	...	20 grains
Water	...	1 ounce
No. 3.—Ammonia ·880	...	1 part
Water	...	9 parts

To make up the normal developing solution the following were taken:—

No. 1*	...	3 grains
No. 2	...	1 drachm
No. 3	...	½ "

and made up, by the addition of water, to three ounces. This was poured over the plate at once, and development proceeded, giving images bright, dense, and perfectly free from fog of any description.

If the reader will follow out the above method of development, he will have no need to complain as to the difficulty of developing silver chloride. It may seem curious that bromide should be used as a restrainer, and for the sake of theory it may be as well to see what action it has. When the developer is applied, of course the tendency is for the sub-chloride to be reduced, but, at the same time, a minute layer of unaltered chloride is converted into bromide, which, owing to its conversion, is not readily reduced. This is what occurs at the first shock of the developer. Density is obtained, as we know, by reducing the haloid salt in contact with the first reduced silver, and this haloid has now been converted into bromide, hence the development goes on as in a bromide plate. In an interesting experiment made some time ago, and described by Dr. Eder, after exposing a chloride plate, he soaked it in potassium bromide till all the haloid silver salt was apparently converted into silver bromide, and then developed a perfect picture. I think, however, that it is probable that the sub-chloride was not converted into sub-bromide, since a theoretical difficulty arises, and my present impression is that the sub-chloride was left behind, forming the nucleus on which the development took place. If so, Dr. Eder's experiment and this latest mode of development are equivalent one to the other. Every plate developed as above gave perfect results, except in one or two instances, where the presence of green fog was most manifest. The presence of this green fog was my own fault. I found in the case of chloride plates, as I do with any other gelatine plates, that if they were *fixed in white light, green fog was sure to occur*, and that if fixed in the tent it was invariably absent. As a proof, if half a plate be fixed in the dark, and the other half in white light, green fog will show in the last half fixed, and not in the other. These experiments also showed me that chloride plates are excellent for ordinary landscape work, giving detail and density, as before stated.

* A portion of dry pyrogallic acid was taken from the bottle at the end of a strip of glass, and judged to be that weight.

Development of Bromide and Bromo-Iodide Plates.—In developing these plates, the same solutions as the above were employed. In several cases, over-exposure was known to have been given, two or three plates having more than six times too much exposure, and in one case twenty times too much exposure. The treatment adopted, and which with plates containing iodide proved uniformly successful, was as follows. The plates were developed with the same proportions as given above for the chloride, adding more bromide or ammonia as the progress of the development indicated was required. If the image began to appear in fifteen seconds, the same strength of developer was continued, adding the same proportions of bromide and ammonia till proper density was secured. On the other hand, if the image did not appear in that time, more ammonia was added, and if it began to appear almost immediately, a drachm of bromide was at once added. By this means the plates were saved. For a properly-exposed picture, the normal developer used was—

No. 1	...	3 grains
No. 2	...	1 drachm
No. 3	...	2 drachms

applied at once. The solution of No. 2 is weaker than I generally employ for gelatine plates, though it is the strength I use for collodion emulsion. I usually make it up—

Potassium bromide	...	50 grains
Water	...	1 ounce

in which case, of course, the amount added must be proportionally reduced to 25 minims.

The water used was from the small stream which runs outside the Riffel hotel, and had we such water in England the use of sulphite in the developer would be abandoned. In the measure used for developing, and after a plate has been developed, I have let the mixed solutions stand some five or six hours, and at the end of that time it has only been of a light brown colour, with no trace of blackness about it. I have, in fact, developed several plates with the same solution. The water is snow water, and does not run through limestone. It thus appears that the chalk has something to do with the horrid black mess which so often disgusts the cleanly photographer. Can it be that the sulphite of soda and the carbonate of lime form sulphite of lime and carbonate of soda? Anyhow, in no case was I obliged to trench on the stock of sulphite of soda which I had with me.

Sulphite of Soda and Green Fog.—Touching sulphite of soda and green fog, I should here like to say a word or two. I think that if photographers would read my paper on the subject of the cure for green fog, which appeared a few months back in the News, they would see that it is in reality a deposit of silver in a minute form, and that it can only occur when some substance is present in the developer in *which the silver salt is soluble.* Now the silver haloids are soluble to a notable extent in sulphite of soda, and we may therefore expect that it should aid its formation. It has been asserted that with ferrous oxalate you can get green fog. My own experience is that, with this developer (which I have employed more extensively than most photographers have done), green fog is impossible unless some substance be present with it, as I said before, in which silver bromide is soluble. Two instances were brought before me of green fog with ferrous oxalate. After close questioning, in one case I found that hyposulphite had been added to the developer, and that accounted for it; in the other, the ferrous oxalate had been made up with ammonium oxalate instead of potassium oxalate. In both cases a solvent of silver bromide was present. Fixing a plate developed in white light after moderate washing will give green fog with alkaline development, but fails to do so with ferrous oxalate.

In a subsequent article I propose to say something about exposures necessary to be given at high altitudes, which I am afraid will somewhat shatter the notions which now prevail.

By-the-Bye.

CONTINENTAL RAMBLES WITH A CAMERA.

A Tour in the Tyrol.*

The Krimml waterfalls—there are three magnificent cascades—is a difficult subject to photograph; at any rate, we found it so. If you recede far enough to get out of the way of the spray, then the stupendous mass of white water, as it comes tumbling and thundering into the big cauldron of black rock, loses all its grandeur; while you cannot expose the lens for a couple of seconds in its vicinity without the whole apparatus being bathed in vapour. Our focussing cloth was wringing wet before we could withdraw it, and the only picture of the Krimml Falls we possess is one taken from the summit of the Plattenkogl, in which the mighty fall, at a distance of five miles or more, looks like a brooklet of milk.

But the Krimml inn makes amends to the photographer, for it is the most charming specimen of architectural woodcarving in the district. The balcony is a masterpiece. The ornamental balustrades are wrought so delicately and elaborately that one hardly knows which to admire more—the skill, or the labour involved. The roof of loose boards is weighted, as usual, with huge stones instead of nails or pegs to keep it down; while another point in its picturesque nature is the heavy timber cross beams that project here and there from the structure.

It is very cold at Krimml, for the village lies at an elevation of 3,300 feet, and it is unprotected from the chill winds that seem to blow all day long. In fact, the only warm place is in bed, and one is rather glad to be off betimes in the morning down the valley to Zell-am-See (not to be confounded with Zell-im-Ziller). It is a long and monotonous road, albeit there are charming glimpses by the way of the snowy Venediger and other white peaks, and for this reason we avail ourselves of a conveyance. And here we may mention that on the Tyrol highways carriages are both reasonable and cheap. Sometimes you have a choice of three different modes of travelling—that is, if you happen to be on one of the post roads. In the first place, there is the so-called "Extra-post," which answers to our old posting. A carriage and pair of horses, with a smart postilion arrayed in shining brigand hat, orange-faced uniform, with bugle complete, costs but tenpence a mile (English), and as the carriage holds four, provided there is little luggage, this mode of journeying is as cheap as it is luxurious. You drive from one post-station to the other, and can break your journey at any one of them (it is usually an inn as well) either for ten minutes, or the night, as you wish. Next, there is the Eilwagen, that is, the mail-coach, which travels as quick as a post-chaise, charging at the rate of about threepence a mile; and finally, there is the Stellwagen, a humbler conveyance, for local people, which stops rather more than it goes on, and altogether travels without much rule or regulation. Nevertheless, a Stellwagen is comfortable travelling in its way, especially if there is no reason for hurry, and you wish to look about you; in fact, so far as we are concerned, we have nothing but good words for it. The charge is frequently not more than a penny a mile, and as you can always walk a bit now and then without delaying your companions, you have more independence than in the case of most public vehicles.

We journey to Zell-by-the-Lake in a Stellwagen, then, and so free-and-easy is our driver that he thinks nothing of deferring to our request when, coming in sight of the picturesque little village, we ask leave to dismount and to set up our camera to get a view. It is a delightful picture. As you approach, the road runs close down beside the placid water, and the white church and cottages of Zell are seen standing out, as it were, upon a promontory jutting far into the lake. On each side are dark rugged hills rising from the shore, and beyond is a rare background of silver grey cliffs of the most fantastic outline. These magnificent crags appear hollowed out, and the dainty little town seems set in a casket of silver and black.

Zell-am-See is a Rip-Van-Winkle of a place; that is, the town is animated enough, but the costumes of the people are of the quaintest and most antiquated. They gaze at you in good-humoured wonder, as they would at wax-work, and when we attempted a view of the street with a glimpse of the cemetery beyond, they crowded round so quickly as to obstruct the horizon. During the exposure, and before we were aware of it, one of the most curious patted the camera gently with his hand, and the consequence was, when we developed, there were four rows of houses instead of two, and a double cross over every little grave.

Speaking of the dead, they have a curious custom in Zell of putting up memorial boards with inscriptions in the streets outside their houses, sometimes the whole front of a shop being covered by these lugubrious inscriptions. The effect upon a stranger is depressing in the utmost, for it is not a cheerful idea to make a dwelling house do duty for a tombstone. This custom one only sees here at Zell-am-See, but the visitor to the Tyrol, and especially the pedestrian, cannot walk a mile along the road without meeting two other marked characteristics having to do with the people's religion, which is Catholic throughout. The first is the number of large painted crucifixes by the road-side, with figures of our Saviour life-size; these are not only posted in cross-ways, but in fields and plantations, by their proprietor, the erections being more or less gorgeous in point of colour and tinsel, according to the wealth of their owner. The other custom is that of putting a roughly-painted picture, about a foot square, by the roadside, representing any fatal accident that may have occurred near the spot. Now, as these paintings last fifty years and more, and accidents occur not unfrequently, the end is that they accumulate, especially where the road is dangerous. The name of this form of memorial is termed a "Votivbild" or "Maeterle," and to it is appended the request for a prayer or "Ave Maria" on behalf of the soul of the departed. The paintings, crude as they are, all possess that strange fascination which the description of anything horrible always excites. Now it is a man drowning in a rapid stream; now a waggoner crushed by his horses; now a woman perished in the snow, &c. The ambition of the village artist is to show every detail of the accident. The unfortunate victim is depicted, not merely with a serene countenance, but with one betokening absolute indifference to his perilous position; and there is painted over his head a little black cross, to show that his doom is sealed. If there are any lookers-on, they are shown in gay holiday attire, regarding the matter with much interest and satisfaction.

* Continued from page 404.

On the way to Zell, at a spot where the Stellwagen crossed the stream by a ford, we saw no less than five "Maeterle" of drowned people, while at Zell itself there is a very grand one, representing a boat accident, with a number of bodies lying on the shore, the dead being distinguishable from the quick by the circumstance that the latter have no black crosses by them.

From Zell, our way leads up the valley of the Fusch towards the monarch of the Tyrol, the Gross-Glockner. It is always well, if you include any arduous mountain travelling in your trip, to defer it for a while, until your feet and legs grow accustomed to the work; in making this little tour, there is no snow or glacier crossed for the first ten days—in fact, not until you reach the head of the Fusch valley. On your way thither, you pass the little spa of Fuschbad, where a day or two's rest is very agreeable in the midst of fine mountain scenery. A whole series of pictures may be here secured looking up the valley towards the snowy region of the Gross-Glockner, or back at the grey crags beyond Zell, mountains in the neighbourhood of the Watzmann and the Steinerne Meer.

Ferleiten, at the head of the Fusch valley—here is an outline sketch of it—is a miserable hamlet with poor

accommodation at the simple inn, but you must perforce stay the night, as you require a long day to walk over the snowy pass of the Pfandelscharte to Heiligenblut. We secure the services of a guide, who cheerfully carries most of the heavy baggage, and set out steadily on our way at four in the morning. The path grows steep at once, and after an hour's climb you have left all vegetation behind you, and can see Ferleiten at your feet, resembling a Lilliput village, the tiny white buildings set up like toy models upon a strip of grass-green carpet.

The Fusch valley ends in a sharp comb chaining together two peaks, and this comb, which is called the Pfandelscharte (some 9,000 feet English, and reached in five hours from the start), must be surmounted to get to our destination. It is now all snow as far as the eye can reach, except where rocky crags, black and green, pierce the shining white coverlet. The far-stretching plains up here seem to be cut off from the living world; there is nothing but glittering ice and smooth snow bounded by gigantic peaks, that seem to have risen up on all sides while you were climbing the slope.

We must have a picture of the order of march, so we ask the line of pedestrians to halt when half way up one of snowy inclines. It is a difficult matter, rather, because we naturally want to be taken in the line as well. A strapping young barrister we have met at the foot of the pass is put in the van, then comes the guide with his huge burden on his shoulders, then other two companions; and we arrange to take up a position in rear, as soon as we have uncapped the lens. A very small stop is used to lengthen exposure; the focussing cloth is made to shade the lens as much as possible from the glare, and then, having pulled off the cap, we rush hurriedly over the snow to take up a position. We halt behind the others, and remain immovable, counting five seconds, feeling all the time very uncomfortable, from a knowledge that the camera has all of us before it, and is in charge of itself. How we should like to glance for a moment behind, to see if it is all right, and that no one is tampering with the lens! Then we rush back again, down the snow slope, and nearly overturn the little camera in our anxiety to cap at once. It is not a bad little picture, when we come to develop it, although there is a strange look about our own ghost-like figure, which has not half the vigour of the preceding ones.

Another view is obtained on our descent of the famous Pasterzen Glacier, one of the most magnificent ice scenes in the Tyrol. The photograph is of value as a reminiscence of travel, but it conveys, unfortunately, little idea of the wonderful mass of ice crystals which sweep down the whole side, from top to bottom, of the cone-shaped Gross-Glockner. Here, from the Johannis Hütte, where we place the camera, you see the dazzling glacier in its entire length, for directly opposite rises the peerless mountain, as spotless as if made of Sicilian marble. Above the Hütte, the Pasterzen is of a pure virgin white, but below it breaks up into huge crystalline masses of translucent emerald. The glacier encircles the rocks at one's feet like frozen billows, and one feels tempted to descend, as it were, to the beach, and toy with the glacial water.

We now enter a pine-clad valley, and, still descending, come once more into the land of the living, passing through pastures fresh and green, and by tiny water mills and white cottages that deck the banks of the rushing river. The big white church—a cathedral-like pile—of Heiligenblut comes into sight, and at the twelfth hour from starting, we reach the village itself. The journey quite suffices for a day's work, but in the evening we mark a subject for the camera to be attempted in the morning. This is no other than the charnel-house beside the church—a scene of the most weird and terrible description. Old crucifixes, figures of human beings in purgatory, and other uncanny objects, were stacked in heaps in this cavern against bones and skulls innumerable, making a picture such as the Belgian artist Wiertz loved to paint. We gave our plate (collodion emulsion) an exposure of three-quarters of an hour, an artist friend, with his pipe for company, guarding the door the whole while: but nothing came of it, we are happy to say, on development.

The inn at Heiligenblut is also rather primitive (they talk of building a better one), and, therefore, a prolonged stay is scarcely to be recommended. Meat is scarce (there was none at all at Ferleiten), and the sleeping accommodation a little rough. A day's walk from the village brings you into the Puster Valley, where there is a railway; but we mean to have another look at the Gross Glockner district, and a peep at the Dolomites, before returning, and so secure a guide to take us over the Katzensteig and Kals Pass to Windich Matrei.

(To be continued.)

SULPHITE OF SODA: ITS USES AND ABUSES.

BY HERBERT B. BERKELEY.

I HAVE read with interest your remarks upon sulphite of soda in the alkaline developer, which appeared in the leading article of your last number. Perhaps I may be permitted to supplement these by commenting on the several points raised by yourselves and by others.

Taking your remarks in the order they appear in the article referred to, I may say that, while it is true that one of the objects aimed at is the prevention of the brown "pyrogallic stain," another point is secured hardly less valuable, and that is, the "wet-plate" character of the image. You state that, with *some* plates, the same effect can be secured by subsequent treatment by citric acid and alum. I much doubt whether the colour and character of the image can be altered to any very marked extent, even though the shadows may, in some cases, be easily freed from the stain. If the image is so affected, the colour being altered, the treatment will generally have made it hopelessly thin; however, in any case, prevention is better than cure.

Then we come to the four charges brought against my method, though, perhaps, some of these complaints may arise from not following my method. Firstly, it is said that it produces chemical fog. This I entirely deny, if reliable chemicals are used. I can, however, account for the appearance of fog under certain conditions. The development may be somewhat prolonged; at the same time, the developer does not deepen in colour; the consequence is, that the plate is exposed to such actinic rays as may pass from the lantern or window during a much longer time than would be the case were the ordinary alkaline developer employed. It is easy to avoid fog by screening the plate from the direct rays, or by covering up the dish.

With the second charge I am more in accord; and in the main I hold your opinion on the matter. It is certain that sulpho-pyrogallol will not initiate green fog; and I do not believe such fog will be readily and entirely avoided by omitting the sulphite; yet my observations lead me to the belief that any substance causing the necessity for the more prolonged action of the developer, further, even simple under-exposure in the camera, will favour the appearance of green fog in those plates which contain the germs of this annoying dry plate pest.

The best way to avoid green fog is to avoid the plates which are afflicted by it; and the best cure for this green fog, when we have it, is the ferric oxalate treatment of Mr. Willis.

Then we come to the third objection. In my own opinion a restraining action on the activity of the developer is a positive advantage. From the first day when I used the sulphite I noted the gradual way in which the full-detailed image appeared to be a distinct point in favour of the addition. In portraiture, perhaps, this "flashing out" of the image may be more allowable than in landscape work, for two reasons—the contrasts of light and shade are not so great in the former as in the latter case; and there is also much greater ease in obtaining the correct exposure in the studio than there is with the varying nature of landscape photography.

But, after all, there is no necessity for prolonging the development should the method of "flashing out" the image be preferred, provided the preparation used be of suitable quality. To ensure "flashing out" to heart's content, simply use a little more ammonia; but, mind, I do not advocate this method; I simply throw it as a sop to those who cannot bear to wait a few minutes longer for their negative. It may here be mentioned that in a developer containing three grains of pyrogallic to each ounce (the solution of sulpho-pyrogallol being used) there will be about sufficient acid present to convert half a minim of strong ammonia. With weakly alkaline development this fact should not be overlooked.

The cause of the remaining change arises from this system of "flashing out" the image. The whole of the detail having appeared, the plate is taken out of the developer, is fixed, and, lo! one of the main objects of the addition is defeated.

To obtain a vigorous negative with full gradation, the development must be of a gradual and steady character; the detail in the shadows must not appear until the high-lights have gained most of the strength desired; and in any case the sojourn of the plate in the developer must be one of six to twelve minutes. Though I do not wish to generalise on this point, at any rate if thin images be obtained, take means for preventing—either by less exposure, by more bromide, or by more sulpho-pyrogallol—the too rapid formation of the image, and allow plenty of time for intensity when acquired. As you remark, the degree of apparent intensity required is much greater than is the case with the ochre-coloured image so commonly obtained by the ordinary alkaline developer.

Lastly, we come to that statement the origin of which I am at a loss entirely to comprehend. We have seen it stated on several occasions that the opinion of some who have made solutions ostensibly by my formula—but, I fancy, generally somewhat diverging from it—is, that the preparation will not give good results for long together, but that it must be made freshly at intervals of a few days. I can only say that any solutions giving cause for such opinion must have been of a shadowy character from the beginning, or that they have not been suitably stored or properly treated. Amongst other things, I do not advise the dilution of the 10 per cent. solution, unless shortly before it is to be used, when, if thought convenient, it may be done. The solution I am now using was made early in October last.

With reference to your formula it has been a puzzle to me to find out—looking to the object sought to be attained—what "the difference 'twixt tweedle-dum and tweedle-dee." If the sulphite become oxidized in the pyrogallic solution, why should it not be similarly attacked in the solution of ammonia? We should get an interchange between the bases soda and ammonia; but this is probably of little moment.

However, in addition to its more important capacity, the sulphite exercises an important function in preserving the plain pyrogallic in good condition. Citric acid alone is not nearly so good a preservative of pyrogallol as is a properly-prepared solution of sodic sulphite.

It has occurred to me that, as it has been found in several instances that green fog is not liable to make its appearance when sodic carbonate is used instead of ammonia, it might be well, where the treatment of these plates is necessary, to use this alkali in combination with sulpho-pyrogallol. However, I only throw this out as a hint, having no practical experience of the combination as a developer.

IODIDE OF SILVER IN EMULSION.

BY A. L. HENDERSON.

THE experience of photographers on the above subject is so varied that it is evident that more light is required.

As a matter of fact, iodide in bromide emulsion does certainly make the plate slower, and this in proportion to the quantity added. Notwithstanding this, no one can gainsay that there are certain advantages which accrue from the double compound.

I have lately hit upon a circumstance (doubtless not entirely new, yet possessing features of interest), viz., that if a bromide and an iodide emulsion are made and washed separately, they may be mixed just before coating without greatly lowering the sensitiveness of the resulting plates. The actinic opacity of the iodide emulsion, compared with the bromide, is invaluable to the photographer, and to this is due the fact that plates containing a small quantity of iodide, from one to two per cent., generally give greater density and pluck; but if a large quantity of iodide is used, say equal parts, entirely different results are obtained—*i.e.*, a thinner image, from the fact that less bromide of silver is reduced, and this result is attained without the blurring by halation.

Strange to say, plates containing the pure bromide gave green fog in the shadows; while others containing the mixed iodide and bromide were perfectly free from this defect, both sets of plates being exposed the same time, and developed together; but no difference in detail was perceptible in either case.

To photograph subjects with great contrasts, the compound emulsion is decidedly best, because of the absence of too great density in the high-lights, and the usual concomitant—halation.

In a former communication to you, I mentioned that the Derby race photograph "did not convey the idea of motion so well as some others taken with a slower shutter in which there is a movement perceptible." In substantiation of this, I enclose some pictures taken on Whit Monday at the Alexandra Palace. The photographs were not sent in competition, as they were slightly under the determined size.

ON THE COMPARATIVE EFFICIENCY OF VARIOUS INSTANTANEOUS SHUTTERS.

BY JAMES CADETT.*

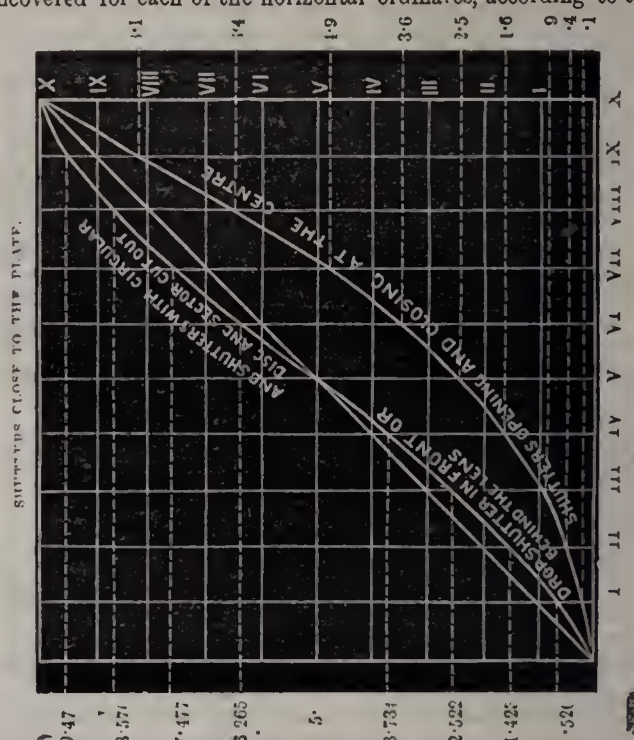
I am one of those who believe there is a great future for instantaneous photography, in spite of the ridicule which is often cast on it from an artistic point of view; in most cases, however, deservedly so. Perhaps the principal reason is, that we are obliged to cramp the capabilities of our lenses by using large apertures, the result being that we cannot get a fair angle of view without loss of marginal definition, and light and depth of focus. If my memory serves me, I once heard Mr. Dallmeyer remark, when speaking of the rapid rectilinear type of lens, that a whole-plate lens should not, for instantaneous work, be used with full aperture for a larger plate, at the outside, than the half-plate; now, under ordinary circumstances, he is right. When we consider that, with an angle of 60°, the margins of the picture only receive 55 per cent. of the amount of light received at the centre of the picture, and with an angle of 70° only 45 per cent., or less than one-half, we see one great difficulty to encounter when exposure is more likely to be under than over. This difficulty, coupled with want of marginal definition and depth of focus, has the tendency to urge the photographer to give his attention mainly to the centre of his picture, generally on some particular object, and thus the surroundings which constitute an artistic picture are, in most cases, ignored. The lens-diaphragm is, of course, an indispensable adjunct, and, unfortunately, its use is very limited in instantaneous photography as at present practised. I am aware that a few seascapes have been fairly successfully photographed with apertures as small as $\frac{f}{18}$, but this case is an exception to the rule. I think that quick exposures ought, and ultimately will, help us more with landscapes, and also tend to more artistic results. How often, when in search of the picturesque, we observe patches of sunlight rapidly travelling over the landscape, according to the movement of the clouds! and, when some particular parts become lighted, though only for a second or so, we give a sigh, and say, "Ah, if I could only get that!" I need scarcely say that we have a suitable stop in the lens, and from ten to twenty seconds are probably required. Again, there is a view in which there is a flowing stream with overhanging trees; who has not wished to catch the ripple and sparkle of the water, and yet get detail in those cool, deep, liquid shadows? Alas! it is not to be done as it ought to be. The fact is, that we want a very sensitive plate to make a new departure, and I must say that some plates made by Captain Abney, showing all the numbers on Warnerke's sensitometer—and more if the scale went far enough—with good quality, give me courage to assert that ere long some effects will be obtained which will raise instantaneous photography to a position as a source of artistic merit.

Mr. Payne Jennings is always complaining that he cannot get plates sensitive enough, and I have heard him remark that his best work has been done on the most sensitive plates he could get; still, I have known him to give twenty seconds' exposure on a bright day, with a plate showing more than 20 on the sensitometer. This shows that a plate showing 20 is not sensitive enough, as he is rather fond of small stops. We all know his work too well to question the value of his opinion. He says that the quicker a negative can be taken the better. I hope that during discussion he will kindly favour us with his reasons.

I have made these remarks to endeavour to impress the importance of what is, perhaps, the chief point with regard to instantaneous shutters—it is, that we should get the greatest possible amount of effective light during the short time of exposure; this point I put first in importance until our plates become vastly more sensitive. I will endeavour to treat of other points afterwards.

The efficiency of a shutter with regard to the maximum amount of light received by the sensitive plate is mainly influenced by the manner and proportion of time in which the lens or sensitive plate is uncovered and covered. The various kinds of shutters in general use differ comparatively very much in this respect. I intend to compare four different kinds, viz., shutters which work close to the plate, such as Mr England's original drop-shutter; the ordinary drop-shutter behind or before the lens; shutters consisting of a revolving disc, with a portion of a sector cut out of it; and shutters which open and close at the centre.

In order to make comparisons more clearly, I have drawn curves representing the efficiency of each shutter with regard to the amount of light received by the lens, presuming that they all take the same time in making exposure. The horizontal ordinates represent the distance or space taken by any shutter to completely uncover the lens, and this distance is divided into ten parts. The vertical ordinates represent the areas of the lens uncovered for each of the horizontal ordinates, according to the



shutter used, the total area being represented by 10. The shutters giving the greatest efficiency are undoubtedly those which work close to the sensitive plate, because the whole of the lens is always uncovered; immediately therefore that the plate is uncovered in any part, that part receives all the light the lens can give. These shutters have their disadvantages, which I will presently mention, but their efficiency is practically total; I will therefore call it 1. When we come to shutters which work immediately before or behind the lens, the conditions are at once greatly altered. Taking the ordinary drop-shutter, it is clear that the lens must be uncovered by degrees, and that, as the lens forms a circle, the amount of surface of the lens exposed does not increase proportionally with the distance moved by the shutter. The surfaces uncovered form increasing segments, and, until the lens is half uncovered, the movement of the shutter is proportional to the versed sine of half the angle extending from the centre of the lens to the edges of the shutter, cutting the circumference of the lens. As we have divided the whole move-

* Read before the Photographic Society of Great Britain.

ment of the shutter necessary to uncover the lens—in this case it is assumed that it is equal to the diameter of the lens—into ten parts, it is easy to calculate the efficiency by finding the areas of the segments of which these parts form the height or versed sine, and representing these areas as vertical ordinates. In this way we can show the area of lens uncovered at any part in the path of the shutter. Its efficiency is ·5 as shown in the drawing, and is one-half that of the shutters which work close to the plate. Many persons are under the impression that there is a loss of about ¾, or more correctly ·7854, of the light with a drop-shutter having the same aperture as the diameter of the lens (on account of the shutter having a square opening which travels over a circle made by the lens); but a little reflection will show that this is not the case. If lenses were square instead of round, the opening of the shutter would be smaller for a lens of the same area to be in proportion; but the efficiency would be ·5, or the same as from a round lens, the only difference being that a square lens would be uncovered more evenly, as shown by the straight-diagonal line in the drawing. It will be seen on examination of the curve that the efficiency of the drop-shutter is a little under ·5 during the time that half the lens is being uncovered, but that during the uncovering of the second half the efficiency is as much above ·5 as it was below it, thus making a total of ·5 exactly. We now come to the shutter made with a circular disc, having a sector cut out of it. It will at once be seen that its efficiency is exactly the same as the ordinary drop-shutter, viz., ·5. Next are the shutters which open and close from the centre between the lenses, or where the diaphragms are placed. Now, it is clear that the area of the opening made by the shutter is proportional to the square of the diameter of the opening, and in consequence its efficiency is only ·25; in fact, we lose ¾ of the light. A glance at the curve will show this at once. I need scarcely say that such a serious defect ought not to be tolerated, especially as it can easily be cured. The only place for these shutters is, of course, where the diaphragms are intended to be placed. It is simply ridiculous to place shutters of this kind in front or behind the lens, as it at once greatly increases the evil inherent to every lens—that of giving greater illumination to the centre of the plate than to the margins. Our lenses are quite bad enough in this respect without unnecessarily increasing the evil; besides, in this case, the evil would be still further increased if a diaphragm should be inserted. In spite of this a great many people use these shutters in this way, perhaps in sheer ignorance of what they are doing.

I will now say a few words about the disadvantages peculiar to each kind of shutter I have spoken of. The shutter which works close to the plate has the tendency to give moving objects a slanting direction; this, of course, is an objection only under some circumstances, and the larger the plate the greater the objection is likely to be. Though we can get any amount of rapidity in exposure for any particular part of the plate by making the opening narrow, different parts are exposed at different times, and at widely different times if the plate be very large. A moving object, if very large, would, of course, suffer; the exposure also would be very much shorter at the bottom of the plate than the top, the slit having to fall the whole distance of the plate; it is, however, in the right direction, as the sky would have the shortest exposure.

The drop-shutter in front or behind the lens has not, practically speaking, the objections of the shutter close to the plate; and, theoretically, the less so as the diameter of the lens is smaller. It is, however, of very great importance as to whether the shutter is in front or behind the lens. In front, simply means giving the sky considerably more exposure than the foreground. For instance, if the top part of the lens had one-tenth of a second, the bottom part would have, approximately, one twenty-third of a second. The smaller the diaphragm used, the nearer would the exposures of sky and foreground approach the above exposures relatively. Under these circumstances, a drop-shutter in front of the lens is bad practice. Of course, I am now supposing that the lens is a doublet, as the difference between the exposures of sky and foreground by a shutter in front of the diaphragm of a single landscape lens working with the ordinarily small aperture would be practically insignificant, though the sky would get a little more exposure than the foreground. The shutter with a circular disc and a sector cut out may be placed in any position with regard to the lens, as it can be adjusted to favour the foreground in any case.

Shutters opening and closing from the centre must be placed between the lenses, or in the same place as the diaphragm. This is imperative, and needs no further comment.

Taking all points into consideration, the best place for any of the above shutters (with the exception of those close to the plate) is where the diaphragm is intended to go, or between the lenses. This enables the greatest possible reduction in the size of the shutters, and, of course, size and weight are most important factors in the photographer's impedimenta.

We now come to a most important point with regard to giving efficiency to any of the above shutters (those close to the plate excepted); it is, to make the aperture of the shutter several times that of the lens or its working aperture; in this way we can get a very high efficiency, but we are, of course, limited by the size that the shutter becomes. Shutters opening and closing at the centre, of course, require to be made proportionally larger in aperture than the others to get the same efficiency. The size of aperture is easily calculated for any efficiency. Those who are unable to make the necessary calculations have only to ask Captain Abney, and I am sure that he will kindly give any required information. I do not think myself that the efficiency of any shutter should be less than ·75.

With regard to testing the rapidity of exposure with any shutter, I have no doubt that many will remember the paper by Mr. Warnerke and myself on this subject. We used a revolving stick; and though it was revolved by hand in a rather unscientific manner, still repeated trials showed that error was not greater than about five per cent. Since then Mr. Warnerke has made a disc, with a small round hole in it near the edge, to revolve by clockwork; I regret that I cannot show it to you to-night, as Mr. Warnerke has taken it with him to Russia. The hole is illuminated by reflected light from a white surface, or by the sky direct; and a photograph is taken while the disc is revolving, and rapidity measured by degrees of arc.

The rapidity of exposure by drop-shutters is easily calculated without experiment. It may be interesting to some to have simple formulæ by which to make the calculation, and this must be my apology in bringing so simple a matter before those of superior mathematical attainments. The formulæ are as follows:—

S = the space or distance fallen in inches;
t = time in seconds.

$$S = t^2 \times 193$$

$$t = \sqrt{\frac{S}{193}}$$

From these two simple equations we can calculate anything we require. Supposing we wish to know what diameter of aperture would uncover and cover a point in one-tenth of a second by falling:

$$S = (\tfrac{1}{10})^2 \times 193 = 1{\cdot}93 \text{ inch.}$$

Supposing that the lens has the same diameter as the aperture of the shutter, in this case 1·93 inch, and we wish to know the rapidity of exposure at a point at the bottom of the lens. We have one-tenth second for the top of the lens, as above; to get our answer, we have simply to subtract the time taken to uncover from the time taken to cover.

$$\text{Time taken to cover} = \sqrt{\frac{3.86}{193}} = \sqrt{\frac{2}{100}} = {\cdot}141.$$

$${\cdot}141 - {\cdot}1 = {\cdot}041 = \text{approximately } \tfrac{1}{24} \text{ second.}$$

Here 3·86 = the distance through which the covering portion of the shutter has to fall, being in this case twice the diameter of the aperture; from this we get the time, and subtract from it one-tenth second, the time taken by the uncovering portion to fall the distance of the diameter of the lens, as above. In practice, we should, of course, allow for the amount of extra cover of the lens given by the shutter before starting; this is easily measured and allowed for, according to the shutter. It must not be imagined that calculation will be practical in every case, because in some shutters there is so much friction as to upset all calculations, especially with very long drop-shutters. Captain Abney pointed this out very clearly in the Cantor Lectures, by experiments with wave lines from a tuning-fork, and he showed, in many cases, that after a certain period in the exposure there was no increase in speed.

With regard to shaking the camera during exposure, *practically speaking*, none of the above shutters, if properly made, will do so, though, theoretically, they must. Under proper conditions, I have failed with a strong magnifying lens to detect any movement in the photograph by any of the above shutters.

In conclusion, I hope that others, more experienced than myself, will give their views on this important subject.

Notes.

Mr. William England has gone to the St. Gothard, to take views on the picturesque route through which the new railway passes.

The Photographic Exhibition at Pall Mall opens this year on the 7th October. No pictures will be received after the 29th September, Michaelmas day.

The constitution of the jury for the award of medals is now definitely fixed; two painters have accepted an invitation to serve, viz., Mr. Pickersgill, R.A., and Mr. Cave Thomas.

Captain Abney has made a scientific trip to Switzerland in connection with the study of solar physics. It was his mission to secure a photograph of the spectrum of the sun, if possible, free from that absorption exercised by the lower atmosphere of aqueous vapour. To do this, it was necessary for him to carry camera and spectroscope to a considerable elevation above the ordinary level of the clouds, and this could be done, obviously, nowhere so conveniently as in Switzerland.

Mr. T. S. Davis called attention at the Photographic Society to the excellent plan of Mr. T. G. Whaite for coating paper with gelatine emulsion. The cold emulsion is applied to the paper by a stiff hog-hair brush, and the paper then drawn over a hot water reservoir of suitable shape, when the emulsion melts and spreads itself evenly. Mr. Whaite's paper recently contributed to the News explains the process more fully.

Upwards of three thousand francs have been subscribed towards the Poitevin memorial. We shall be happy to transmit to the central committee at Paris any sums our readers may entrust to us for the purpose.

Shutters worked by elastic webbing are convenient, but sometimes treacherous. A friend of ours, who was present on the occasion of Her Majesty's visit to Epping Forest, has reason to remember this. Provided with camera and plates, he secured a capital out-look on one of the grand stands, and having focussed and made ready, anxiously awaited the Royal approach to take a snap-shot. It was a long time to wait, so he set to work testing his shutter to be quite sure of its action. Horror! suddenly snap went the rubber, and the slide was motionless. There was plenty of sympathy for his misfortune—for those around had viewed the young photographer's preliminaries with deep interest—but sympathy would not mend the elastic webbing.

At last there came a suggestion from one of the bye-standers. It was a little girl who spoke, and she called out, in a loud whisper, "Mama, I've got a garter." And without more ado the brave little woman stripped off a rose-coloured circlet, and handed it blushingly to the photographer. *Honi soit qui mal y pense*; and let us add, if we had a copy of that photograph, we should value it very much indeed.

Yet another anecdote from the same source. It was a question of changing plates in the country, and our friend knocked at a cottage door to beg permission for the use of some dark corner for a few moments. A solitary old woman was within, who was too frightened by the sudden apparition and strange request to answer rationally, but she made no objection to the young fellow entering a sort of wash-house, and, in fact, carefully closed the door after him, as he bade her.

The plates were changed, and he knocked at the door for the old lady to open. No one came, so he knocked louder. The house was evidently deserted. He knocked once more. Then there came sounds of people hurrying towards the house, and presently the door was unbolted, and an angry cottager, bludgeon in hand, stood over him. Our friend had been mistaken for a burglar, and the housewife had taken considerable credit to herself for having trapped him so neatly.

A correspondent asks for a formula for collotypic ink. Here is the plan recommended by Herr Allgeyer, who for several years superintended the collotype work at Albert's establishment at Munich:—The so-called lithographic chalk-printing ink is to be slightly thinned with special boiled oil lithographic varnish; this latter being sold in London as 'middle litho varnish.' It is generally advisable to tone down the black colour by the addition of madder lake and indigo, both of which can be obtained ready ground in oil varnish at any lithographic material warehouse.

Some years ago, when the construction of our ironclads was under consideration, and the battle of guns *versus* armour was being waged *à l'outrance* at Shoeburyness, the Admiralty and War Office wisely resorted to photography as the most impartial recorder of the experiments. Photographs of the damage done to armour plates by heavy shot were secured, so that every one could see how far a shot penetrated, and what actual mischief was wrought to the structure. Now that our ironclads have experienced actual warfare at Alexandria, it would surely be well to have recourse once more to photography; pictures of a most valuable character would thus be at hand to illustrate the reports, which, we are told, every captain is to render of the first naval action in which our modern battle ships were engaged.

The "Postal Photographic Society" is the name of a new body, started with the object of interchanging photographs among ladies and gentlemen who practise with the camera. One of the principal features is what our German cousins call a "Wander Album," a sort of scrap-book to go the round of all contributors. Full information about the Society will be found in another column.

Delton's equestrian album, of which we spoke last week as containing portraits of most of the well-known riders in the Bois de Boulogne, is commanding a good sale in Paris. Its publishing price is 100 francs, and it has become quite fashionable. M. Deltou secured many of his pictures by stealth, placing cameras in ambush, and taking snap shots at cavaliers and dames as they passed.

The photographers of Germany meet in convention on the 23rd of next month, at Eisenach, in Thuringia. Foreign photographers, both professional and amateur, are invited to this beautiful district of mountain and dark pine woods, which is as full of legendary lore as the Harz mountains and the Black Forest. We shall describe a tour in Thuringia after our trip to the Tyrol.

Military maps of Egypt seem to be scarce. There is no difficulty now-a-days in multiplying a map, because it can be done readily by photo-lithography; but you must first get your map to copy, as Mrs. Glasse would remark. Of course there are maps of Egypt in plenty, of some sort or another, but none of them possess that accuracy in respect to roads and distances that military maps should have.

Germany appreciated very quickly the value of photo-mechanical printing during the Franco-German war, and maps were reproduced so rapidly and numerously that every subaltern, and well-nigh every serjeant in their army, was provided with a good road map. An "intelligence department" is now a recognised branch of every army, and it is one of the principal duties of officers attached thereto to collect plans, surveys, and maps of countries and towns in every corner of the world, so that copies of these may be furnished at a moment's notice. Our Ordnance Survey Department at Southampton, where photo-zincography is practised on a large scale, undertakes all the work in this country connected with the copying and printing of military maps.

In respect to map making itself, Austria is far ahead of any other European country. At home, we still pursue the laborious and time-taking method of engraving every line on metal, the old-fashioned plan that obtains in most map-making establishments. But in the Vienna Government office the maps are all drawn on a large scale upon white paper with Indian ink, and then, by the aid of the camera, these plans are transferred to metal and etched; the consequence is, Austria produces her Ordnance maps about ten times as fast as we do.

An interesting telephonic experiment was tried at Malta during the bombardment of Alexandria. A telephone was attached at Malta to the Alexandria cable, and it was found that the firing at Alexandria was distinctly heard, through the telephone, at Malta, a distance of more than a thousand miles. The next bombardment that happens may, therefore, be telephoned to London, and we shall be able to listen to it at the Royal Exchange, or at Charing Cross, distinguishing the heavy booms of the 80-ton guns from those of our lighter artillery; and, as Mr. Shelford Bidwell has shown us how a system of telegraphic photography may be established, who knows but one of these days we may see as well as hear something of a bombardment by wire.

Mr. Ireland, one of the Vice-Presidents of the Dundee Society, of whose capital work in Norway we had occasion to speak in high praise at the Dundee Exhibition, has again visited Scandinavia this year, and brought back with him some more delightful camera sketches from the far north.

"The Photographic Society's Standards," relating to standard flanges for lenses and screws for cameras, are likely to be adopted in America, if not also on the Continent. Sealed patterns of the "standards," and specifications relating thereto, will be in the custody of the hon. secretary of the Photographic Society of Great Britain, who will give opticians information concerning them.

Mr. W. D. Valentine sends us some charming instantaneous views, all difficult subjects, and most of them taken against the light and just off the sun. Tthere are among them steamers on the Clyde at full speed, the circling black smoke from the funnels so crisp and clear, there can be no doubt about the rapidity of exposure. They were every one of them secured, Mr. Valentine tells us, by the shutter which is sketched and described in our "Studios of Europe."

TWELVE ELEMENTARY LESSONS IN PHOTOGRAPHIC CHEMISTRY.

No. I.—Apparatus.*

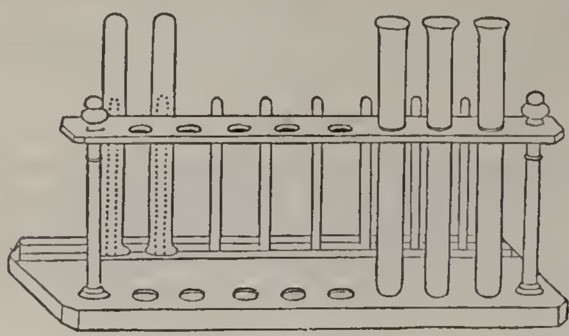
In dealing with this subject, we shall treat of it under three headings: Firstly, "apparatus required for the simple testing of photographic chemicals"; secondly, "apparatus required for the preparation of certain photographic chemicals"; and thirdly, "apparatus necessary for the estimation of photographic chemicals." In this way the student can take up any one of the three branches without buying apparatus which may be useless to him. For the first-named purpose, the following apparatus will be required:—

Test-tubes and stand.
Tube-cleaner.
Spirit lamp or Bunsen gas-burner, with rose top.
Retort staud.
Wash bottle.
Small evaporating-basin.
Funnel.
Filter paper.
Platinum wire.
Sulphuretted hydrogen generator.
Two watch glasses.
Glass rod and tubing.
Triangular file.

Test-tubes are made of thin, hard glass tubing closed at one end, and should be about five inches long by three-quarters of an inch in diameter; they are used for dissolving the substance to be tested, and for experimenting upon it in a manner to be described in a future lesson.

* The woodcuts are of apparatus supplied by Messrs. J. J. Griffin and Co., of Garrick Street, W.C.

Test-tube Stand, as the name implies, is used for holding test-tubes in a convenient position.



Test Tube Stand.

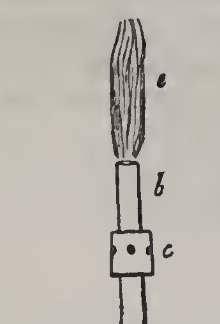
Tube cleaner consists of a piece of wire with bristles worked in at one end. To use it, soak the bristles in water and push into the test-tube, when any dirt adhering to the inside will be quickly removed.

Spirit lamp is a glass bottle with a perforated brass cap through which an ordinary wick passes. Methylated spirit

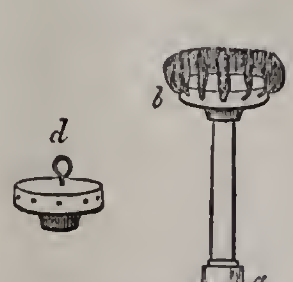
Spirit Lamp.

is placed in the bottle, and a ground glass cap is used to extinguish the flame and prevent the evaporation of the spirit when not in use.

Bunsen burner should be used in preference to a spirit lamp where gas is laid on. The burner consists of an upright brass tube about three inches high, through which the gas passes; at the bottom are situated two holes for the inlet of air. On applying a light at the top of the tube the gas burns with a colourless flame, which is incapable of smoking anything placed in it. A brass cap perforated



Bunsen Burner.

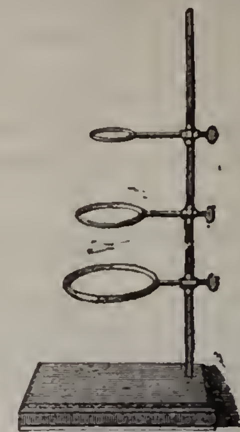


Burner with Rose.

with six or eight holes, called a "rose," is placed on the top of the burner to diffuse the flame when a gentle heat is required.

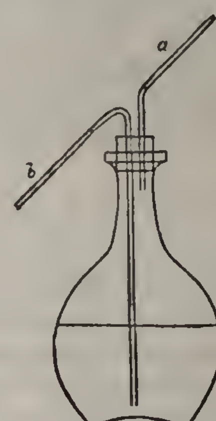
Retort stand is simply a vertical iron rod fitted with two or three rings, which can be adjusted to any convenient height above the stand. It is used for holding evaporating basins, beakers, and flasks whilst being heated, or for supporting a funnel during filtration.

Wash bottle may be used as a convenient vessel for distilled water; but its chief use is for washing precipitates on filters. This apparatus may be constructed of any bottle at hand; or, where it is desired to boil the water, a flask should be used. To the bottle is fitted an ordinary cork perforated with two holes, through which two bent



Retort Stand.

glass tubes pass, one of which should reach to the bottom of the bottle, with the outer end terminating in a fine jet. The other tube need only be long enough to pass through



Wash Bottle.

the cork, and here the mouth is applied to blow the water out of the bottle up the long tube through the jet in a fine stream on to the filter.

Evaporating basin is a shallow vessel made of thin porcelain, and for analytical purposes should be about three inches in diameter. In order to evaporate a solution, pour it into the basin supported on a ring of the retort stand; now place a spirit lamp or gas burner fitted with a rose under the apparatus, and the heat applied will soon warm the water and drive it off in the form of steam, leaving the solid residue behind.

A small *funnel* about three inches in diameter is required for filtering any liquid containing a precipitate; the apparatus requires no further description, and no photographic laboratory is complete without one.

A packet of one hundred *filter papers*, about four inches in diameter, will be required for use with the funnel.

A piece of *platinum wire* four inches long, and about the average thickness of a pin, is useful for the "colour-flame" test.

Sulphuretted hydrogen generator can be constructed of an ordinary six-ounce medicine phial by making a hole in the cork and placing it in a glass tube bent twice at right angles; one end need only be sufficiently long to go just through the cork, the other end should be about three inches in length. About an ounce of iron sulphide is placed in the phial, and, when the apparatus is required for use, about half an ounce of strong hydrochloric acid mixed with an equal volume of water is poured into it, and the tube and cork quickly placed in position, when a plentiful supply of the gas will escape from the tube. This operation should only be performed out of doors on account of the bad smell.

Watch glass is useful for holding solutions which necessitate stirring in order to prove the presence of such substances as potassium or sodium salts.

Two or three feet of *glass tubing* about three-sixteenths of an inch in diameter is required for making the wash bottle and sulphuretted hydrogen apparatus. To bend the tubing it must be placed in the upper part of the flame of an ordinary fish-tail gas burner till it is soft; it can then be bent to any required angle or drawn out to a jet; glass tube can be easily cut by scratching with a file and then breaking it.

In the second branch the following apparatus will be required:—

Four beakers.
Two flasks.
Dial glass.
Funnel.
Filter paper (a quire).
Bunsen burner.
Retort stand.
Glass rod.
Wire gauze.

Beakers are tumbler-shaped vessels made of very thin, hard glass, and will consequently hold boiling solutions without cracking; four will be required, holding, say, 20 ounces, 10 ounces, 4 ounces, and 2 ounces respectively.

Flasks are also made of thin, hard glass, and in appearance are not unlike decanters; those containing from ten to twenty ounces are of most useful size for ordinary purposes.

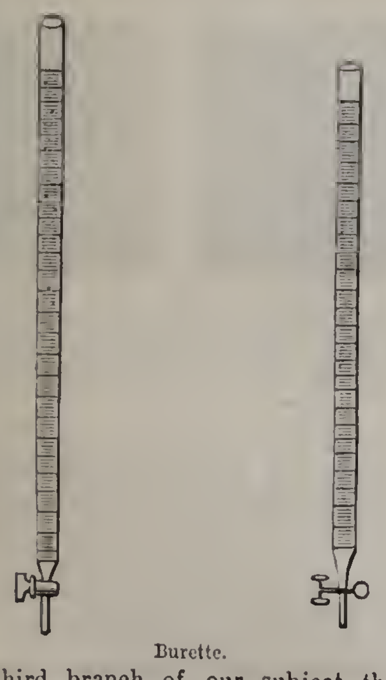
Dial glass, which is simply a large watch glass, is useful for covering a beaker to prevent evaporation, and keep out dust.

A ribbed or fluted *funnel* of about five inches in diameter is best for quick filtering.

Thick *filter paper* (bibulous) will be necessary for drying any moist solids or precipitates. A square or round piece, cut of convenient size, folded in four, and opened upon a funnel, constitutes an ordinary filter.

A few *glass rods* from eight inches to a foot long are useful for stirring solutions to facilitate dissolution.

A piece of coarse *wire gauze* about four inches square is necessary to stand beakers or flasks upon to equalise the temperature when being heated.



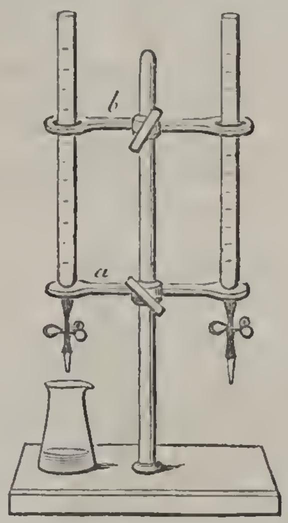
Burette.

For the third branch of our subject the following apparatus will be required:—

Burette.
Burette stand.
Pipette.
Flask.
Evaporating basin.
Balance.
Weights.
Litre flask.

Burette is a long glass tube graduated into tenths of a cubic centimeter, and fitted with a stopcock at the bottom, consisting of either a metal clip pinching a small piece of india rubber tube, or a glass stopcock. We show the two kinds of burette here, but should advise the student to use the one having a glass stopcock.

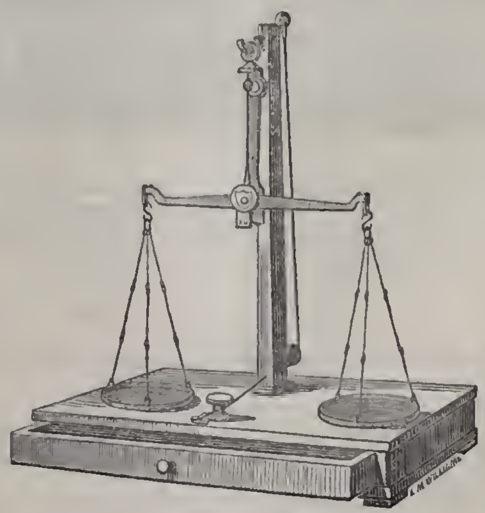
Burette stand is a necessary piece of apparatus for supporting the graduated tubes in upright position.



Burette Stand.

Pipette is a glass tube graduated into cubic centimetres, and drawn to a fine jet at both ends. It is used for delivering exact measures of standard solutions, which may easily be accomplished by inserting the lower end in the solution and applying suction at the top till the liquid has risen to the required point; now place the finger on the top instead of the tongue, and in this way the pipette and its contents may be carried to any convenient vessel, and the measured liquid delivered into it.

A chemical balance is very expensive; but one which answers all the requirements of the photographic student can be made with a good apothecary's balance (costing about seven or eight shillings at Messrs. Griffins' establishment) fitted on a stand.



Scales on Stand.

A set of weights varying from ten to one hundredth of a gramme is indispensable, and should cost about seven-and-sixpence.

APPARATUS FOR TESTING SHORT EXPOSURES.

BY G. L. ADDENBROOKE.*

I think it becomes daily clearer that, within certain limits, the shorter exposure one can manage perfectly with, without using unduly large stops or strong developers, the better; but this exposure must be just as well known and under control as longer ones, and must be subject to this reservation, which may at first appear paradoxical, that while for perfectly still objects the very minimum of exposure may be used, on moving objects this is not the case; the exposure should always be so regulated, in relation to the rate of motion of the object, as to give soft outlines. There is no artistic beauty in a sea-piece taken in the $\frac{1}{50}$th part of a second, and which, to borrow an expression from *Patience*, looks as if were "struck so." Some slight indisdinctness of outline is absolutely necessary to convey the idea of motion, though this should not go so far as blurring, which offends the eye. Turner's paintings of motion are rather leading ideas for imagination to fill in, than accurately detailed representations of particular scenes.

Perhaps, therefore, an apparatus to test short exposures is desirable, and may prove useful; and it may not be altogether unprofitable to recapitulate briefly what has been done in this direction.

As far as I am aware, the methods used up to the present have been as follows:—

To photograph a falling weight, which requires a good deal of delicacy and care to carry out in practice, and is not altogether satisfactory.

To photograph a pendulum.—This must be attached to a clock, or the arcs of vibration will not be equal, and then it hardly moves quickly enough; and there are other objections.

To photograph a hand moving round a dial.—Not a bad way; but, though I have not tried it, it seems that it would be difficult to avoid blurred images, and that it could only be used in very strong light indeed.

To cover the slide of the shutter with camphor smoke, and mark it as it falls with a vibrating tuning-fork.—This, the simplest and prettiest of all methods, is, I fear, too delicate to succeed in the hands of most men, and does not meet the case of a shutter with separate opening and closing slides.

About four months ago it occurred to me to use a similar apparatus to that designed for measuring the velocity of projectiles, which may be shortly described as follows:—A clockwork apparatus to turn a disc rapidly round in a known time, say one second. Two screens, each made of a continuous wire connected with a battery and induction coil, and placed, say 100 feet apart, in the direct line of the projectile. These screens are so connected up with a point almost touching the revolving disc, that, when the projectile breaks the screens in succession, a torrent of sparks passes during the interval between the point and the smoke-covered surface of the revolving disc. The arc thus made by the electric sparks gives the velocity of the projectile.

All that was necessary to adapt this apparatus to testing-shutters was to alter the two screens into two spring contacts of the proper form, acted on by the falling shutter. This I succeeded in doing; but, as the connections were very complicated, and it was almost impossible to avoid disagreeable shocks sometimes while operating, I determined to try and utilize the principle of the revolving disc in another way. The above method gave graphic records of the exposure, as brown lines on a sheet of paper moistened with starch and potassic iodide.

The method which I have finally succeeded with is as follows:—A small gelatine plate is placed on a revolving axis, in a light-tight box, by taking off the removable front. On this front a thin sliding plate of ebonite is fixed, having a small hole about one-tenth of an inch in diameter drilled in it. This hole is, first of all, pushed exactly to the centre of the front, so that when the plate is revolved a small black speck is formed on it, which afterwards gives accurately the centre to measure from. The hole is next drawn from the centre towards the side, and if now a shutter be put close in front of the box, and be released while the plate is kept turning, the light, falling through the shutter, and through the small hole in the front of the box, will leave a narrow black line on the plate for exactly the time the shutter took to act. By using a gelatine plate three inches square, and beginning with the hole half-an-inch from the centre of the front, and pushing it about one-tenth of an inch further after each exposure, so as

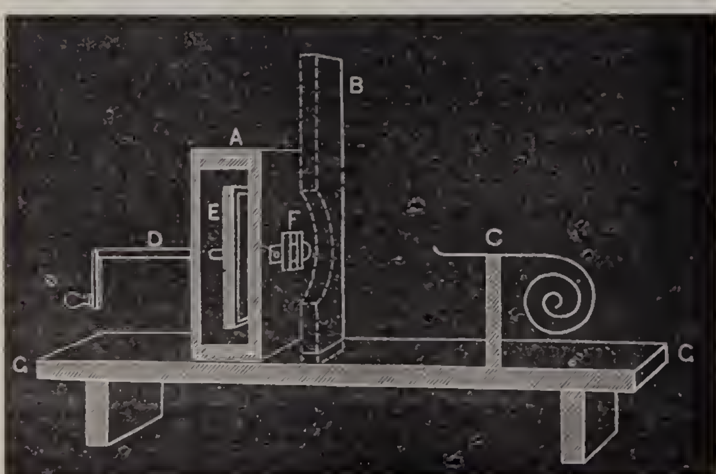


Fig. 1.

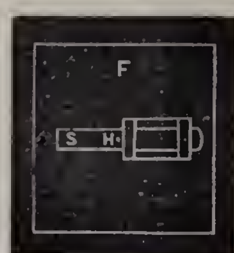


Fig. 2.

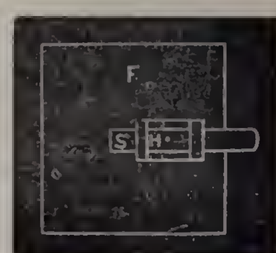


Fig. 3.

Fig. 1 shows a vertical section through the centre of the apparatus. A is a light-tight box, about 6-in. square and 1½-in. deep; B is the shutter to be tested, which is clamped to an upright, not shown; C is a piece of magnesium wire; on turning the axle D, the photographic plate, mounted on E by an elastic band stretched over opposite corners, is revolved; F is the removable front of the box. Fig. 2 is a front view of F, showing the sliding plate of ebonite fixed with the hole H in the centre. Fig. 3 gives the same view, with the slide S pushed so that the hole H is out of the centre, as ready for testing a shutter.

to keep the arcs formed distinct, as many as ten testings may be made on one plate.

The markings, after development, are plotted on a sheet of paper, and measured with the common arc.

I find about an inch of magnesium wire is all that is necessary for one testing. An ordinary candle may be used instead of the wire, but it requires a very strong developer to get the markings out on the plate afterwards.

In my own experiments I have turned the axle by hand, and, used in this way, any one could obtain results always within 20 per cent. of absolute accuracy; while the apparatus is so simple that an amateur could easily make it in a few hours.

The markings obtained on the plate are so sharp and clear, that I think any one using this will prefer it to the other methods.

By adopting proper clockwork to turn the axle, results of the most perfect accuracy would be secured, and it would be practicable to test the relative exposures given to the sky and foreground by different forms of shutters; the loss of light on the edges of the plate, by using shutters opening and closing in the centre; and, in fact, to settle nearly all questions connected with the comparative exposures given by the different forms.

There are three methods which promise success for turning the plate:—

1. A clockwork movement controlled by a fly.
2. An apparatus founded on the gravity of an escaping liquid properly regulated.

* Read before the Photographic Society of Great Britain.

3. A very simple modification of the driving-movement of an equatorial: the suggestion of a friend.

It would, however, be somewhat outside the intention of this paper to go into the comparative merits of these motors and their construction; and I must therefore conclude, venturing only to hope that in some small way it may aid in bringing about a more scientific use of the various forms of shutters.

I must beg to mention that I heard, for the first time, from Mr. Cadett's paper, that Mr. Warnerke had designed and carried out a clockwork apparatus having a revolving disc with a hole in it, through which bright light was reflected as it revolved and photographed.

REPORT OF THE "LENS COMMITTEE" TO THE COUNCIL OF THE PHOTOGRAPHIC SOCIETY OF GREAT BRITAIN.

We, the Members of the Committee appointed by the Council of the Photographic Society to consider and report upon the best means of attaining uniformity in the construction of apertures in the "diaphragms of lenses," "flanges," and "camera screws," have now the honour of communicating the result of our investigations. Our aim has been, as far as possible, to combine the nearest approach to scientific accuracy with practical utility. Had either consideration exclusively engrossed our attention, modified recommendations might have resulted. Dividing our report into three divisions, the first section has reference to "lens diaphragms," the second to "flanges and adapters," and the third to "camera screws."

Lens Diaphragms.—With regard to diaphragms we recommend—1st, that the aperture of the standard-unit diaphragm should have a diameter equal to one-fourth the equivalent focus of the lens, and be marked "1," the approximate equivalent focal length of the lens itself being engraved on the mount; 2nd, that diaphragms with smaller openings should have apertures diminishing in area to the extent of one-half from the unit standard downwards, and be marked successively 2, 4, 8, 16, 32, 64, &c. These numbers would indicate to the practical photographer that if a given sensitive film requires with the unit stop an exposure of one second, the introduction of a smaller one would necessitate an exposure of as many seconds as the numbers marked on it; in other words, each stop would require double the exposure of the preceding one.

Should a lens not admit of a diaphragm with an aperture as large in diameter as one-fourth its focal length, nor exactly any one of the above-mentioned sizes, we still recommend that all the apertures be made in uniformity with the above scale, with the exception of the largest, which should be marked with the number its area requires in relation to the unit diaphragm. In the case of a lens having a working aperture exceeding in diameter one-fourth its focal length, the diaphragms should be marked in fractions (as ·5, ·25, &c.), in uniformity with the standard apertures, according to the sizes of their relative apertures. We further advise that diaphragms required to be made with apertures intermediate to the standard sizes should invariably be marked with numbers corresponding to the ratio of their area to the aperture of the unit diaphragm.

Flanges.—We advise the construction of flanges with internal and external screw threads of a standard series, for attachment to cameras having screw threads adapted for screws $1\frac{1}{2}$ in., $2\frac{1}{2}$ in., 3 in., and $3\frac{1}{2}$ in. in external diameter, and made with twenty-four threads to the inch; if larger ones are required, we recommend that they increase in size to one inch in diameter, from four inches upwards, with twelve threads to the inch. We also recommend the manufacture of a series of adapters, with inner screws made to carry any existing lenses, and with outer ones corresponding to the next or other larger size of the standard flanges above described. Hereafter, whenever practicable, the screws cut on the mounts of all newly manufactured lenses should be suited to one of the above-sized standard flanges.

Camera Screws.—With regard to camera-screw connections, we recommend that henceforth all screws fitted to cameras, either for attachment to the stand, for fixing rising fronts or for other movable parts, should be either $\frac{3}{16}$, $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$ of an inch in external diameter, and in pitch of thread and other details in accordance with the generally recognised Whitworth standards for the above-mentioned sizes.

Signed, on behalf of Committee, T. Sebastian Davis, *Chairman.*

The Council, having accepted this report, have directed that a series of standard flanges and camera-screws be constructed and kept in the custody of the Society, and be called "the Photographic Society's standards." Upon application to the Secretary, these standard flanges and screws will be shown, and printed copies of this report be given to those manufacturers of lenses or cameras who may be desirous of adopting the above standards.

THE PHOTOGRAPHIC SOCIETY'S EXHIBITION.

The exhibition of this Society, for 1882, will be held at the Gallery of the Royal Society of Painters in Water Colours, 5a, Pall Mall East, London, S.W. It will be inaugurated by a conversazione, open to members and their friends, at 8 p.m., on Saturday evening, the 7th of October. The exhibition will remain open daily (Sundays excepted), from Monday, the 9th of October, until Thursday, 16th November. Admission (from 10 a.m. till dusk), 1s. It will also be open every Monday, Wednesday, and Saturday evening. Admission (from 7 to 10 p.m.). 6d. Members will be supplied with tickets to admit their friends. Season tickets will be issued. Single, 3s. Double, 5s.

All packing cases must be sent (carriage paid), addressed to the Photographic Society of Great Britain, care of Mr. James Bourlet, 17, Nassau Street, Middlesex Hospital, London, so as to arrive *not later* than Friday, September 29th. No packing cases can be received at the Gallery. Pictures by hand will be received at the Gallery, 5a, Pall Mall East, on Friday, September 29th, until 9 p.m.

Each exhibitor must send a letter of advice containing a description of each picture, as also a statement of process and any further detail, to be inserted in the catalogue (and it is suggested that when the work shown is taken by a special process, prepared, and made by the exhibitor, information as to particulars should be communicated), addressed to the Hon. Secretary, Photographic Society of Great Britain, 5a, Pall Mall East, London, S.W.

Each frame or picture may have the exhibitor's name and subject neatly inscribed, but no address, or anything in the shape of an advertisement will be permitted. No pictures in Oxford frames, and no pictures previously exhibited in London, will be admitted.

Photographs coloured by scientific or mechanical means will be admissible. Photographs coloured by hand will not be admitted.

Photographic apparatus and appliances may be sent for exhibition. Negatives and transparencies will be admissible.

The Hanging Committee will have the power of rejecting any pictures or apparatus forwarded.

Medals will be placed at the disposal of the judges for artistic or scientific excellence, and the judges are instructed to reserve three medals for portrait or figure subjects (if they find them worthy of awards). The judges will consist of the following gentlemen:—Two artists (painters), Frederick R. Pickersgill, R.A., W. Cave Thomas; the President of the Society, James Glaisher, F.R.S.; two members of the Council, T. Sebastian Davis, F.C.S., W. S. Bird; two members of the Society, W. Ackland, G. Shadbolt.

No charge will be made to members of the Society for exhibiting their pictures; but to non-members a charge of 1s. per square foot will be made for wall space, the minimum charge being 5s. No charge for wall space will be made to foreign exhibitors. The charge for wall space to those exhibitors who may become members of the Society at the November meeting will be remitted.

It is proposed to lay on the table a catalogue containing the price of pictures to be disposed of; those who wish to avail themselves of this proposal will please state the price of their pictures in the letter of advice.

Notice will be sent to exhibitors when to fetch away those works which are left at the Gallery by hand, and should any exhibitor not be able to send to the Gallery, he can, by giving notice to the Assistant-Secretary, and paying the cost, have his pictures packed in a case and returned by carrier. The Council do not hold themselves responsible for any damage that may happen to the pictures, or other exhibits, whilst in their custody, but they will take every precaution to insure their safety, and their prompt return to the owners at the close of the Exhibition.

Any further information respecting the Exhibition can be obtained from the Assistant-Secretary, Mr. Edwin Cocking, 57, Queen's Road, Peckham, S.E.

Proceedings of Societies.

Photographic Society of Great Britain.

The twelfth Technical Meeting was held on Tuesday, June 27th, John Spiller, F.C.S., Vice-President, in the chair.

The Chairman stated that there were three questions sent in for discussion that evening, as also some exhibits; probably it would be better for the exhibits to be taken first.

Mr. Starns then exhibited a quarter-plate camera he had designed, which was constructed to act as a changing-box, the plates being kept inside; no dark slide was necessary. The camera was prolonged behind the focussing-glass so as to admit of two chambers which contained the plates before and after exposure; at the back of the camera was attached a light-tight sleeve which, when the hand was inserted, was fastened round the wrist; the plates were then put in the place occupied by the ground glass, exposed, and put back into their proper chamber.

The Chairman inquired how many plates could be carried.

Mr. Starns replied that three dozen plates could be used; also that, the lens being of short focus with only one-quarter inch range, he had introduced a little screw-adjustment which moved the lens, and did away with the necessity for any sliding movement of the camera.

Mr. Peek said that, whilst the matter took a long time to explain, he could state from experience that it took but a little time to work.

Mr. T. S. Davis remarked that possibly a difficulty might arise in focussing, as, from the construction of the camera, the eye must be some distance from the ground glass; this would also be increased if the camera was constructed for large pictures.

A conversation then arose respecting focussing in general, and darkly lighted objects in particular.

Mr. T. M. Brownrigg then exhibited some photographs taken in a very close and dark wood, the focussing being done from a single point, seven minutes' exposure having been given.

Mr. E. Dunmore exhibited a new developing-dish made of wood, with a corrugated bottom, which would enable small plates to be easily lifted; also a lever at one end for lifting large plates; the dish was coated first with black varnish, then with shellac.

The Chairman remarked that it was a most useful apparatus. In his own practice he used pasteboard boxes coated with paraffin; when the box got wet it was dried, and became all right again.

Mr. Maxwell Lyte suggested, for coating trays, the use of lead plaister in conjunction with paraffin, which could be spread with a hot iron.

Mr. Inck said that he had made a developing-dish with a flat piece of glass, upon which four pieces of thick plate glass ½ inch wide were attached by moisture; the ends of the bars were touched with glycerine, the whole was then water-tight. The advantage was that any size could be made at once.

Mr. T. S. Davis stated that a little time since a difficulty arose to him in covering a certain batch of plates with emulsion, so that round the edge the development was more rapid; he exhibited several of the plates, and said he fancied it arose from the length of time taken in drying the plates, owing, probably, to the gelatine being too soft, and, by remaining damp in the middle of the plate, set slower.

The Chairman then read the question, "Will the borax and gold toning solution, as recommended by Mr. Cowan, keep when the solutions are mixed; or is it desirable to mix sufficient required for the number of prints, and then throw it away?"

Mr. Cowan said that it was only necessary to mix as much as was wanted at the time, and, after being used, thrown away.

Mr. Maxwall Lyte stated that some years ago he was the first person who proposed phosphate of soda, and also borate of soda, for toning purposes; but he found that the borate did not keep so long as the phosphate, as also that he did not get so many pictures toned by the former as he did with the latter, viz., phosphate. The toning action of the borate began quickly, but soon got slower, and then stopped.

Mr. Cowan said that there was no necessity to keep the borax bath, and it would be better to tone no more than one sheet of paper at a time, as also that the borax bath was very useful for the commercial sensitized paper.

The Chairman then read the question, "Upon scientific grounds, what is the difference between liquor ammonia and ordinary washing-soda when used with a pyrogallic developer?"

Mr. Cowan thought that with the soda the yellow stains did not come.

Mr. Davis stated that with the soda the development was more gradual; at the same time, the balance in the end was equal as to results.

Mr. Mawdsley said that plates liable to green fog when using ammonia, would be free from it by using the soda.

The Chairman then read the question, "Does the addition of sulphite of soda to pyrogallic acid in bulk, after a time, cause the developing action to be slow? If so, can each—viz., the pyrogallic acid. the sulphite of soda, and the citric acid—be kept in solution and mixed together at the moment of using?"

Mr. Berkeley remarked, that if the solution of pyrogallic and sulphite of soda was used as strong as he had recommended, it would keep well. Some he had mixed last October was good now. With the addition of more water, the preservative action was lessened.

The Chairmam said that the sulphite acted as an antiseptic, and prevented decomposition.

Mr. Davis stated that when pyrogallic acid was kept in alcohol, it was necessary that it should be absolute alcohol, and the solution should be kept in darkness.

A conversation took place respecting the keeping properties of the addition of sulphite of soda to the pyrogallic acid, as also its retention of developing power, when,

The Chairman said that the question seemed to be answered by the concurrent testimony in favour of Mr. Berkeley's formula.

Bristol and West of England Amateur Photographic Association.

The second excursion meeting this session took place on Wednesday, the 12th inst., the place selected being Froom Glen, Stapleton.

Mr. T. Davey (Vice-president), the Hon. Secretary, and other members, assembled at Clifton Down Railway Station and proceeded to Stapleton Road Station, thence by vehicle to Stapleton, and, alighting at the Bell Inn, apparatus was at once put in form for work.

Stapleton is a pretty country district, only a short distance from Bristol, so that very little time was occupied in reaching it. The "hunting-ground," Froom Glen, was soon reached, when all were evidently disappointed to find that the river—along the banks of which there was a large number of charming subjects—was almost covered with white flakes of foam, caused by its being very full from the recent rains, and falling over many weirs before reaching the spot visited. Although the light was very favourable for exposing plates upon many subjects, they had to be abandoned, all being spoilt by the foam.

A move was made higher up the stream to Wyckham Bridge, where the foam took a far less decided and conspicuous form, and made a view of this most picturesque and beautifully-situated bridge possible. Many of those present had taken negatives of it many times before, but it is a subject one never tires of, and can nearly always find something new in making a picture of it. The party next continued the walk still further up the river Froom, and after passing the first mill, some more very picturesque "bits" were met with; but it was utterly impossible to get pictures of them, the wind having by this time got very boisterous. At this point the quantity of surplus water in the in the river was very apparent, it having in places overflowed its banks, and rendered paths almost impassable. On arriving at the snuff mill, some brethren of the "brush" department were met; they, too, were lamenting the extreme fullness of the river, and consequent inability to find work. The members had therefore to pass this spot, where generally such pleasing and well-composed subjects could be secured, and (by permission) pass over the land of Mr. Vassal, to whom one bank of the river belongs at this spot. But from the same cause it was impossible to secure any pictures of the numerous fine parts of the river scenery, and beyond one or two shots at a group of foxgloves (really to have something to do) nothing was attempted.

The wind was now blowing with such persistency and force that a feeling of despondency became pretty general, and everyone seemed disinclined to spoil plates by exposing them under such hopeless conditions. It was therefore resolved to alter the programme, and instead of having meat tea at the inn at Hambrook, the party resolved to at once retrace their steps, and see if things generally were in a more favourable state at Wyckham Bridge, where they started from, so that until the arrival at that place "the weed" was more the order of the day than photographic apparatus.

It was, however, some little consolation, on arriving again at Stapleton, to find that there was not quite so much wind affecting that district, and that the amount of white froth in the river had considerably decreased. Plates were therefore exposed on a few of the many choice subjects in close proximity, after which it was found time to repair to the Bell to take tea.

Every member seemed at once in a brighter and more hopeful humour on entering the snug and pleasant hostelry, and over the table jokes were bandied, until the appearance of the conveyance at the door reminded all that traps must be packed up, and, unfortunately, the day written down as "unfortunate."

Every member present brought apparatus, and, as far as "the fates" would allow, worked.

LONDON AND PROVINCIAL PHOTOGRAPHIC ASSOCIATION.

AT the meeting of this Association, held at Ashley's Hotel Covent Garden, on Thursday, the 13th inst., Mr. A. J. BROWN in the chair,

Mr. COWAN exhibited some plates, the results of further experiments with citrate of potash as a restrainer. Two of the plates had been six times over-exposed, and he found that if the citrate was added to the developer and used from the first it acted so powerfully as a restrainer that the plate appeared to have received the correct exposure. If, however he treated the plate in the ordinary way for over-exposure until the image started, then added the citrate to his solution, its restraining action was apparently *nil*.

Mr. JOHN STUART (Helensborough) said he found sulphite of soda very uncertain in its working, and, if not made acid, it got very brown in two days. If sufficient citric acid is added to keep it from turning brown, he thought it had no advantage over the ordinary solution. He found the only way to work it at all satisfactorily was to keep the sulphite in solution, and add the pyrogallic as required.

Mr. HADDON had, about a month ago, prepared a stock solution of—

Pyrogallic	1 ounce
Sulphite (about)	2 ounces
Water	10 ounces

and it had gone very brown.

Mr. COLLINS exhibited one of England's bamboo camera stands to carry a 15 by 12 camera, its weight being about 3 lbs. It was very rigid and firm.

Mr. COLLINS stated that Mr England had had a similar stand in use about fifteen or sixteen years.

Mr. NORRIS demonstrated the method of estimating the amount of silver in solution, as described in the issue of the PHOTOGRAPHIC NEWS of the 7th inst.—*i.e.*, by means of the burette and ammonium thio-cyanate, using ammonia ferric alum as the indicator.

At the request of Mr. Ashman a solution containing by argentometer reading 30 grains to the ounce was tested, and gave by the burette 25·6.

Mr. NORRIS said this method had been in use for some time for estimating the quantity of silver in coinage, and was found to be most accurate in its results.

Mr. REIMAN passed round some plates given him by Mr. Brown, which were known to give a great deal of green fog. Half one plate he had developed with the sulphite of soda formula, the other half with common soda. In the first half was much green fog, but in that where the common soda was used green fog was absent; but its place was taken by a yellowish stain.

The CHAIRMAN thought that even green fog was preferable to an opaque yellow stain; but that green fog did not appear when the negative was thoroughly exposed, and plenty of bromide used.

Mr. REIMAN had intensified a green fogged negative by Monckhoven's formula, the result being a clearance of fog.

Mr. HENDERSON said that the cyanide would have that effect.

The CHAIRMAN's theory was that green fog is a fine deposit of metallic silver, which would be converted into a black deposit by the mercury solution.

Mr. HADDON said that plates giving green fog with the pyrogallic developer do not do so with the ferrous oxalate, but instead, there is a fine grey deposit, which, with the pyrogallic developer, would be green.

The CHAIRMAN had obtained green fog with the ferrous oxalate developer.

Mr. STUART had observed, when coating plates that had been used before, that a part of the old image sometimes remained, which it was impossible to remove, and that this would cause green fog.

Mr. BARKER found that if the following formula were used there was no green fog:—

1.—Rain water	1 ounce
Sulphate ammonia	1 „
Liquor ammonia	$\frac{1}{2}$ „
Bromide	30 grains

Add rather more bicarbonate of soda than will dissolve —

2.—12 grains bromide cadmium to ounce of developing solution.

Mr. HENDERSON had tried cadmium, both in emulsion and developer, and found the only advantage was that the plate developed rather blacker.

Mr. STARNES exhibited a camera and changing box combined; it was very simple in construction, the camera being the front part of an elongated box. There were two chambers in the bottom of the box to hold three dozen plates, the front one being for exposed, and the back for unexposed plates. After the picture is focussed, the glass is removed, and a light-tight back fastened on; the hand is then inserted through a sleeve in the back, and a plate removed from the back chamber and placed in the groove which held the focussing glass. When exposed, the plate is removed to the front chamber, and so on till all the plates have been exposed.

Mr. HENDERSON mentioned that he gave some partly prepared emulsion to Mr. Prestwich, with instructions how to proceed, and that gentleman had coated several plates, and on developing found them frill badly; he had, however, handed two of these to Mr. Henderson, who well washed one of them, and allowed it to dry. He then exposed both for three seconds, and, on developing, the unwashed plate frilled directly, while the other was apparently three or four times more exposed, and did not frill at all.

Mr. PRESTWICH had made enquiries, and found that the plates had been badly washed.

The following gentlemen were elected members of the Association:—Messrs. H. Baden Pritchard, T. Bolas, C. E. Abney, A. J. Cox, N. M. Phillips, C. H. Searle, and H. Richards.

BURY PHOTOGRAPHIC AND ARTS' CLUB.

THE first out-door meeting of this club was held at Whalley and neighbourhood on Thursday, the 29th ult., most of the members having their cameras with them. The first place of interest visited was the splendid mansion and beautiful park of Morton Hall, to which permission had been kindly granted by H. L. Taylor, Esq., the proprietor. Several views having been secured, the members resumed their journey, and soon arrived at Whalley.

The old church was the first object of interest, and soon many cameras were at work securing views from various points of sight, after which the fine old ruined Abbey afforded many choice subjects for both brush and camera, the cloisters attracting particular attention, several very fine views being taken. The members have to thank all parties having care of the church and abbey for the kind and courteous manner in which they were treated.

The party then drove to Mitton Church, where various views, both internal and external, were taken. A group of the members was taken by the hon. secretary, Mr. T. W. Livsey. After a refreshing and substantial tea had been partaken of at the Dog Hotel, Whalley, the party drove back to Accrington, and returned home by the 8.30 train, after having spent a very enjoyable day, forty views having been taken.

THE POSTAL PHOTOGRAPHICAL SOCIETY.

THE above has been founded as a postal society for the convenience of amateurs in different parts of the country, and with the following objects:—For the circulation of prints, negatives, &c. For the exchange of photographs, and of information on photographic matters, and for the general advancement of the science and art of photography.

It is to be noted that this society will in no way interfere with any society now in existence, but will rather tend to the advancement of existing societies, by bringing their members more into communication with each other.

Entrance fee, 2s. 6d., annual subscription, 5s.

Further information and a copy of the rules may be had on application to H. H. Cunningham, Hon. Sec., 7, Figtree Court, Temple.

Committee.—G. Allison, Stoke-on-Trent; F. C. Cowley, Brighton; S. G. Horton, Royal Military Academy, Woolwich; J. Pocock, 21, Ladbroke Grove, London, W.

The following are the principal rules :—

Each member shall send to the Secretary prints from as many of the negatives taken by him as possible, together with particulars of the kind of plate used, lens, exposure, light, locality, and any other interesting information.

No member shall send *less* than six prints annually for the benefit of the Society.

The affairs of the Society shall be governed by a committee of six persons (four of whom shall be residents in London), who shall be elected by the members of the Society. Three members of the committee to retire annually, but to be eligible for re-election.

Photographs sent in by members shall be circulated among the subscribers in scrap-books, together with note-books in which members may jot down useful hints or information, with criticisms on the photographs circulated.

The photographs in the scrap-books shall be numbered for reference, the names of the senders being also given unless they signify to the Secretary that they do not wish their names to appear.

No member shall keep a scrap-book or a note book for more than three days, at the end of which time both shall be forwarded, postage paid, to the member whose name stands next on the list sent with the books.

The name of any member not sending in six prints in the year shall be transferred to the list of honorary members.

Honorary members shall pay an entrance fee of 5s. and an annual subscription of 10s., and such members shall receive the scrap and note-books in their turn, but shall not be required to send in any prints for the benefit of the Society.

Talk in the Studio.

PHOTOGRAPHIC SOCIETY OF GREAT BRITAIN.—The last of the Technical meetings for the session will be held next Tuesday, July 25, at 8 p m., in the Gallery, 5A, Pall Mall East.

MIDNIGHT PHOTOGRAPHY IN A STEEL-WORKS.—A picture sent to us by Mr. Chas. P. Richards, and taken by the light of a Bessemer converter, possesses considerable interest. The whole area of the Bessemer pit is well lighted up, and the remarkable play of light and shade gives to the photograph a notable pictorial effect. An exposure of two minutes was given.

A RIDE THROUGH THE THAMES TUNNEL IN A PHOSPHORESCENT RAILWAY CARRIAGE.—At the present time a railway carriage painted inside with the Balmain phosphorescent paint is included in the train which leaves Liverpool Street station for Rotherhithe, *via* the Thames Tunnel, at 11.8 a.m. Although only one-half of the available space of the carriage is painted, the phosphorescent light is quite sufficient to enable the passengers to distinguish small objects when passing through the tunnel; and, moreover, the light is powerful enough to enable a person to read the indication of an ordinary watch. It is probable that the railway companies will be enabled to effect a considerable saving in gas and oil by using the phosphorescent paint.

THE little town of Fez has nearly got up a revolution on its own account, and the motive has been photography. It seems that the Sultan has a tolerably large family. The wives of his bosom and the ladies of his harem between them number four hundred. English manners spread quickly Eastward, and the four hundred have shown a taste to become professional beauties. They wanted their portraits taken, and the lord of the harem had no objection. Such an album might act as a reminder to him of the ladies of his choice. The only difficulty was that Fez was hitherto unprovided with a photographer. That, however, was to be overcome. There was sunshine in abundance, and there were the four hundred beauties all keen to pose and look lovely, and occupying their leisure in studying attitudes. The Sultan saw to the rest. He imported a photographer from France, and made the artist bring with him the necessary collodion and camera. The harem was in a state of great excitement, and the French photographer had his work pretty well cut out for him. But in the meantime a difficulty had arisen, and this was the complication that was near producing a revolution. In the Koran it is laid down that no likeness should ever be taken of a human being. Some of the Sultan's family were certainly unpopular, but their claim to being human beings could not reasonably be disputed. The report that they were to be photographed got abroad, and the inhabitants of Fez were resolved to prevent it. Public opinion ran so very high on this subject that it was thought wise to yield to the storm. The camera, which had been smuggled into the palace, was never set up in the operating room. The beauties of Fez were left unrecorded, and the French photographer, who seems to have been regarded as a sort of active principle of evil, had to be specially protected. It was very hard to keep him, and it was nearly impossible to get rid of him. At last he was smuggled out of the town disguised as an old woman, and peace once more reigns in Fez.—*Evening News.*

To Correspondents.

*** We cannot undertake to return rejected communications.

*** LESSONS ON CHEMISTRY.—A printer's error last week described the metre as equal to 29·37 inches: the metre is 39·37 inches.

CHARLES PETTITT.—Thank you.

T. B. HOWE.—We are much obliged for the cutting.

V. DE V. (Plymouth).—1. The work will be ready in a few weeks. 2. The difference may be roughly expressed by saying that the ferrous oxalate contains a larger proportion of iron than the ferric oxalate; the composition of the former being FeC_2O_4, and that of the latter $Fe^2(C_2O_4)_3$.

SULPHITE OF SODA.—1. We have found it to work well three months after being mixed; but much depends on circumstances. 2. It is to be recommended as affording security; but in this case, as in many other instances, it is possible to diverge widely from absolutely safe ground, and yet obtain fairly good results. 3. Yes.

Z. Y. W.—By careful and patient manipulation, whereby the print is stretched as regards the central parts. Of course there is a limit to the stretching practicable, but we have had no difficulty when working with glasses having a radius of curvature equal to thirty inches. By means of a stamping press and suitable dies, the proper curvature might be given at once.

ENLARGEMENTS.—We have had many complaints regarding this matter. Address a letter, giving full particulars, to the Inspector of Police, nearest station to —— ——.

BROMO.—1. Test a solution of the salt with red litmus paper; if it is alkaline, the paper will become blue. Gradually add a solution of oxalic acid until the solution does not change the colour of either red or blue litmus paper. 2. They often arise from imperfect washing before fixing.

F. COWLEY.—1. The numbers represent the relative times of exposure as nearly as we can estimate them, assuming it to be close on midsummer, and the atmosphere quite free from haze in each case. If you make a few trials in the early morning, when no trace of mist is to be seen, you will find the light to be surprisingly quick. We took midday as unity. 2. Try the experiment, and see which gives the best picture; using rather old collodion and a moderately strong developer. The *ten times plate* would be about seventy times quicker than the collodion plate we should employ for the purpose. 3. Enormously reduced, perhaps to one two-hundredth of what it was. Make a few trials for yourself. 4. Write to Messrs Jones and Barber, Alexandra Palace.

H. SPINK.—1. Multiply each number by twenty, and then assume that the quantities are given throughout in grains. 2. It would come to about the same thing, as the heat is seldom over 200° F. when the emulsion is boiled in the usual way. 3. We have not tried it yet, and should be much obliged if you will let us know how it succeeds in your hands.

"3988."—It is probably due to the separation of metallic gold in an extremely fine state of division. If it is as we suppose, the metal will finally settle down as a purple sediment.

SUSSEX.—1. On the whole it is to be preferred; but it is occasionally an advantage to be able to admit light from the south. 2. No. 3. It is desirable, but its practicability must depend on the manner in which you propose to construct the building. 4. That marked in violet ink, assuming that the right-hand side of the diagram is the North. 5. We cannot just now tell you the exact focus, but we have used it very successfully for landscapes on 8½ by 6½ plates.

SOUTH DEVON.—We believe not; you had better get one made from the description given in our columns.

ENDEAVOUR.—The pose is stiff and unnatural, while the lighting is such as to render it almost impracticable to obtain any details on the shaded side. Use a few sheets of old newspaper as a reflector.

JULIUS KOPP.—1. Any ordinary white enamelled paper will answer, provided that the texture is fine. 2 If too soft, some is liable to set off and damage the plate; and if too hard, it does not take the ink readily. 3. Certainly not, as complete insolubility would soon set in.

B. R. CLARK.—Remove the excess of acid by evaporating the liquor to dryness on a water bath.

THE PHOTOGRAPHIC NEWS.

Vol. XXVI. No. 1247.—*July* 28, 1882.

CONTENTS.

OZOKERITE AND PARAFFIN.

There is no substance of organic origin which displays such an indifference towards chemical reagents as paraffin, as at ordinary temperatures it is quite unaffected by strong nitric acid, sulphuric acid, or chlorine. Paraffin is a name applied by chemists to an extensive series of hydro-carbons, each one possessing a chemical composition corresponding to the general formula C_nH_{2n+2}, and ranging in physical condition from the gaseous state to the harder kind of paraffin wax, which melts at about 140° F.

The solid paraffin or paraffin-wax is, however, the form of this substance which is likely to do most service to the photographer or the photographic experimentalist. This substance is found ready formed in nature to a considerable extent, either occurring as crystalline granules, interspersed through earthy matters, as in the case of the so-called fossil wax or ozokerit; while Rangoon tar and analogous bituminous exudations contain abundance of paraffin wax. The principal commercial source, however, of solid paraffin is the so-called Bathgate mineral or bituminous shale, which is distilled at a low red heat; the crude distillate being subsequently fractionated, and the heavy portions refined by treatment with sulphuric acid, and crystallisation from exceedingly light paraffin or benzoline oil.

The best qualities of commercial paraffin wax melt at about 140° Fah., and consist principally of an hydro-carbon containing $C_{30}H_{62}$, and such a product is excellently well adapted as a waterproofing material for wood-work, paper, and textile fabrics, as no trace of oily exudation tends to separate from it. A well-made wooden box, if soaked for some half-an-hour in such paraffin heated to about 300° F., becomes so thoroughly saturated as to become a tank fitted for any photographic purpose not involving the use of hot liquids, and we have long had such a box in use to contain an electrotyping bath. It is well not to use nails in putting such a bath together, but either to dovetail or dowell the work. Paraffined wooden boxes made in a similar way are excellently well adapted for containing the nitrate of silver bath and other solutions which are easily injured by foreign matter.

A friend of ours, who had to send some dry plates to the Antipodes, wrapped the boxes carefully in paper which was well gummed at the folds, and, when the gum was dry, he dipped each package for an instant in a bath of paraffin maintained near its point of solidification. The plates thus protected arrived in better condition than others which were wrapped in lead-foil. This reminds us of the way in which ingots of sodium are sent into the market. Each ingot is dipped into melted paraffin wax, and this so far protects the metal from oxidation, that the coated ingots may be kept in an ordinary tin canister. Something of the same kind was attempted a few years ago with joints of meat; but it was found that the covering of paraffin was liable to become broken during the voyage from Australia.

The use of paraffin as a substitute for wax in rendering prints transparent was referred to in our columns some weeks ago, and our readers were cautioned against employing samples containing oily or viscous constituents. We have found that paraffin may replace white wax in the so-called encaustic paste used for facing albumen prints, and it is quite possible that it may prove a more effectual protective against damp than ordinary beeswax.

Stenhouse's method of waterproofing paper, cloth, and other textile fabrics with paraffin is of great practical value, and, as Dr. Nicol pointed out in our Year-Book for 1876, admirable temporary dishes may be made from paraffined paper, the edges of the sheet being folded up, and kept in position either by pins or a light frame of wood. Dr. Nicol also mentions that friction with paraffin wax is an excellent preliminary to coating a plate with collodion for the wet process. The plate is warmed so as to be a few degrees above the melting point of paraffin, after which it is rubbed over with a lump of the solid material, and the excess is polished off with a warm flannel. We have tried this, and found it to yield excellent results, the collodion adhering well during the development and washing; but when dry it can readily be stripped from the glass should a reversed negative be desired. The paraffin forms a chemically clean substratum, and covers up many impurities on the plate, rendering these impurities harmless. Paraffin has one decided advantage over albumen as a substratum; namely, that of not working the slightest mischief to the nitrate of silver bath.

Instead of employing a lump of solid paraffin and warming the glass, a twenty-grain solution in benzole may be used, this being merely poured on the cold plate, and all excess polished off as in the previous case.

SULPHITE OF SODA IN THE ALKALINE DEVELOPER.

Our readers will have perused with great interest the remarks by Mr. Herbert B. Berkeley on "Sulphite of Soda, its Uses and Abuses," in our last issue. It will be seen that, in the main, Mr. Berkeley and ourselves are in accord. His article, however, suggests to us a few further reflections on the question of the new developer.

The first of these has regard to the "colour of the negative." There seems to be a general impression that, apart from the colour of the shadows, and from the nature of the print which is got from a negative, there is some charm in certain colours of images. The more nearly the tint approaching to the colour of a wet plate negative the better the result is considered. This notion we consider is an entirely mistaken one. We would point out that the only qualities which have any practical influence on the nature of a negative are, first, the difference of actinic opacity between the most transparent and the least transparent part of the negative, or, in other words, the contrast; second, the number of shades between these two limits, which are correctly represented; and, thirdly, the colour of the most transparent parts of the shadows. The colour of the image (so as it is in all cases of equal actinic opacity) has no influence on the quality of a negative. The quality of a print is entirely governed by the first two of the three factors mentioned, and these being equal, the rapidity of printing is governed entirely by the third, the clearness of the shadows.

To take an example. If there were two negatives which gave precisely similar prints, and which each showed clear glass in the shadows, no matter how different the *images* were in colour, the negatives would be equally quick printing. We point this out because the "wet plate" character claimed for negatives produced by various developers is, we believe, much over-rated. The great object—next to the principal one of getting a negative which will give a good print—is to obtain clearness of the shadows; and although we consider the colour of image of little moment, we quite agree with Mr. Berkeley that it is better to prevent, by the use of sulphite, the yellow pyrogallic stain which is so common, than to cure it afterwards with alum and acid.

We now come to the matter of chemical fog. Here we have but to say that whatever has been Mr. Berkeley's experience, we have had one case in which chemical fog was distinctly produced by the use of sulphite: also that we believe our experience of the development of dry plates is sufficient to ensure our taking all necessary precautions against the action of light on the plate during manipulation. As regards the reliability of the chemicals, we may say that we used a mixture sold by the Platinotype Company, under the title of "sulpho-pyrogallol."

The next question is the vexed one of "colour fog." Doubtless Mr. Berkeley's explanation of the extended time of development partly explains it, but not entirely. We have found the protraction of the development but slight, and on keeping plates (parts of which had been entirely protected from light) side by side, one in the ordinary developer, the other in the sulphite, there was markedly more green fog visible in the one treated by the latter developer than by the former. Possibly this appearance may be in part due to the effect of the yellow stains in the one case covering to a certain extent the green fog. On the other hand, we have seen cases where plates giving green fog with the ordinary developer, gave a fog merging on red with sulphite. Again, however, we agree with Mr. Berkeley that in these cases the best course is to reject the plates.

With regard to what Mr. Berkeley is pleased to call the difference "'twixt tweedle-dum and tweedle-dee," in relation to the formula we gave, the distinction is pretty clear in our own minds. Nothing was said about "oxidization of the sulphite." What we had heard stated—no cause being given—was that the pyrogallic solution, mixed with sulphite, lost its power of development without any change of colour taking place, the sulphite having some deleterious action on the pyrogallic. As we have said, we cannot confirm this. Nay, on the contrary, we can almost positively deny it. It is evident, however, that did any such action take place, all that is necessary to prevent it is to keep the pyrogallic and the sulphite separate.

A slight advantage to be found from keeping the sulphite mixed with the ammonia is this: the tendency which pyrogallol has to oxidize is almost proportional to the alkalinity of the solution. It is desirable, therefore, to have a large amount of sulphite present in a developer strong in ammonia than in one which is weak. This is brought about if the ammonia and the sulphite are mixed.

We do not wish it to be imagined that we are not fully awake to the benefit to be derived from the new developer We regularly use it ourselves, and perceive that its advantages greatly outweigh those drawbacks which undoubtedly arise in certain cases. We believe, nevertheless, that the success of the innovation will be more assured by recognising these drawbacks and discussing them than by denying their existence, or passing them by in silence. There is nothing which discourages a man so much, when he is making trial of a new process, as to find in it some defect of which he has not been forewarned. When he knows beforehand, however, what difficulties may crop up, he is forearmed. In the special case in question he will know that the fault is not in the developer—which, in the vast majority of cases, gives perfect results—but in the plates.

One of the great advantages of the sulphite developer is that a large number of plates may be developed in the same solution. We have before now called the attention of photographers to the fact that, even with the ordinary developer, it is by no means necessary to throw the solution away after one plate has been developed, but that it may be used for three or four. Here, however, the limit is reached, unless an extravagant amount has been used at first. But with the sulphite it is different. Last Thursday we saw exhibited a couple of ounces of the new developer with which a dozen half-plates had been successfully developed, no addition, as we understood, having been made from the first. Certainly, we here have the expenditure necessary to develop a plate reduced to a minimum.

By-the-Bye.

CONTINENTAL RAMBLES WITH A CAMERA.

A Tour in the Tyrol.*

A guide is again necessary from Heiligenblut to Windisch-Matrei, and it is as arduous a day's journey as that from Ferleiten. You have, indeed, two passes to cross, and a rather difficult bit of walking on the way, called the Katzensteig, or Cat's path. The latter leads over the edge of a rock, at the base of which, and a few hundred feet below, rushes the Leiter stream. But it is not so dangerous as it seems, and any steady pedestrian would pass it without a second thought. We naturally take a photograph of the Cat's Walk at its worst; and our friends in front, when we cry a halt, do anything but appreciate our discretion in thus causing them to stop just at the nastiest part of the giddy precipice.

The Leiter Hütte, or hut, which we pass soon afterwards, affords a shelter for those undertaking the ascent of the Gross-Glockner, and here a supply of milk and black bread may be had. You are now under shadow of the magnificent bell-shaped mountain, and cross a soft snowy shoulder of it. Here a gap in the mountain side suddenly shows you a whole cluster of frosted peaks, seemingly within stone's throw, they are so close. It is as if you have been searching everywhere for them, as in a game of "hide and seek," looking high and low, round this mountain and down that valley, until at last you have hemmed them in from further escape, and find the big white giants all huddled together in a corner. "Come on, here they are!" you feel disposed to cry out to your companions.

It goes steeply down hill to the little village of Kals. There are two inns here, but both of them are very so-so, and we rest a couple of hours before assaulting the second pass. It is but a narrow mountain comb that separates Kals from Matrei—the Matrei Kalser Thörl, it is

* Continued from page 420.

called—but the ascent is very steep during the two hours that it lasts. The top is marked by a wooden cross, and a magnificent panoramic view of snowy ranges greets the traveller on either side. There is the Glockner group of mountains and the Venediger group, the snowy pyramids rising right into the heavens among fantastic cloud masses; green meadows and black pine forests in the plains below enhance the beauty of the snow spires, and the tiny farms and houses grouped about in the valleys, so near, apparently, as to be within pistol shot, induce the belief that you must have discovered fairy-land, and that these miniature habitations and microscopic buildings are the veritable dwellings of the elves and fays children talk so much about. No big rivers or broad torrents are there, but only slender threads of silver, and the little village church below, nitched apparently out of white chalk, could be shut up in a pill-box.

Windisch-Matrei has a first rate inn, with sleeping apartments well furnished, and a good kitchen; hence a stay of a few days is very agreeable. "Mine host" is also a capital fellow, and can give you some good travelling hints. The Gros-Venediger, a magnificent snow-mountain, is very accessible from Matrei, and, if you have time, he will assuredly send you up it. He is a terrible mountaineer, at any rate in theory, and if he has not been to the top actually himself, he has, at any rate, been half way up on two occasions, he assures you, and that is surely as good. We take a photograph of the street in front of the hotel, with a big black mountain towering above it, and include our host himself in the picture; but he holds the result will be unsatisfactory, and for a double reason: in the first place, there is a patch of snow a few feet below the peak, which usually melts in the summer time, and therefore has no right to be in the picture at all; while he himself—in the photograph he is shown not half an inch high—is conscious that his "Blick war nicht ruhig" (his glance was not steady) during the exposure, and hence the composition cannot be perfect. Despite all this, however, the little photograph turns out exceedingly well on development.

We have spoken, perhaps, a little too disparagingly about the commissariat in the Tyrol. If veal is but too often served up to the hungry traveller, the meat is generally toothsome and well flavoured. But there is trout to be had in the Tyrol, cheap and plentiful. "Will you have them blue or brown?" the neat-handed waitress usually asks you, and she means exactly what she says. When boiled, the delicate fish are of a pale blue tint; while fried or baked they naturally enough assume a brownish hue. Cooked either way they are delicious, and form a welcome change or adjunct to a veal and salad dinner. There is another dish, too, that they understand perfectly in these parts—namely, pancakes, and these can be obtained when meat and butter are not forthcoming. *An eingefülltes Mehlspeise* (a pancake stuffed with preserves) will satisfy anybody, and is a sound foundation for a day's walk. For drinking, there is capital beer to be had throughout the Tyrol, as well as palatable red wine (Tiroler), whose only drawback is that it is too good.

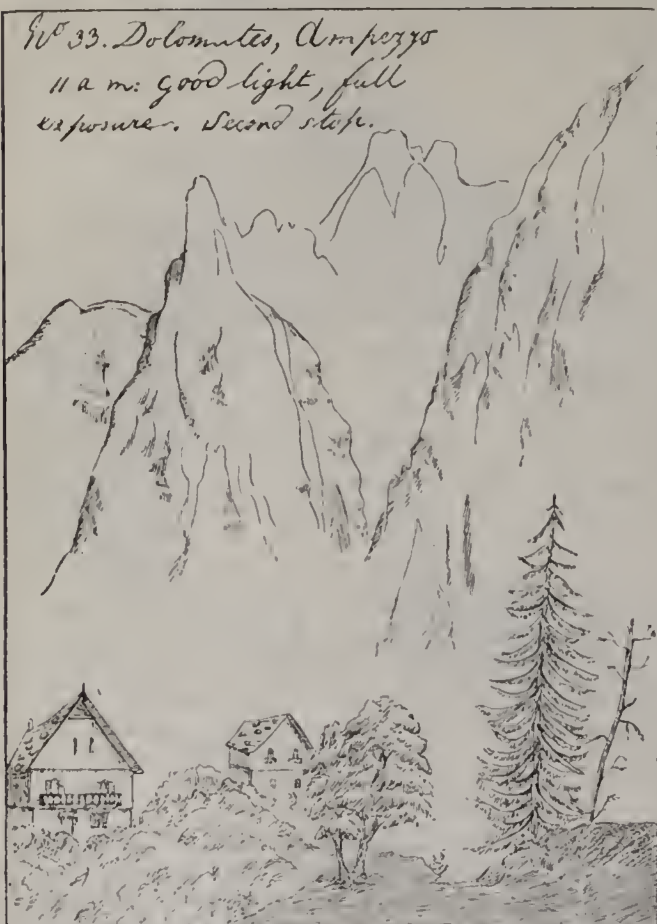
To the little market-town of Lienz is a march of sixteen or seventeen miles. Lienz is a most quaint place, with old public buildings surmounted by mosque-like cupolas, that give some parts of the place quite an Eastern look. Naturally, we take a picture of these cupolas, as also of another ancient edifice, an old inn. We give the sketch of the latter made by our artist friend in his note-book, and reproduced by the photo-etching process.

In setting down particulars, it will be seen that the number of seconds of exposure is not noted, but instead, the words, "full," "fair," or "short" exposure are employed. By having recourse, moreover, to the terms, "very short exposure" and "very full," we get five degrees, which are quite enough for anybody. There is only your own judgment to go upon in the matter, and we believe that if the time of day is noted and judgment passed at the time, in the above terms, this is a better criterion, when it comes to development, than if the exposures were expressed in seconds.

The latter plan often misleads, because the question of morning light, afternoon light, sunshine, or diffused light, have so much to do with the matter. A photographer can do no more than look around him, and, knowing the capabilities of his lens, his stops, and his plates, note then and there whether, in his idea, the exposure has been long or short.

And just another by-the-bye, while we are about it. The tourist photographer does well, as a rule, to spend his plates not upon the wonders of nature so much as upon subjects characteristic of the people and places he is visiting. A big mountain is only a mountain after all, and a monster cascade is but a cascade; when you look at photographs of them, they might have been secured in the Tyrol, Switzerland, the Pyrenees, Norway—well-nigh anywhere; but it is different if you photograph village streets, primitive churches, quaint cottages, and the like; these pictures hereafter are much more interesting, and they have each of them a story that comes vividly to the mind as you look at them. With gelatine plates at his command, the photographer, too, can now-a-days very well include figures in his pictures, without running much risk of spoiling them by shy children or giggling women, who used to be the bane of long exposures.

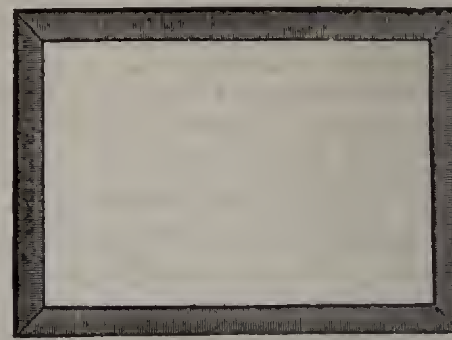
Lienz is in the Puster Valley, and a railway connects it with the main line that runs over the Brenner pass between Germany and Italy. But on the way back we are going to pay a short visit to the Dolomite mountains, those silver grey crags which have for the most part proved inaccessible to the hardiest mountaineer. We take rail to Niederdorf, and put up at the Höllenstein inn, a suitable name enough for photographic travellers, since Höllenstein is the German for nitrate of silver. Niederdorf is at the opening of the Ampezzo valley, and all the way to Cortina—a twenty-five mile walk—there is a succession of beautiful scenery. If you have but a few days to spare, you may very well walk one way (leaving your heavy packs at Niederdorf), and drive back by the diligence, which goes twice a day. Once fairly in the valley, you are surrounded by the mighty jagged spires of the Dolomites, which rise in fantastic shapes on all sides. Here is a view taken at the opening of the Ampezzo, which conveys some idea of their grandeur.



Your way lies through a magnificent pine forest (the little Toblau lake sparkling in the sun like a beautiful turquoise fittingly set in the silvery crags is a wonderful picture), and presently you come in sight of the famed Monte Cristallo, standing alone in magnificent splendour, and almost barring one's path in front. All the way there is a succession of grand and ever-changing scenes; now wild and gloomy, now supremely soft and pastoral.

The changing of plates must, of course, always be done at night, before retiring to rest. The plates should be packed up in fours or sixes, according to whether you carry two or three double dark-slides in your pouch; there is then no need of opening a packet more than once. You take out the fresh plates, and put up exposed films instead. A yellow and ruby paper to fold them in first, then some tin-foil, and finally a sheet of brown paper, blackened on the outside, should suffice to keep from harm even the most sensitive of gelatine films. Tin-foil is apt to break and get damaged when worn, and for this reason new foil should be employed at first; and as it is only once subjected to unpacking and packing, it ought not to suffer injury thereby. The plates should be packed in pairs, face inwards, and between the films a skeleton frame of cardboard should be placed, to keep them from harm, as shown in our sketch. The pairs themselves need not be separated.

The *mauvais quart d'heure* occupied by the tired photographer in changing his plates, when his companions probably are fast asleep, is the most disagreeable part of his lot. Our plan is to do it absolutely in the dark, for you cannot well trust a light, however feeble. Make your bed your work-table, for it is always available, and it is very soft. Place everything convenient to hand, as you



are accustomed to have them, never making a change, and then, with the single packet of plates before you, the dark-slides, and a broad camel's-hair brush handy, to dust the faces of the films prior to enclosing them in the slides, your troubles are reduced to a minimum.

From Niederdorf the rail takes you to Franzens Feste, a fortress guarding the neck of the valley (there is no photography permitted in the vicinity), and here is the junction with the Brenner line. Innspruck and Munich are reached in a few hours hence, and the way home is straight enough.

Another time we shall be happy to take the tourist-photographer another trip to the Tyrol (for there is plenty more to be seen in this delightful alpine country); but we must bid it adieu for the present, in order to act in the capacity of guide to Thuringia, where the German photographers meet in convention on the 23rd of next month.

FRENCH CORRESPONDENCE.

M. Enjalbert's Photographic Revolver—M. Duborg's Shutter—Photographic Exhibition of Paris—The Poitevin Subscriptions—Proposal of an International Association of Photography.

M. Enjalbert's Photographic Revolver.—M. Enjalbert, whose ingenious apparatus for working in full light, called the "tourist," is well known, has just invented a photographic revolver, the description of which may be read with interest. We have only seen a photograph of the instrument, giving a complete idea of its external appearance; and with regard to its internal mechanism, we can only judge of it by description here given. Its weight is 600 grammes, and its dimensions those of an ordinary pocket revolver, differing only in appearance by the barrel containing the lens having a larger diameter than the tube destined to contain the sensitive plates, in the form of ball cartridges. The plates are, unfortunately, of minute dimensions; one dare not say much on that score for fear of interfering with its portability, and an apparatus of this kind cannot be portable if the plates be larger. They are scarcely four centimetres square, so, in order to make use of such a small surface, it is necessary to work with great care. We found in a little portable apparatus of our own invention, and actually in construction, that the surface obtained, although four times as large, was rather too small: but we succeeded in enlarging the dimensions to 30 centimetres, the plates, made of pure gelatino-bromide, measuring 5 by 6 centimetres. By soaking in water before developing, they increase by natural distension of the gelatine, after which the water is replaced by the developer, and treated in the usual way. By this means we obtain a notable enlargement. To return to the photographic revolver. The lens is aplanatic, and its focussing point is regulated in such a manner that at the distance of five paces the further planes are found in focus. It is, in a word, automatic, and the angle it embraces is sufficiently wide to enable one to centre the image well, although not viewed in an absolutely accurate manner. The rapidity of the shutter is such that the shaking of the hand is not noticeable. The lenses of the objective are large compared with the plates, and allow of working with a great amount of light, and of taking instantaneous views even in the shade. The barrel tube contains twelve plates which change places after exposure by an ingenious mechanical contrivance. No doubt, by adapting gelatino-bromide films to this instrument, a considerable number might be introduced, at least treble those indicated by M. Enjalbert. It will be a great advantage to watch them increase in size previous to development. That will be capable of study when we have an apparatus of this kind in our possession. Of course these tiny results are expected to be enlarged, otherwise they would not be sufficiently useful. A simple enlarging process is, therefore, the indispensable complement to the use of the photo-revolver. It is awkward that this instrument is obliged to take the form of firearms. The inoffensive employment of murderous-looking weapons may sometimes cause considerable fear. Imagine anyone pointing his instrument in the direction of one of our rulers in order to take an instantaneous photograph. It would succeed in putting the police in a flutter. A traveller travelling with but one other by railway—what a fright he would have at seeing the other draw from his pocket this weapon, apparently to kill him! Without speaking at greater length on the singular situations, comic or tragic, which might be occasioned by the use of the photo-revolver, we say that the employment of pocket photographic apparatus, whatever form they take, so long as they are portable, and the results obtained are instantaneous and clear, require that the objects or living beings to be reproduced appear absolutely without restraint on the negative. As soon as we have the opportunity of studying M. Enjalbert's apparatus, we shall not fail to tell all we think of the photographic pocket pistol.

M. Duborg's Shutter.—Instantaneous shutters play a very important part in the practice of our art, and the numbers increase every day. A very curious collection might be made by collecting all the various forms of shutters which have been invented. In our preceding letter we spoke of two different shutters, both produced between the lenses of the objective. M. Duborg has invented an apparatus based on the same principle, but with a simplicity and lightness of construction hitherto unequalled. It is simply a small disc of thin metal blackened and attached to a rod capable of oscillating through the action of pneumatic bellows. Nothing is visible externally but the small box containing the bellows, and the India-rubber tube and pear attached, by which the disc inside is made to act. The same instrument may be adapted to different lenses. It will be seen how convenient this is. If an exposure of appreciable length be desired, the pear is pressed for the desired length of time; for a rapid exposure, the pear is taken in one hand and violently struck by the other, causing the disc to be sharply displaced and return to its position so speedily as to give an instantaneous exposure. For the size of this little apparatus, we have never seen anything in use equal to this charming little shutter.

Photographic Exhibition of Paris.—The forthcoming photographic exhibition at the Palais de l'Industrie promises well. It will take place in three large halls adjoining. A reading table will be reserved for the visitors, having spread out on it all the photographic journals and publications sent for exhibition. It is an excellent idea, not only giving great publicity to the representative works, but at the same time showing the great importance of the photographic press and writings. There is no charge made; the publication or work has only to be addressed *L'Exposition du Palais de l'Industrie, (photographic section), Paris.* The exhibition will take place during the three months, August, September, and October.

The Poitevin Subscriptions.—The Poitevin subscription list amounts to over 3,000 francs. It seems certain that the monument will be raised in a square in the town of St. Calais. The managing council of the place have just expressed a wish to that effect. We hope our esteemed colleagues in England will help us in this work, just as we should help them if they undertook anything by which we might glorify our art.

Proposal of an International Association of Photography.—A project exists for the formation of an international association of photography. To our mind a close and sincere bond is wanted to unite all those who take an interest in the photographic cause. LEON VIDAL.

WITH THE ECLIPSE EXPEDITION.

BY C. RAY WOODS.*

Souhag, May, 1882.

HOWEVER pleasant a voyage through the Mediterranean may be at this time of the year, the same cannot be said of an excursion up the Nile during the month of May. Interesting as, doubtless, it is likely to be, at a time when the dreaded Khamseen blows, scientific observations, nay, even the novelties to be seen in travelling, can scarcely be looked forward to with feelings of unmixed pleasure.

Whilst certain duties connected with the forthcoming eclipse have to be done, the members of the expedition have, of course, a good deal of time on their hands; and, with the exception of a short period during a smart gale whilst leaving the Bay of Biscay, life on board the "Kaisar-i-Hind" has been exceedingly pleasant. The rocking motion of a ship does not conduce to the taking of successful photographs; but no small amount of time and trouble, and by no means a few plates, have been not only exposed and developed in obtaining pictures of different parts of the ship, with occasional groups of the passengers and crew.

The principal necessity of a photographer is the possession of a dark-room, particularly when the slides are empty at starting. Our first impulse was to utilise our cabins; but mine happened to be very unfortunately placed in this respect, for, being on the main deck, a considerable amount of light streamed in at the top, in addition to that obtained from the lamp. The latter, had that been the only source of light, would have been convenient enough, for it was placed outside, the light coming through ground glass; but not having sufficient pillows to stuff into all the spaces through which the light streamed, I had to wait till all was dark, and the only illumination was a small amount of faint moonlight coming through the port-hole. Then the slides were filled, and two of them exposed with a drop shutter, in the morning, the subject chosen being an expanse of sea—which, by the way, was rather rough—a small passing vessel, and an almost cloudless bright blue sky beyond. As the sun shone brilliantly, a pretty picture was at least hoped for, though scarcely expected; but both plates turned out to be over-exposed, though taken with a small stop in about the tenth part of a second. The plates, it may be mentioned, registered 22 on Mr. Warnerke's sensitometer, and were much too rapid for the purpose. Had the circumstances under which they were developed been a little more favourable, they might have been saved; I resolved, therefore, to try no more developing till I had got a better dark-room. Application to the purser in the morning brought us luck. He was very ready to oblige, and accommodated us with an empty post-office cabin, which, with the help of our ruby cloth and orange paper, gave us a very convenient place to work in. We were turned out subsequently; but after leaving Malta another cabin was given us which proved still better. It was on the spar deck, and for the remainder of our voyage through the Mediterranean the port was never closed. The sash was soon covered with paper and cloth, and, by simply sliding it along, white light and plenty of fresh air could be readily admitted at will. Could we only have had a supply of water from a tap, instead of having it in tin vessels, no better dark-room could have been found to work in. Our developing-trays were made from some sheets of tinned iron obtained at Gibraltar, and many of our chemicals were obtained from the same place; whilst the stewards of the ship supplied us with plenty of clean bottles, for we did not think it advisable to open our chemical chest on the voyage.

The most picturesque subjects on which to try our art on board were certainly the Lascar crew When we went on board

* Read before the Photographic Society of Great Britain.

the ship at Tilbury, their costume reminded me of that of Drury Lane pirates; from thence to Gibraltar they were habited in incongruous mixtures of their own and weather-beaten European garments. During the gale in the Bay, when they wore oilskin hats and long coats of the same material, I thought they looked villainous; but we saw them at their best in the Mediterranean. Few good photos. were obtained of them, for we had some little prejudice to get over. One morning some of them were squatting on deck playing at cards, and, bringing up my camera and some quick plates, I was putting in the slide, and was just about to congratulate myself on the picture I should get, when they saw me and jumped up in alarm. Having brought the camera up, I contented myself with a group of a few of the passengers and such of the coloured men as came in the picture, but, not being in a direct line of the lens, thought themselves out of harm's way. With the men from India (I believe most of them come from Surat) the prejudice soon wore off, and some of them, who had probably seen the rough print I gave one of them, and were even anxious to have their likenesses taken; but with the Africans I never succeeded. On the Sunday we spent in the Mediterranean all the crew came out for parade, dressed in their smartest attire, with clean white trousers and tunics, blue sashes and red turbans, forming a most picturesque group. The chief of the Hindoos made energetic signs to me, which I rightly interpreted that he desired to have them photographed; and signs of pleasure appeared on many of their faces when I brought out my camera. I got some of them to sit down, whilst the others stood up behind, and got a pretty fair negative, only one man moving during the four seconds the cap was off the lens. The posing created a good deal of fun, one of them sitting down in front, with a little black goat in his arms, which kicked and struggled to get away, but was at length quieted. I then turned round my camera towards a group of negroes on the other side of the deck; but it created great consternation, and was the signal for such a dancing and shouting of "No sah! no sah!" that I thought it expedient to lay my camera aside before they took, as they seemed disposed to do, vigorous measures. I was rather sorry, for I wished particularly to get their chief, who was so smartly dressed that he looked like Solomon in all his glory, and seemed, by the airs he assumed, to be quite aware of it.

We have obtained various pictures of different parts of the ship, and I succeeded in getting an instantaneous picture from the mizenmast, climbing up with my camera fastened round my neck, and exposing it with a drop-shutter whilst holding the camera as steadily as I could in my hands. The picture obtained was fairly sharp, but very much under-exposed so far as the decks and the figures on it were concerned.

Our photographic work on board was very successful. The water was warm; but, with the plates I had especially prepared with hard gelatine and a double quantity of chrome alum, no signs of frilling appeared.

The heat we experienced on board was sometimes 80° in the shade, and in the railway journey from Suez to Cairo it rose to 90°. As not more than 110° in the shade is expected here, my own plates, I am confident, can be developed with impunity by simply cooling the water in porous earthenware pots. The damp sea air does not seem to have affected my plates, which develop free from spots; and some sensitized paper we took with us prints well. Toning has not been attempted, nor are we likely to try it, as it is not necessary for anything we are likely to do *en voyage*, either for private or scientific work.

In the Suez Canal we had a beautiful moonlight night, and all throughout the evening the ship was perfectly motionless. The scene from the bows of the ship was very good—the high banks of the canal on either hand, and in the centre another steamer, with its reflection in the water. I exposed a quarter plate for 72 minutes with the full aperture of my lens, and obtained a picture, very thin it is true, but with a fair amount of detail, and capable of intensification.

On arrival at Suez we were greeted with a sight of a most glorious sunset—a scene which only the pencil of an artist could do justice to. The camera was quite inadequate to the task of depicting the harbour, with the beautiful ruddy and purple tints of the adjacent hill and the delicate play of colour on the light fleecy clouds.

Speaking of clouds, either report speaks falsely regarding the clearness of Egyptian skies, or the weather here is exceedingly exceptional. Our first sight of Egypt, whilst passing through the canal, was signalised by a sky completely covered with heavy clouds; and soon the rain began to fall, dispelling the mirage that rendered the landscape so attractive. Whilst the sky in Upper Egypt has been, as a whole, remarkably clear, clouds have appeared at different times near the horizon, sufficient to spoil our observations, should there be any present at the time.

We got through the canal easily, owing to the energy displayed by the Egyptian Government and the English consuls out here, and, stopping at Suez and Cairo for a short time only, were soon on our way for Assiout, which we reached early on the morning of the 6th. Our heavy instruments were soon placed on the backs of camels, and our lighter baggage on donkey-carts, and a strange procession was seen winding its way towards the steamer. Camels, donkeys, turbaned natives, with a few Europeans in white helmets, formed an interesting scene, and, but for the necessity of having to see the cases safely on board, might have formed the subject for a good picture. The strength of the Arabs, as they exerted their powers to the utmost in carrying on board our heavy cases, seemed almost superhuman; and one no longer wonders how the Pyramids were built, if, as no doubt, they had such fine fellows as these. Our heavy cases have already brought us into trouble, for the authorities on the steamer did not care to take them on board; and a compromise was effected, some of them being towed behind in a small boat. The steamer had a large number of soldiers on board, and, being heavily weighted, grounded occasionally; and when evening came on, it at last fairly stuck. We got no the barge, to set an example to the soldiers, who were with difficulty persuaded to get out of the steamer. No progress, however, was made, and we had to remain motionless all night. After some delay in the morning, we were once more on our way, and, after sticking in the mud several times, have at last reached Souhag; and we may now consider our work to have begun.

It may interest members of the Society to know what we propose to do in the forthcoming eclipse, but I will first draw attention to the photographic work that has already been done in former eclipses. The photographic work attempted in previous eclipses may be divided into two classes; firstly, attempts to photograph the corona and prominences; secondly, attempts at photo-spectroscopy. The latter have hitherto met with but little success, but many of the former have been remarkably good.

The first attempt to photograph the corona was on the 7th of July, 1842, by Professor Majocchi, of Milan, who employed the Daguerreotype process. One plate was exposed just before totality, and an image of the thin crescent obtained. Another plate was exposed two minutes during totality, but no trace of an image was obtained. The light was also condensed by a lens on a sheet of bromide paper for two minutes during totality, but no sign of action was found upon it. The whole account of these experiments is somewhat vague, and the causes of failure are correspondingly uncertain.

In July, 1851, Dr. A. L. Busch, of Königsberg, during the eclipse on the 28th of that month, obtained a photograph of the corona on a Daguerreotype plate. A telescopic lens of 2·4 inches aperture and 2½ feet focal length was used, the plate being exposed for eighty-four seconds during totality. Although the image of the corona did not in this photograph extend far from the moon's edge, in fact not very far beyond the prominences, this photograph is by far the most valuable record of the eclipse of 1851.

Although several eclipses occurred between 1851 and 1860, no further photographic attempts were made until the latter year. During the eclipse on the 18th of July, 1860, attempts were made by Mr. Warren De las Rue, at Rivabellosa, and by Padro Secchi and Professor Monserrat at Desierto de las Palmas. Mr. De la Rue used a photo-heliograph with an object-glass of 3·4 inches aperture and 50 inches focal length, the image thus formed being enlarged by a Huyghenian eye-piece to about 3·8 inches diameter. Two photographs were obtained, each one being exposed for about sixty seconds, but only slight traces of the corona were obtained. This was undoubtedly due, firstly, to the large size attempted and consequent feebleness of the image, and secondly, though in a smaller degree, to the loss of light through the extra lenses. The only useful result obtained, therefore, in addition to the knowledge that the photo-heliograph is unsuited for the work required, was the fact that the photographic intensity of the light of the prominences is about 700 times less than that of the sun's photosphere. Padre Secchi and Professor Monserrat were more successful. Using the Cauchoix telescope belonging to the observatory of the former, the object-glass of which was 0·15 metre (somewhere about six inches) in diameter and 2¼ metres (about 7¼ feet) in focal length, four good photographs were obtained. Professor Monserrat, who conducted the phetographic work, as well as Mr. De la Rue, used the wet-collodion process.

In the eclipse of August 18th, 1861, attempts were made by Dr. G. Fritsch, Dr. H. Vogel, and Dr. W. Zenker to take photographs in the principal focus of a 6-inch refractor of 7 feet focal length; but owing to cloudy weather, the low altitude of the sun, and short exposures, only the prominences are visible. Colonel Tennant and Sergeant Phillips attempted at Guntoor to obtain photographs with a 9-inch reflector, but only the prominences were obtained, and scarcely any trace of the corona. Mr. F. W. Sutton was unsuccessful with a telescopic objective of 3½ inches aperture and 66 inches focal length; the plates were exposed six and seven seconds, but no image was obtained, either with the iron developer or a strong pyrogallic one. It is a question, however, whether the apparatus was really directed towards the sun, or whether it had shifted.

In the eclipse of August 7th, 1869, photography played a more prominent part, and some of the many attempts made on that occasion were crowned with success. Professor Himes, assisted by Messrs. Browne and Baker, at Ottumwa, Iowa, obtained several photographs of different phases of the eclipse, but only portions of the corona. Wet collodion was used, and an iron developer of medium strength; the pictures coming up rapidly being no doubt over-exposed for the prominences, and under-exposed considerably for the corona. Professor A. M. Mayer, at Burlington, obtained good photographs of the prominences, but only traces of corona; he having endeavoured to obtain, although using an equatorial of 6·4 inches aperture and 9 feet focus, a larger image by the interposition of an eyepiece. Messrs. Black, Fitzgerald, and Pourtales, at Springfield, Illinois, only obtained a series of superimposed images (the sun having been followed by hand), showing the prominences only. Professor Winlock and Mr. J. A. Whipple, at Shelbyville, however, obtained a really good image of the corona with a lens of 7½ feet focus and 5½ inches diameter. This was taken with an exposure of forty seconds, and, like all successful photographs of the corona, was taken without an eyepiece or enlarging-lens.

The eclipse on December 22nd, 1870, was, owing to the great state of solar activity, a very fine one; and the experience gained from previous eclipses rendered it unusually favourable for obtaining a photographic record. Lord Lindsay, using a reflector of 12 inches aperture and 6 feet focus, obtained an image, but the plate was so fogged that it was useless. Prof. Winlock, with Messrs. Willard and Mahony, were more fortunate, both the last-mentioned gentlemen obtaining good photographs of the corona. A still better photograph, showing more detail, was obtained by Mr. Brothers at Syracuse, the lens used being one of Mr. Dallmeyer's "rapid rectilinear" combinations of 4 inches aperture and 30 inches focal length; the aperture, however, being cut down to 3 inches. The negative showed a fair amount of detail, and was of more value than any that had been previously obtained.

It is from the photographs taken in 1871 by Mr. Davis (Lord Lindsay's assistant) at Baikul that we derive our most reliable notions of the coronal structure; and Mr. Hennessey and Captain Waterhouse, at Dodabetta, obtained most satisfactory photographs of the corona; in fact, those taken at the latter place are unsurpassed. Like many of the preceding, they were taken on wet plates; and though the effect is marred by photographic defects, such as streaks and scum-marks, in addition to halation, the actual details of the corona can be made out with certainty by comparing the negatives.

Of the eclipse of 1874 we possess no photographic records. During the eclipse on April 6th, Mr. Beasley, who was with Dr. Schuster in Siam, obtained, with an ordinary camera and lens of 13 inches focus, a series of images with exposures of 2, 4, 8, and 16 seconds respectively. The photographs, however, were poor in detail; and the most noteworthy feature about them, it is said, is the rapid increase in the extent of the corona with the longer exposure. In the last, the extent of the corona exceeded the diameter of the sun. One must recollect, the image of a sun by a 13-inch focus lens is very small.

In 1878, Dr. Henry Draper and Dr. Blackett obtained photographs of the corona; the first using wet plates, with a telescope of 5 inches aperture and 78 inches focal length, and the latter a camera of 6 feet 2 inches in length, with a lens having an aperture of 13 inches, Swan's dry plates being used. Other series of photographs were taken by Mr. Rogers, of Washington Observatory, and Prof. Harkness, at Creston. In 1878, however, the sun was comparatively quiescent, and similar coronal structure to that shown in the Dodabetta photographs was not obtained.

This year's eclipse will, it is expected, be more favourable. The sun has lately been showing greater activity. Larger spots and extensive prominences have lately been observed. With such a climate as that of Egypt (if, indeed, the khamseen does not interfere with our arrangements) it is hoped that good work may be done. Gelatine plates will be used; but as to whether they will be developed in Egypt is doubtful. The developing done in the Mediterranean, however, looks promising, and with the aid of freezing mixtures I personally entertain little fear. As, however, we expect a temperature of 110° in the shade, it will not do to be too hopeful; trial plates, when we get to work, will give us some idea as to what course it will be best to pursue.

I shall not attempt in this communication to give a complete account of our arrangements; by the time I write again, I shall be able to take photographs of our instruments, and thus save a deal of explanation; I do not think it probable, however, that it will arrive in time for the May number of the Journal, and it will therefore, I expect, be inserted in the same number (June) as a brief account of our photographic results is likely to appear in. Nevertheless, I will endeavour to state briefly what we propose doing.

In the first place, we shall endeavour to obtain photographs of the corona. This we do not consider to be by any means the most important part of our work; but such photographs will be useful for reference, even if they do not clear up moot points. For this work we shall use a camera with a lens of a little more than 5 feet focus, that would give an image of the sun about half an inch in diameter. No lens will be interposed to amplify this image, the inadvisability of such a proceeding having been amply demonstrated in previous eclipses. The direct image will be better, not only on account of the less loss of light, but also for orientation and measurement. The orientation will be performed by various methods, photographic and otherwise.

The plates to be used are about sixty times as rapid as wet collodion. Means will be adopted to prevent halation, advantage being taken of Captain Abney's communication to the Society in December last. This halation question is most important. By preventing it, we hope, firstly, to give good long exposures, and thus obtain an image of the corona to its utmost possible limit; secondly, better definition; thirdly, a clean edge to the moon's black disc; and, what is far more important, a more reliable record of those parts of the corona near the limit of the edge of the disc.

In what we hope will prove the more important part of our work we shall be trying a ground hitherto almost untrod. Photo-spectroscopic work during totality offers a fresh field, but one which is capable of yielding most important results should the attempt prove successful. An attempt was made in 1875 to photograph the spectrum of the light of the corona, but it failed with the methods then in use. Photography has been spoken of rather disrespectfully in scientific circles for such work since that occasion; but what was impossible then, we certainly hope to accomplish now, with the more rapid material at our disposal. A further attempt was made, during the same eclipse, with a prismatic camera, but only the corona appeared. With the plates we have with us, we hope to obtain a far better result with our prismatic camera; and strong reliance is placed on a spectroscopic camera, which I hope to describe, with the rest of our apparatus, in my next communication.

(To be continued.)

EXAMINATIONS IN PHOTOGRAPHY.

The Pass List of the May Technological Examinations in the City and Guilds of London Institute has just been issued, from which we extract the following particulars relative to the prizes and certificates given in photography:—

First-class Honours Certificates.—1st Prize—Walter Angus Watts, of Manchester, £5 and Silver Medal. 2nd Prize—Arnold John Spiller, of London, £5 and Bronze Medal.

Second-Class Honours Certificate.—Edwin Banks, of Liverpool.

First-Class Ordinary Certificates.—1st Prize—George Embrey, of Gloucester, £3 and Silver Medal. 2nd Prize—Ernest H. Farmer, of London, £3 and Bronze Medal. 3rd Prize—H. G. Templeton, of Gateshead, £2 and Bronze Medal. Harry Hinchcliffe, of Liverpool.

Second-Class Ordinary Certificates.—Arthur John Banks, Francis Caldwell, Augustus Rainger, and William S. Ramson, all of Liverpool.

Notes.

Although a larger edition was printed than on any former occasion, our Year-Book for 1882 is already out of print.

Mr. J. T. Taylor has corrected the last proofs of the new edition of Hardwich's photography, and its publication may be looked for very shortly.

Dr. Eder sends us Part III. of his important work on photography. It treats principally of optics, and we shall take an early opportunity of reviewing it in these columns.

We are glad to learn that "first-class honours" have been obtained in photography at the last examination of the City and Guilds Institute, by Mr. W. A. Watts, of Manchester, and Mr. A. J. Spiller, of London. A gift of five pounds is made to each of these gentlemen, while the former receives a silver, and the latter a bronze medal.

Liverpool is well represented in the pass list, no less than six candidates upholding the honour of their city. These are Mr. Edwin Banks, who secures honours, Mr. H. Hinchcliffe, who takes a first class certificate, and Messrs. W. S. Ramson, A. Rainger, F. Caldwell, and A. J. Banks.

The special artists of the *Graphic* and of the *Illustrated London News* both avail themselves of photography in depicting the stirring scenes now passing in Egypt.

Useful knowledge for the Tropics. A gentleman writes from India:—"Some gelatine plates I have had have done very well, and others of good name at home are quite useless here. I should say that the only plates really useful in India are those prepared with hard or hardened gelatine. The soft gelatine will not do at all. It is particularly annoying to find that makers who have been using a hard gelatine, and whose plates consequently answered well, change their gelatine, and their plates then become quite useless in the hot weather."

Our Indian correspondent adds:—"I find that with the thermometer above 90° F., and the temperature of ordinary cold water above 80° F.—water was 84° the other day in a cool porous jar—very few plates will stand without ice in the washing waters. Still there are those of several makers that do. I generally prefer the ferrous oxalate development, followed by alum, and then fixing."

"The A B C of Modern Photography" is the title of a handy sixpenny book issued by our publishers, containing the "Twelve Lessons on Elementary Dry Plate Photography" that recently appeared in these columns. The work has been carefully re-edited by the author, Mr. W. K. Burton, C.E.

We notice, in one of the recent reports issued by the Ordnance Department of the United States, some instructions as to the carrying on of photography for warlike purposes. No mention whatever is made of gelatino-bromide, and the military photographer is given the choice between wet plates and the tannin process. If North America is to maintain its character as a go-ahead nation, it must do better than this.

Major Armstrong, the chief instructor in telegraphy and photography to the Royal Engineers, will probably proceed to Alexandria.

A staff of Engineer officers have also been ordered to Egypt to commence a general survey, there being, as we pointed out last week, no trustworthy military map of the country. Several large cameras, together with other apparatus, will be included in their equipment, for photography affords aid to the military surveyor as well as being a means for the rapid production and multiplication of maps. During the march to Magdala, in 1868, the surveyors and photographers attached to Lord Napier's force accurately mapped out the whole 400 miles of Abyssinia through which the army passed.

Dr. Kaiser has exhibited to the Physical Society of Berlin a shutter of some novelty. On pressing a bulb with the hand, two swinging valves before the aperture of the lens are opened, and meet one over the other. Dr. Kaiser claims, moreover, that he can so alter the mechanism of the valves that one acts faster than the other, and in this way he can allow the light falling from the sky to act for a much shorter time than that coming from the earth. The doctor's mechanism is doubtless very ingenious, but the difficulty about the top light may generally be met in a much more simple manner by the use of a sky-shade or camera-peak, such as Mr. England always uses in landscape work.

A "special notice" in red ink, attached to the regulations of the next Exhibition to be held at Pall Mall, tells us the rules this year will be *strictly adhered to*, and, therefore, no picture will be received after 9 p.m. on Friday, September 29th. We sincerely trust this will be the case, and that late contributors will have their works sternly rejected; it is not fair that those who obey and those who disobey should be treated alike.

Sir James Hannen last week decided a case on purely photographic evidence. A witness having readily indentified the photographic portraits of respondent and co-respondent in a divorce suit, his Lordship said that in general he was not in the habit of relying on photographs as evidence of identity; but as the portraits had not been called in question by the counsel of the accused, he considered that the case had been proved.

You may carry special pleading sometimes too far. In commenting on the three great electric inventions of the day—the telephone, the storage battery, and the incandescent lamp—the French journal, *Electricité*, desires to point out that all three were really originated many years ago. It says:—"Graham Bell does not efface Riess, in spite of the recent Chancery suit; Faure cannot destroy Planté; and Swan, Edison, and the others cannot suppress the anterior labours of Changy." Undoubtedly we should give credit to the pioneers; but let us not be unjust in order to be generous. Riess, Planté, and Changy all will be recognised as great original workers; still it is very certain that if we had been without Graham Bell, Faure, Swan, Edison, and the others, there would, practically, be no such things at this moment as the telephone, the storage battery, and the incandescent lamp. Nay, more; had these latter *savans* never been, the names of Riess, Planté, and Changy would have been comparatively unknown.

Now that it has been decided to build an observatory on the top of Ben Nevis, upwards of 4,000 feet above the level of the sea, we sincerely hope that regular photographic observations will form part of the work to be conducted therein. Both France and Germany are before us in respect to official photo-astronomical work, and where we have apparatus—viz., in London, Greenwich, and Kew—the vapours of the metropolis cannot but interfere sadly with the delicacy of the results. The top of Ben Nevis is generally above the mists and fogs that at times envelop Scotland, and there can be little doubt that in the purer atmosphere at the highest point in the United Kingdom, more valuable and trustworthy photographic records could be secured than elsewhere.

The explosion in an albumen factory at Manchester, a short time ago, whereby the proprietor, Mr. Riley, met with his death, seems to have been satisfactorily cleared up by the Inspector of Explosives. It was rather difficult to understand how even very dry and finely-divided particles of albumen could explode, notwithstanding all we have learnt lately about the danger of all sorts of dusts when ignited. It turns out that Mr. Riley employed his albumen not for photography, but for thickening and fixing colours, and he employed, too, in his work large quantities of chlorate of potash and prussiate of potash; with these latter on the premises, the cause of danger was not so far to seek.

Sir Allen Young, writing a fortnight ago from the most northern point of Norway on his way north, says that the plucky little craft the *Kara*, with Mr. W. Grant on board, is still ahead of him, and has by this time doubtless reached Novaya Zemla. Arrived here, the *Hope* and the *Kara* are to join in their search for the the missing *Eira* and her crew. All hope to be home again in November.

Professor H. M. Paul ingeniously employs reflected light as a means of testing the vibration imparted to the earth by moving vehicles. His arrangement is a very simple one. He sinks a stout post some four and a half feet into the ground, and upon this is a plank supporting a reservoir of mercury—or, rather, of amalgam of tin and mercury. The surface of the mercury is obviously a mirror, and when any vibration is felt by the earth, the surface of the mercury is disturbed more or less. An object of a suitable kind is reflected upon the mercury surface, and when there is no vibration, this reflected image is, of course, sharply defined. As soon, however, as any vibration occurs, the image moves, and becomes more or less exaggerated.

Professor Paul has hitherto employed a telescope to note the amount of vibration, taking optical notes the while; but there is little doubt that photography would help materially in registering the degree of change or vibration. He has found that an express train passing at a distance of one-third of a mile affects the mercury very considerably for a space of two or three minutes, and a one-horse vehicle, passing at a distance of five hundred feet, caused a disturbance of the image on the surface of the mercury whenever one of the carriage wheels passed over a stone.

M. Charpentier tells us that the time elapsing between a person seeing a signal and being able to repeat it with his forefinger is about 13 hundredths of a second. With some people the interval is twice as long, but the above may be taken as the average. M. Charpentier terms the interval in question the "duration of luminous perception," and he measures it in a very ingenious manner. A black disc is set revolving at a given speed, and the observer faces it, having under his finger an electric key. There is a small opening or window in one part of the disc, and when this comes round opposite the observer, he sees a light shining through it. Immediately he presses the key, and an electric signal passes to the revolving disc. The disc is stopped, and the distance between the window and the record of the signal being measured, furnishes the result. The distance between the two points on the disc is, of course, easily turned into time, since the disc was revolving at a known speed.

TWELVE ELEMENTARY LESSONS IN PHOTOGRAPHIC CHEMISTRY.

No. II.—Reagents.

In the quantitative analysis of photographic chemicals, the following solutions will be required:—

Solutions in 6-ounce Stoppered Bottles.

Sulphuric acid (strong).
,, ,, (dilute).
Hydrochloric ,, (strong).
,, ,, (dilute).
Nitric ,, (strong).
,, ,, (dilute).
Acetic acid.
Potash.
Ammonia.
Ammonium sulphide.

Solutions in 2-ounce Corked Bottles.

Ammonium carbonate.
Ammonium chloride.
Ammonium oxalate.
Potassium antimoniate.
Potassium chromate.
Potassium iodide.
Silver nitrate.
Iron protosulphate.
Lead acetate.

Barium nitrate.
Sodium phosphate.
Tin protochloride.
Platinum perchloride.
Lime water.
Starch solution.

Each bottle should be labelled with the name of the reagent and its symbol; in that way it will greatly assist the student in learning the symbols of the various chemicals, and also save a great deal of time in taking notes of experiments. Labels can be had from philosophical instrument makers suitable for the purpose, but for those who prefer to make their own we append an example.

SULPHURIC ACID
(Strong)
H_2SO_4

Sulphuric acid, H_2SO_4.—About eight ounces will be required. The dilute solution should contain about one of acid to three of water, but in making it up the water must be placed in a beaker, and the acid added slowly, stirring the whole time; when cold, pour the mixture into a stoppered bottle.

Hydrochloric acid, HCl.—Eight ounces will be sufficient; the dilute solution may be made by mixing three parts of water to one of acid, no precaution being necessary in mixing as in the former solution.

Nitric acid, HNO_3.—Two solutions will also be required. The dilute solution is made up after the manner of the hydrochloric acid solution.

Ammonia, NH_3, otherwise known as *liquor ammonia*, when mixed with an equal volume of water, is of convenient strength.

Potash, KHO, better known as *caustic potash*.—About an ounce of the solid *stick* should be dissolved in six ounces of water.

Acetic acid, $C_2H_4O_2$.—The strong acid should be mixed with about two volumes of water.

Ammonium sulphide, NH_4HS, is obtained by passing sulphuretted hydrogen through a solution of ammonia till it is saturated; the solution should be colourless, or only of a slight yellow colour. Sulphide of ammonium is a test for iron, forming with it a black precipitate of iron sulphide.

Ammonia carbonate $(NH_4)_2 CO_3$.—A quarter of an ounce of the salt should be dissolved in two ounces of water; it is chiefly used as a precipitant of the alkaline earths.

Ammonium chloride, NH_4Cl, commonly known as *sal ammoniac*.—A saturated solution should be made up.

Ammonium oxalate $(NH_4)_2C_2O_4$.—One drachm dissolved in two ounces of water will be required; it produces with calcium salts a white precipitate soluble in hydrochloric acid.

Potassium antimoniate, $KSbO_3$.—One drachm must be briskly shaken with two ounces of water, and the solution filtered. It gives, with alkaline solutions of sodium salts, a granular precipitate on stirring.

Potassium chromate, K_2CrO_4, is a yellow salt, and should be neutral, or only slightly alkaline; five grains dissolved in two ounces of water is of convenient strength. It is used as an indicator for the volumetric determination of silver, and also as a test for salts of silver, forming a blood-red precipitate of silver chromate. When the solution of potassium chromate is kept in a glass bottle for some time, a yellow deposit of lead chromate is formed on the inside, by the combination of chromic acid with the lead in the glass.

Potassium iodide, KI.—Twenty or thirty grains dissolved in two ounces of water is a useful solution. It is a test for silver, mercury, and lead, giving pale yellow, scarlet, and bright yellow precipitates respectively. The scarlet mercuric iodide is readily soluble in an excess of potassium iodide. The lead iodide is dissolved by boiling water, but crystallizes out in beautiful golden spangles on cooling.

Silver nitrate, $AgNO_3$.—Five grains dissolved in two ounces of water is sufficient. It is a test for chlorides, giving a white precipitate, soluble in ammonia; with bromides, it gives a cream-coloured deposit, only slightly soluble in ammonia; while with iodides, a yellow precipitate, totally insoluble in ammonia, is formed. Hyposulphite of soda forms with silver nitrate a white precipitate, which soon changes to the black sulphide of silver.

Iron protosulphate (ferrous sulphate), $FeSO_4$.—Ten grains dissolved in an ounce of water is sufficient; but it will not keep longer than a month, from the fact that it absorbs oxygen from the air, and is converted into the ferric salt. If strong sulphuric acid is added slowly to a mixture of any nitrate and ferrous sulphate, a brown band is formed at the junction of the two liquids.

Lead acetate, $Pb(C_2H_3O_2)_2$.—Twenty grains should be dissolved in two ounces of water. This solution is a test for sulphides, forming a black precipitate of lead sulphide.

Barium nitrate, $Ba(NO_3)_2$.—A solution containing half an ounce dissolved in two ounces of water should be made. Its chief use is as a test for sulphates, forming a white precipitate insoluble in nitric acid.

Sodium phosphate (hydrodisodic phosphate), $NaHPO_4$.—Half an ounce should be dissolved in two ounces of water. It is used as a test for magnesium compounds, with which it forms a white granular precipitate in the presence of ammonia.

Lime water, CaO.—A piece of quicklime about the size of a marble should be powdered up and shaken with two ounces of water, and then allowed to settle. The clear liquid must be decanted off. Lime water is used as a test for carbonates. The substance to be tested is placed in a test-tube fitted with a perforated cork holding a tube bent twice at right angles, the outer end dipping into another test-tube containing the lime water. Hydrochloric acid is poured on the substance, when a white deposit formed in the lime water will indicate the presence of carbonates.

Tin proto-chloride (stannous chloride), $SnCl_2$, is prepared by boiling about twenty grains of metallic tin with two drachms of strong hydrochloric acid, and then diluting to two ounces of water. The solution will keep fairly well if a small piece of metallic tin is left in the solution. It gives with solutions of gold a purple precipitate, and with platinum a bright red solution.

Platinum perchloride (platinic chloride), $PtCl_4$.—A solution containing ten grains in an ounce of water will be required. It produces with ammonium and potassium salts a crystalline precipitate when stirred.

Potassium ferrocyanide, $K_4Fe(CN)_6$.—About ten grains should be dissolved in an ounce of water. This solution is used for distinguishing salts of iron; with persalts it forms a dark Prussian blue precipitate, while with the proto-salts it gives a pale blue precipitate.

A packet of litmus paper (purple) is required for testing acids and alkalies; a red colour is formed by acids, and a blue by alkalies. About a gallon of pure distilled water is required for making up the above solutions, and also the standard solutions, &c., required in quantitative estimations. Stills are sold on purpose for purifying water, but it is far better to buy distilled water from the druggist, taking care to test for chlorides before using it. Of course everyone knows that in testing for chlorides all that is necessary is to add a few drops of silver nitrate to the suspected water, which, if it be impure, will form a white milky cloud. Filtered rain-water is the best substitute for the above.

IODIDE IN EMULSIONS.

BY CAPT. W. DE W. ABNEY, R.E., F.R.S.

In your last number, Mr. A. L. Henderson writes acknowledging the advantages of the addition of silver iodide to an emulsion, and it is a matter of congratulation to myself that he has given his support to the introduction of what I think the sheet anchor of a clean emulsion, more especially as, if I am not deceived, he till recently ranked as opponent rather than as an advocate of its employment. Mr. Henderson's method of adding the iodide is not new, as he will see that the plan of mixing separately (after each emulsion has been washed) has been published by me several times, and, except for the trouble, it is an excellent way of adding it. It is also satisfactory to find that Dr. Eder, under certain circumstances, does not regard the addition of iodide as valueless, though in your leader of the 23rd June, you quote, apparently from Dr. Eder's older experiments, from which it appears that the addition of $\frac{1}{12}$ of iodide makes a boiled gelatine emulsion less sensitive, and is also the cause of thinner images than one containing only bromide. I must once more protest against this assertion. With my own emulsions the very reverse is what I find; but then, of course, there may be different ways of manufacturing. If an emulsion after it is boiled is of a bright yellow colour by reflected light, density and sensitiveness will assuredly be found, and this colour arises from a true double salt being formed. I have, perhaps, had more experience than most photographers with this double salt, and can now, as ever, recommend it to them. The great point is that the boiling should be continued sufficiently long, and that all chance of fog should be guarded against by the introduction of a *small* modicum of hydrochloric acid.

One fact which is worthy of notice is, that a bromo-iodide emulsion which has been boiled gives a greater range of gradation than one which has been prepared by the ammonia process, or than a pure bromide emulsion prepared by any method. Using the sensitometer, it will be found that with a boiled bromo-iodide emulsion showing 23, every number will show a different gradation; whereas with the other emulsions the first 5 to 8 figures will show the same density. With a bromide emulsion this might, perhaps, be due to a reversing action commencing, but not in the case of the bromo-iodide.

THE PHOTOGRAPHING OF MOVEMENT.

BY E. J. MAREY.*

THE excellent results secured by Mr. Muybridge by means of instantaneous photography, in analyzing the movements of men and animals, impose upon the physiologist a difficult task. The successive images must be compared one with another, each representing a different attitude, and classified in series according to the position, at the time, and in the space, corresponding to each.

Admitted that nothing has been neglected during the experiment; that, on the one hand, the marks to be reproduced by photography have been placed along the course run by the animal, so as to be able to calculate at once the position it occupies in the divided space; while, on the other, the moment at which each picture has been taken be determined, as is the case with photographs exposed at equal intervals. All these precautions taken, it is necessary, in order to draw from the figures the meaning they contain, to place them in order, so as to cover a strip of paper corresponding to the course run, with a series of cut-out images, of which each explains the position the trunk and limbs occupied in the space at each of the divided intervals of time.

Such representations gave birth to the similar figures introduced by the Brothers Weber, to explain theoretically a man's walk. In their works are to be seen silhouettes of men shaded with cross-hatchings of decreasing intensity, and imbricated so as to show the successive changes of position of the legs, arms, body, and the head, in the different phases of one step.

Until now, this mode of representation has been found

Reproduction of a photograph showing successive phases of movement of a man running.

to be the most effectual. It has been adopted by the greater number of classical treatises. It has appeared to me, and this conviction has been confirmed by experiment, that by means of photography it is possible to take on the same plate a series of successive images representing the different positions that a living being, proceeding at no matter what pace, has occupied during certain regulated spaces of time. Supposing, for instance, a photographic apparatus is set up by the road walked over by a man, and the first image is taken instantaneously. Should the plate keep its sensitiveness, we could after an instant take another picture showing the walker in a different attitude and place. This second image, compared with the first, would indicate exactly all the changes of attitude effected in the second instant. By repeating thus the images taken at very close intervals the succession of actions during locomotion would be obtained of perfect accuracy. In order to keep the plate sensitive for these successive impressions, it is necessary that everything in front of the apparatus be absolutely dark, and that the man or dog should come out white against a black background. But the blackest substances strongly lighted still reflect many actinic rays; I have therefore had recourse to a

* *La Nature.*

method suggested by M. Chevreul for obtaining a perfectly black field of vision. My screen is a cavity, the walls of which are black. A man dressed entirely in white, and strongly lighted by the sun, walks, runs, or jumps, while the photographic apparatus takes his image at shorter or longer intervals by means of a rotating shutter more or less rapid.

This same method may also be applied to the study of different types of locomotion; a white horse or a white bird will give a series of their attitudes in the same way.

The window, pierced in my rotating shutter, can be enlarged or decreased in size at pleasure, so as to be able to regulate the exposure according to the intensity of the light or the speed of the revolution of the disc. With contracted aperture and slackened rotation the results come out at greater intervals from one another. A quick rotation gives the images at lesser intervals, but with insufficient lighting, unless the window has been enlarged.

Finally, a drop shutter placed in front of the other serves to regulate the commencement and end of the proceeding.

The prints and negatives I have obtained, a specimen of which is produced above, have been executed at the physiological station of the Parc des Princes, where I was assisted in the work by M. G. Demeny.

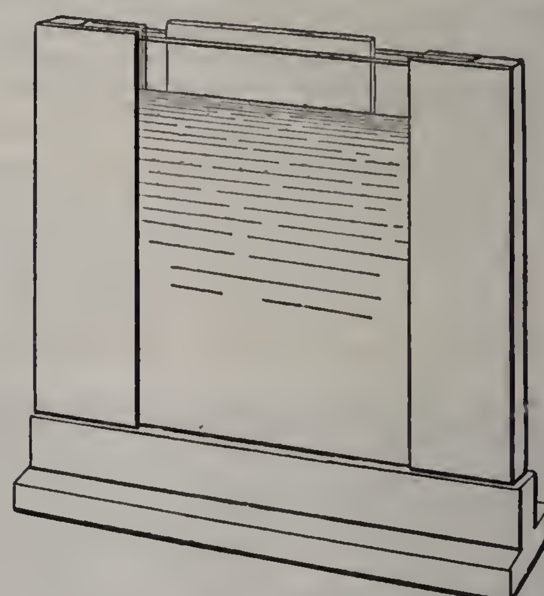
RECENT ADVANCES IN PHOTOGRAPHY.

BY CAPTAIN W. DE W. ABNEY, R.E. F.R.S.*

Now, there is another kind of development, which some call chemical development; and here I differ from some of my brethren who live on the other side of the water, in Germany, who have chosen to name as chemical development something quite different to what my idea is of chemical development. I say chemical development is only a development which is shown by a change in the colour or material of the substance acted upon, and not by a building-up process, such as we have had before us.

Now, I have something which I hope will show you what I mean by this chemical development. I have here a picture which has been printed on nitrate of uranium; I am going to use simply silver nitrate for a developer. I do not want a reducing agent in the developer in this case, because the uranic salt is reduced to the uranous state by the action of the light, and we shall have a picture formed of silver oxide, because the uranous salt will reduce the nitrate of silver to the state of oxide, and that of itself can be reduced afterwards to the state of metallic silver. This paper was exposed, just before you came to the lecture, to the electric light behind a negative. There is an outline of it now, but when I apply the silver, you will see that it springs out into vividness. It has been rather over-exposed, but this I do not mind, as I merely wish to illustrate a principle. The whole of that picture is formed by silver oxide reduced by the particles of uranium nitrate which have been acted upon by light, and by nothing else. The silver oxide reduced is an exact equivalent of the uranium salt which has been altered by light. That is what I call chemical development, and I know no other meaning for the term. It is impossible, except where you have a change in a large amount of the material that is acted upon by light. I hope I have made you understand the difference between this development and the development you saw just now. The gallic acid, in the one case, reduces the silver solution to the state of metallic silver; and, in the other case, the uranous image itself reduces it to the state of silver oxide; but still that silver oxide was only equivalent to the amount that had been acted upon by light, and nothing more. I have here a wet plate prepared. I dare say most of you know what a wet plate is, though some of you may not if you only began photography when the gelatine process came in. To such, I suppose, a wet plate is as much a matter of novelty as a Daguerreotype is to many who know what the collodion process is. I will ask you to bear with me, however, while I produce the picture, because I want to show you the use of the electric light. Of all the recent aids to photography, the electric light is one of the most powerful, because with it you can photograph by night or by day. In fact, in some of the advertisements I have seen it stated that they prefer to take portraits by night; I do not know why, but in a country town I saw an advertisement in which they said distinctly they preferred to take photographs by night, as it was more convenient. [An engraving was focussed on the camera-screen, and the wet plate exposed for twenty seconds.] A short exposure will do for this. Now I will try to show you the development on the screen. You see a cell there with water in it. Now I hope you will see the crystalline action taking place before you, and the image will be seen on the screen gradually coming out. A cell containing ferrous sulphate in solution, and a small quantity of glacial acetic acid, is focussed on the screen. The plate of sensitized (and now exposed) collodion is fairly transparent. After placing a piece of yellow glass in front of the lantern, the plate is immersed in the cell, and the image is seen gradually being built up.

There is another mode of development which our friends across the water have chosen to call chemical development, though I cannot agree with them, and that is the method which is called alkaline development. I dare say I could very rapidly demonstrate that to you. The *rationale* of the alkaline development is, that when you have a strongly oxidising agent in the presence of an alkali and a silver compound, solid or in solution, then you have the last reduced to the metallic state. Such an oxidising agent we have in the pyrogallic acid, and the alkali generally used is ammonia. Now, this kind of reduction is evidently useless unless it can discriminate between a compound which has



Cell for demonstrating Process of Development.

been acted upon by light, and one which has not. When pyrogallic acid is used in order to make this discrimination—or, in other words, in order that those parts acted less on by light may alone be reduced—something more has to be added, which is usually a solution of a bromide of an alkali. This restrains the reduction, inducing the change to take place in the part acted upon by light. I may say that without a restrainer the tendency is for these parts to be first reduced, but the action extends to that which has not been acted upon by light. It has been usually said that alkaline development is only available for bromide of silver, and until recently I dare say that was the case—or, rather, it was not the case, but it was thought to be so. I hope on a future occasion to show that iodide of silver is as amenable to alkaline development as bromide of silver, although not so rapidly, and that chloride of silver is very amenable to alkaline development, giving, in fact, most beautiful pictures. The plate I am going to expose now is a bromo-iodide plate. I have shown you this form of it, simply because it is transparent. I have here a negative, and the sensitive plate behind it, ready prepared. Now I expose it to the light from the magnesium wire for a few seconds. I will take a cell, in which I will place some of the alkaline developing solution. The pyrogallic acid and bromide are mixed, and to which the ammonia is ready for adding; I mix a small portion of this latter with the pyrogallic acid and bromide—the bromide, remember, being for restraining purposes. I place the plate in the cell, which is seen in focus on the screen. The picture is one of Mr. England's beautiful statuary studies, and you can see the outline of the bust gradually appearing. That, I say, is another case of physical development.

* Continued from page 407.

Now, I want to show you why I say it is physical development. I throw on the screen a slide, which is a picture of a young lady, seemingly cut in half, part of her figure being intense, and part not intense. This difference in intensity was produced by exposing a plate behind a negative, and then, before development, coating a portion of the plate with bromide of silver. The top layer thus had no exposure whatever, and yet you see where the unexposed film is, there we have the picture very much denser than in the case where there was only the one film. This shows that here we have a case of physical development, for the image is built up from the film itself, being partly fed, as it were, from the film which had received no exposure. There is thus crystalline action taking place in the film, just as much as there was in the silver reduced from the nitrate of silver. I want you to understand why I object to the words chemical development, when we are talking about alkaline development.

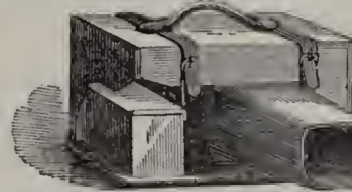
There is another mode of development, which is now very much in vogue, and that is, with ferrous oxalate. In this case we have an organic salt of iron in the ferrous state, which is capable of reducing silver bromide, iodide, and chloride to the metallic state, whilst itself is reduced to the ferric state. That was a development which also required a restrainer. If I had had time, there were several more experiments I should have gone through, but I must omit them. There is, however, another kindred developer, which, I think, is one of the most recent advances in photography, about which I am supposed to be lecturing. I speak of it with great tenderness, because it is my own child. I have now got an iron developer, which is capable of being used without any restrainer whatever. I call it ferrous citro-oxalate ; it is rather a long name, and some of my audience may not understand it, but I will tell you how it is made. You take a solution of citrate of potash, and then you add ferrous oxalate to it, till no more will dissolve ; the resulting compound is probably citrate of iron, but in a stronger form than is usually found, and much more energetic than that form which was recently recommended by Dr. Eder, to whom I shall have to refer more at length presently. I propose to use some of that same paper which I used just now. Its use for the purpose I have in view is a novelty. This paper can be developed by the alkaline method, or by the ferrous oxalate method, or by the ferrous citro-oxalate method ; it is an excellent paper, and was prepared, as I described, about two years ago at the Photographic Society, before the gelatine papers came into vogue ; it gives a very clear picture, and I dare say that you will also see that it gives very satisfactory negatives. I expose a piece of the paper behind a negative to the light of the magnesium wire again. The negative I used in this case was kindly lent me by Mr. William Bedford. It is rather a dense one, and requires longer exposure than I should have given to a thinner negative. The exposure is now given, and on withdrawal from the frame, it apparently is a perfectly blank piece of paper. [The paper was wetted and placed on the developing stand already described, and brushed over with ferrous citro-oxalate without any bromide being added. The lantern was covered with yellow glass, and the light of the disc thrown on the paper.] You see it is beginning to develop ; see how beautifully it comes out. This, I say, is a novelty in photography, for here we have an iron developer which needs no restrainer, and a paper which can be developed by an energetic developer. I think I may claim that as an advance over the calotype process.

I must defer what I have to say on other developers to the next lecture ; but, before I close, I am gratified to be able to bring before the meeting some very early calotypes taken by my distinguished friend, Mr. James Glashier, who is President of the Photographic Society, and who has worked at photography from its very earliest beginning. These are some of his beautiful fern impressions he got with the Talbotype, and printed afterwards. I will ask the members to look at them, as being early examples both of Talbotype and calotype—the one being developed pictures on iodide of silver, and the other being the printing process of the negative on chloride-of-silver paper, such as Talbot first introduced. I have also to show you Mr. England's developed Daguerreotype. I will undertake to say that under the circumstances it is a very good Daguerreotype indeed. Of course, a lecture-room is not the place to show all the niceties of the art—and, in fact, it is very difficult to demonstrate before such a large audience ; but I hope those experiments which have, luckily, all been successful, will, at any rate, have afforded some instruction to the junior members of the photographic world.

(To be continued.)

PORTABLE DARK ROOM FOR DRY PLATE PHOTOGRAPHY

The invention shown in the accompanying engraving is a portable dark room, consisting of a box made of suitable material, and provided with straps and a handle for carrying, and having an aperture from which a flexible sleeve of proper material projects from



the box. The opening and sleeve must be of such size as to permit the plate-holder of the camera to be passed through them into the box. Two compartments, provided with lids, are located at either end of the box, one containing dry plates that have not yet been exposed, and the other the exposed plates.

The operator passes the plate-holder through the sleeve into the box, opens the frame, and deposits the exposed plate in its proper compartment, and takes a fresh plate from the opposite compartment and places it in the plate-holder, which is then withdrawn. In this manner the plates are placed in or removed from the plate-holder without being exposed to light or dampness. While manipulating the plates with one hand the flexible sleeve is held against the arm with the other hand, so that no light can pass into the box by accident. The box also serves as a receptacle for transporting plates. This ingenious device, which is described in the *Scientific American*, is patented by Mr. John Serdinko, of New Braunfels, Comal county, Texas.

Correspondence.

ATTITUDES OF ANIMALS IN MOTION.

Dear Sir,—In reading the lecture delivered by Mr. Muybridge before the Society of Arts, one cannot but be struck with his refreshing assurance at the commencement, where he says that artists of all ages have been inaccurate in their " notions " of depicting animals in motion. After reading the article, and seeing the pictures of the animals he has photographed in this month's *Century*, I am of opinion he is not warranted in his attempt to lecture artists.

An artist paints simply an *impression of motion* as he sees it, as it is impossible for him to see the sub-division of motion, or a single section of a stride ; and until we are endowed with further visual powers, we must be content.

When a horse rises to a fence it is impossible to see him in the stiff awkward positions represented in the photographs. The pasterns look especially unreal, though they may be correct. Again, fancy a bird in flight painted with its wings folded under it, or a dog with his legs gathered together as if in a knot. These may be right photographically, but wrong artistically. To give a notion of a hunting field with horses and pack in full cry, they must be painted as we see them, with limbs stretched to their utmost, " tearing away like mad."

Another illustration. If the spokes of a wheel in motion are perfectly seen as represented by instantaneous photography, and an artist were to paint them so, we should have no idea of motion, for they always appear to us as a blurred circle.

Instantaneous photography, in many instances, might be termed " photographic jugglery ; " or, " a glimpse of the unseen "—a practical illustration of a line from Longfellow, that—

" Things are not what they seem."

The lecture and illustrations are undoubtedly of great interest to the scientist or the curious as studies of analysis of motion ; but beyond that, I fear, will be of little use. Probably they may be the means of starting a new school of fanatics in painting who will stand the chance of being laughed at for their pains in trying to depict what may be right photographically, but is never seen with naked eye.

Persons who are interested in this matter should study the pictures referred to (not in the zoopraxiscope, but simply as they are), and I leave them to judge whether they seem correct with their ideas of animals in motion.—I am, dear sir, yours truly, T. Prothero.

REMARKS ON GREEN FOG, AND ON THE DEVELOPMENT OF SILVER CHLORIDE.

Sir,—There are several errors in my communication of last week.

At the top of the second column, for "change" read charge.

In the next paragraph it is difficult to arrive at my meaning, owing to the sentence following "six to twelve minutes" commencing with a capital T. There should be a small t, and a full stop after "on this point."

Further on, in same paragraph, instead of "intensity when acquired," read "intensity to be acquired."

There are other errors of minor importance; and allow me to say that I do not care to appear to write of "pyrogallic" and "alkaline pyrogallic."

Perhaps I may take this opportunity of penning a few thoughts which occur to me in connection with Captain Abney's remarks on sulphite of soda and green fog.

On Sulphite of Soda and Green Fog.—Shortly after the publication by Captain Abney of his theory of the cause of green fog, it occurred to me that the solubility of bromide of silver in the sulphite might account for the increased amount of green fog which many have testified follows the use of sulphite in the developer. I came to the conclusion, however, that such theory is hardly admissible, for, did we accept it, we should have to account for the fact that many plates do not give green fog when the same developer is used. Such a theory seems to me to place sulphite of soda in the position of being the cause, or initiator, of green fog, which it certainly is not. It would be somewhat inexplicable that, in some cases, sulphite of soda causes green fog, while in other cases it does not do so. Is the bromide not dissolved in the latter instance, and why? If so, would not the addition of bromide of silver to saturation in the sulphite used be an interesting experiment?

I think, however, it will be found that green fog is purely the effect of the pyrogallol developer. If the iron developer be used, the fog will be grey; if pyrogallol be used, the fog will be green. The green colour is due to organic matter derived from the pyrogallol.

Captain Abney's remark upon the effect of fixing in white light is interesting; but, according to his theory of the effect of silver salt in solution, should there not be fog when using ferrous oxalate equally as when using alkaline pyrogallol—not green fog, but grey? It would seem, judging by Captain Abney's experiment, that bromide must have been acted on by light before it can produce green fog.

With respect to Captain Abney's experience with the water which supplies the Riffel hotel, I think he takes the right view in attributing a benefit to use of water containing no lime salts. What a "messy" developer did Davanne's "sacharate of lime" make, even with dry collodion plates. But yet the use of distilled water will not enable one to arrive at the results produced by sodic sulphite in the water. There may be an improvement in the appearance of the developer; but that is not everything.* Altogether, I rather doubt whether many who have used sulphite in the developer have been able to appreciate its many advantages. Though Captain Abney puts in the form of a question the following—"Can it be that sulphite of soda and carbonate of lime form sulphite of lime and carbonate of soda?"—I do not intend to appear to inform him of the fact of which he is fully aware, but merely state that such is the case.

Silver Chloride and the Alkaline Developer.—Captain Abney's remarks upon the development of chloride plates are to me especially interesting. Here, again, we have proof that my views on this subject, with which Dr. Eder disagreed in the spring of last year in your columns, are not so altogether unworthy of consideration as that gentleman would have had your readers believe.

Among other statements in which my writings were entirely misrepresented, or ignored, was that oft-repeated assertion of Dr. Eder's, that I *failed* (*sic*) to develop chloride plates, owing to having used the *alkaline developer*; and all this in the face of my equally often repeated statement that I had *succeeded* with such development, though I had failed to observe sufficient reason for advocating the use of chloride instead of bromide of silver. To the readers who took the trouble to judge of the merits of the case, by reading what appeared on both sides, at the time to which I refer, this method of reasoning *lucus a non lucendo* must have been almost as amusing as that of Mr. Weller, sen., when giving his opinion at the close of the Pickwick trial, and lamenting: "Oh! Sammy, Sammy, my boy! why weren't there a halibi!"

As you yourself remarked in a recent leading article, there is a great deal too much of dogmatic assertion in photographic literature and elsewhere. Because a man fails to produce certain results in a certain way, is no reason why he should declare the method proposed to be an impossible one—especially when another, presumably not addicted to stating falsehoods, asserts his opinions and experience to the contrary. At any rate, here we have Captain Abney using an *alkaline developer*, almost identical with that used by myself for chloride plates in my experiments four or five years ago. Will Dr. Eder forthwith proclaim that Captain Abney *cannot do what he has done?* Or will he wisely come to the conculsion that what was "sauce for the goose" is *not* "sauce for the gander?"

Perhaps he will naively state that his view of this case has been all along that alkaline pyrogallol is a good developer for chloride *negatives*, but not for chloride *positives*; if so, I would remind him that my statements at the time referred to were especially stated to apply to the development of negatives, and not to that of positives. However, I do not think Dr. Eder will attempt any such defence of his position, since he has repeatedly stated that the use of alkaline pyrogallol results in hopeless fog.

What Captain Abney says of the sensitiveness to the ultra-violet rays, fully bears out what I have many times expressed, viz., that when the light is brilliant, and the subject an open one, the rapidity of chloride (alkaline pyrogallol being used) will compare for sensitiveness favourably with that of silver bromide. Such conditions are likely to prevail largely in such a locality as that visited lately by Captain Abney. I cannot refrain from quoting the sentence which brings Captain Abney's remarks on this subject to a conclusion:—"These experiments also showed me that chloride plates are *excellent* for *ordinary landscape work*, giving detail and density as before stated." The italics are my own.—Faithfully yours,

Herbert B. Berkeley.

* An interesting experiment, illustrating the action of sulpho-pyrogallol when made alkaline by ammonia, is to add twenty or thirty minims of the solution to an ounce of water, and then to drop in a minim of strong ammonia. A pink tint will at once be formed; this presently becomes decolourised, and the solution for a short time remains about as colourless as it was before the addition of the ammonia; it subsequently begins to absorb oxygen with exhibition of a straw tint.

Proceedings of Societies.

London and Provincial Photographic Association.

At the meeting held on the 20th inst., Mr. J. Barker in the chair,

Mr. W. K. Burton said he had made a number of experiments with the sulphite of soda developer against Mr Cowan's citric acid formula, with the view of ascertaining which gave the best results, and he gave a most decided preference to the citric acid. His plates contained chloride.

Mr. Cowan preferred the citric acid, but would not altogether condemn the sulphite formula. He thought different results were obtained with different makes of plates.

Mr. Mackie exhibited a transparency cut in halves—one half having been developed with a part of 2 ounces of pyrogallic citric acid solution, in which Mr. Cowan had, some six or seven months ago, developed eight plates, which was handed to another person to keep. He left it one hour in the solution, and the other half for five minutes in a fresh sulphite solution. Both halves were fully developed, that with the old pyrogallic looking much like a pyrogallic developed wet plate.

Mr. Coles exhibited two negatives—one developed in the ordinary light of the dark-room, the other being covered up, and only looked at occasionally. The uncovered one was perceptibly fogged. He also showed a transparency taken by the light from the window while developing was going on.

The Chairman described a visit paid some years ago to Mr. Slater, the ghost photographer. A vague undefined picture was shown him as the ghost's portrait, and he was informed he could obtain similar portraits if he intensely wished for them; but, needless to say, he had never succeeded. He, however, produced a wet plate negative, in which the sitter, a lady, was shown in two distinct positions; he could not account for this in any way, and was certain no previous exposure had been given.

Mr. Henderson had also seen Mr. Slater operate, and in this case the ghost turned out to be a clot in the collodion. Some years ago he was troubled by ghostly images on his negatives, and upon making an investigation found there was a small hole in the cover of his bath which acted as a lens, and he obtained pictures of the roof of his room previous to exposing the plate.

The following gentlemen were elected members of the Association:—As honorary and corresponding members—Dr. Eder, Dr. Monckhoven, Capt. Pizzighelli, Capt. Toth, and Dr. Vogel. As ordinary members—Messrs. G. H. Garret, J. E. Bliss, H. Reynolds, John Stuart, A. Seward.

Talk in the Studio.

The Prince of Wales as Commodore of the Royal Yacht Squadron.—We hear that Messrs Boning and Small recently had the privilege of attending at Marlborough House, and were successful in securing some good pictures of H.R.H. the Prince of Wales in his new character of Commodore of the Royal Yacht Squadron.

The Enjalbert Camera.—Mr. A. R. Dresser, of Upper Norwood, who writes in strong terms of approval of this camera, says:—"I found the camera a little trouble at first, but got my hand in very soon. The day was dull, but I had not one plate spoilt, which I think very good for my first trial, and I must say I would not give up my new 'Enjalbert' for any two cameras in London, as I have not seen one that works as well for so many plates, for you can carry sixteen plates, camera and all, with about six or eight pounds. I find it does not do as well for pictures on end, as it is apt to get moved if not very careful; but I spoke to Messrs. Marion and Co., and they are going to make an alteration I suggested, and then it will be all right. I have been out three times, and only got into trouble once, and that was by taking two pictures on one plate. There is a little trouble at first in focussing, as you have to move your focussing glass for each picture, unless it is the same focus, and then there is a scale to work it by. But still I am sure anyone who had one for a week would not give it up on any account. I trust some of your readers will buy it, and then I am sure they will thank me. I am only an amateur who does a little photography for pastime, but like to help my friends along who also like to dabble in that way. While I am writing, I may as well put your readers up to a dodge of my own, which I have told to two professionals, who both found it to work well. It is for reducing black parts in negatives, or halation. My plan is, take one quart of water, put in half-an-ounce of sulphuric acid, then soak your negative in that for half-an-hour or more till film is soft, then take a fine piece of old linen and rub over parts that want reducing with your finger, and you can work it down as thin as you like; a little practice, and it comes out all right; only try it and see.

Perception of Colour.—Mr. J. W. Swan writes on this subject to *Nature*:—"Happening to be reading out of doors, while the sun was shining on my book, I noticed that patches of weed on the lawn appeared peculiarly conspicuous in their difference of tint from the grass. The same patches of weed close-cropped to the level of the grass were ordinarily scarcely observable from difference of colour. Now, as I looked up from my book—my eyes dazzled with the glare—they appeared to me to have a strong blue tint. My attention thus being drawn to the point, I extended my observations, with the following results, which, if new, will doubtless prove interesting to some of your readers. I found that if the eye was exposed for two or three minutes to the action of a very strong light, *by looking at a sheet of white paper*, while bright sunshine fell on it, the capacity of the eye for perception of colour was curiously modified, under certain conditions. For example: if, on the instant after the exposure of the eye to strong light, as described—solarization I will call it—flowers of various colours, placed in a shady part of a room, were examined, a pink rose appeared the colour of lavender; dark crimson sweet William, almost black; magenta snapdragon, indigo; scarlet poppy, orange; the eye was, in fact, red-blind. After a minute or two, the eye recovered its normal sensibility to red, and the flowers assumed their natural colour. In order to ascertain that the ?mal-perception of colour, under the conditions described, was due to the action of strong light on the eye, and not to any other circumstance, I repeated the experiment, allowing the solarization to take place on one eye only, the other eye being kept shut until the moment of making the observation. I then found, as before, that the solarised eye was red-blind to objects in a subdued light for a minute or two after solarization, but sensitive to blue, and in less degree to yellow, while the non-solarised eye was perfectly normal in its perception of all the colours. By alternately closing and opening the solarized and non-solarized eye, the difference in colours perceived by the two eyes was extremely striking—the rose was, as seen by one eye, pink, by the other eye, blue. It must be remembered that the effects described were produced when the flowers were observed in a room not strongly lighted. When a corresponding experiment was made with the flowers *in the sunshine* instead of in the shade, it was found that a reverse effect was produced—that every colour, and red particularly, was intenser to the solarized eye than to the non-solarized eye, as was readily seen by alternately shutting and opening them. To the solarized eye a red rose-bud was deep red, to the other eye, light red. The red of the poppy was deeper and more vivid to the solarized eye. A calceolaria was orange chrome to the solarized eye, lemon chrome to the non-solarized eye. A viola was dark violet to the solarized eye, a colder tone of blue to the non-solarized eye. I found that after the insensibility to dimly-lighted red and orange (the effect of solarization) had worn off, a reverse condition succeeded. For example, Venetian red, which was a dirty brown, as seen the instant after solarization, appeared gradually to change to a full vermilion. I found also that portions of the solarized eye that had escaped the solarizing action behaved like the non-solarized eye. I leave the explanation of these slight observations to those within whose special field of study they naturally fall, only remarking that the power of the eye, fatigued by solarization, to perceive blue light, and light of no other colour, under the conditions described, seems to suggest that the eye, like almost all matter sensitive to light, is more sensitive to blue rays than rays of lower refrangibility.

The Crystal Palace School of Engineering.—A few days ago we had occasion to visit this School, which is located, as our readers are doubtless aware, in the south tower of the Palace. It was the dinner hour, but many of the pupils were busily engaged on work of their own—electrical and photographic pursuits being evidently most popular just now. One of the students, Mr. A. H. Whinfield, was engaged in photographing a group of his fellow pupils, and he gave us a very effective picture of the chemical lecturer and his assistant, taken while they were setting out and arranging apparatus on the lecture table. This picture was necessarily made with a very short exposure; but it must be remembered that the sides of the tower are wholly glazed, and exposures are much shortened when made above the slight surface mist which generally remains close to the ground. The Electrical Department of the School, which has recently been organised by Mr. J. W. Wilson, the principal, is now in active operation, and it is likely to be considerably extended before long.

To Correspondents.

*** We cannot undertake to return rejected communications.

F. COWLEY.—We are obliged for your appreciative letter.

T. W.—A mixture of castor oil with collodion; add a few drops to the pint.

BEDFORD.—1. We cannot recommend one particular firm, since we know a dozen good makers. 2. Get Abney's "Photography with Emulsions."

VERY TALL.—We fear our readers would not fully appreciate your story; explain it to Her Majesty's Marine Forces.

CONSERVATIVE.—Consult "Payne Jennings" in the "Studios of Europe;" his whole method is there explained.

SUSSEX.—1. We should make it about two-thirds the depth of that on the north side, and nearly as long. 2. It had better extend from the eaves to the ridge, as you can easily block any portion by suitable blinds. 3. The common window-glass answers quite well, provided it has no yellow cast. You would do well to obtain a few samples from a glass merchant, and roughly test them by placing them over a sheet of sensitive paper, the whole being then exposed to light. 4. Yes; but if your camera will not extend sufficiently, you can leave the front combination in its place, and work with the stop behind the lens. The bright screw thread, as laid bare by the removal of the back lens, should be covered with a ring of black paper or velvet. 5. If you use a stop ¼ or ⅜ of an inch in diameter, you will obtain all the depth of focus you are likely to require. In some cases the swing back will be useful.

SHAH YEHAN.—If you mean to employ photography, the best method would be to take a negative and reproduce copies by photo-lithography; but this would involve a considerable expenditure of time; or, perhaps, the papyrograph would answer your purpose. For information about this latter, you should write to Messrs. Zuccato and Woolf, Charterhouse Street, London, E.C.

HENRY O'NEILL.—We will endeavour to gather information regarding the matter.

AMATEUR (Blackheath).—1. Obtain the "A B C of Modern Photography," by W. K. Burton, price 6d., this being published at our Office. 2. No thoroughly satisfactory method has yet been published. 3. "The Art and Practice of Silver Printing," by Robinson and Abney, is issued by our Publishers, price 2s. 6d.

W. K.—The reason is that our Publishers have no more left. See the first note this week.

C. CLARK.—1. We are pleased to hear that the negative is likely to be found. 2. Our Publishers will give you full information.

BRIGHTONIAN.—Neither print so deep, nor carry on the toning to such an extent.

W. G. (Dublin).—1. It is made by melting together india-rubber and shellac, and it is not convenient to prepare it oneself. Your best way will be to write to the maker, Alfred Jeffries, Limehouse, London. 2. You will find full particulars in an early number, probably next week.

A. F. COX.—Received with thanks.

S. G.—Soak the sample of paper for a few hours in a weak (slightly acid) solution of aniline red (magenta dye), after which wash thoroughly several times in hot water. Any wool fibres which may be present will then be found to have retained the dye, while the linen and cotton fibres will be colourless. A solution of picric acid may be used instead of the aniline red.

S. DEAN.—One surface of the sample of glass has become thoroughly disintegrated by the action of the weather, and your difficulty is not to be wondered at. You had better have your studio entirely reglazed.

R. RICHARDSON.—1. You must considerably increase the proportion of silver nitrate, and it is probable that one-fourth more may be about the thing. 2. They arise from the use of dirty plates. 3. Quite unnecessary. 4. Because it invariably contains a trace of acetic acid. 5. Ammonia is rapidly decomposed by chlorine, nitrogen being liberated; but unless an excess of ammonia is present, the dangerously-explosive chloride of nitrogen may be formed.

PHOTOGRAPHS REGISTERED.

Mr. G. LAVIS (Eastbourne)—Photograph of Mr. G. R. Sims.
Mr. MOFFAT (Edinbro')—Photograph of Rev. W. G. Forbes.
Mr. C. HAWKINS (Brighton)—Photo of Princess of Wales and Daughters.
Messrs. TURNER & DRINKWATER (Hull, and 10, Barnsbury Park)—Photographs of Prince of Wales and Duke of Cambridge.
Mr. J. MONK (Preston)—Four Photographs of Mr. W. Shaw Simpson.
Mr. T. P. GRAHAM (Scarboro')—Photograph of Dog taking Portrait of Cat.
Mr. W. SHERWOOD (Workington)—Photograph of Miss Lucy Sands.
Mr. VILLIERS (Newport, Monmouth)—Photograph of Rev. Canon Hawkins.
Mr. F. J. WALKER (New Radford)—Four Photographs of Mr. A. E. Cooke.
Messrs. WYATT & PHILLIPS (Fareham)—3 Photos. of Launch of *Colossus*.
Mr. H. ROBINS (Landport, Hants)—Photo. of Launch of H.M.S. *Colossus*.

THE EVERY-DAY FORMULARY.

THE GELATINO-BROMIDE PROCESS.

Emulsion.—A—Nitrate of silver 100 grains, distilled water 2 oz. B—Bromide of potassium 85 grains, Nelson's No. 2 gelatine 20 grains, distilled water 1½ oz., a one per cent. mixture of hydrochloric acid and water 50 minims. C—Iodide of potassium 8 grains, distilled water ½ oz. D—Hard gelatine 120 grains, water several oz. When the gelatine is thoroughly soaked, let all possible water be poured off D. A and B are now heated to about 120° Fahr., after which B is gradually added to A with constant agitation; C is then added. Heat in water bath for half an hour, and stir in D. After washing add ⅞ oz. alcohol.

Pyro. Developer.—No. 1—Strong liquid ammonia 1 oz., bromide potassium 160 grains, water 80 oz. No. 2—Pyrogallic acid 30 grains, water 10 oz. In case of an ordinary exposure mix equal volumes of the solutions.

Iron Developer.—Potassium oxalate solution (1 and 4) 80 parts, ferrous sulphate solution (1 and 4) 20 parts, distilled water 20 parts. To every 4 oz. of the mixed developer add from 5 to 30 drops of a ten per cent. solution of potassium bromide, and 30 drops of a solution of sodium hyposulphite (1 and 200).

Substratum or Preliminary Preparation.—Soluble silicate of soda 1 part, white of egg 5 parts, water 60 parts. After heating, let it settle and filter.

Cowell's Clearing Solution.—Alum 2 parts, citric acid 1 part, water 10 parts. Edwards adds enough of a strong solution of perchloride of iron to give the preparation the colour of sherry.

Fol's Backing Sheets.—A chromographic paste is prepared with gelatine 1 part, water 2 parts, glycerine 1 part, and a very small addition of Indian ink. Strong paper or shirting is coated with this mixture, and the sheets are laid, face downward, on waxed glass to set. One of these pressed into optical contact with the back of the glass is an effectual preventive of halation.

THE WET COLLODION PROCESS.

Cleaning Preparation for New Plates.—Alcohol 4 oz., Jeweller's rouge ¼-oz., liquid ammonia ½-oz.

Film-removing Pickle for Old Plates.—Water 1 pint, sulphuric acid 4 fluid oz., bichromate of potassium 4 oz.

Substratum.—The whites of 2 eggs are well beaten up with 6 pints of water, and 1 dr. of liquid ammonia is added.

Negative Collodion for Iron Development.—Alcohol 1 pint, pyroxyline of suitable quality 250 grains, shake well and add ether 2 pints. *Iodize this by mixing with* one-third of its volume of following:—Alcohol ½ pint, iodide of ammonium 80 grains, iodide of cadmium 80 grains, bromide of ammonium 40 grains.

The Nitrate Bath.—Water 14 oz., nitrate of silver 1 oz., nitric acid 1 drop. Before using the bath coat a very small plate, and allow it to remain in the bath for about twenty minutes.

Normal Iron Developer.—Water 10 oz., proto-sulphate of iron ½ oz., glacial acetic acid ½ oz., alcohol ⅞ oz. The amount of proto-sulphate of iron may be diminished to ¼ oz. when it is desired to obtain full contrasts, or may be increased to 1 oz. when contrasts are likely to be unduly marked. When a new bath is used, the quantity of alcohol may be reduced to ¼ oz.; but when the bath is very old, it may be necessary to add rather more than recommended above.

Intensifying Solution, or Re-developer.—Water 6 oz., citric acid 75 grains, pyrogallic acid 30 grains When used, add a few drops of the silver bath solution to each ounce.

Eder's Lead Intensification.—After the negative has been well washed it is immersed in distilled water 100 parts, red prussiate of potash 6 parts, and nitrate of lead 4 parts. When the negative has acquired a yellowish white appearance it is again well washed and immersed in liquid sulphide of ammonium 1 part, water 4 parts.

Cyanide Fixing Solution.—Potassium cyanide 200 grains, water 10 oz.

Varnish.—Shellac 2 oz., sandarac 2 oz., Canada balsam 1 dr., oil of lavender 1 oz., alcohol 16 oz.

THE FERROTYPE PROCESS.

Collodion.—Ammonium iodide 35 grains, cadmium iodide 25 grains, cadmium bromide 20 grains, pyroxyline 70 grains, alcohol 5 oz., ether 5 oz.

Bath.—Silver nitrate 1 oz., water 10 oz., nitric acid 1 drop.

Developer.—Ferrous sulphate 1 oz., glac. acetic acid 1 oz., water 16 oz.

Fixing Solution and Varnish.—Same as for the ordinary wet collodion process.

PRINTING PROCESSES.

Albumen Mixture for Paper.—White of egg 18 oz., add 500 grs. ammonium chloride dissolved in 2 oz. of water. Beat into a froth, allow the mixture to settle, and filter.

Sensitizing Solution.—Nitrate of silver 50 grs., water 1 oz., sodium carbonate ½ gr.

Acetate Toning Bath.—Chloride of gold 1 gr., acetate of soda 20 grs., water 8 oz.

Lime Toning Bath.—Chloride of gold 1 gr., whiting 30 grs., boiling water 8 oz., saturated solution of chloride of lime 1 drop. Filter when cold.

Bicarbonate Toning Bath.—Chloride of gold 1 gr., bicarbonate of soda 3 grs., water 8 oz.

Fixing Bath.—Sodium hyposulphite 4 oz., water 1 pint, liquid ammonia 30 drops.

Reducing Bath for Over-Printed Proofs.—Cyanide potassium 5 grs., liquid ammonia 5 drops, water 1 pint.

Encaustic Paste.—Best white wax 1 oz., oil of turpentine 5 oz.

Sensitizing Bath for Carbon Tissue.—Bichromate of potash 1¼ oz., water 30 oz., ammonia 1 dr., methylated spirit 4 oz.

Enamel Collodion.—Tough pyroxyline 120 grs., methylated alcohol 10 oz., ether 10 oz., castor oil 20 drops.

Mountant for Prints.—A freshly prepared solution of the very best white gum.

Collotypic Substratum.—Soluble glass 3 parts, white of egg 7 parts, water 10 parts.

Collotypic Sensitive Coating.—Bichromate of potash ½ oz., gelatine 2½ oz., water 22 oz.

Collotypic Etching Fluid.—Glycerine 150 parts, ammonia 50 parts, saltpetre 5 parts, water 25 parts.

THE PHOTOGRAPHIC NEWS.

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CONTENTS.

DARK-SLIDES *VERSUS* CHANGING-BOXES—THE ENJALBERT

"Shall it be double backs or a changing-box?" is a question many times asked by the amateur, and sometimes by the professional, photographer, when he is about to provide himself with a new fit-out for working dry plates in the field. The question is not easily answered. Each system has its advantages. With dark-slides there is probably less chance of danger to the plates from light, the manipulations are more easily performed, and, moreover, the number of plates and the consequent slides may be reduced as much below the maximum as is considered desirable. The changing-box, on the other hand, has its advantages, quite as decided as the slides. The apparatus is less bulky and lighter; at least, when many plates are to be used. From our experience with both methods and with various-sized plates, our opinion is that for sizes up to whole plate, the two plans are about equally good; but that for larger sizes the dark-slides are decidedly the best.

When these are used it is a great advantage to have some means of changing plates without waiting for darkness, as it is not always convenient to have a number of double backs sufficient to carry all the plates for a day's work. We were greatly struck some time ago by the ingenuity and simplicity of a box which Mr. A. Cowan exhibited, which was constructed to hold his whole "kit," and which was so contrived that the slides could be emptied and again filled, the arms and hands being inserted through sleeves into the box, and the manipulations being guided by the sense of touch only. It is wonderful how easy it is with a little practice to change even large plates in total darkness. All that is necessary is to know exactly where everything is, so that the hand may be laid on it at once.

A new camera and changing arrangement has recently been introduced, and is so ingenious, and, so far as we have been able to judge, efficient, that we believe a description of it will be of use to our readers. It is sold under the name of the "Enjalbert" camera.

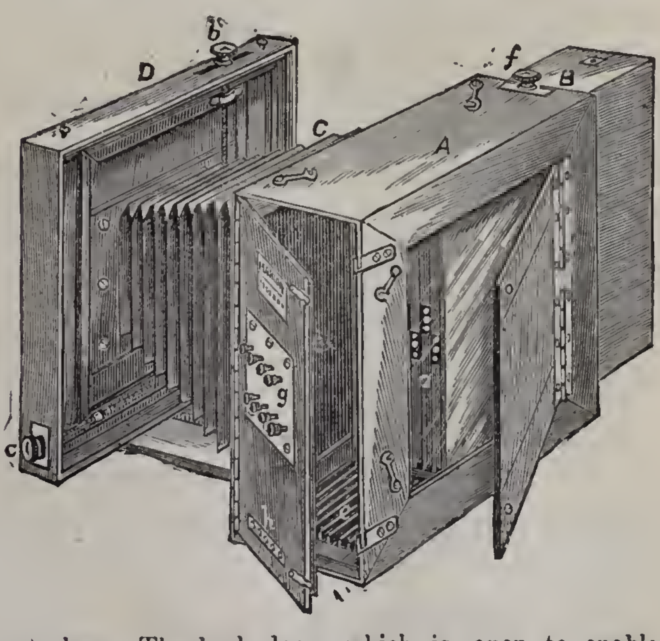
In place of the simple groove into which, in the ordinary camera, the ground glass slides, there are several—eight, if we recollect rightly. These are very narrow, and it will thus be seen that the ground glass may be placed at any one of eight different distances from the lens.

A box of such a size that it fills the width of the whole of the grooves is supplied. I believe we shall give our readers the best idea of the arrangement by saying that this box is arranged somewhat like a chest of drawers, there being eight drawers, each forming the carrier to hold a plate.

We shall now describe the working of the apparatus. When the camera is placed in position, the chest of drawers is withdrawn—not taken entirely away, but drawn so far to the side that the ground glass may be placed in whichever of the grooves is desired. Of course, in practice, No. 1 is first used. After focussing, the ground glass is removed and placed in a spare groove provided for its reception. The back of the apparatus is closed by a door, so that the whole inside of the camera is in total darkness. The box of plates is now slid home once more. There are catches whereby it is possible to take hold, from the outside of the camera, of any one of the drawers. The catch corresponding to the groove in which the focussing glass was placed is actuated. If now the chest of drawers be again withdrawn, a plate in its carrier will be left in the position formerly occupied by the ground glass, and all that is necessary is to make the exposure.

As is usual in such cases, the operations sound far more complicated in a written description than they really are. We found on trying the apparatus that it worked with the greatest ease.

We append an engraving which will make the arrangement clear.



The back door, which is open to enable focussing to be performed, and the side door, which can be opened to take out the box of plates, either for changing or for development, are both shown ajar, so that the arrangement of drawer-shaped carriers and catches may be distinctly seen. The camera is made to open to a great length, so that a long-focus lens may be used. This is a great advantage, and one too often overlooked with modern cameras. The *possibility* of using a wide angle conferred by modern lenses, and most advantageous when used with discretion, is too often abused, and the principal object in a landscape is so dwarfed as to spoil the artistic effect.

All the necessary motions are effected in the Enjalbert in most ingenious ways. There is, in addition to those usually provided, one to enable two exposures to be made without re-focussing, should two negatives of the same subject be desired. It will be at once evident that as the plates are each at a different distance from lens than the others, a re-adjustment must be made to bring a second plate into the same place before occupied by the first. A scale and vernier are cut on the sliding part of the camera, and it is only necessary to observe this to be able to move the back part of the camera just the right distance nearer to or further from the lens without using the focussing glass at all.

When packed up, the plate-box is slid home, the ground glass is placed in the spare groove, the back and side doors are closed to keep everything safe, and all is folded up, the space occupied being but little more than that taken up by an ordinary camera without any slides.

SOME APPLIANCES FOR THE COATING OF PAPER.

Five or six months ago we described several arrangements more or less likely to prove useful as aids in spreading even layers of sensitive material on paper, and among these we mentioned the roller apparatus ordinarily used in the cold curing of spread india-rubber fabrics. Through the kindness of the Secretary of the Society of Arts, we are now enabled to place before our readers two woodcuts representing the spreading and curing arrangements of a rubber factory, these blocks being taken from a *brochure* on the rubber industry which has recently been issued by the Society.

The diagram of the cold curing machine (fig. 1) almost explains itself, the slate roller, A, carrying up the fluid to

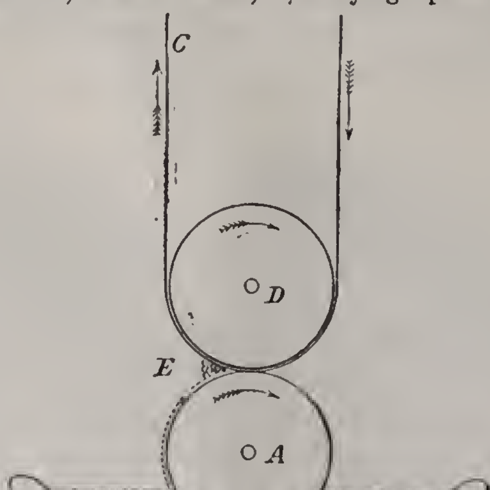


Fig. 1.

the point E, as indicated by the dotted lines, while the fabric, C, is led in a contrary direction, and against this wave of fluid.

We have tried the apparatus in question, and find it especially adapted for making carbon tissue and transfer papers; but the lower roller must be heated a few degrees over the setting point of the gelatinous mixture. It is curious to note how much freer from bubbles the coating is than when the usual tissue machine is employed; it being understood that reasonable precautions are taken This apparatus is also well adapted for preparing gelatino-bromide or gelatino-chloride paper, but there are doubtless cases in which a gelatino-bromide mixture might advantageously be applied to paper by means of the usual tissue machine, a convenient form of which is represented by fig. 2.

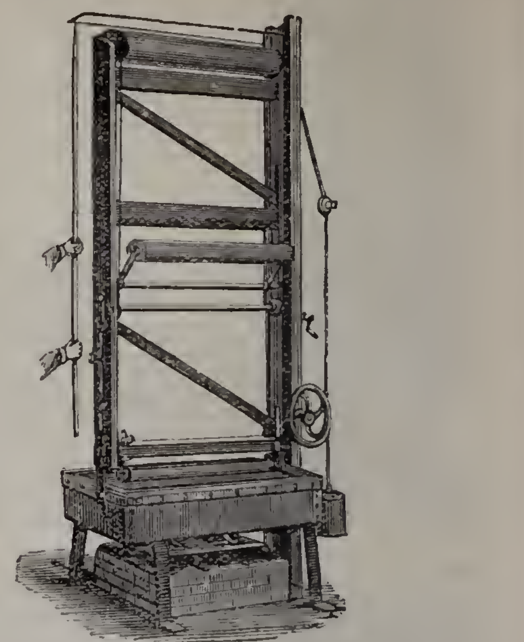


Fig. 2.

A strip of paper is placed over the whole system of rollers, the ends of the strip being cemented together so as to form a continuous or endless band. The height of the system of rollers carrying the paper band is now so adjusted that the paper just skims the surface of the gelatinous mixture contained in the trough, and the rollers are set in motion. The small roller shown in front, and mounted on projecting arms, is intended to keep the band tense, notwithstanding its expansion by the action of the solution. Persons wishing to prepare a small quantity only of coated paper will probably find this apparatus more especially adapted to their wants than the india-rubber curing machine just described, although it must be remembered that the latter apparatus is adapted for coating plates as well as paper or flexible material. It is, of course, understood that in this latter instance the top roller is not used, the plate being quickly drawn over the bottom roller, so that the direction of the motion communicated to the plate shall correspond to that of the paper or fabric in the previous case.

Fig. 3 represents the arrangement employed for spreading india-rubber paste on cloth or other fabric, the paste being placed behind a scraper, B, so that a guaged thickness, D, is laid on the cloth when it is drawn under the scraper. The shaded part, A C, represents a steam box

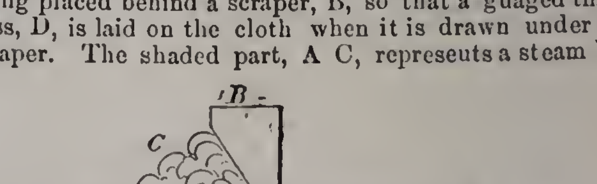


Fig. 3.

intended to assist in the drying of the rubber paste, and it appears to us that this apparatus might easily be rendered available for coating paper with gelatinous mixtures. Let us suppose that a set emulsion is thoroughly broken up into a smooth paste as suggested by Mr. Whaite on p. 151 of our present volume, but the paste is piled up behind the scraper instead of being applied with a brush. If the strip of paper be now drawn forward at a proper rate, the united action of the scraper and the hot chest should result in the production of an even coating; a level setting table being of course provided beyond the hot chest. This method of carrying out Mr. Whaite's idea will, we think, prove of considerable practical value.

Mr. Whaite's original arrangement is represented by fig. 4, the lower table serving to support the sheet while

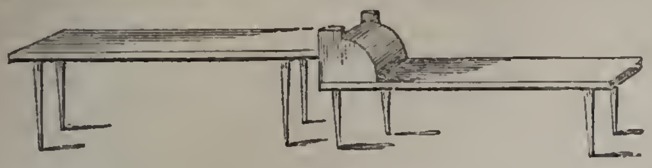


Fig. 4.

it is being roughly covered with broken-up emulsion by means of a stiff hog-hair brush. After this the sheet is steadily drawn over the curved face of the hot water box, so as just to melt the emulsion; the top table being merely a level support on which the film can set.

On a future occasion we shall indicate to our readers other well-known methods of spreading even layers of soft materials, as a knowledge of these methods may do good service to the photographic experimentalist.

SULPHITE OF SODA IN THE DEVELOPER.

BY CAPTAIN W. DE W. ABNEY, R.E., F.R.S.

Mr. H. B. Berkeley is always so close in his reasoning, that, with the Editor's permission, I should like to say a few words *in re* his remarks which appeared in your last number. As to green fog, Mr. Berkeley says: "I think, however, it will be found that green fog is purely the effect of the pyrogallol developer. If the iron developer be used, the fog will be grey; if pyrogallol be used, the fog will be green. The green colour is due to organic matter derived from the pyrogallol." In effect, then, as the only thing that grey fog can be, is reduced silver, therefore the green fog is also due to reduced silver *plus* something else which is due to the pyrogallol. Regarding the matter which composes the green fog, Mr. Berkeley and myself are at one, since I have already demonstrated that green fog can be converted into grey fog by treatment with ferric bromide or other similar iron compound, when followed by ferrous oxalate. The genesis of the green fog is where we differ. I don't admit that, if with pyrogallic acid development you get green fog, that with ferrous oxalate you get grey fog. If green fog is caused, as it is usually, by forcing out the image on an under-exposed plate, I have not found that grey fog is produced when using ferrous oxalate. I think we must go further back than the development to arrive at the initiatory liability for the advent of the green fog. With some gelatines you always get it, whereas with others you don't. In the one case, "forcing" with ammonia will produce grey fog, in the other green, and in these cases the grey or the green fog will only be intensified by the addition of sulphite of soda.

Let us see how this occurs. If you have any solvent of (say) silver bromide, and use it in development, the silver salt, by the nature of things, must be reduced to the metallic state, and be precipitated somewhere, and that rapidly. If within range of molecular attraction, the silver will be precipitated on the nearest previously reduced metallic silver; if not, it will be deposited on a blank space which bears no image, and with the dye caused by the action of the developer on the gelatine will cause a green metallic deposit. This is the case when an under-exposed picture is developed. If sulphite be used, it is quite possible that the developing solutions are so altered in character that the green fog may be absent, and only give a tendency to increased grey fog. The experiment I quote about green fog being caused by fixing in daylight, Mr. Berkeley argues, should equally apply to a ferrous oxalate developed negative, the fog in this case being grey. Suppose that both negatives were fairly washed, this would not be so. Ferrous oxalate in dilute solutions is not a developer at all, but a destroyer of the image, or rather it prevents any visible action of light, for the reason, I suppose, that as fast as the bromide is reduced, the silver itself is converted to silver oxalate, the act of developing reducing the ferrous salt to the ferric state, and so on. The fact remains that perfectly bright pictures can be fixed in daylight if ferrous oxalate development has been used, which is not the case when alkaline development has been employed. For my own part I think that sulphite is an unmitigated blessing to photographers, and if I get green fog I don't mind it, as there is the cure for it at hand. Personally I have not been troubled with any fog lately, and certainly the use of sulphite has, with me, not induced it; but then I have not under-exposed my plates, and it is only then when it is most apparent. I am glad that we have an authentic statement from the inventor of the sulphite developer that *one* of its uses is to render innocuous to the pyrogallic acid the lime salts usually present in water. Another use of the sulphite is the fact that bromide of silver *is* soluble in it; for, whether it tends to give green fog or not on an under-exposed plate, it must of necessity give an intensity to the image which it would not otherwise have. Some eight or nine years ago I showed how an ordinary collodion negative, taken on an iodide plate, could be intensified by the use of a solution of silver chloride in ammonia and a reducing agent, and the solution of bromide in the sulphite must have the same effect. My remark, that, if we had such water here as we had at the Riffel, sulphite would be abandoned, was only intended to apply to the fact that if photographers could obtain such limpid solutions of alkaline developer, they would be loathe to make any other addition. Mr. Berkeley makes a happy defence of the position he assumed regarding chloride of silver plates, and my success with them has fully impressd me with their more than fleeting value. If we take the ultra-violet of the spectrum, and compare a chloride with a bromide-gelatine plate, the former has decidedly the best of it as regards exposure; at least, the batch I had out with me in Switzerland told me so.

By-the-Bye.

CONTINENTAL RAMBLES WITH A CAMERA.

A Tour in the Thuringian Forest.

The photographers of Germany have of late made it their custom to meet once a year in convention, and on the present occasion the meeting is to be at Eisenach, in the Grand-Duchy of Saxe Weimar, on the 23rd of this month. Eisenach, a little old-fashioned town, is situated in the very midst of the Thuringian Forest, and may be taken as a convenient head-quarters whence many interesting and delightful tours can be made. That it is a holiday ground little known to the British tourist will of itself be a recommendation; while the fact that it is the home of many of the legends known to us through the Brothers Grimm invests it with a romance equal only to that possessed by the Harz Mountains and the Black Forest.

Thuringia makes a convenient trip for a fortnight. By the Flushing route, Eisenach can be reached in thirty hours, traversing Hagen and Cassel. There are some capital hotels there, of which the Rautenkranz is our favourite; for Eisenach has many visitors in the summer, although it finds no place in Mr. Cook's tours. Indeed, the Thuringian Forest is in no way an obscure district. It is classic ground in history—the cradle of Germany—for its Landgraves, whose castles still top many a height, were the first great independent chieftains. The late Prince Consort was bred and born in Thuringia, and much of the beautiful country is described by Her Majesty in her book relating to the early days of the Prince Consort.

When we first knew Eisenach, more than five-and-twenty years ago, it might have been taken for a bit of old London during the last century, with its crooked, queerly-paved streets, its cramped buildings, scanty oil lamps, and antiquated watchmen. Long, dark thoroughfares were lighted —if one may use the term—with a couple of feeble lanterns, one at each end of the street, swinging on wires across the road, and supplied with oil sufficient to last till nine o'clock in the evening, for at that hour all good people were supposed to be in bed, and, so the authorities argued, it would be foolish indeed to burn oil for the bad ones. There are still plenty of quaint dwellings and relics of old-German architecture that would make valuable camera pictures in the town, albeit it has been considerably moderuized of late; and two such objects we may at once point out—viz, the residence of Martin Luther, and the house where Sebastian Bach, the composer, was born.

But it is the neighbourhood of Eisenach to which the photographer will turn with most interest. The black pine woods and forests of beechen green that clothe the Thuringian mountains, the deep-shaded vales, the moss-grown defiles, and cool grottoes, their soft, verdant walls decked with purple foxglove and yellow gentian, the grey ruins that crown the hill-tops, and the pleasant shooting-boxes that here and there peep forth from the greenery—all these will serve to make a holiday tour in this district pass agreeably. As tourist-photographer you should be the happiest of mortals in such a paradise. Enjoying yourself on a summer's tour, it is some satisfaction to know that you can carry back with you a reminiscence that will serve to call up the pleasures of your journey once more; to know that you can bring home a cap-full of bright sunshine with you, stored up in the film you are exposing; to be assured that you have not seen the last of the glittering landscape at your feet, that plashing waterfall among the leaves, or the quaint old village through which you have just strolled.


THE WARTBURG.

One of your first plates will be exposed at the old Wartburg. The sturdy castle, with its walls standing grey and grim, as they have done these seven centuries past, almost overshadows the town. It stands on a leafy pedestal, as proudly as in the days when, an impregnable Burg, it sheltered from harm worthy Martin Luther. The Castle of the Wartburg was in the great Reformer's mind when he exhorted all to put their trust in God, as in the stout walls of a fortress.

"Ein feste Burg ist Unser Gott,"

is the beginning of Luther's famous hymn.

The Wartburg appears at its best, to our thinking, not from Eisenach, but from a point exactly opposite the town, as it is sketched here; the walls are steeper, and its position, rising from the waving foliage, the only pile in the undulating landscape, is most romantic.

There is plenty to see inside the castle. A sentry keeps watch and ward up here, pacing the ramparts beside a battery of old guns. The guns and the sentry are of some use, though, for he can command a view over the whole town, and it is his duty, on the first sight of a fire, to discharge one of the guns, and thus call the attention of the burghers below. You enter the castle through a heavily mailed gate, and then immediately on your right of the courtyard is the quaint tenement that Luther inhabited, and where he translated a large portion of the Bible. It is difficult to secure a view of the house, because the courtyard is so narrow; we carried our camera some yards beyond the house, and then secured a view looking back at the portals of the castle, and showing Luther's house on the left. The room that the Reformer inhabited is still intact, his bedstead, footstool, and jolly old flagon; but it was not easy, we found, to get permission to take a picture of the interior. He must have been a cheery, light-hearted, genial soul, good Martin Luther, a friar who took anything but a black view of the world, for his poems and hymns tell far more about smiling nature, its bright green woods and chattering songsters, than of vaulted cell and cold penitential observances. It was while on his way home from the Diet of Worms in 1521 that the Reformer was waylaid, and compelled to exchange his monk's robe for the trappings of a soldier, in which he was carried, half friend, half foe, to the Wartburg. A legend tells us that while in his room here, translating the Bible, the Evil One came, time after time, to tempt him to desist, until at last Luther, quite out of patience, hurled the inkstand at his tormentor. The ink obviously did little damage to Satan's dusky skin, but it stained the white wall beyond, and there are marks of it still; only the blackened plaster has since been removed by relic hunters, and now there is but a big hole in the wall to testify to the event.

The rest of the castle is for the most part modern, having been restored by the present Grand Duke. The halls are well worth a visit, however, especially the Hall of Song, which stands, it is said, upon the same spot where the famous singing contest of the Minnesingers or troubadours took place in 1207, an incident utilised by Wagner in his opera of Tannhäuser. At this contest, which was instituted by Duke Hermann, passion waxed so high among the Minnesingers that it was decided the least skilful of them should die. Walter von der Vogelweide was the victor, and Heinrich von Ofterdingen the vanquished, but although measures were taken to erect a scaffold on the castle, the latter was in the end spared his life by intercession of the duchess. When Walter von der Vogelweide died—he was no character of fable—he left a sum of money to be expended in the purchase of seed to be strewn upon his grave that the birds might gather there, and four cavities were wrought in his monument to supply the warblers with water.

Elizabeth's Fountain, just at the foot of the Wartburg, should not be forgotten by the photographer. The old stone structure is green with moss, and the spot so overgrown with trees and foliage that it is easily passed over. You will want a lot of exposure, for no daylight comes from above, only the green sheen that passes through the verdant foliage; we exposed a collodion emulsion plate for three minutes, and could get no result. But a little trouble may well be taken over the subject, for this same Elizabeth it was who spared the troubadour's life, and the spot is the scene of a touching legend. As Elizabeth was returning from Eisenach one day, on an errand of mercy, which was no other than that of conveying baskets of food to the sick and wounded of an enemy besieging the castle, she was met by her husband, the Landgrave. He had long suspected Elizabeth's errand, but, despite entreaties and threats, she still continued the merciful mission.

"What have you there?" he cried angrily, tearing back her cloak.

The basket became uncovered before his eyes, and lo! its contents had changed to white roses.

A pleasant excursion is through the Mary-Valley, or Marienthal, and Annathal to Wilhelmsthal. A little brook runs through the green meadowland of the valley, and on both sides are picturesque hills and big grey rocks. On one of these is a capital M, in very large type indeed, that may be seen for miles. You must have a photograph of this, for the big rock above is called the Princess Rock, and thereby hangs a tale. A princess is imprisoned therein, so the story goes, kept in durance vile by some wicked old genius who allows her "a day out" but once in a hundred years, and then only at midnight. So delighted is she at seeing the beautiful world again, even in the dark, that she is invariably taken with a fit of sneezing, crying "Tischeu" no less than twelve times running. Should anyone happen to be there at the time, and politely say, as is the custom in Germany, "Gesundheit," or "Wish you better," in reply to every sneeze, then the princess will be released. Nobody has done this yet, but once a carter, it is said, passing along the road below with his team, and hearing violent sneezing going on, did answer "Wish you better" as many as eleven times; but when it came to the twelfth, his patience was exhausted, and he called out rudely, "Oh, go to the devil!"

Further on is the Anna Thal—the rock at the entrance marked with a capital A—apparently a moss-grown fairy grotto, but in fact a narrow defile and thoroughfare. The way hither has been through the most romantic of glens, over-shadowed by forest trees, and if any pictures are taken, exposure, exposure, exposure, must be the watch-word. Even when rays of sunlight escape the leaves overhead and fall into the deep hollow way, dappling the soft green moss with patches of gold, the light is exceedingly non-actinic; in fact, we confess, that repeated attempts on our part have never resulted in a well-exposed plate. The Dragon's defile, as the narrowest part is called, it is impossible to depict in the camera, for the path is so narrow two people cannot walk abreast. It is simply a cleft or fissure in the rock through which you walk, the strip of blue sky above being at times quite excluded by the verdant creepers and luxuriant greenery that fall in festoons overhead. Supreme quiet reigns in this cool retreat, its green walls of moss tufted with ferns and glistening with drops of moisture. For a hundred yards or so this cold grotto-like pathway continues; then presently you emerge again into the beech wood, the warm air floating towards you laden with the perfume of meadow-sweet and wild briar.

Another object on your way to Wilhelmsthal worthy of photographing is the big hollowed rock—Landgrave's Hollow—where a party of horsemen are said to have lain *perdu*, when contemplating an attack on the Wartburg; while Wilhelmsthal itself, with its lake, gardens, and homely little palace, will make some nice little pictures. There is a tolerable inn here, where you can refresh before returning to Eisenach, the walk back being through the Landgrave's defile, a forest pathway almost as romantic as that through the Annathal.

(*To be continued.*)

PHOTOGRAPHY IN AND OUT OF THE STUDIO.

How did Daguerre Discover Mercurial Development?—The Difficulties of the Daguerreotyping Days—Peripatetic Photographers.

How did Daguerre Discover Mercurial Development?—Mr. Sims, of The Grove, Clapham Common, writing to a contemporary, has taken exception to Captain Abney's description of the manner in which Daguerre accidentally discovered that the image on the silvered plate could be developed by means of the vapour of mercury. Captain Abney, it will be recollected, in his lecture before the Society of Arts, stated that Daguerre, in the course of his laborious experiments to discover some method by whic the exposure could be reduced, happened one night to place a plate in his chemical cupboard, and in the morning found an image fully developed, which phenomena he afterwards traced to an open bottle of mercury. Mr. Sims, commenting on this, says:—"First of all, I would call attention to the fact that, although mercury does throw off vapour at a comparatively low temperature, it is not sufficient to make the image upon the Daguerreotype plate take a positive form. We must suppose, therefore, that the cabinet in which Daguerre kept his bottles was unusually hot, and, therefore, unfit for the purpose—or that there is some mistake or oversight in Captain Abney's description. The description I read some time ago, but in what publication I cannot now say, but think it was a publication by Lerebours and Co., of Paris, during Daguerre's lifetime, and to the following effect: Daguerre had made a camera image upon a silver plate, prepared with vapour of iodine. This image was, of course, a negative one, the light having converted the yellow iodate into the sub-oxide. A process of fixation, without at the same time destroying the image, was unknown to Daguerre at this time, and what he must have most earnestly longed for was a positive image, because his and Niépce's surfaces were opaque. So, in order to preserve the image he had made, he put the Daguerreotype plate, with the impression upon it, into a small drawer, that it might be kept from the action of the light; that in this same drawer there was, or had been, a bottle of mercury which had been upset, and the particles of mercury had become diffused very generally over the whole inside of the drawer, by its having been continuously opened and shut; that on his again going to look at the image on the plate he saw a positive image where the molecules of mercury had attached themselves, and that was the very part upon which the light had acted, and which before had formed the dark lines of the image." The discrepancy at this distance of time is perhaps not a very important one; but as a matter of historical accuracy it would be interesting if the point could be satisfactorily settled. We might, however, in passing, ask whether Mr. Sims is not slightly in error when he says that "although mercury does throw off vapour at a comparatively low temperature, it is not sufficient to make the Daguerreotype plate take a positive form?" Robert Hunt, in his "Researches on Light," says: "In forming a Daguerreotype image it is not absolutely necessary to heat the mercury. Faraday proved that mercury was volatilized at common temperatures; and Moser has pointed out that if the Daguerreotype plate, after it is taken from the camera, is placed over a vessel of cold mercury for some hours, the image will be brought out in the same manner as if the mercury had been warmed." This being the case, in the absence of positive evidence on the subject, we should be inclined to believe in Captain Abney's version of the story rather than in Mr. Sims'. Certainly the reason advanced by the latter against the "chemical cupboard" theory has no weight in the face of Robert Hunt's statement.

The Difficulties of the Daguerreotyping Days.—The remark of Captain Abney in the lecture referred to above, that the plate requires the most elaborate polish such as even a silversmith can scarcely give them, carries one back to the old times when the Daguerreotypists had to contend with troubles such as would appal the modern practitioner of the art accustomed to the "sweet simplicity" of gelatine plates. In a copy now before us of the *New York Daguerrian Journal*, the first photographic periodical published, we find a large portion of the space devoted to various methods of cleaning the plates. One writer gives a most elaborate account of his experience, remarking that, at the outset of his career, the difficulty of procuring good plates was so great that he instructed a Connecticut manufacturer to prepare a roll of silver plated metal with pure silver. A pound of this material cost nine dollars, and it must have been with considerable satisfaction that the American Daguerreotypers recovered soon after a supply of English plated metal of a very superior quality, and, to use the words of the writer, relieved us from the toil of making and plating one plate at a time, an expedient we were compelled to resort to to command material to meet the pressing demand for portraits. The writer then goes on to say: "Having it now in our power to obtain good plated metal, a more rapid mode of polishing than that attempted by Daguerre was attempted as follows." The description of this "more rapid mode" which does follow would occupy more than a page of the News, and, therefore, we will content ourselves with saying that the mode embraces rolling the plates on a steel die highly polished, annealing, the use of a lathe with a wheel suspended after the manner of a grindstone, to say nothing of most elaborate directions in regard to the preparation of tripoli rouge, rotten stone, and lampblack. The photographer who grumbles now at a little trouble deserves, if such a thing were possible, to be transported back some five and thirty years, and he would at once become reconciled to his present easy circumstances.

Peripatetic Photographers.—We fancy, if a census could be taken of the peripatetic photographers, the number would be found to be rather astounding. We recently had occasion to travel by road from Kennington to Hampton, and gathered an experience which was decidedly novel. The day was Sunday, and the weather fine, and, doubtless anticipating plenty of customers, a whole army of photographers prepared itself for the emergency. The advanced guard was met at Clapham Common, a strong battalion had stationed itself at Putney Heath, a goodly contingent was to be seen on Barnes Common, the picturesque road of the river Thames from Richmond to Petersham was lined with sharpshooters, while at Hampton Green was stationed the main body. Here, not only male, but female photographers were hard at work; the air was literally etherial, save when a whiff of cyanide unpleasantly saluted one's nostrils. And then the dark boxes and tents! Rouch, Howard—not to speak of England and Maxwell Lyte—were not to be mentioned by the side of the astonishing collection which it was our privilege to see. The perambulator variety, in which a tent had been mounted on an old perambulator frame, was evidently a favourite; but the box species, in which the manipulations were carried on by means of sleeves, ran it hard. The operators who used the boxes, we must confess, excited our wonder and admiration. They despised such weak-minded subterfuges as covering the head with the focussing-cloth and looking through a yellow glass window, and boldly faced collodion and cyanide fumes by watching the operations through a hole in the top of the box. This hole was just large enough to admit the eyes, and round the edges was placed a pad, against which the forehead and nose were pressed so as to exclude the light, and in this position, with ether ascending into the eyes and mouth and nose, almost excluded from air, did the hardy photographer work. We ventured to ask one gentleman whether he did not find the collodion fumes rather unpleasant, and he almost took the question as one reflecting upon his skill. In the course of a desultory conversation with two or three, we were made aware of the fact that your peripatetic photographer is on manipulative points one of the most sensitive of beings, and we therefore advise all who seek to know something of the bye-ways of photographic life to proceed cautiously. It may give some idea of the extent of this out-door business when we say that we counted nearly seventy cameras, and to each was attached, in the way of photographer, assistant, and touts, an average of four persons; there could not have been less than three hundred individuals engaged in photography in one day in the particular line of route. What proportion this formed of the number at work in the metropolis at the same time we must leave to the speculator in statistics to discover.

WITH THE ECLIPSE EXPEDITION.

BY C. RAY WOODS.*

Cairo, May 24th, 1882.

The eclipse is now over; the instruments are packed, and the expedition is on its return. The results obtained have exceeded the most favourable hopes that were entertained, and another field for the gelatine dry-plate process—a process increasing in usefulness day by day—has been opened up. Not only do the results obtained fully repay the trouble and pains that were expended on them, but are, in addition, so full of promise that, if properly followed up on future eclipses, many another discovery may yet be added to the many that photography has been the means of imparting to the increasing store of scientific knowledge.

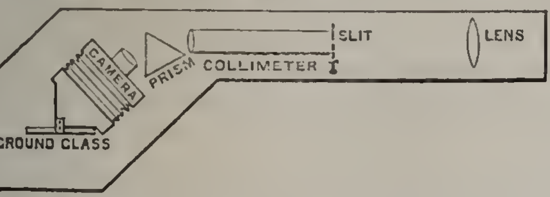
As stated in my previous letter, it was proposed to take not only photographs of the corona, but an attempt, at least, was to be made towards obtaining a permanent record of the coronal spectrum. An idea of the apparatus used may be gathered from the accompanying illustration. The lens used for photo-

graphing the corona was the front glass of a Dallmeyer's rapid rectilinear. The back lens being removed, a focus at a distance of a little more than five feet was obtained. A long mahogany box (AA), four feet seven inches in length, and six inches square in section, carried the mount and lens at one end, whilst at the other was screwed a quarter-plate pocket camera, by Meagher, with rack-and-pinion motion, forming a sufficiently fine adjustment for a lens of so long a focus, whilst a coarse adjustment could be obtained, if necessary, by the movement of the tube containing the lens in another tube screwed into the flange that held it in its place. Across the camera, coming as close as possible to the slides without interfering with their free movement, a fine wire was stretched, in order that a line might be impressed on each plate, rendering the orientation easy. This long camera was mounted on a photo-heliograph stand (S) lent by the Transit of Venus Committee, and, with the other apparatus about to be described, was driven equatorially by clock-work (F), and occupied, together with the spectrum apparatus, the position held by the photo-heliograph that had been removed to give place to it. Above this camera a shorter one (B) was placed, destined to photograph the corona, analysed by a glass prism. The lens (D) was a single one of 4 inches

* Continued from page 439.

aperture and 22 inches focal length, but stopped down to 2 inches aperture. In front of this lens was screwed a brass box (c) containing the prism, set at the angle of minimum deviation for G. The camera had a swing-back of about 45°, in order to bring all parts of the spectrum into focus at the same time; and, although the lens used was corrected, the angle mentioned did not give more latitude than was found to be necessary. This camera was so mounted that it could be placed at any angle to the longer one between about 10° and nearly 90°, and was finally adjusted at such an angle that the green rays fell in the centre of the ground glass. The slides were constructed to carry plates $4\frac{1}{4}$ inches by $1\frac{3}{4}$ inches in size. This camera carried no slit, and the spectrum of the corona would therefore consist of a series of rings.

A third piece of apparatus used was a slit spectroscope and camera in the accompanying diagram. It consisted of a



collimator, ten inches long with a platino-iridium slit* of three-quarters of an inch in length, but capable of being partially opened or closed, or opened one-third at a time. In front of the slit was placed an achromatic lens of about 2 inches aperture, and about 10 inches focal length, to throw the sun's image on the slit. One prism of 60° was used set at the angle of minimum deviation for (G), and a small camera with a corrected lens and a back capable of a very considerable swing. It had been originally intended that these pieces of apparatus, which had been adjusted and fastened down to a board, should have been placed on a horizontal stand, and the image of the sun thrown on to the slit by means of a siderostat; but, fearful that the latter might require special attention, it having been damaged on the journey, this was abandoned, and the board, with its attachments, was screwed on to the long camera, and driven by the same clockwork which guided the other instruments. The alteration proved to be a wise one; for a larger amount of light was thus received by the lens, and, in addition, all three pieces of the apparatus were so compactly arranged that they were all under control without a change of one's position being rendered necessary.

* The illustration here is not strictly correct, the slit being flat and of the usual construction, and not barrel-shaped as here represented.—C. R. W.

All difficulties were not at an end, however, when the apparatus was once up; for, though the material of which the cameras were made was well seasoned, no small amount of trouble was occasioned by the warping of the wood. When the thermometer stands at over 100° Fahr. in the shade, when the sand registers a temperature of 140°, and the iron and brass work of the instruments are so hot that they cannot be handled without cloths, the best wood is likely to be guilty of vagaries. Slides had frequently to be meddled with, and smoothed every time they were used to ensure their moving easily. Rackwork would occasionally get out of order, and the utmost care had to be taken to prevent the sand getting into the clockwork and fittings, and to keep things generally in working order. On the eve of the eclipse, however, everything seemed satisfactory; preliminary experiments and rehearsals had been gone through, and the morrow was looked forward to with confidence, though with anxiety. A few days before the eclipse an attempt was made in the early morning to photograph the spectrum of the moon in the spectroscopic camera; and this having been accomplished satisfactorily in the space of seventy seconds, very little doubt was entertained that the plates were sufficiently rapid to perform the task that was required of them. The light of the corona is more intense than that of the moon, and the plates were fifty times as quick as wet collodion—the only process that had hitherto been used in attempting to obtain a record of the coronal spectrum.

On the morning of the 17th lenses were cleaned, final adjustments were made, the slides which had been filled the previous evening were tried and found to work easily, and every one waited with suspense, glancing at the chronometer now and again for the time when it would be necessary to commence operations. The inhabitants of the neighbouring town of Souhag had deserted their homes, and were grouped near the encampment, from which they were kept at a respectful distance by the soldiery, looking with wonder at the strange shadow that was obscuring the sun. The dahabeahs of the gentry at anchor in the river, the slope of the embankment, and the steamer kindly placed at the disposal of the astronomers by the Khedive, were crowded with anxious faces; a buzzing murmur came from all as they glanced now at the rapidly diminishing sun, and now at the observers standing patiently by their instruments; the very animals seemed interested, and the feathered creation cackled loudly and gathered round the tents as if anxious for human sympathy. The sun was rapidly becoming a mere crescent; a slide was placed in the long camera, and by means of a slit passed rapidly across the lens, exposures were made on the same plate at intervals of two minutes, for purposes of orientation. Two exposures had been made, when it was discovered that the clock had not been stopped, as was necessary for obtaining successive images. The error was repaired, and three more exposures made on the same plate. The omission, however, was not without its use; for the two images so very nearly overlapped that the second one obtained shows how well the clock was driving. This task done, the slide was taken out and laid aside, the instrument was once more pointed to the sun, and the clockwork again put in motion. As totality approached, the slides were put in their places, positions were taken up, and nothing remained but to wait carefully for the signal to commence.

Three plates were exposed in the long camera, the first for ten, the second for twenty-three, and the third for three seconds, these plates being very rapid. A rapid plate, sensitive from the green to the ultra-violet, was placed in the spectroscopic camera, and exposed during the whole of totality. A plate, sensitive right down to the red, was likewise exposed for the whole of totality in the prismatic camera.

The amount of diffused light during the totality was at least twice of that given by the moon when full, but it was of a strange bluish tinge. That part of the corona nearest the sun was of a dazzling brightness, so dazzling indeed that in the short gaze of six or seven seconds, permitted during the long exposure, but little idea of the general character of the corona could be obtained. To the right of the sun, at a short distance from it, appeared a brilliant object, which was speedily recognized as a comet; but so unexpected was this phenomenon, that not even approximate measurements were taken of its position—an observation, however, which was happily rendered quite unnecessary by the accuracy with which the plates registered its position, size, and shape.

Totality over, and the slides closed, a little breathing-time was taken, and then, as the sun once more appeared as a crescent, another slide, containing a slow plate, was placed in the long camera, and three successive images obtained at intervals of two minutes, the clock meanwhile being stopped. This done, nothing more remained but to lay all the slides carefully aside, whilst taking a short interval of rest between exposing the plates and, as photographers will allow, the less easy task of developing them.

Precautions had to be taken agains running, blistering, and frilling in such a hot climate as Egypt, and materials had even been taken out to prepare freezing mixtures. The Nile water, however, was not very warm, and plenty of cool, clear water could be obtained from the large porous earthenware vessels that acted both as filters and coolers. Plates which had been developed previous to the eclipse, and belonging to the same batches, showed no signs of the aforementioned faults, so that the freezing mixtures were abandoned. Nevertheless, it was still thought advisable to have at hand other materials, such as collodion, alcohol, and even chrome alum, in a case of emergency; fortunately, however, not only were none of these required, but development could not be carried on at home with greater impunity. Water, when once cool, takes some time to get sufficiently warm to spoil plates which have no tendency otherwise to frill, and the cabin, which had been fitted up as a dark-room, was itself half below the water-line.

The two orientation plates were developed first, and, though very much over-exposed, in spite of the rapid exposure given, were well brought out with plenty of bromide of potassium in the developer. The developer used was the ordinary iron developer, made up with ferrous oxalate and a saturated solution of oxalate of potash. These, the least important, having been successfully developed, the corona photographs were developed; but these being very much over-exposed nearest the moon's edge, and equally under-exposed further away, required considerable care. The ten-seconds one had had a slight shift, and a double image was produced; but the second image was somewhat faint. The longest-exposed plate did not suffer from any such defect, and the image obtained is very clear. Some parts of the corona extend in the photograph to a distance of two diameters; the head of the comet is clear and defined, whilst its scimitar-shaped tail is perfectly distinct. So bright, however, was the sky at the time, and so quick the plates, that a veil extends over the two plates. The third plate was also over-exposed for the parts nearest the moon's disc; but the prominences are clear, and it is altogether a useful photograph. The comet also is visible, but not so distinctly as in the two others. The backing, though thick, did not entirely prevent halation; in fact, the extent of the halation shows how very much the plates were over-exposed for the bright parts. The next plate developed was that in the spectroscopic camera. The apparatus was so adjusted that the image of the sun, when the instrument was pointed to it, fell right across the centre of the slit, and this was the case at the time of the eclipse, the whole length of the slit being open, and its width at the time being $\frac{3}{10}$ of a millimetre. After the eclipse, the instrument was pointed to the bright sky, and portions of the slit, $\frac{1}{8}$ of an inch at each end, were opened, and a reference spectrum on both sides of the coronal spectrum obtained. On development, a continuous spectrum with bright lines was seen; the H lines being very bright and prominent. The plate exposed in the prismatic camera was also successful, and exhibited a continuous spectrum with a number of bright rings due to the prominences. As most are aware, the comet has been given the name of "Tewfik," in remembrance of the favours bestowed on the expedition by the Khedive, to whose help and attentive foresight, with those of his staff who accompanied us, so much of the success of the expedition is due.

The other work accomplished during this eclipse has already been to some extent made public—so much, of course, as could be done so soon after the event; and as it is not of a photographic character, it need not be entered into here. Suffice it to say that the work done in the short time during which totality lasted has more than realized the highest hopes that one dared entertain.

Notes.

The Trieste "Great Exhibition of Industry and Art" was officially opened on Tuesday.

Dr. Eder, who has just returned from Trieste, tells us the Exhibition is delightfully situated on the sea-shore, facing the blue Mediterranean. Immediately behind the fine building rise green hills covered with vines and fruit trees, the "Campagna" of the city. "There is little connected with photography in the Exhibition," adds Dr. Eder, "but what there is I will describe at a future time."

The Royal Engineers, who include in their number a staff of trained photographers, sailed for Egypt this week.

The silver medals awarded by the Vienna Photographic Society to Mr. G. M. Whipple, B.Sc., Director of Kew Observatory, to Mr. Walter Woodbury, and to the Platinotype Company, have been forwarded to us for transmission to their proper destination. They represent very handsome workmanship.

"The readiest way to identify a negative is by its defects," a practical man tells us. When a series of plates are much alike, many minutes may be wasted in picking out a particular one, if you go by pose or position; while, on the contrary, if you seek to identify by a pinhole, a tiny comet, or other similar defect in the film, you can make the selection at once.

Signalling by sunshine is again being resorted to with much success in Egypt by our army of occupation. In a sunny land, the system has many advantages over the electric telegraph, for you can signal by mirror over an enemy's head, and he is powerless to cut communication. But some system of recording the signals—it should be feasible by photography—is still wanted.

The method of signalling by the heliograph may be explained in a few words. A circular mirror—a ten-inch mirror suffices to send a signal visible to the naked eye at fifty miles—is set up facing the far-off station with which communication is desired, and a few feet in front of the mirror is erected an upright iron rod. The iron rod has a sliding button, which can be moved up and down the rod. An observer places himself behind the mirror, and looks through a hole in the centre provided for the purpose: he looks in the direction of the far-off station, and while he does so, an assistant slides the button up the rod until it is seen by the observer behind the mirror. The button is, in fact, like the foresight of a rifle, and, as soon as it has been properly placed, all that is necessary to send a signal is to bend the mirror so that sunlight is reflected on the button. As the distant station is in a line with the button, you may be sure the ray of sunshine you reflect will travel straight to it.

Several cameras were in readiness on the arrival of Cetewayo at Plymouth yesterday, but we have not yet seen any of the resulting pictures.

We shall next week give a specimen of Ives' photo-engraving process in these columns, one of the few practical methods at present capable of transforming a half-tone photograph into a type block for the printing press. The process, which emanates from America, is a secret one, and although the results are still far from perfect, they are quite promising enough to lead one to hope for better things in the future. That our readers may best judge of the capacity of the process, we have chosen as specimen a portrait, from life, of Mr. Walter Woodbury, which has been kindly placed at our disposal by the Editor of the *Philadelphia Photographer*, Mr. E. L. Wilson.

Mr. Wilson writes us from Philadelphia that his trip this spring to Egypt has been a great photographic success. He is now busy developing the large series of plates exposed on his journey, and is fairly delighted with the successful issue of affairs. His expedition proves effectually—if any proof were wanted—that gelatine plates may be used with advantage in the tropics. Since Mr. Wilson interviewed Arabi Pasha in his wanderings, and depicted many of the towns and seaports now being spoken of by our Special Correspondents, his collection of photographs should prove very valuable just now.

Light seems to play an important rôle in the drying of oils and paints, and it would be an interesting investigation to the photographic chemist to find out what principle it is in linseed and other oil which is so sensitive to the action of light. Oil dries by taking up oxygen from the air, but with pure oil this takes place only under the influence of light or heat. Light is the first and most important drier of oils, however, according to the *Railroad Gazette*, and heat is but second to it.

Our Belgian contemporary makes a sensible suggestion —and, to do him justice, he generally is sensible when he is not applauding his own country, or vaunting the art treasures (?) of the Brussels *Musée*—respecting the writing of the name of the man who first secured a photograph in the camera. Historians are unable to agree, it seems, as to the nature of the accent which should be employed, whether *grave* or *aigu*, some setting the word down Nièpce, and others Niépce. To settle the difficulty, our contemporary suggests that both are to be right, and the word in future written Niêpce, namely, with an accent *circonflexe*.

The *Archiv* tells us something of the sad death of the African traveller, Siegfried Langer, who was recently murdered by Bedouins. It seems that it was while securing a photograph—for every pioneer carries a camera now-a-days—that he was suddenly fallen upon and killed. Three Bedouins in his company were occupied in prayer at sunset, and left to himself for a few minutes, he proceeded to focus a view in his camera, unfortunately with his back to the people. Suddenly they fell upon from behind and stabbed him, Langer, although well-armed, being doubtless too much encumbered by the dark cloth to make use of his weapons.

The pigeon-post with micro-photographic dispatches would be a capital means of communicating along the Suez Canal, should this thoroughfare be unfortunately interrupted by the enemy. The only difficulty would be the securing of trained pigeons ; but it is not too late even now to set about establishing an ærial post of this nature.

A thermometer that will indicate the thousandth part of a degree Centigrade is promised us by M. Michelson, who has demonstrated the principle upon which his very sensitive instrument is constructed before the French Physical Society. He does not employ mercury or spirit for his thermometer, but something that expands still more in the presence of heat, viz., hardened rubber or ebonite. The instrument is in the form of a spring, which is made of platinum on one side and ebonite on the other, and as the latter dilates some ten times more than the former under heat, there is naturally exerted a rise and fall in force every time a rise and fall of temperature takes place. The force exerted is communicated to a delicate lever or arm, and this, reflecting a beam of light from a lamp, magnifies the force that has been developed, and renders the change easily readable to the eye. Edison, it may be remembered, employed rubber for a similar purpose.

Gun-cotton has played a conspicuous part in our operations in Egypt. You may blow a gun to pieces, or at any rate render it unserviceable, as quickly as it could be spiked in the olden time, by merely thrusting a cake of the explosive into the muzzle of a cannon, and detonating by electricity. Our tars who landed at Alexandria all employed guncotton to destroy the guns in the batteries in this way. This is the military guncotton we are speaking of, manufactured in the form of *papier maché*, and pressed into any handy shape. But collodion cotton, which is soluble in ether and alcohol, is also attracting attention as a military explosive, for by its means military men obtain an agent more violent still. Photographer's gun-cotton will dissolve in that terrible substance nitro-glycerine, and together they form a jelly which goes by the name of blasting gelatine ; this in all probability will be the explosive of the future.

Major Waterhouse writes that he is still working at his sand photo-engraving process, and, according to the proofs he furnishes, not without some success. It would be difficult to describe the *modus operandi* more briefly or to the point than does the Deputy Surveyor-General of Ordnance for India. "I am working on just the same lines as before: pigment print transferred to silvered plate—treated after development with bichromate solution—then grained with stearined sand, emery or glass powder, according to the grain required—dried—graining powder removed—black-leaded—electrotyped."

A critic of M. Zola's novels declares them to be endowed with "the brutal justice of a photograph." Perhaps this accounts for the fact that the French novelist is at this moment the most extensively read author in Europe.

M. Charpentier's statement which we published last week, that an average person may perceive and repeat a signal in the short space of thirteen-hundredths of a second shows pretty plainly that a photographer ready to expose can secure a picture of the most rapid phenomenon—unless it is an electrical discharge—by watching his opportunity and working the shutter by hand. This is a matter worth knowing in these days, when all sorts of electrical communications are proposed to secure exposures at the right time. Indeed, in our experience of photographing torpedo explosions, and buildings blown down by gunpowder or dynamite, we have never met with an instance yet in which the exposure could not be perfectly well controlled by hand.

Multiply the height of your model with the focus of your lens, and divide by the distance he is from the instrument. This is the simplest way, according to Dr. Vogel, of getting at the size of the resulting photograph. It is merely a question of doing a rule-of-three sum. If the model stands 5 feet 6 inches, or 66 inches, and the focal length of the lens is 10 inches, while his distance from the camera is 15 feet, or 180 inches, then 66 multiplied by 10, and divided by 180, will give you the result, which is 3·6. In this case, then, the photograph of your model would be a little more than three inches and a half high.

ON INTENSIFYING WITH THE FERROUS-OXALATE DEVELOPER, AND CERTAIN OTHER METHODS OF INTENSIFICATION.

BY F. STOLZE.

Having made further trials with the mercurial ferrous oxalate intensifier, I am more and more convinced of its excellence. Its power of rendering forcible contrasts is considerable, and, at the same time, one need not fear its causing the picture to disappear in the developer, being, therefore, much easier to work with than the cyanide of potassium developers. It is preferable not to use the developer too concentrated; the whole process can then be closely watched, and during the proceeding the amount of intensification lies in one's own hand.

Although, theoretically considered, the desired intensification must be unlimited, as by repeated strengthening more mercury will be stored up, the experiment still shows that when it approaches a certain limit, its progress is not quite so simple as it at first sight appears. In the case of a very thin negative, should it not be fit for printing after using this intensifier, it will form a good base upon which to work the silver intensifier with gallic or pyrogallic acid. It acts exceedingly well if the order of things be reversed, the gallic or pyrogallic intensification being performed first. All those who have tried the silver intensifier know well that negatives made from very thin emulsion often give with gallic acid a deposit so decidedly yellow as to hopelessly spoil the negative. Although this yellow deposit disappears in the sublimate bath, it reappears, unless it was previously very slight, in ammonia or cyanide of mercury. This does not happen with the oxalate developer. As a trial, I intensified half a very thin, useless negative with gallic acid until all the deep parts were stained a dark reddish brown. This entirely disappears when treated with the sublimate, and with the ferrous oxalate showed a very faint yellow tint in the depth; the faint yellow, I believe, would also have vanished had it stayed longer in the sublimate bath.

As mention has been made of the gallic intensifier, it may be desirable to many to know how to prevent the yellow and brown colouring. As with pyrogallic acid, the addition of salicylic acid proves beneficial.

The following is a good formula:—

Alcohol	120 parts
Gallic acid	10 ,,
Salicylic acid	0·5 ,,

The silver and glacial acetic solution must not be mixed long before using, as it becomes cloudy, and throws down a precipitate.

Questions are constantly arising with regard to Monckhoven's intensifier, whether the chemically-pure crystallized cyanide of potassium must be employed in its preparation. An answer is readily found. If it is highly necessary to adhere to the original recipe (1,000 parts water, 20 nitrate of silver, 20 cyanide of potassium), decidedly use the pure; but if a similar result only is desired, the ordinary cyanide of potassium will answer just as well. First dissolve the silver in some of the water, then add as much of the concentrated cyanide in solution, until the resulting precipitate is again nearly dissolved, after which sufficient water is added to make the solution up to the required volume.

Dr. Eder desires attention to be drawn to the fact that, if the changing from yellow to brown will not take place, it only needs the addition of a little more cyanide of potassium in solution. This is important after long usage of the fluid, the proportion of free cyanide becoming quickly reduced, particularly if the negatives are not carefully washed after treating with sublimate. Under these circumstances the bath may be quite spoilt, while a slight addition of cyanide puts it all right again.

FERROUS OXALATE REDIVIVUS.

BY W. T. WILKINSON.

There is a disposition in some quarters to advocate the return to ferrous oxalate development, especially by manufacturers of plates, who, from some reason or another, cannot make emulsion free from chemical fog, in which case pyrogallic development is fatal to the production of clean negatives, whilst ferrous oxalate at least yields clean shadows, even if the quality is not there.

In advocating ferrous oxalate development stress is laid upon the following points: first, it is used by the best continental houses; secondly, it is simpler, and less time is required to get printing density; thirdly, the same solution can be used for the development of several images. But nothing is said about the very important factor of latitude in exposure, for the reason, I suppose, that there is none, especially in the case of under-exposure.

Comparative quality is also ignored, but I am at any time prepared to prove that with a really first-class plate, such as Wratten's, Edwards', or the Paget, it is not possible under any circumstances to get as good a negative with ferrous oxalate as with pyrogallol; but there are nevertheless in the market plates with which the best results are obtained *vice versa*, but simply because they are of faulty manufacture.

Being always open to conviction, after reading the recent able arguments in favour of ferrous oxalate, the good quality negative, and the celerity with which printing density can be obtained, as against pyrogallol, I tried the following experiment. Two of Swan's plates, 6½ by 4¾, marked twenty-five times, were exposed in the studio for three seconds each, the subject being a cricketer in white flannel. One was developed in ferrous oxalate, the other by the sulpho-pyrogallol formula, given by me two or three weeks ago, the results being that the one developed by ferrous oxalate required fifteen minutes to get density, and was only barely exposed sufficiently; the other, developed in sulpho-pyrogallol, was sufficiently dense, and in the fixing bath just under four minutes, and was, if anything, over-exposed, but has no tendency to flatness. Two of Wratten's plates were afterwards treated in the same way, except that they, being slower, received five seconds' exposure each; but the results were the same, except that the Swan's, under pyrogallic, gave veiled shadows, whilst Wratten's did not. Upon examination, after fixing, the ferrous-oxalate negatives are harsh and dirty-looking, with a great suggestion of want of continuity; but the pyrogallic negatives are soft and full of detail in lights and shadows, especially the Wratten.

For my own practice, this experiment disposes of the claims of ferrous oxalate development to simplicity and quality of negative (when first-class plates are used). The third point is not worth arguing; but I have often, when copying or developing an accumulation of exposed plates, developed six plates in four ounces of pyrogallol solution. It is also claimed that the surface of a ferrous-oxalate developed negative takes the retouch easier. Well, it has need to do so, as they require far more than a pyrogallic-developed negative does.

My experience with ferrous-oxalate development is that it requires a much longer exposure, is tedious in development, and even with plates exhibiting only a slight tendency to green fog, does not give the best negative; in fact, it is only useful as a manufacturer's developer, enabling a faulty batch to be utilized.

There is one very important point not yet touched upon, viz., latitude of exposure. It is very well to say, in case of flatness from over-exposure, intensify with mercury; but for good work that will not do. As for under-exposure, that is quite hopeless; but, with pyrogallic, care and plenty of bromide will give any amount of latitude, both for over and under-exposure; of course, taking the standard from the time required under what is termed a "normal developer."

RECENT ADVANCES IN PHOTOGRAPHY.

BY CAPTAIN W. DE W. ABNEY, R.E. F.R.S.*

At the last lecture I had the honour of giving here, I introduced to your notice the ferrous citro-oxalate developer, for which I claimed the advantage that it was able to work without any restrainer whatever. To-night I propose to bring before you another developer, which is also able to work without a restrainer; but before I do that, I should like you to take note of an improvement, which has been lately introduced by Mr. Berkeley, in the ordinary alkaline developer. With the pyrogallic acid solution is mixed four times the weight of sulphite of soda. The action, apparently, is this—the sulphite of soda absorbs the oxygen with greater avidity than does the pyrogallic acid, thus leaving the pyrogallic acid free to do its work, and, consequently, we have a developer which remains uncoloured for a very long period indeed. I hold in my hand a bottle which was presented to me by Mr. Berkeley, some time ago, which I read was made up on October 13th, 1881. This contains four times the quantity of sulphite of soda than it does of pyrogallic acid. Here is another bottle of pyrogallic acid, made considerably later—some time in January—and you will see the difference in colour between the two. The one is slightly yellow in tint; the other, a deep muddy brown. I consider that this introduction of sulphite of soda into the developer is one of the most remarkable improvements in alkaline development, and I hope that those practical photographers present will not hesitate to try the formula which Mr. Berkeley has lately published.

I now propose to show you the practical use of the developer to which I referred when I commenced. It is a new one, but has not been used to any very great extent, I am afraid, on account of the high price it used to fetch. I refer to hydrokinone; the first quantity I bought cost me 12s. a drachm, but I am happy to say it is now only 8s. an ounce, and one grain of it goes so far that it is as active as two grains of pyrogallic acid, for it is a much more powerful absorber of oxygen than pyrogallic acid; an advantage with it is, that you are able to use it without any restrainer. You can even develop chloride of silver without adding any soluble alkaline haloid to it, which photographers know is essential when using even a very weak pyrogallic and alkaline development. To illustrate this, I have an opal glass plate which is covered with a film of collodion containing chloride of silver. Until quite recently, this was a film which it was almost impossible to develop by the alkaline or iron methods; but, thanks to Dr. Eder, we are able now to develop chloride of silver exactly in the same way as we can bromide of silver. To save time, I gave the plate a short exposure just before the lecture. In this cell I have now simply hydrokinone and ammonia, and I think you will see that it develops the plate without the slightest trace of fog. I have taken an opal glass as the background, so that you will be better able to see the result; it comes out very gently and gradually. Thus you see that this new developer works without any restrainer whatever, even when such a troublesome salt as silver chloride is used. Not having any restrainer, it is able to give a better detail, and allow a shorter exposure in the camera than if the ordinary alkaline developer was used. This development is applicable not only for collodio-chloride, but for collodio-bromide plates, or for gelatino-bromide plates—in fact, any plate with which you work, even iodide. [The perfectly developed image was then shown.]

I promised last lecture that I would show you how very easy it was to develop iodide of silver with either the alkaline or the ferrous oxalate developer. You saw in my last lecture how we could develop the iodide with silver and gallic acid, but it becomes a very different thing—at least, it was always so considered—when you have to develop a plate containing simply iodide with nothing but an oxalate developer, such as I have here. In this frame I have a paper which is coated with pure iodide of silver, not a particle of bromide or chloride in it; I will give it a slight exposure, and I propose to develop it on the screen before you. I will simply immerse it in water, and use some of the same ferrous citro-oxalate which I introduced to your notice last week. It will be apparent with what facility the iodide of silver can be developed. The paper, where viewed in the yellow light, is apparently colourless, although really it is yellow. If everything be correct, you will see that we get an image developing out rapidly, which is formed of pure metallic silver, reduced from the sub-iodide at first, and then led, as it were, from the adjacent iodide. [The picture was fully developed.] We now have a practical demonstration that you can develop iodide just as easily as you can bromide, which is a desideratum when you come to consider the composition of gelatine plates, with which we may have to deal more fully in subsequent lectures. Having fulfilled my promise with regard to this, the next point I wish to call the attention of the meeting to is the action of sensitisers. I should like to explain to some of you who are not initiated in the mysteries of photography, what a sensitiser is. I will throw a diagram on the screen, and then you will be able to understand better what I mean. When you have chloride of silver, for instance, exposed to light, you have a new compound formed, which is called sub-chloride, or argentous chloride

$$(Ag_2Cl_2 = Ag_2Cl + Cl),$$

and chlorine liberated. This chlorine is a very obstinate thing to eliminate, if you do not give it something that can take it up; for instance, if you place perfectly dry chloride of silver in vacuo, without any trace of organic matter present, you will find, if it is exposed to brilliant sunlight for months, you get no darkening action. If such a white powder was submitted to you, to test by its darkening, you would say at once that it was not chloride of silver, because it was not darkened, since one of the tests of chloride of silver, amongst chemists, is, that it shall darken in the light. Here I have a little bulb of it which was prepared, dried carefully, and sealed up, the vacuum being made by means of a Sprengel pump. This tube has been exposed for months to light, and it is as pure a white as the very first day it was put into the bulb. Another experiment was made at the same time; a bulb was prepared, but in using the Sprengel pump, unfortunately, as I then thought, a small globule of mercury got in the vacuum, and was sealed up with the chloride; the consequence was, that the chloride of silver immediately darkened; although the mercury was not in contact with the chloride of silver, the chlorine flew to the mercury, and formed chloride of mercury. This is an instructive experiment, showing that merely in the presence of something that will mop up the chlorine, chloride of silver will darken. Here is another darkened bulb, which is chloride of silver, which was sealed up, not in vacuo, but in hydrogen. Now, hydrogen, as you are perfectly aware, can combine with chlorine to form a gas, which we call hydrochloric acid, so, when the chlorine was in the presence of hydrogen, it combined with it, instead of returning to re-combine with the sub-chloride of silver.

$$Ag_2I_2 = Ag_2I + I.$$

On the screen is a diagram showing these reactions of the two other haloid salts of silver. I have already shown you the diagram of silver chloride, and its splitting up by light. Silver iodide splits up into silver sub-iodide and iodine.

$$Ag_2Br_2 = Ag_2Br + Br.$$

Silver bromide, when exposed to light, splits up into silver sub-bromide and bromine.

Now, in order that there shall be a ready darkening of either of these, you must have something which will absorb the iodine or bromine (or, in the case of the latter, allow it to escape), whichever you expose to the light. Now, the image which you just now saw developed on the iodide is, before development, precisely the same as the darkened image on the chloride; it is a matter simply of degree. Of course, if you took a few shot, and hid them in a bushel of flour, you would not be able to know that there was anything black in the flour; in the same way, if you alter two or three particles of iodide into sub-iodide, or chloride into sub-chloride, you do not notice it, because they are so mixed up with the particles that are not altered. It is these little altered particles that are the nuclei for the developed image. In order to show the use of sensitisers, I have prepared a sheet of paper, a quarter of which has been washed over with that vulgar beverage, beer; another quarter with potassium nitrite, and another quarter with gum; the fourth quarter has nothing on it. Now, all these are—but in greater or less degree—absorbents of iodine and bromine, and you will see, when I expose the paper and develop, that there is a decided increase of sensitiveness where those substances have been applied. You may say, "According to what you have said already, the particles not coated with anything ought not to develop," but you must recollect that we are in contact with air, and air contains moisture, and if you have chlorine, for instance, in the presence of moisture, light is able to split it up into hydrochloric acid and oxygen, so that, in the case of a paper like this, you have a sensitiser present, but only a feeble one. This paper is the bromo-iodide paper that I introduced to your notice some little time ago. I have marked on the different quarters of it what is the sensitiser on each. I will brush it over with this ferrous citro-oxalate developer, and we

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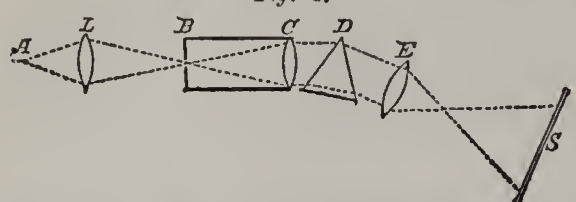
* Continued from page 445.

shall see if there is any difference in the rapidity of coming out. The part coated with nitrite is coming out very rapidly, it has a very inordinate affection for iodine and bromide; the vulgar beverage beer does not seem to be doing its duty as it ought to be now the gum is flashing out; now the beer is coming. You see the nitrite came out first, then the gum, and then the beer; finally, that in which the sensitiser was merely the air and the paper; and you will see, when the picture is finished, there is a vast difference in the amount of development. If there had been no moisture in the atmosphere, if it had been exposed in dry air, there would have been no action whatever where it was not coated with some sensitiser. Here, then, we have a proof that a sensitiser is necessary in order to give the greatest possible sensitiveness, and I hope that this will explain to you what I shall have to allude to further on.

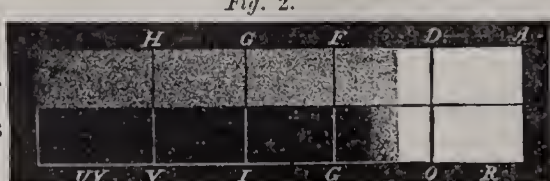
I next have to call into use the spectrum. Here we have it on the screen, and I have produced it by the same arrangement of apparatus as if I were going to use it for photography. You will see that we have a tolerably clear spectrum. We have the light, A, and a lens, L, to throw the image on the slit B. and then the lens, C, to make the rays parallel, then a single prism, D, then a photographic lens, E, which focusses the spectrum on the screens. Now I want to point out to you not only that we have red, green, yellow, blue, and violet rays, but we have rays beyond the violet also which we cannot see, but which, by an artifice, I shall be able

Fig. 1.



to show you. For instance, if I place this card on this screen, you see we have a vast extension of the spectrum beyond the violet; but if I take away, it is absent. The reason of that is, that I have brushed on this card a solution of sulphate of quinine, which lowers the wave light of the ultra-violet rays, making them visible. I was anxious to bring this spectrum before you for this reason, that it is the principal part of the spectrum which is useful to photographers, though I do not believe they are aware of it. When we expose one of these haloid salts of silver to the spectrum, it behoves us to know what part of the components of light it is that acts upon the haloid salt. Now, a very simple way is, of course, to place a film containing the haloid salt in the spectrum. But what I want first to point out to you is, that we must go upon scientific principles in dealing with the facts that come before us, and the main principle is the principle of work. When you have what you call light radiating from a source, be it the sun or be it a gas flame, it is only when its radiant energy is stopped or absorbed that you are able to get any work out of it at all; that is to say, supposing you have a transparent glass plate, you know that the light, as you call it, passes straight through the plate, without leaving a very visible effect on the glass. But if you have a red glass, why does it appear red? Simply because a part of the rays have been stopped; but what becomes of those rays that are stopped? They must take one of two forms, or, rather, the work they do must take one of two forms. The work they can perform may be shown by the heating the glass, or else the energy must be exhausted by doing chemical work upon the substance on which it acts. The effect then is this, if you have an haloid salt of silver, the principal part of the energy which is radiated, and which is absorbed, does chemical work, and it is only those regions of the spectrum which are absorbed which are capable of doing chemical work. I cannot show you a better example than I have upon the screen. The second part of the

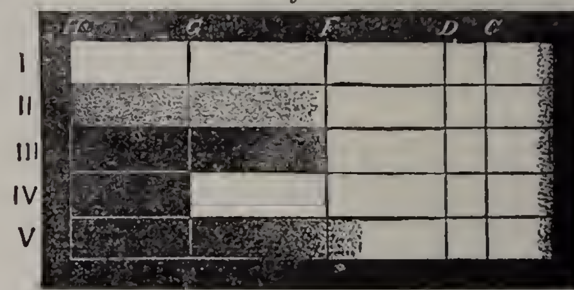
Fig. 2.



slide shows the whole spectrum, taken with a substance which I shall be able to show you by-and-bye. You see the darkening caused by the light; at the far end we have the ultra-violet rays, and at the other end we have the red rays. In front of the slit of the spectroscope was placed a cell of bichromate of potash, and you see it cuts off, not only the blue and the violet, but a part of the green, and leaves the red and yellow intact (B, fig. 2).

Now, photographers know that those beautiful prints that go by the name of carbon prints depend for their manufacture on the fact that bichromate of potash is altered by light in the presence of organic matter. Here we have the spectrum taken on carbon tissue in which you will see the absorption exercised by bichromate of potash exactly coincides with the work done on the bichromate (A, fig. 2); notice that the part of the spectrum which is impressed ends exactly where the bichromate absorption begins. I think that is a very excellent illustration of the work done by radiation. I propose now to pass two or three films through the spectrum (I., fig. 3), to see what kind of work we may expect to be done with them. First, we have a film of chloride of silver (II.), and you will see that the violet part of the spectrum towards the yellow is subdued, whilst the other parts pass through. Next, we have a bromide film (III.), in which you see some parts of the spectrum are cut off which before were visible. Next, I take iodide (IV.), where you see the violet is cut off entirely, leaving a trace of blue, which was not the case with the bromide. Here,

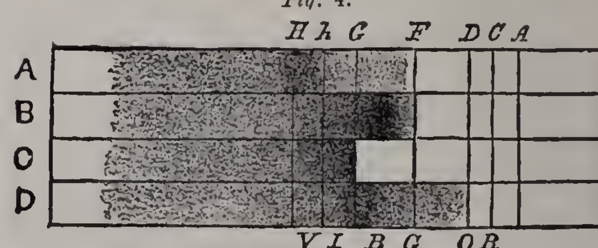
Fig. 3.



again, we have the bromo-iodide (V.) cutting out the blue, going right into the green. That is interesting, because I propose to show you next the fact that the absorption coincides with the work done on the films themselves.

I have here a board with four strips of paper upon it—the first coated with chloride of silver, the second with bromide of silver, the third with iodide of silver, and the fourth with bromo-iodide of silver. I will expose each of them for twenty seconds, to the spectrum, and develop them before you. In order to recognize the parts acted upon, there are strings put across the different parts of the spectrum. [The exposures were made, and the strips damped and placed on the developing board.] I brush each strip over with the ferrous-citro-oxalate developer. [The prints developed rapidly, the chloride taking rather longer than the others to appear.] The chloride sometimes takes a little longer to develop, and I ought to have given it a little longer exposure, because it is not quite so sensitive as the other salts. Here are the four spectra (fig. 4). The maximum sensitiveness of the chloride, A, is about the line H on the spectrum. The iodide, C, goes as far as G; the bromide, B, half-way between G and F, and extends down as far as B; the bromo-iodide, D, extends as far as F in the spectrum. I think I can show you this more directly by photographs taken in the spectrum, in a more accurate manner than is possible in a lecture experiment. When I passed the different silvers over the spectrum, I only passed the haloid salts in the state in which they are usually prepared photographically,

Fig. 4.



but now I wish to show you how different coloured salts of silver can be obtained. Let me take bromide, for instance. Here you have the ordinary form of bromide, such as you saw developed on the screen—the red or orange bromide. By boiling it, as you do with gelatine emulsion, you can change the molecular condition into a grey-blue form, such as you see here. From what I have told you of the principle of work and absorption, you will be quite prepared to learn that these particular forms are sensitive to different parts of the spectrum; so they are, but their maximum place of sensitiveness is but very slightly changed; that is a point worthy of attention. Again, we have two forms of chloride, the ordinary form, which, as a rule, is decidedly yellow by transmitted light; and the other is the blue molecular form, which is got by boiling. Once more, we have the iodide in the yellow form, and also the blue form. Now, I will show you photographs which were taken to show the maximum of the different haloid salts (fig. 5). The first one is the red form of chloride (No. 1), and you see that the maximum sensitiveness is half-way between H and *h* in the violet part of the spectrum; if we go to the boiled chloride (No. 2), you see it has the same place of maximum intensity as the orange, and that the intensity is very great as far down as the yellow line, D. We next come to the red form of bromide (No. 3), and we see that its maximum place of sensitiveness is half-way between G and F. When we come to the blue

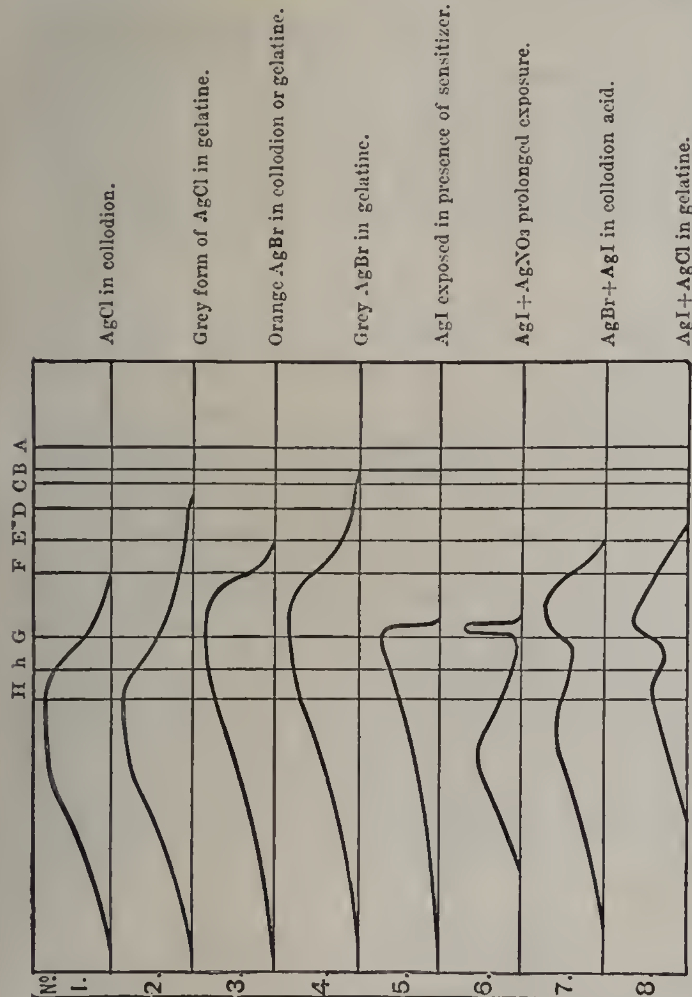


Fig. 5.

form (No. 4), we have an immense extension towards the red; but still it retains nearly the same place of maximum sensitiveness between G and F. Next, we have the yellow form of iodide (No. 5), and it shows that it ends sharply at G. There is no spectrum impressed beyond G. In one case, where I gave it a very prolonged exposure, I got what is called a reversal of the image; but still the iodide spectrum is cut off at that particular point (No. 6).

(To be continued.)

Correspondence.

ANALYSING THE MOVEMENT OF ANIMALS.

Sir,—Permit me to say a few words in reply to Mr. Protheroe's remarks in your last. He admits that Mr. Muybridge's photographic results may be of importance to the physiologist; but the bearing of his remarks would show that artists can learn nothing from the photographs. Seeing that physiologists have been shown by Mr. Muybridge positions never dreamt of in their philosophy, it certainly is obvious that something very novel has been brought before them by these instantaneous pictures of animals in motion. And now as to their relation to artists. I am not going to argue that painters and draughtsmen might learn something by a study of Muybridge's pictures, though I fully believe that they would, and awkward as some of the silhouettes appear to modern minds, the *bas-reliefs* at the Crystal Palace—reproduced, I believe, from Assyrian artists—certainly show one or two positions not unlike the most awkward (?) of Muybridge's. What I wish to point to is a particular reason why Mr. Muybridge should seek to "lecture" artists, to borrow a phrase of Mr. Protheroe.

"Nothing so inartistic, so vilely realistic, as Muybridge's silhouettes can be conceived," howl the chorus of artists. Good. My reply is, there is nobody more illogical, more inconsistant than artists. I mind me of the great controversy about the "Roll Call." Miss Thompson's horse in that picture was fallen upon by a whole army of painters, and their argument was that whether the steed seemed natural or unnatural in the picture, its position was simply impossible. No animal could possibly assume such a pose; the position of its legs was ridiculous—abnormal—untrue. At that time they were all for fact, just as now they are all for art. When, therefore, as the result of his experiments, Mr. Muybridge tells us Miss Thompson was right, and her painter critics were wrong, there is, I contend, some ground for Mr. Muybridge to lecture. Of course, it is still open to any painter critic to argue that Miss Thompson's picture is inartistic altogether; but on this point, fortunately, I need not say a word, for the lady painter has certainly more supporters among artists of high rank than she has detractors.—Faithfully yours,

Brighton.

Dear Sir,—For the sake of truth, and for the benefit of credulous mortals, statements such as those made by Mr. Muybridge, in his paper to the Society of Arts, on the subject of the attitudes of animals in motion, should not be permitted to pass unchallenged.

Apart altogether from the question of the utility to artists of the photographs themselves, I wish to prove that, wonderful as are the data upon which the above-named gentleman founds his inferences, those inferences, though in a somewhat different way, are more astounding still.

Among other startling novelties, we are asked to believe that a man in running or jumping always alights on the heel first; the horse, we are assured, does the same. Not being very well posted up in the technology of animal mechanism and comparative anatomy, I will leave Mr. Muybridge's quaint and curious specimen of the solidungulata in peace, merely remarking that, as the heel of a man corresponds to a horse's pastern, the ball of his foot to its fetlock, and the point of his toe to its hoof, I fail to understand how a horse is like a man in its manner of alighting on the ground; that is, if the author of the new movements is right about the man.

En passant, allow me to remark that Mdlle. Rosa Bonheur is notorious for her enthusiastic and careful study of animal mechanism and motion, and were all works of art to be looked at with a total disregard of the effect of perspective foreshortening, certain very clever photographs might, like a certain limb, be the object of the fingers of scorn and injustice. Rosa Bonheur is not a photographer—more's the pity for photography—and on the lines laid down by Mr. Protheroe she has done her duty honestly and well.

But to return to my mutton, *i.e.*, man. He can run and jump—naturally, and as men always do—with naked feet, on a course smeared with an ointment composed of butter and black-lead, without soiling his heels. With his toes alone protected, a course of broken glass cannot break his skin. In running to any extent, and in easy high jumping on a level course, birds' eggs, small bladders, and detonating packages attached to the heels remain intact. The *os calcis*, in short, cannot be employed in running and calcining at one and the same time. Had Mr. Muybridge said that 999,999 runners out of every million were very positive that, in running, they never came down on their heels, save when they stumbled, and that the millionth man strained courtesy to a painful extent, he would have been, to my very humble thinking, much nearer the truth than he was.

I was at first sight a good deal puzzled with several apparent discrepancies between instantaneous photographs and facts, but was able in a very short time to see that the sun was absolutely right, and that John Leech, Tenniel, Linley, Sambourne, Corbould, *et hoc genus omne*, were not very far wrong. I do not know whether Mr. Muybridge possesses a coat of arms, but if not, I would suggest, "On a field vert, an eagle, or, displayed, improper highfaluten."

With regard to Mr. Muybridge as a photographer, and Mr. Muybridge as logician, the quotation, to my mind, seems apt :—

"Hic vertex nobis semper sublimis; at illum
Sub pedibus nox atra videt, manesque profundi."

I remain, sir, yours truly, H. B.

GREEN DEPOSIT ON NEGATIVES.

Dear Sir,—Referring to the green deposit on negatives in my last letter, I exposed another plate from the same dozen on a group, developed the same with sulpho-pyrogallol, but used the ammonia-glycerine solution of Mr. Edwards' instead of Nelson's. Result: a beautifully clear and detailed negative. Now that set me thinking, and I came to the conclusion that the plates were not at fault (as some allege). It seems to me to lie between the ammonia and sulphite, or the bromide and sulphite. You know I said I had excess of bromide when developing the negatives I wrote to you about. Could not some experiment be made to prove whether any reaction takes place between bromide and sulphite or ammonia and sulphite of a nature calculated to affect silver bromide? Also, has the glycerine any effect?

The deposit does not seem to have had any effect, except to slow the printing, and I think thereby making the picture harsh. I may mention that since writing my last I have removed the deposit by some hours' soaking in common alum and citric acid.—I am, faithfully yours,

W. E. D. Jones.

IODIDE IN EMULSION.

Sir,—Captain Abney does not seem to have grasped the point of my letter which appeared in the Photographic News of the 21st. I did not say that iodide made an emulsion quicker; on the contrary, I have found that a small quantity, say 1 per cent., did not slow the emulsion sufficiently to be of any great disadvantage, but a large amount slows in proportion to the quantity used, *i.e.*, when the iodide and bromide are formed together; but if made separately and mixed before coating, the same result is not produced. I have lately made a batch of emulsion (purposely slow) which gives such density, that plates when developed with 1 8th grain of pyrogallic are too dense in the high lights before the half tones are sufficiently developed. Had I added 75 per cent. of iodide emulsion, coated very thinly, or mixed other substances that would separate the bromide, the density would have been reduced (closeness and fineness of deposit tends to give greater density).

I have long known, although contrary to the recognised theory, that a wet collodion negative is softer when developed with a weak reducer. I have fully developed a 5 by 4 negative with 5 minims of a 14 per cent. solution of sulphate of iron, without requiring any great increase in exposure.

It would appear that a small quantity of iodide in a bromide emulsion, when cooked a long time, will have the same effect as a larger quantity emulsified a short time. I do not take colour as the proof, but actual working; nor have I formed any definite theory to account for this, for it seems that the iodide has the power of re-converting bromide into iodide. Captain Abney does not explain what he means by "not getting clean negatives with pure bromide." If the shadows are not clear, then I can only suggest an unsafe light by which the plates are prepared, or over-exposure.

I may add another advantage in using iodide mechanically mixed with bromide of silver—viz., it acts like a screen of yellow glass to the more sensitive compound, especially the under strata.

I have lately improved a method of cold rapid emulsification, by which, in one hour or less, according to temperature, an emulsion can be made giving plates twice the speed of any plate in the market.

I intend to give the formula and discuss the merits of the same at the next meeting of the London and Provincial Photographic Association on Thursday, the 10th, when all interested are cordially invited.—Yours truly,

A. L. Henderson.

DRYING NEGATIVES.

Dear Sir,—In reference to your recent leader, I may mention the following as an aid to expedite the drying of gelatine negatives.

My plan is to merely use a squeegee of pliant rubber or chamois leather to expel the loosely adherent water from the film.—I am, dear sir, yours truly, A. W. Hosmer.

STAINS ON GELATINE NEGATIVES.

Dear Sir,—Having heard so much said of late about the stains on gelatine negatives caused by the use of pyrogallic acid in development, I may be excused for throwing in a small mite for the benefit of my fellow-workers.

If a plate, after fixing, shows a brown or yellow stain, place it, after washing, into a dish containing a very dilute solution of nitric acid, when all stain will immediately disappear, and a clear, bright negative will be the result. Over-dense negatives are easily reduced in the same manner. It may also be applied to parts of negatives with effect.—Yours faithfully, J. E. Walker.

Proceedings of Societies.

Liverpool Amateur Photographic Association.

The monthly meeting of this Association was held on Thursday, the 27th instant, at Clare Mount, Wallasey, the house of the Rev. H. J. Palmer, Hon. Secretary.

The members met in considerable force on the landing stage, and it had been arranged that a competitive trial of the numerous instantaneous exposures devised by associates should be made on the way to New Brighton. An inexorable downpour of rain, however, rendered instantaneous work out of the question, and the members made the best of their way to the place of meeting to enjoy the hospitality of Mr. and Mrs. Palmer.

At the evening session the Rev. T. B Banner took the chair. The minutes of the June meeting having been read and confirmed, the Hon. Secretary read a communication from the Hon. Secretary of the Photographic Postal Society.

The Rev. H. J. Palmer asked the members present to give the result of their experience with the sulphite of soda developer.

Mr. J. H. T. Ellerbeck thought it utterly useless, except in cases of incorrect exposure.

Mr. E Twigge spoke somewhat strongly in its favour.

Mr. R. Crowe had exposed a plate and then divided it into two pieces, one of which he developed in the ordinary way of pyrogallic, and the other with the sulphite developer. The former portion resulted in a perfect negative, but the latter was dirty and fogged, and had to be greatly forced with ammonia.

He thought that in many cases a peculiar greyness and smokiness affected the film.

Mr. P. H. Phillips said that he found the presence of sulphite of soda in ferrous oxalate of no advantage to the development, but of unquestioned value as a preservative of the developer. He added that he had found Captain Abney's accelerator of great use in the case of some plates of his own make. In order to show the effect of this preparation, two plates were exposed and developed under precisely similar conditions of time and light and developer, one of the two having previously been treated with the citrate of silver solution. The latter on development had proved very much the better negative.

Mr. Ellerbeck proposed that a Council meeting be held at an early date to select the presentation print for 1882, so that it might be delivered to the members at the annual meeting in November.

After some discussion, the resolution was seconded and carried. It was, however, decided by a vote of the members present that the selection of the presentation print should not be made until after the November competition.

Mr. E. Newall asked the Hon. Secretary if he could give any further information on the subject of Morgan's paper for negatives.

The Rev. H. J. Palmer said that it would be in the recollection of members present that during the last meeting a telegram had been received from Messrs. Morgan announcing an important discovery just made by them, which would result in a considerable improvement in the paper in question, and of which particulars would be transmitted in due course. He had written again and again to Messrs. Morgan and Kidd for the promised particulars, in the hope that he might have taken some of the paper with him on his annual tour in Switzerland. No further particulars had been received from Messrs. Morgan and Kidd, and not even an acknowledgment of the receipt of his inquiries.

Mr. E. P. Houghton, on a discussion arising as to the time and place of the next summer meeting, invited the Association to meet at his house, Stonebye, New Brighton, during the month of August.

The Chairman proposed that Mr. Houghton's kind offer of hospitality to the Association should be accepted, and this was carried *nem. con.*

Mr. Ellerbeck having exhibited a fine series of prints, resulting from negatives taken during a recent tour in Germany, remarked that clouds seemed to be unusually easy of attainment in landscape negatives this year.

Mr. H. N. Atkins exhibited a very clever instantaneous shutter of his own devising and manufacture, for use between the lenses of a doublet.

Messrs. Newton and Co. sent for exhibition a shutter of the simplest construction, to be used between the lenses of a doublet, or in the place of a diaphragm in a single lens.

The Chairman proposed a vote of thanks to the Rev. H. J. Palmer for his hospitality, and the meeting shortly after separated.

London and Provincial Photographic Association.

A meeting of the above Association was held on Thursday, the 27th ult., Mr. J. J. Briginshaw presiding.

Mr. G. Smith exhibited an alpenstock camera-stand which he termed the Brattice stand; its weight was one pound three-quarters; the principal improvement was the introduction of a second strut in the leg, which gave it great rigidity, the struts being alternately pull and thrust; and another improvement was that instead of the pins of the head going through a plate into holes in the wood, sockets were soldered to the plate, and so prevented any shaking.

Mr. Cowan exhibited negatives made from parchment jelly prepared by Mr. A. Collier; he found it gave a good emulsion, and kept the bromide well in suspension, the difficulty being that it gave pits.

Mr. Brown had also tried a sample of this jelly, and preferred it to any gelatine he had yet tried, if he could only get it strong enough.

Mr. Collier said it could easily be made stronger by adding more cuttings, and at the request of the Chairman he gave the method of preparation, which was as follows:—Wash 3 pounds of parchment cuttings first in hot water then in two or three changes of cold water, then boil in three quarts water for three hours, carefully skimming it from time to time, then strain through three thicknesses of flannel. His idea in using it in a jellified state was that there was no risk of decomposition while drying; it did not decompose during the boiling process. With reference to the pits he attributed them to grease, and thought that if Mr. Cowan had cut the top and bottom parts off, and only used the centre portion of the jelly, he would not have been troubled with these plague spots.

Mr. Brown thought that pits are caused by some portions of the emulsion setting quicker than others.

Mr. Henderson attributed them to carbonic acid gas caused by the plates taking a long time to set; he had tested for grease by keeping gelatine in a liquid state for some days, then allowing it to set, and cutting away the top and bottom portions; but this did not save the pits.

Mr. Cowan said he had prepared an emulsion from a bottle of solution handed him by Mr. Henderson; he had followed the direction for making a plate as rapid as an ordinary commercial plate. He only used heat sufficient to dissolve the gelatine, and let the emulsion stand for one hour. He gave a plate the same exposure as a commercial plate, and found they were both alike, the plate prepared from Mr. Henderson's solution being, if anything, the more dense.

Mr. Henderson promised at the next meeting to give the details of the process. He then exhibited a number of negatives taken without a lens, but by a pin-hole in a piece of cardboard. His first exposure was fifteen seconds, but he had now reduced this to five seconds; he had also taken a number of negatives in an ordinary plate-box; he first made a hole with a needle in the side of the box, but found that the thickness of the wood obstructed the field; he then cut a hole in the box and substituted a thin piece of brass with a pin-hole in it. With this instrument he obtained very good results, the figures in the streets being sharp.

Mr G. Smith found that, to get a fair picture, it was necessary to give a long exposure; but did not see any reason why, for ordinary amateur work, the system should not be used.

Mr. Haddon, speaking upon the theory that the image of the last thing seen by a person dying a violent death is depicted upon the retina, said that experiments had been made in Germany which cast light on the question. A rabbit's eyes were bandaged; it was then placed so that it looked full at the window which illuminated the room, and the cloth was removed from one eye. The head was then cut off and removed into a darkened room, when a perfect representation of the window was depicted on the retina. The dead eye was then exposed in the same way, with precisely similar results. The image can be fixed by soaking the retina in alum. If the light is yellow, it has little or no effect on the visual purple.

Lieutenant H. Dockrell, R.N., Dr. Stracey Forrest, Messrs. Henry Stevens, Horatio W. King, and G. I. Lee, were elected members of the Association.

This being the first committee night, the following gentlemen were elected as officers for the year ensuing:—

Trustees.—A. L. Henderson and W. E. Debenham.
Treasurer.—W. B. Prestwich. *Curator.*—A. Haddon.
Secretary.—C. B. Cutchey.

Talk in the Studio.

The Guilds Examination.—Captain Abney, R.E., F.R.S., examiner in photography, says: "I cannot report any improvement in the result of the examination. Some of the candidates who sat knew absolutely nothing either of the practice or theory of photography; others showed a practical knowledge of the gelatine process, and of that alone, showing that their training had been neglected. On the other hand, there are some exceptionally well-answered papers in both grades, and these show that in some cases the teaching has been sound, and the practical work well carried out."

The Wedge Photometer.—In a communication to the American Academy of Arts and Sciences in May last Prof. Pickering has some remarks upon the use of a wedge of shaded glass as a means of measuring the light of the stars. He considers that, while it has been maintained by some writers that it is not a new device, "the credit for its introduction as a practical method of stellar photometry seems clearly to belong to Prof. Pritchard, director of the University Observatory, Oxford." Various theoretical objections to this photometer have been advanced, and many sources of error suggested, but Prof. Pritchard has made the best possible reply to them by measuring a number of stars, and showing that his results are in very close agreement with others obtained elsewhere by wholly different methods. His photometer "consists of a wedge of shade glass of a neutral tint inserted in the field of the telescope, and moveable, so that a star may be viewed through the thicker or thinner portions at will. The exact position is indicated by means of scale." The measure of the brightness of the star is made by bringing it to the centre of the field and moving the wedge from the thin towards the thick end until the star disappears. Stars must always be kept in the centre of field to insure the readings being comparable. But Prof. Pickering makes the ingenious suggestion that this photometer may be further simplified by substituting the earth's diurnal motion as a measure of the position of the star in the wedge at disappearance. "It is only necessary to insert in the field a bar parallel to the edge of the wedge, and place it at right angles to the diurnal motion, so that a star in its transit across the field will pass behind the bar and undergo a continually increasing absorption as it passes towards the thicker portion of the wedge. It will thus grow fainter and fainter, until it finally disappears." Then the interval of time from the passage behind the bar until the star ceases to be visible becomes a measure of its light, and the time will vary with the magnitude. As in Prof. Pritchard's form of the instrument, it is only necessary to determine the value of a single constant. Prof. Pickering adds some suggestions with regard to observations with this photometer, and recommends them to the attention of amateurs.—*Nature.*

Cooling and Air-purifying Apparatus.—A new method of cooling rooms by what may be termed a chemical lung, or punkah, might prove useful in India and other tropical countries. The following is a description of the apparatus:—Attached to the frame of the punkah is an endless blind, passing round rollers, at the top and bottom. The bottom roller is a trough, which contains a solution of a caustic alkali. At the very swing of this punkah a wheel and ratchet arrangement causes the rollers to revolve, thus drawing the sheet or blind through the solution. The wet sheet, swinging to and fro, takes up from the air the sulphurous and carbonic acid gases, as well as some organic matter. Brought to the test of experiment, this plan appears to work successfully. In a small room, 18 feet by 15 feet, and only 8 feet high, fifty jets of a gas-stove were set burning for an hour, with the windows and doors of the room closed, and to make it still further unfit for animal life, a quarter of an ounce of sulphur was burnt in it. The punkah, charged with caustic soda, was here set to work, and in ten minutes the temperature was reduced from 85° to 70°, and the air was made sufficiently fresh and pleasant for twenty persons crowded in the room.

Dangerous Device in Shape of a Cigar Lighter.—The following letter from the *New York Public Ledger* is reprinted in the *Chemical News*:—"Mr. Editor,—As I stepped from the platform of a car this morning (corner of Seventh and Filbert Streets), I came upon a motley crowd, listening to the harangue of a bright fellow, who entertained his audience somewhat after this manner:—'Only five cents. I offer you, gentlemen, something entirely new—a new kind of cigar-lighter. Cut off a small piece (about the size of a pin's head), place it upon a cigar or the contents of a pipe, as I do now, apply a drop of water, and it will at once take fire. We generally use water to *put out fire*, but here I will use it to make a fire,' and then, dipping the pointed open knife into the gutter, the orator touched with it the bit of cigar-lighter lying upon the tobacco, and, presto! it took fire almost immediately, and burned with an intensely yellow flame. The vendor continued, 'Once kindled, the flame will not go out till your pipe is lighted. Only five cents.; who'll take the next?' The writer of this took 'the next,' with the view of examining the contents of the vial and reporting to you, The vial (an '$\frac{1}{8}$th homœopathic vial,' covered with marble paper), contained several very small sticks of the metal sodium. Little did Sir Humphrey Davy imagine, when he made his brilliant discovery of the alkali-metals, that ere the close of the century one of them would be hawked about the streets to light cigarettes and pipes. Insurance men can tell a sorrowful tale of the loss of life and property caused by the household use of friction matches. But what if papa should leave within reach of the children metallic sodium, a material that must always be handled with great care, even by those best acquainted with its properties. I trust that you will give the above immediate publicity, that people throughout the country, being forewarned, may leave the 'new cigar-lighter' severely alone, and that our efficient mayor may, if possible, prevent the retailing of metallic sodium in the streets of Philadelphia.—Yours, &c., R. A. Fisher." [Some three or four years ago sodium was sold in the streets of London as a cigar-lighter.—Ed. P.N.]

To Correspondents.

*** We cannot undertake to return rejected communications.

W. Hart.—It is impossible not to feel thankful that there is at least one bright spot in the general darkness. We have made a note of it, and sent your letter to the offending parties.

W. C. Tate.—It is an insoluble basic per-sulphate of iron, and we presume that the solution from which it was filtered worked fairly well.

Engraver.—Thank you for calling our attention to the paragraph. We had already recognised it as having been reprinted from the Photographic News, notwithstanding the circumstance of it being accredited to another publication.

Peter Collins.—You can only register a device or design, not working improvements. In your case the only way will be to take out a patent.

Enquirer.—Notwithstanding what you say, we have but little doubt that they arise from defects in the glass. It is not a rare thing for numerous specks of imperfectly vitrified material to exist on the surface of a plate, and if these particles contain excess of alkali, defects are almost certain to arise.

T. B. E.—You will find full particulars as to its preparation on page 546 of our last volume.

B. Biden.—1. When it is treated with strong nitric acid, metallic silver is dissolved out. 2. By a prolonged treatment with *aqua regia* (nitrohydrochloric acid). 3. When the melted iodide of silver is allowed to cool, a notable contraction occurs at the solidifying point, and the solid iodide contracts regularly until the temperature of 142° Centigrade is reached, when it expands considerably and becomes crystalline.

N. O. P.—1 It is well to remove the size as completely as possible by repeated treatments with boiling water. 2. It is caused by the gradual crystallisation of the material. 3. No.

Samuel Baker.—1. For your purpose it is best prepared by heating the usual mixture of potassium chlorate and manganese dioxide, and it is just as well to pass it through a wash bottle containing water. 2. Troublesome and uncertain.

W. J. W.—There have been many well authenticated cases in which fatal poisoning has resulted from absorption through the skin, and you should take care to always wash your hands very thoroughly immediately afterwards.

A Troubled Amateur.—So purely and entirely a matter of taste as to be beyond our province. As an amateur, who does the work without pay, you may legitimately carry out your own ideas. Were you a professional photographer it would be policy to consult the wishes of your customers as far as practicable.

Vera.—1. Follow one set of directions or other, but do not attempt to effect a compromise between them. 2. It is your own fault, as you were cautioned beforehand. Throw all down the sink, and try again.

Thomas Arnold.—Results of highest excellence have been obtained, but few persons have been uniformly successful.

John Farmer.—The MS. and specimens are to hand, and shall be attended to immediately.

W. Oppenheimer.—1. Rather wide of the mark. 2. Certainly not, as it contains a large proportion of gold. 3. Quite the reverse. 4. The thinnest kind in the market will suit your purpose. 5. Dilute with about three times its volume of water. 6. An efficient mill is required; one of the most convenient kinds consisting of a pair of granite rollers revolving against each other at different rates. 7. Not at present, as the patent has yet nearly a year to run.

Taunton.—No doubt many others like yourself have dark tents they would like to dispose of, but we fancy customers will not come forward very readily. 2. Glycerine does not injure the bath so long as it is free from impurities; but it is very injurious to the dark slide, as if you saturate the wood with it, the slide will always be damp. 3. The single view lens is generally admitted to be the best, provided that the characteristic defects to which you allude do not interfere.

PHOTOGRAPHS REGISTERED.

Mrs. E. E. Cox (Nottingham)—Four Photographs of Canon Harnett.
Mr. E. Reeves (Lewes)—Ten Photographs of "Railway Jack."
Mr. W. Eskett (Lendal, York)—Two Photographs of Jane Johnson.
Messrs. Hatch & Miller (Slough)—Photograph of Ruins of "Windmill" Hotel, Salt Hill.
Mr. Guttenberg (Manchester)—Six Photographs of Rev. A. Maclaren.
Mr. C. P. Richards (Barrow-in-Furness)—Photograph of Ld. F. Cavendish.
Mr. Haseler (Wolverhampton)—Photograph of 14 Brass Articles, &c.
Mr. T. Birtles (Warrington)—Two Photographs of Witton Hall Salt Mine. Photograph of Edward Murphy.

THE PHOTOGRAPHIC NEWS.

Vol. XXVI. No. 1249.—*August* 11, 1882.

CONTENTS.

A PHOTOTYPE BLOCK FOR THE PRINTING PRESS.

According to our promise of last week, we place before our readers a specimen of Ive's photo-engraving method as adapted for printing by the letter-press method. The satisfactory production of phototype blocks adapted for

printing together with type has long been regarded as an ideal or goal to be aimed at.

More than thirty years ago Paul Pretsch produced, by his method of inducing the reticulation of a film of bichromated gelatine, some of the finest press blocks which have been yet seen; but those who have practised his process since have failed in obtaining the same depth of tone and vigour. Gustave Re in Berlin, and Dallas in London, now make typographic blocks commercially, and, judging from their appearance, one may conclude that they are made by one form or the other of the Pretsch method.

A very characteristic Pretsch-block print is included in Husnik's recent manual of photo-engraving,* the print in question being a view of the Ring theatre at Vienna, which building was, as our readers will remember, recently destroyed by fire. The granulations, or recticulations, are extremely fine in the case of this print, and the detail is so minute that smalll inscriptions on the adjoining houses are easily legible. There is, however, the fault common to almost all phototypic block prints made from half-tone negatives, namely, the absence of vigour and bold contrasts, the general aspect recalling a print from an over-exposed negative. Pretsch prints are, in ordinary cases, extremely difficult to print from, the grain being so fine as to become clogged up with printing ink unless the greatest care is exercised; and in ordinary cases the difficulty of obtaining satisfactory impressions when the block is worked along with the type at the ordinary machine is so great as to preclude their use for newspaper and general illustration.

The Pretsch process may be modified by the addition of various substances to the sensitive mixture, and the subsequent treatment of the exposed film; but these variations appear to have no importance whatever, as equally good printing grains can be obtained by the use of plain bichromatized gelatine, and soaking in water. The following outline of the Pretsch method for the production of type blocks may be of interest to our readers.

A sensitive gelatinous mixture is prepared by dissolving six parts of gelatine in thirty parts of water, and one part of powdered ammonium bichromate is stirred into the solution. A piece of plate glass, which is all the better for having been previously coated with a collotypic substratum, is now levelled in the drying cupboard—a temperature of about 50° C. being suitable in most cases. When the plate has reached the full temperature of the hot cupboard, some of the gelatine preparation is poured on and spread with a strip of paper, about 30 grains being allowed for each square inch of surface. When the plate is dry it is exposed under a negative, about six times the exposure which would be required for a silver print being given. When the exposed plate is soaked in water, the reticulation and granulation of the gelatine rapidly set in, and in a few minutes an exact reverse of the required printing block will result. The next step is to allow the plate to become partially dry, and to deposit copper on it by the electrotype process so as to form the printing block. It is, perhaps, a more certain proceeding to take an impression from the reticulated film by means of softened gutta-percha, and to send this cast to an electrotyper or a stereotyper to be reproduced in metal.

Our readers will have noticed that a large proportion of the war pictures now appearing in the *Illustrated London News* are *fac-similes* of the original sketches of the artists. It is extremely likely that the existing taste for faithful

* Die Heliographie, von J. Husnik, Hartleben, Liepzig.

representations of distant occurrences will ultimately culminate in the general use of photo-typography for journalistic illustration.

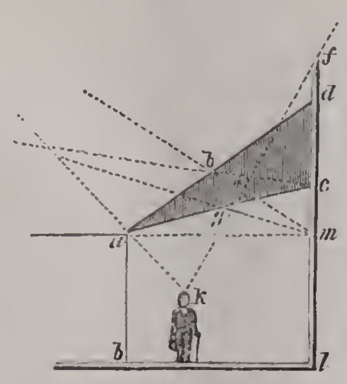
ON THE INCLINATION OF GLASS ROOFS IN THE STUDIO.

Our esteemed friend Dr. H. W. Vogel has lately returned to this subject, and he publishes in the *Notizen* some very interesting remarks that are well worth perusal. Repeatedly, says Dr. Vogel, I have taken the opportunity to speak in these pages upon the construction of studios, and have touched upon nearly all the leading points in the question. I have come to the conclusion that for portraiture a low studio lighted from the north is preferable to all others, a statement which has been confirmed in the course of fourteen years, since the printing of my first treatise and numerous new experiments.

Lately the question of studio construction was again under discussion in the *Verein zur Forderung der Photographic*, and the superiority of a north-lighted studio from ten to twelve feet up to the glass was acknowledged. Another point came up in the course of speaking, viz., the height of the back wall of the studio. This measurement, of course, fixes the inclination of the glass roof. The question is now, whether a steep or slightly oblique glass roof be preferable.

The first point agreed to by the speakers was that a more inclined roof greatly facilitates the flowing off of rain and snow, consequently is kept cleaner than a horizontal surface. A more important question was how the more inclined may be compared with the horizontal with regard to lighting. Herr Reichard, who had lately exchanged his old studio with flat roof for one having a slanting one, declared that with the latter he could obtain harmonious lighting much more easily. In course of the discussion, however, it appeared that the cause of better lighting in Reichard's new studio was to be found less in the loftiness of the roof than in the high situation of the studio itself. The old one was two stories high, and opposite to a lofty building which greatly influenced the lighting on account of the many reflections acting upon the studio. In the new one nothing interfered with the north lighting, and there was no reflecting action to combat with; hence the more harmonious illumination.

Herr Schaarwächter remarked that in working in studios with steeply inclined glass roofs he had found the light was too dispersed, and that, under certain conditions, it was difficult to obtain a distinct shadow side to the face. It is, however, not difficult to compare the effects of a steep with that of a slightly inclined roof in point of lighting, by means of a diagram. Let *a b c* represent the section



of a north lighted studio with roof *a c* inclination one foot in four, while *a d* is much more slanting (rising three feet in four). If the back wall, *l f*, is in both cases the same height, it is clear that a person's head receives the same amount of top light through the open glass roof, whatever may be its inclination. By drawing lines through *a* and *f* meeting at *k*, the angle of light received will be found to be the same, whatever slant the roof may have, as it is regulated by the wall behind. The more slanting roof will assuredly cause less reflection than the other. As, however, blinds are usually drawn down to about one half the length (somewhere about *h*) the difference is practically very slight with regard to the top light.

Of course, with the front lighting, as the roof is raised in inclination, so must the side wall be elevated to the amount of *a c d*. By this means some of the front light is lost, which would otherwise fall on the sitter. This is observable when the roof blinds are drawn up, but scarcely so if they are pulled down, as they usually are. Therefore, under such circumstances, the elevation of the roof but slightly influences the action of direct light.

It is different with regard to light reflected from the back of the studio, *c l*. Take, for instance, a point, *m*, and another at *g*, bisecting *a c*, the angle of light taken in from the flat roof is considerably less than the angle *a m h*. Therefore, with the slanting roof, the back wall is much better lighted. The steeper the roof the greater the reflecting surface.

Herr Schaarwächter is quite right in saying that through the inclined glass roof there is more dispersed light; in certain circumstances this may be desirable: in others, not so.

The discussion next turned on the possibility of having blinds fixed more horizontal than the inclined roof. This has a remarkable influence, as may be seen on referring to the diagram. Supposing the inclination of the roof to be *a d*, and the blinds slanting at the angle of *a c*, it is easily seen that when they are drawn back to *g*, the amount of light which *m* receives is not greater than with a flat roof. By such an arrangement, also, the back wall, *d c*, will be quite shut out, and its reflecting rays will have no effect upon the sitter, *k*. A studio with strongly inclined roof, by having the blinds arranged more horizontally, obtains less reflected light and deeper shadows.

Upon certain occasions the blinds must be fully drawn up—seldom for single portraits, but more often in groups. In such cases, the inclination of the roof takes no part.

COLOURED PHOTOGRAPHS ON GLASS.

BY W. M. ASHMAN.

It has frequently been said that the public have a weakness for colour. Whether a taste in that direction may be considered a weakness when laid on photographs, or otherwise, I do not wish to argue. Photographers will always consider their finest plain photographs to be quite equal to good coloured work, and much better than the majority they come in contact with. The colourist's opinion will be *vice versa*; while the amateur and many others consider it an open question whether photographs should be touched in any other way than ordinary spotting. *Quot homines, tot sententiæ.*

Photographers are grumbling a good deal about the dullness of trade, and, to my mind, they have to blame themselves, and not the public, for there appears to be a feeling amongst them that their productions must be accepted by their patrons just as they choose to serve them up, no matter how that may be, and one may find many instances where the style of work has not considerably changed during the last ten or twelve years. In fact, we do not progress with the times. Observe the difference between a dull-looking draper's store, and one teeming with novelties. In the first case, you may not see a customer enter if you wait for an hour; whilst the other will be blocked with patrons as long as the observer chooses to stay. *A priori*, there must be some reason for this difference, and doubtless it will be found in the fact that the general public thirst after anything fresh. Photographers would do well to draw the moral, for the same all-suffering community seek after novelties in photography as keenly as they do in the matter of dress, and those who can supply the novelties will not have occasion to grumble about the dullness of their business. Take, as an in tance, portraiture by electric lighting. Most of us agree that it is a costly method; but as the public are ready to pay, why should we object? I do not advocate the universal adoption of the daylight extinguisher for our studios, but, for the sake of novelty, I hold that we should stir up our friends, the electricians, to provide us with a suitable and reliable method of lighting by electricity at a cost that will assure us a profit on the outlay, and at some future time I hope to be able to say something more on the subject of electricity in the studio. I could point out numerous instances where the success of an individual has been attained by the early adoption of a new idea, but will content myself by mentioning one or two recent exploits, and I ask pardon from those gentlemen whose names I may mention. Never has there been such a success in photographic literature in so short a time as achieved by Mr. H. Baden Pritchard's "Studios of Europe." And why? Because the style is fresh, at the same time conveying as much information as a book written after the old pattern. Who has not heard or seen the photographs of the "Flying Dutchman," by Messrs. Marsh Brothers; the "Athletic Sports" by Messrs. Hills and Saunders; and last, though not least, "Derby Studies," by Mr. A. L. Henderson? The enormous sales in each of the above cases being sufficient evidence that people are ready to appreciate in a substantial manner anything of real merit and novelty.

As I have previously stated, the public have a weakness for colour, and a highly commendable weakness it is. We have tried to satisfy their cravings in this direction with some exquisite water colour and oil work, also with some that is not exquisite (shall I include collodion transfers covered up, or shall I leave it unsaid?); but there still remains a form of coloured photograph which, if properly treated, looks exquisite, and has to a great extent the charm of novelty. Many have added to the revenues of the Patent Office, and, under different names, the pictures have been produced; but never to my knowledge have they been fairly put before the public of this country, and pushed as cameo vignette and allied shapes were a few years ago. Some time during the early part of last year our Editor gave us a very simple formula for producing these pictures, but I think the artistic conditions therein to be complied with might deter some from making the attempt. Let those of my readers who have not read the article in question turn to page 133, March 25th, last year's volume of the Photographic News, wherein they will find the process briefly described. I have obtained excellent results by this process, but find by a slight modification that I can get still better results. Make up the following: Nelson's No. 2 gelatine, 30 grains per ounce of water, or Henderson's hard gelatine, 15 grains per ounce of water; this is the mounting solution for attaching the print to a glass plate. Next weigh out solid paraffin 2 ounces, white wax 2 ounces, Canada balsam 5 ounces; dissolve on water bath. This mixture is for the purpose of rendering the photograph transparent, and allowing the oil colours to permeate. The other articles required will consist of a stock of crystal glass plates, either in sheets or convex, to suit the fancy; squeegee; rectified spirits of turpentine (spts. terebinth rect.), a bottle of thinning oil (fine poppy oil), an assortment of oil colours in tubes, brushes, palette, &c. Take an unmounted print of warm tone, by preference printed on ready sensitized paper, and place it in a flat dish; the print may be treated dry, but it will be found better to place it in warm water for a couple of minutes previously, then blotting off the superfluous liquid. Warm up the mounting solution, and pour it into the dish. After the print has soaked, say a minute or two, place the glass plate, previously cleaned and dusted, into the solution, and attach the print in the same manner as in making carbon transparencies, gelatinized prints, &c.; or perhaps the best plan would be to put the print down as collodion positives used to be transferred to leather, viz., attach one end to the glass plate held in the left hand under the solution; a squeegee held in the right hand is then drawn gradually up the print, expelling both air and excess of solution by the same operation. The glass plate should be held so that the top inclines outwards, and the print underneath; you can readily see if the work is being carried out satisfactorily. If only ordinary care is taken, no air-bells will form; should there be any, they can be easily removed by drawing the print away from the plate under the solution, and putting it down again. The print should now be covered with a piece of blotting-paper, some flexible material such as American cloth, and well squeegeed. It may now be put aside to dry spontaneously, which, under ordinary circumstances, will occupy about eight hours. It is important that the print be quite dry before the next operation. When thoroughly dry, rub away a portion of the paper with fine sand paper or No. 0 glass paper, working with a circular motion. This not only renders the print thinner, but, in breaking up the outer surface, allows it to be permeated more evenly and readily.

Melt the wax compound on the water bath at as low a temperature as possible, immerse the plate in it, and allow it to remain at the same temperature for half an hour or longer if necessary. When perfectly transparent it should be removed, and when cool enough the excess rubbed off both sides. It is now ready for painting. An ordinary retouching desk is the best form of easel to employ. A certain amount of artistic skill is required to paint the picture thoroughly, but if anyone will try the experiment he will be surprised at the result obtained. Small details, eyes, lips, &c., should be painted on the back of print, using a sufficient amount of thinning oil to keep them transparent. Strong lights, whites, &c., should be also put on the print in body white, likewise the light in eyes. When this has been done, adjust a second plate behind the print, and secure it with gum paper sufficiently to allow of working upon it. Mix body colour with all the colours to be laid on the back of second plate, and, in laying them on, be careful not to go beyond the outlines, otherwise the effect of blurring will take place. If the first attempt is not satisfactory, the colour may be easily removed with a piece of rag moistened with the turpentine, and the operation repeated. When the picture is painted to the operator's satisfaction, all that remains to be done is to bind the two plates together with gum paper to exclude the dust, cover the back up with white paper, and fix it in a suitable frame.

EXAMINATION IN PHOTOGRAPHY.

A fortnight since we published the names of those who had passed the recent examination in photography under the auspices of the City and Guilds of London Institute. We now publish the particulars and the questions.

Instructions.

The Candidate must confine himself to one grade only, the Ordinary, or Honours, and must state at the top of his paper of answers which grade he has selected. He must *not* answer questions in more than one grade.

If he has already passed in this subject, either in the first division of the Elementary, or in the Advanced Grade, he must select his questions from those of the Honours Grade.

The number of the question must be placed before the answer in the worked paper.

A few questions accurately and fully answered will secure higher marks than a large number of questions imperfectly answered.

Ordinary or Pass Grade.

1. Describe the manufacture of pyroxyline, giving a formula which will produce one suitable for wet plates. As far as you can, describe the chemical changes that take place.

2. State the reason of the addition of iodide of potassium to a

wet plate sensitizing bath, and show your practical acquaintance with the wet process by giving a formula for such a bath suitable for hot weather.

3. Give an outline of the platinotype process, and, as far as you are able, the theoretical explanation of the reaction that takes place in developing the image.

4. What are the drawbacks, if any, to a lens which embraces a very wide angle?

5. How should you prepare a gelatine emulsion to give slow plates? Give a detailed description of the process you would adopt.

6. When a stereoscopic negative is printed, the two pictures have to be divided, and reversed as regards right and left. Show why this is.

7. When silver chloride is exposed to light it blackens. Describe what happens to this darkened chloride (1st) when treated with nitric acid, (2nd) with sodium hyposulphite, (3rd) with ammonia.

8. What are the chief characteristics of silver iodide, bromide, and chloride when used photographically? Describe them as fully as you can, more especially as to their behaviour with acid and alkaline development.

9. Give the theory of toning as far as you know it, and detail any experiments which may throw a light on it.

10. Describe a process for the production of developed paper negatives, giving a detailed account of the mode you would adopt of developing the image.

11. A carte-de-visite negative is handed to you from which a 12 by 10 print is to be produced for colouring upon. How should you execute the order?

12. I have two lenses, one of 12-inch focus, and another of 8-inch focus, and I have to make a copy of a map of exactly equal size. I find that with the first lens I have to use a diaphragm (stop) having an aperture of $\frac{1}{4}$-inch diameter to get good definition, and with the other a diaphragm having an aperture of $\frac{3}{16}$ inch diameter to attain the same definition. Give the relative exposures necessary, supposing the light not to vary.

13. I wish to make an emulsion which shall contain 10 grains of silver iodide, 100 grains of silver bromide, and 15 grains of silver chloride. How much of sodium chloride, ammonium bromide, potassium iodide, and silver nitrate must I weigh out from these quantities. The combining weights may be taken as follows:—

$Na = 23$ $N = 14$ $Br = 80$ $K = 39$
$Cl = 35{\cdot}5$ $H = 1$ $I = 127$ $Ag = 108$
$O = 16$

Honours Grade.

1. Give the plan you would adopt to ascertain the effective aperture of a doublet lens when a stop is used.

2. Show how you would calculate a "table of enlargements" with a lens of 12 inches equivalent focus; give the distances of the conjugate foci, from the optical centre of the lens, when enlargements of 3 and 7 times the original have to be made.

3. Give your explanation of the matt stains which sometimes occur on a wet plate negative when the plate is kept a considerable time before development.

4. Give the theory of ferrous-oxalate development, and give the different methods of preparing the developer.

5. In a gelatine emulsion there is usually an excess of soluble bromide after washing. What effect will this have on the sensitiveness of the plate, and trace theoretically the reasons of the modifications it may induce.

6. Describe in detail the reproduction in photo-engraving on a copper-plate of a line engraving.

7. A phosphorescent tablet emits light which has no violet or ultra-violet constituents. If this source of illumination be used with a sensitometer, it is found that a wet plate is only $\frac{1}{10}$th the sensitiveness of a gelatine plate, and yet when the former is compared with the latter by exposure in the camera, it is found that no such difference exists. Explain the reason of this, and also describe the mechanical details of some sensitometer, showing how you would obtain the values of the graduation.

8. It sometimes happens that silver nitrate contains impurities; how should you detect them? State how you can obtain pure silver nitrate from ordinary silver coins, giving details of the operations that would have to be gone through.

9. Write out, as far as you can, an explanation of solarization, halation, and reversal of the image on a photographic plate.

10. When you mix sodium hyposulphite with a ferrous-oxalate developer, what chemical reactions occur?

11. I have an emulsion containing silver bromide. I apply to six different portions of it the following:—Chlorine water, iodine water, bromine water, and solutions of iodide of potassium, chloride of sodium, and bromide of ammonium. What will happen in each case?

By-the-Bye.

CONTINENTAL RAMBLES WITH A CAMERA.

A Tour in the Thuringian Forest.*

A three hours' walk from Eisenach brings you to the little market-town of Ruhla. Ruhla is noted for its meerschaum pipe factories, and there is not a tobacconist, however humble, in this country, who has not heard of Ruhla meerschaum. The way lies past the bald, long-backed Hörselberg, where, as everybody acquainted with Tannhäuser knows, the goddess Venus holds her court. A shrubless, uninteresting mountain to look at, one scarcely feels tempted to waste a film over it; still, the other day, when we witnessed Tannhäuser at her Majesty's Theatre, and saw the Hörselberg depicted like one of the sharply-peaked Dolomites, we certainly wished we had a photograph to forward to the scenic artist with our compliments. The Wartburg, too, was shown in the scene like a red-brick Elizabethan mansion, we remember—a still more unpardonable error. If a poet or composer localizes his legend in some romantic district, in order to add to its interest, surely it is not for the scene-painter to do his utmost towards spoiling the story again.

A few miles past the Hörselberg, where a bit of grey cliff is seen through an opening in the green trees, is the Wittgenstein, of which you certainly must get a picture. If you can secure a little out-building or cottage in the foreground, all the better; for, truth to tell, it will help to make a picture, for the rock and foliage are scarcely material enough. There used to be a castle upon the rock, so they say, in which a baron once lived with a lovely daughter. The lovely daughter was, of course, in love, and every evening a dapper young knight came a-riding to see her. There was to be an elopement, only the baron found it out just in time, and slew the cavalier as he rode towards the castle to fetch his bride. The body was brought to the young lady, and, as was only to be expected of her, she died outright at the sight of it. For a long time afterwards the slain knight came riding a coal-black charger to the Wittgenstein at night, wandering through the castle searching for his lost love; and it was only with the aid of the Evil One that the baron was at last successful in banishing him to another height—the Rittersberg—which lies not far off, and where he is still to be met in the small hours upon his sable steed. The princess, however (for so she is usually called now), still inhabits the Wittgenstein, and is evidently a person well worth knowing; for one night some musicians returning home to Ruhla stopped at midnight under the rock, and serenaded her. Scarcely had the first note sounded than a little old man, with a grey beard, appeared, and asked for whom the honour was intended?

"The Princess of Wittgenstein," was the reply.

"Very good!" said the dwarf; "play on!"

The musicians obeyed, and gave the princess such a concert as she had not heard for many a day, and when it was all over, out came the dwarf again, and presented each with a freshly-gathered sprig of oak. Some toyed with the branch, and pulled off the leaves one by one, while others carried them awhile, and then threw them heedlessly away. Only one pinned the twig carefully in his hat. He soon forgot all about it, however, and he was startled next morning when his wife asked him what the

* Continued from page 453.

yellow thing was he brought home with him last night; then he came to look at it more closely, and found the oak twig had turned to burnished gold. The others, of course, ran off to search for the leaves they had thrown away, but the branches were nowhere to be seen.

Ruhla is full of quaint pictures, the houses, built of black oaken beams and white plaster, being peculiarly well adapted to the camera. It is a long straggling street at the base of a green valley, and on either side rise smiling gardens and verdant woods. A clear little brook runs through the middle of the street, dividing the Duchy of Saxe-Weimar from that of Saxe-Gotha, so that the opposite rows of houses belong to two different dukedoms.

One of the principal heights of the Thuringian Forest, the Inselsberg, some 3,000 feet high, is close to Ruhla. Indeed, you can ascend it in three hours hence. There is a capital view of the Thuringian Oberland, and a good hostelry now exists, where one may pass the night comfortably. A carriage drive leads thence in a couple of hours to Rheinhardts-brunn, where the Duke of Gotha has a palace, and where his brother, the late Prince Consort, resided for many years before he found a home among us.

Rheinhardts-brunn is well worth visiting, with its castle and pretty flower gardens hidden away in the depths of a thick forest, like Rosamond's bower. The patches of green meadow-land and mountain streams that make this portion of the Thuringian Forest so picturesque, render it also pre-eminently a game country. Deer are still common in Thuringia, as are also wild boars, while the roebuck is to be met with very frequently. Even bears are not unknown, and at the Wartburg some years ago was an animal that had been captured in the forest.

A pretty spa—Bad Liebenstein—is not far off, reached in a short drive through the forest roads. In the summer there is quite a fashionable company here, and as Saxe-Meiningen is close by, the Meiningen dramatic company, which made a sensation in London last year, frequently come over to play. But the place is a little too trim to please—we secure a photograph of the Hotel Müller, which looks like a palace, so that we may boast a bit of its grandeur to our friends when we get home—and the photographer will do better to take his camera into Altenstein (another principality), three miles off, where there are some wonderful natural rocks and a cave of colossal dimensions.

From Liebenstein, by rail and trap to Schmalkalden—a most picturesque town, but very dirty—and thence on foot to Oberhof, leads one into the Oberland of Thuringia. Let not the photographer in his wanderings hereabout, when a day's journey may take him into three or four different dukedoms, omit to get a picture of one of the old toll-bars or frontier-bars, which still exist in many parts of the country. They are "bars" in fact, as well as in name, and they are oft-times very ingeniously constructed. They are weighted at one end, generally with a big stone which keeps the bar open, while a chain at the other extremity permits the bar to be pulled down with the utmost ease. Here is a picture of such an one. The Germans are

a somewhat phlegmatic people, and like to take things easily, and toll-bars are therefore usually so constructed that the toll-keeper need not go out of doors to close the thoroughfare; and he generally expects those who pay toll to hand it in to him at the window, so as to reduce his trouble to a minimum.

Of the inn at Oberhof—the village stands at as high an elevation as Chamonix—we take a picture, but not of the duke's shooting box (we forget, by the way, which principality we are in, we have changed so many times), for we find it to be indeed nothing but a square box-like edifice of white plaster when we have brought the camera to the spot. The wind blows very keenly up here, and the efforts we make to keep our little camera steady are not very successful. It will not bear more than a few pounds' weight of granite, and these fail to give perfect rigidity. Absence of contact between the base of the camera and the triangle is often a cause of shaking, and we have found the wedging of paper or of a rubber washer between to improve matters vastly. But the best plan to secure rigidity is to have a camera and triangle—or, better still, base-board—so true, that perfect contact is ensured throughout. One wants the camera to rest upon as broad a base as possible, and for this reason the ball-and-socket joint met with in many French cameras is unsuitable for out-door work. They are convenient, and may be serviceable, if ball-and-socket are pretty big, for the studio; but directly the apparatus is exposed to the least wind, it shivers like an aspen leaf. To the out-door photographer, stable apparatus is indispensable, and one of the first things to be done with a new camera and stand is to see that they fit closely together, and that the camera is upon a tolerably broad base.

From Oberhof, another day's walk in the forest, over the Schmücke, where there is a better inn than at Oberhof, and a most delightful view, leads to Ilmenau. This little town was a favourite resort of Goethe, and on the Gickelhahn hill, up which we climb, is a little summer-house where the great German poet dwelt, and where he wrote many of his poems. In fact, his Ode to Night, or *Nacht-lied*, was scribbled one evening on the door of the wooden erection, and from time to time he was wont to renew the pencilled characters. After his death, the authorities, anxious lest any harm should come to the relic, had the handwriting photographed, and it is very well the precaution was taken, for but a few months afterwards the house, or a great portion of it, was destroyed by fire. Here is the poem :—

" Ueber allen Gipfeln
Ist Ruh'
In allen Wipfeln
Spürest du
Kaum einen Hauch.
Die Voegel schlafen im Walde ;
Warte nur balde
Ruhest die auch.

The little hut has been renewed, and, setting up our camera among the pine stems, we secure a picture of the primitive habitation. It is quite at the top of the hill, and, as far as the eye can reach, there are the waving pine tops over which Goethe must ofttimes have gazed when he took up his solitary habitation here in the Thuringian Forest.

We have left one of the finest "beauty-spots" to the last. This is Schwarzburg, a sylvan retreat in the principality of yet another princekin—His Serene Highness of Schwarzburg-Rudolstadt. Schwarzburg is within a day's walk of Ilmenau ; but, as the walk is not very inviting, we recommend a drive. Schwarzburg has a palace and a very good inn, and from the hostelry you enjoy one of the finest forest views in Europe. We may say that not even in the Black Forest have we beheld such leafy luxuriance, such a vast wealth of undulating foliage. It is as if one were surrounded by a sea of waving boughs and dark green branches, the palace of gleaming white upon one one of the eminences standing out like a rock in mid-ocean. A solitary fox, his long tail sweeping behind him, may be seen scampering across some deep-shadowed vale, and roebuck in twos and threes come out to feed in the soft green glades that fringe the forest. Schwarzburg has acquired a great reputation of late, and therefore hotel expenses are rather heavier than in Thuringia generally ; but you may dine off wild boar or forest venison, and drink better wine than they give you at most of the hotels on the Rhine, at a less cost than these pretentious hostelries are in the habit of charging.

ON GREEN FOG.

BY HERBERT B. BERKELEY.

The great importance of this subject may, I hope, be my excuse for again returning to the question of green fog and its causes, real and alleged.

I do not altogether admit that the development must be "forced" with ammonia in order that green fog may appear. Even with a mildly alkaline developer, hardly capable, one would think, of dissolving bromide, with some plates green fog is produced ; though I admit that with under-exposed plates and long development it occurs in its worst form.

Then, as to the theory of bromide in solution being the cause, for which we are indebted to Captain Abney, and which certainly seems exceedingly plausible. Have we not heard of green fog produced by ferrous oxalate? Captain Abney believes that in all these cases hyposulphite has been added to the ferrous oxalate. Perhaps so ; I have no knowledge one way or the other. But we have also read a statement to the effect that carbonate of soda not only produces "pyro. stain," but also may cause green fog. Presuming this to be the case, what shall we say to the solution theory? Shall we say that, when bromide of ammonium is used, carbonate of ammonium is formed? Or shall shall we put the solution of the bromide down to the soluble bromide pure and simple.

Captain Abney cannot concede that ferrous oxalate produces a grey fog where alkaline pyrogallol would cause a green fog ; but when we treat a not too virulent case of green fog with ferric oxalate, and then re-reduce with ferrous oxalate, is not the result of such a nature as to make the ordinary observer declare that the "fog has all gone"? It is the peculiar character given to the reduced silver by the pyrogallol that makes the fog so evident. Had ferrous oxalate been used, the fog would have escaped notice, and *perhaps less* silver would have been reduced.

I have observed that when green fog is treated with ferric oxalate, the silver being re-reduced by a weakly alkaline developer, the green fog returns in pronounced form. Of course, this may be said to favour Captain Abney's view, for silver oxalate is very soluble in ammonia. The experiment would be worth trying, using only pyrogallol and carbonate of soda as the reducer, for, I believe, carbonate of soda is not a solvent.

Captain Abney very truly states that some gelatines result in green fog, while other kinds do not—at least, so it would appear. Perhaps it might with still more truth be said that less rests with the gelatine than with the treatment that gelatine—or, more particularly, the emulsion—has received, for we find plates made with a certain batch of gelatine sometimes giving green fog and sometimes free from it—at least, I understand this to be the case. We also find one man swearing by a certain make of gelatine, while another condemns it altogether.

One thing I cannot quite get over in regard to the "solution and deposition theory," and that is the fact that with certain plates, and, perhaps, with certain gelatine, green fog is absent, though a strongly alkaline developer may be used. Now, adhering to the theory, we must presume one of two things: either that the gelatine prevents the solution of the bromide, or that the bromide is not in a very suitable state for solution ; or, on the other hand, that the silver dissolved is restrained by the nature of the gelatine from depositing itself on the surface. In connection with this hypothesis it has occurred to me that perhaps Colonel Stuart Wortley's collo-glycerine restrainer might be of advantage for replacing the soluble bromide in the developer. It would seem likely that a colloid restrainer would do much in preventing the deposition of silver. At the same time, a less liberal dose of sulphate of ammonia than is contained in Colonel Wortley's solution might be advisable with sulpho-pyrogallol, for the sulphate is itself a restrainer of a powerful character.

Returning to the "deposition theory," if we allow that a certain portion of bromide is dissolved, but not deposited again on the film, we must look for it in the developer or on the sides of the dish or of the developing-glass. Can it be that it has in these places escaped our notice? *

For my part I am inclined to believe that there is a state of the gelatine which especially favours the reduction of the silver salt when the developer is applied ; and when pyrogallol is used it lends a character to the reduced silver. It may be, too, that the silver thus reduced forms a convenient nucleus for any silver which may be dissolved by the developer ; but I take it, this latter is not the cause of the appearance, but merely a secondary action following upon it.

Is it really true that manufacturers are at their wits' ends with regard to green fog ; and are they despairing

* It may, of course, be supposed that when the plate is in a suitable state the *whole* of the silver is deposited on the *image*, no matter how broad the spaces unacted upon by light may be ; and that only when a plate entirely unacted upon by light is placed in the developer would, what I will call, the abnormal deposition ensue, the deposit in this case being, possibly, rather grey than green. With dry collodio-bromide, and with both alkaline and hydrosulphite development, it was no uncommon experience, when forcing a plate, to find nearly all the bromide dissolved away, these parts becoming grey and transparent ; yet neither the density of the image (which was generally thin) nor the deposit on the shadows, was suggestive of a deposition action. Indeed, not many years ago, I believe the "deposition theory" of alkaline development was considered rank heresy. Was the reduced silver in those days mainly present in suspension in the developer, or upon the glass—for no dish was used as at present? My only object is to look at both sides of the question, and to arrive at the truth, if possible.

of its banishment? If so, I wish they would try one or all of these things:—The use of a really hard but absorbent gelatine (what a comfort this is in many ways, all who have used it will concede): secondly, drying in a current of air pure, and of the normal temperature; and thirdly, the use of precipitated iodo-bromide, the hard gelatine being added after the boiling and washing of the precipitate. I should say that the first two precautions will go a long way towards avoiding green fog, especially if the gelatine be added to the emulsion containing extremely little gelatine, and after this has been boiled in the acid condition, the whole being afterwards well washed. I am certain, however, that a precipitation plan might easily be conducted on a large scale.

Captain Abney's remark on the action of dilute solutions of ferrous oxalate is interesting. It certainly seems curious that, supposing the effect to take place which he has thought probable, any trace of ferric oxalate formed by the initial reduction is not, by its mixture with the bulk of the dilute ferrous oxalate, at once placed beyond the possibility of again exercising an oxidising action; for the dilute ferrous oxalate would then appear able, metaphorically speaking, to snap its fingers at the exertions of its antagonist, ferric oxalate. But surely the hyposulphite in excess should at once reduce any ferric oxalate formed to the ferrous state, so that, however small the quantity of iron salt present, it would not be rendered inert (as a reducer) owing to its being converted into the ferric state. Perhaps extremely dilute ferrous oxalate is almost inert as a reducer, and certainly so when there is plenty of hyposulphite eager to gobble up the haloid salt. It also seems to me probable that when hyposulphite is in excess, ferrous sulphite may be formed, a secondary reaction of the tetrathionate—which I believe may be formed—upon the ferrous oxalate produced in the first instance. I have my reasons for supposing this, but I will not enter into them at present.

I did not intend my statement in regard to the precipitation of lime salts by sodic sulphite to be taken as an assertion that such precipitation is an actual benefit. It may be so; but I have no proof. Sodic sulphate, which is always present, throws down calcic sulphate from hard water, but not to any marked extent, except under certain conditions; and ammonia throws down calcic hydrate. If two bottles be taken, each containing the same amount of water, a little sodic sulphite being placed in one of them, then if an equal quantity of ammonia be dropped into each it will soon be observed that while the bottle which contains the sulphite adds nothing to the very slight amount of precipitate present (due to sulphate), the other bottle will soon present a clouded appearance (due to precipitation of calcic hydrate). It is thus evident that the lime salts in the former case remain in solution. It is easy to understand that the absence of any insoluble hydrate might be of great advantage for securing a clean and structureless film.

I know that Captain Abney prefers to consider alkaline development as purely physical; therefore I must not be misunderstood when I suggest a trial of what I will call a purely physical reduction of silver on a bromide plate. Let the ammonia used be saturated with silver bromide; then, taking a plate not prone to green fog, let the usual alkaline developer be made with the silver-saturated ammonia, or, if the instant reduction of the silver be feared, this might be flowed over the plate first. Let one half of the plate have been entirely exposed to light, while the other half remains unexposed. Then let the developer be poured on. The result of this experiment might be interesting, especially were another plate identical with the other developed with a like developer, but with ammonia free from silver bromide. Should this suggestion commend itself to Captain Abney, perhaps he will take the trouble to try it.

It is amusing to read the alternate praise and blame bestowed upon sodic sulphite in the developer; even those who formerly thought there was nothing like it, at times recanting and favouring us with their decided opinion that their quondam friend is a fraud—simply wormwood and gall, and fit only to be classed with that photographic preparation which at one time went by the name of "ground bone and sand." It is the old story! Photography cannot be encompassed by formulæ, and I suppose it will always remain a fact that circumstances alter cases, so that what in one case is "food," in another case will be "poison." However, I must say that I believe it is a great mistake to throw the blame of certain evils upon sodic sulphite, when it would be fairer to look nearer home. Certainly with a good gelatine plate qualities can be got unattainable by other means. "Pyro. stain" is never absent when sulphite has not been used, neither is the quality or colour of the image so good. This quality of colour is important, not because it necessarily affects the character of the resulting print (though in the case of silver chloride paper this may be), but because the printing intensity of "wet plate" colour is so much more easy of estimation than that sickly non-actinic tint which commonly prevails with ordinary alkaline development.

With respect to the reply of the editor to my criticism upon his suggestion to mix the sulphite with the ammonia, instead of with the pyrogallol, which appeared in a recent number, I was perfectly well aware that it was not alleged by any that the solution, as recommended by me, oxidized to the extent of darkening; but we are quite at liberty to assume that the effect complained of—if there be any justice in the complaint at all—has been due to the oxidation of a large proportion of the sulphite into sulphate. Certainly, this would have a restraining action, so that the image would not appear for perhaps a considerable time. At any rate, this theory is more plausible than any other, which must be pure hypothesis. The fact that pyrogallol in solution of sodic sulphite has been known, in many cases, to retain its developing power, is alone sufficient proof, to my mind, that there can be no prejudicial effect on the developing power of the pyrogallol brought about by the action, *per se*, of sodic sulphite. But sodic sulphite will be liable to change, wherever it be; and so, I say, little difference is there, in the case in point, "'twixt tweedle-dum and tweedle-dee."

Notes.

The British Association meets at Southampton on the 23rd inst. Dr. C. W. Siemens is the president-elect.

"With a Camera at the Italian Lakes" will be the title of our "By-the-Bye" next week.

The Collotype illustrations that appear weekly in *Life* are printed at the *Moniteur* office on the Quai Voltaire, Paris; about eighteen hundred copies are issued at a time.

One of the officers of the 7th Dragoon Guards takes with him to Egypt a small camera that packs in a sling case, and is no larger than the field-glass carried by our staff-officers. He will employ Pumphrey's gelatine films for the work, since they are lighter to carry and less perishable than gelatine plates. The camera will be used for reconnaissance, and similar purposes.

The fine Grotto of Adelsberg has just been photographed by means of artificial light by Herr Rottmayer, of Laibach, in Carinthia. Gelatine plates were of course employed, and for illumination phosphorus and saltpetre were used. The phosphorus was simply laid upon a little heap of saltpetre, and set burning when the time for exposure arrived.

Our Parisian contemporary, *La Nature*, is engraving in its pages a series of photographs of animals taken by M. Pierre Petit at the Jardin des Plantes, the Zoological Gardens of the French metropolis. If not so grand and terrible as the pictures of wild beasts drawn from the imagination, with which our youth are wont to form their first impressions of lions and tigers, the engravings have at any rate the quality of truth about them.

Our readers will be glad to learn of the safe arrival of the Arctic yacht *Kara* at Novaya Zemlia. She was found there by Sir Allen Young in the *Hope*, when he arrived on the 19th of last month. Mr. Grant, when we visited him on board the *Kara*, told us that the *Eira* must be found by the middle or end of September if they are to find her this year, so there are two months wherein to make the search. The last heard of the missing ship was in July last, when she was spoken on the Novaya Zemlia coast by a Russian captain.

We print to-day the questions set at the recent photographic examination. Any of our younger readers who wish to test their theoretical and practical knowledge cannot do better than sit down with a few sheets of paper before them and try their hands at answering as many of the queries as they can.

Once more the question of utilising the heat rays in place of fuel in our everyday life has cropped up. At a popular fête in the Tuileries garden, on Monday, a printing machine was set in action by the concentration of the sun's rays; while, to illustrate another application, water was boiled and coffee made by sunlight. The sunshine is concentrated by means of a mirror, and thus made to heat a little boiler, thirty to forty minutes sufficing to evolve steam with a summer's sun. To M. Mouchon is due the idea of making practical use of sunshine in this way, and it is hoped that an apparatus may be constructed whereby a soldier or sailor in the tropics may supply himself daily with distilled water.

Mr. Ireland, one of the vice-presidents of the Dundee Society, whose "Three Weeks in Norway" will be found in another column, has sent us some fine examples of his work this year in Scandinavia. His views are quite remarkable for their clearness and softness—we see Mr. Ireland emphasizes the brightness of the weather in Norway—and some of them (to wit, the coast views about Molde) are really gems of pictures. We ourselves shall have something to say about a tour in Norway shortly.

A secret developer, called Eternat, has made its appearance with much pomp and circumstance in Germany; this preparation has just been examined by Dr. Eder, who found it to be an ordinary ferrous oxalate developer. There is, however, something to be learned from the directions for using the Eternat.

The stock solution is kept in a clear glass vessel, and should be protected from the action of the air by a layer of petroleum oil, a portion of the solution being drawn off by means of a syphon as required. This is ultimately returned to the stock receptacle, and as the vessel in question is kept in a well lighted place, the reduction of the ferric oxalate to ferrous oxalate takes place progressively, the developer being thus ultimately restored to its original condition; but occasional additions of oxalic acid (Renovator No. 1) must be made to balance the decomposing action of light. This is very good in theory, but the busy photographer would hardly care to wait for the light to restore his developer. In order to make the "Eternat" as deserving of its name as possible, provision is made for removing any accumulation of soluble bromide which may make it slow in action. This is done by means of a soluble silver salt (Renovator No. 2).

Mr. F. Gutekunst, of Philadelphia, forwards us two magnificent pictures of monster proportions, one of them, the Capitol at Washington, measuring no less than 53 by 18 inches. The pictures are unmounted, so that the skilful manner in which the prints are joined is emphasised, and half an hour's careful study of them has not qualified us to say with certainty where the blending of the photographs takes place. In a word, we must acknowledge that the panoramic effect is perfect.

Nor can we speak less highly of the artistic quality of the photographs themselves. Some are disposed to think that but little taste and knowledge of art can be displayed in depicting architecture or panoramas, but this proceeds usually from the fact that they have never occupied themselves with such work. In Mr. Gutekunst's picture of the Capitol there is a harmony and delicacy of lighting, without which the magnificent picture would be but a vulgar print of a somewhat monotonous building; he has contrived to show forth its fine proportions under a smiling light, and thus produce a grand and impressive picture of a pile, as it is in all probability rarely seen by the spectator.

The exaggerated accounts transmitted by special correspondents from Egypt have caused the military authorities to draw up some strict regulations to govern these gentlemen in the field. Their number is to be considerably reduced, and it is contemplated granting to each individual a species of passport, enumerating the conditions on which the privilege is granted, and containing, as instant means of identification, a photographic portrait. The Russian War Office made a regulation of the same sort at the time of the Russo-Turkish war.

As the portrait of a correspondent at home will scarcely represent that of the same correspondent in the field, after the latter has been roughing it for a few months, it would be well, in order to make the regulation of any value, that photographs should be taken by the military authorities on the spot, at the time of issuing the passport. Since every convenience for the taking of portraits, as well as for fulfilling every other branch of photography, is now at the disposal of our army photographers, the service could be quickly fulfilled.

Indeed, seeing the completeness of the travelling photographic waggons that now accompany our army in the field, and the excellent training that Sapper-photographers undergo, surely some very valuable applications of the art might be made in the matter of identification. Several Egyptian spies are reported to have been captured of late, provided with "safe conducts" from the British general, which had either been surreptitiously obtained on some excuse, or stolen from their rightful owners. Our army photographers could take a portrait, and supply a print, in a couple of hours, so that if such pictures were required for appending to "safe conducts," they would be forthcoming without delay.

Already preparations for observing the next Transit of Venus are in active progress. M. Guénaire, photographer to the Nice Observatory, sailed last month for Patagonia, where no less than three parties of French observers are to be stationed. We believe M. Guénaire will have recourse to the Daguerreotype process, as neither collodion nor gelatine images can be relied upon when very minute and accurate measurements have to be made.

Lieutenant Darwin, R.E., late Honorary Secretary of the Photographic Society of Great Britain, has been selected to proceed to Brisbane, to watch the Transit of Venus from that spot. Captain Macinlay, R.A., goes to Jamaica, and Lieutenant Thomas, R.A., to Barbadoes, so that there will be no lack of observers to represent this country.

The Transit of Venus takes place on the 6th December next, and, as the phenomenon will be partly visible in this country, it will be looked forward to with considerable interest. Our readers are aware that the estimate of the sun's distance from the earth is based upon former observations of the phenomenon, and is now reckoned to be 92,880,000 miles. It will be the endeavour of astronomers and photographers on the next occasion to verify this estimate.

Mr. W. K. Burton recently showed us a shutter with releases arranged at different heights, so that an exposure of one-fifth, one-eighth, or one-tenth of a second could be obtained, according to the momentum acquired by the falling shutter, before its opening passes the lens. By inclining the shutter, it is easy to prolong the exposure to nearly a second.

By burning a thin thread which holds back the shutter, all vibration of the apparatus which does not arise from the actual movement of the falling part is avoided; but, to realize this advantage to the fullest extent, the thread must be stretched in a direction which exactly corresponds with the direction in which the shutter is to move.

An ordinary cigar-lighter or fusee is best for firing the thread, and if the thread has been converted into pyroxyline, so much the better. Waterproofing with an alcoholic solution of the resinous product obtained by nitrating milk-sugar is also an advantage.

Sir Thomas Parkyns, whose name is well known as an accomplished amateur photographer, and who has lately given much attention to the manufacture of a steam tricycle, anticipates being able to reach a speed of fifteen miles an hour with his most recent vehicle. Unfortunately, the English law, which specifies that a steam carriage traversing an ordinary road shall be preceded by a man bearing a red flag, does not permit of the vehicle being used on our highways.

TWELVE ELEMENTARY LESSONS IN PHOTOGRAPHIC CHEMISTRY.

No. III.—Photographic Chemicals.

Acetic acid, $C_2H_4O_2$, is the essential constituent of vinegar; the liquid known as *glacial* acetic acid contains 99 per cent. of the real acid, and is obtained by distilling sodium acetate and sulphuric acid. It may be recognised by its odour of vinegar, and also by heating with alcohol and sulphuric acid, when the characteristic odour of acetic ether will be produced.

Citric acid, $C_6H_8O_7$, is obtained from fermented lemon juice. The latter is neutralised with chalk, and the insoluble calcium citrate is decomposed with sulphuric acid, the sulphate of calcium is filtered off, and the citric acid crystallised out after evaporation. The acid is very soluble in water and alcohol, and when heated with strong sulphuric acid it gradually blackens, with evolution of carbonic oxide, which burns with a blue flame.

Gallic acid, $C_7H_6O_5$, is prepared by boiling powdered nutgalls with extremely dilute sulphuric acid, and then allowed to cool, when the gallo-tannic acid in the galls is decomposed into grape sugar and gallic acid, which crystallizes out in yellow needles. Gallic acid is sparingly soluble in cold water, although readily soluble in hot water. When added to a solution of perchloride of iron it produces an inky-black precipitate, and with ammonia it forms a red brown solution which darkens when shaken in the air.

Pyrogallic acid, $C_6H_6O_3$, is manufactured on the large scale by heating gallic to about 200° C. (392° F.), by which means it is split up into carbonic anhydride and pyrogallic acid. It is very soluble in water, alcohol, and glycerine, and may be distinguished from gallic acid by its property of producing a dark brown colour when an alkaline solution is shaken in contact with air. Pyrogallic acid is not, strictly speaking, an acid, and its solution will not redden litmus paper; thus it is termed by chemists *pyrogallol*.

Hydrochloric acid, HCl, is an aqueous solution of the gas formed in the preparation of sulphate of soda from common salt and sulphuric acid. The acid is recognized by its property of reddening litmus paper, forming a white precipitate with silver nitrate, and its pungent odour.

Nitric acid, HNO_3, is prepared by distilling a mixture of potassium nitrate and sulphuric acid. Strong nitric acid has a specific gravity of 1·42; while the acid known as "fuming nitric" should have a specific gravity of 1·52, and often possesses a yellow colour, from the presence of nitric peroxide. The acid may be detected by its property of producing red fumes when heated with metallic copper, and a brown colouration with a solution of ferrous sulphate.

Sulphuric acid, H_2SO_4, is produced by the oxidation of sulphurous anhydride; on the large scale it is manufactured by allowing sulphurous anhydride, steam, air, and nitrous fumes to mix in a series of leaden chambers, where they all react to form the acid, which collects at the bottom of the chambers. The acid in this condition is somewhat dilute, so in order to concentrate it, the acid is placed in a platinum still and distilled till it is of the specific gravity 1·82, when it is in the condition known as "commercial acid" or "oil of vitriol." It generally has a brown colour, from the presence of organic matter, and it also contains an appreciable amount of lead. Pure sulphuric acid is obtained by distilling the commercial acid, thus freeing it from lead, organic matter, &c. The acid may be identified by its property of blackening sugar, and producing a white precipitate with a solution of a barium salt.

Alcohol is, correctly speaking, the name of a series of organic compounds; but that which is generally understood by "alcohol" is ethyl alcohol, C_2H_6O, or C_2H_5HO, or spirits of wine, and is obtained by the fermentation of sugar in presence of yeast.

Methylated spirit is a mixture of three parts of ethyl alcohol and one of methyl-alcohol—a liquid obtained by the distillation of wood. The object of adding the methyl-alcohol is to prevent the use of the spirit for manufacturing intoxicating liquors.

Spirits of wine should be of specific gravity ·825, containing 10 per cent. of water; while absolute alcohol (which is prepared by distilling the above with quick lime) is of specific gravity ·794, and should not contain a trace of water. Ethyl alcohol may be recognised by its property of producing the characteristic odour of acetic acid when heated with a mixture of sulphuric acid and potassium bichromate.

Alum, $AlK(SO_4)_2.12H_2O$, or $AlNH_4(SO_4)_2.12H_2O$, is a double sulphate of either potassium or ammonium and aluminium; the alums are made by adding a solution of aluminium sulphate—prepared from clay and sulphuric acid—to a solution of sulphate of the alkali. The potash alum is generally found in commerce, but ammonia alum is occasionally met with, and can be distinguished by its power of evolving ammonia when treated with a solution of caustic soda or potash. Both potash and ammonia alum produce a white precipitate with a solution of barium chloride, and a violet colour with a solution of logwood.

Chrome alum, $CrK(SO_4)_2.12H_2O$, is obtained as a secondary product in the oxidation of substances by potassium bichromate and sulphuric acid, and is formed in the bichromate battery. This salt forms large dark purple crystals, which exhibit a ruby colour by reflected light. Chrome alum may be identified by its property of being oxidised when heated with nitric acid and potassium chlorate; the presence of chromic acid being afterwards proved by the addition of a solution of acetate of soda and lead acetate, when a yellow precipate of lead chromate will be formed.

Ammonia liquor is a solution of ammonia gas (NH_3) in water, one volume of the liquid containing about six hundred volumes of the gas in solution. The ammonia is obtained by heating a mixture of ammonium chloride and lime, and the solution is formed by passing the gas thus formed into water. The liquid is generally known in commerce under the name of *liquor ammoniæ fort.*, and is of specific gravity ·88, containing nearly 30 per cent. of ammonia. The only impurity that is likely to be present is the carbonate, which is formed by direct combination with the carbonic acid present in the atmosphere. Ammonia is recognised by its well-known pungent odour, and its property of bluing litmus.

THREE WEEKS IN NORWAY.

BY D. IRELAND, JUN.

A question which comes up yearly, and which wants some care in deciding, is that of—where are we to go this summer? Having spent three weeks very enjoyably in Norway last year, we decided to pay another visit to this interesting and beautiful country, selecting, of course, a different route. Wishing to get on the road before the run of tourists arrived, we crossed the North Sea, in the end of June, to Gothenburg, in the south of Sweden, and thence by rail to Christiana. Having neglected to secure rooms beforehand, we found on our arrival all the best hotels full. Only staying a night here, we went by rail to Eidsvald, a three hours' journey, at the foot of the Myösen Lake. The railways in Norway are few and of recent construction, and the travelling very slow (fifteen miles an hour); but the arrangements, like those all over the Continent, are far ahead of our own, both as regards the luggage system and the attention paid to the personal comfort of the passenger. On the journey the heat was oppressive, and we were very much surprised and pleased at finding that a couple of tanks of iced water filled the spaces ordinarily occupied by the lamps. Arrived at Eidesvald, we got on board the steamer *Kong Oscar*, which landed us, after a pleasant sail of eight hours, at Lillehammer, at the head of the lake. The guide-book informed us that the water at the head is thirteen feet higher than it is at Eidsvald, so that we had been sailing up hill all day.

At Lillehammer we got our four-wheeled carriage a *trille*, and commenced our journey proper. Coming up the Myösen, we got an instantaneous view or two; but we found a grand subject for the camera at Lillehammer in the shape of a splendid waterfall, about a mile from the hotel, and on which we exposed four or five plates. At night we did our first changing, which was by no means easy; for Norwegian houses have a superabundance of windows, and the doors are very badly fitted. One would hardly expect to have much difficulty about keeping out the light at night; but from the middle of June to the end of July there is sufficient light all the night through to read or even photograph by, some of our best negatives having been done betweeen the hours of five and six a.m. and seven and eight p.m. After considerable trouble we succeeded in getting everything made light-tight, and emptied and re-filled the slides. We afterwards dispensed with the lamp, adopting the plan of covering one-half of the window with double ruby paper, and pinning up double black calico over the other half. This answered admirably, and we always had an abundance of light to work by, which is a great thing, and perfectly safe, too, which is a greater. We usually changed plates about eleven or twelve p.m., and had always plenty of light. The plates used were Wratten and Wainwright's ordinary 12 by 8, and we could not have wished for better. One double slide was always kept filled with instantaneous films for emergencies; but they are of little use for ordinary landscape work.

We drove about fifty miles a-day, changing horses every eight or nine miles. From Lillehammer to the end of the Gudbrandsdal—two days' journey—the scenery was very pleasing. The Romsdal commences at Mölmen, and the scenery from there to Veblungsnaes is grand in the extreme. During this part of the journey the camera was in constant requisition, every turn of the road bringing fresh beauties before us. The difficulty was, not in finding subjects for the camera, but what to leave undone. From Mölmen to Veblungsnaes we exposed during the day seventeen plates, and could have had as many more. The weather, too, was all that a photographer could desire—bright and clear.

The principal feature of this valley is the Romsdal Horn, an immense mountain with a curiously shaped peak, not unlike a rhinoceros horn. We passed this rather late in the evening, but a couple of plates were successfully exposed on it. Two hours afterwards we arrived at Veblungsnaes, prettily situated on the fjord at the entrance to the Romsdal. Here we made the acquaintance of a gentleman who spoke English fairly well, and having read in the never-failing *Murray* that some glaciers were to be seen at the entrance to the Romsdal, we asked him if he knew of a glacier in the neighbourhood, and he at once replied, "Oh, yes!" On asking where it was, he said, pointing to the opposite shore of the fjord, "Right over there!" Now, we thought, this is a splendid opportunity, and will be a good chance for getting some photography done; and accordingly decided to sail over the next day. In the evening, while speaking to a young gentleman connected with the hotel, the glacier was again mentioned, when he at once remarked, "Ah! I met the gentleman a little while ago who told you about it, and I am afraid there has been a little mistake; he thought you were wanting a man who puts in glass, you know. So our glacier transformed itself into a glazier, and our hopes of getting some photographs of that remarkable formation were reduced to *nil*.

A twelve hours' sail from here, in one of the numerous little steamers which run on all the Norwegian fjords, landed us in Molde, near the sea coast. We ascended a hill at the back of the town, and were charmed with the view, which, indeed, is said to be the best of its kind in Europe. At your feet lies the little town on the shore of the island-studded fjord, while on the other side, about thirty miles off, tower range upon range of snow-covered peaks, from east to west, as far as the eye can reach. A panoramic view was taken of this on four plates (12 by 8), and these negatives are amongst the best.

The steamers which run to the North Cape call here, and we sailed down to Bergen in one of them, the *Olaf Trygveson*. Some drop-shutter work was done on the way down, and the results were fair, plenty of density being easily obtainable by using glucose in the developer. A couple of days were spent in Bergen, of which a magnificent view is to be got by ascending the hill to the north. A large fish-market is held in Bergen twice a-week, and we were successful in obtaining a good instantaneous view of it.

We left on Saturday morning, and arrived in Newcastle on Monday morning, after a quick run of fifty-two hours. Altogether sixty-eight exposures were made, and—thanks to the excellence of the plates—not a single failure had to be recorded. The best negatives were those which got a full exposure (over-exposed, in fact), and which were developed with a small quantity of the ammonia bromide solution in proportion to the pyrogallic.

RECENT ADVANCES IN PHOTOGRAPHY.

BY CAPTAIN W. DE W. ABNEY, R.E. F.R.S.*

The next spectra are exceedingly interesting—to me, at all events—and I should like them to interest you. They represent a new form of molecule. I believe very few people know anything about them. The peculiarities of the mixture were discovered by me, and a paper about them sent to the Royal Society a very short time ago. That molecule is this: It is not a combination between iodide and bromide in the ordinary acceptation of the word, that is to say, it is not $Ag_2Br_2 + Ag_2I_2$, or not simply one equivalent of each of bromide and iodide of silver added together, but an absolute combination, Ag_2BrI, or a double molecule, which has been formed, and on which the spectrum has a totally different effect. You will see (No. 7) that, instead of having the maximum intensity at G, its maximum is far into the green, and it has a minimum about G. In the same way, another molecule is formed by a combination of molecules of chloride of silver and iodide of silver, and that, too (No. 8), has no maximum about G, but has a minimum there, which is the place where the maximum sensitiveness is found in the ordinary iodide of silver.

I will try and explain how these last curves are produced; if you take iodide and bromide of silver together, and expose them to the spectrum, what happens is this: first of all, iodine and bromine are liberated. What becomes of the iodine and bromine? The bromine immediately attacks the sub-iodide of silver, and forms a new molecule, Ag_2BrI; the bromine undoes the work of the iodide as fast as it is done, so that we have, in the place of maximum intensity of the iodide, the least work done. In the same way with the chloride. The chlorine liberated from the chloride undoes the work which is done by the iodine; the consequence is, that in the place of maximum intensity of the iodide we have a diminution of intensity in the case of the double salt; in other words, the dry bromo-iodide of silver is less sensitive for the spectrum about the part G than any other part of the spectrum to which it is sensitive. In order to prove that, I will tell you a little experiment which was carried on by myself. Chloride of silver was absolutely blackened in the light, and sub-chloride was formed; then it was treated with iodine again, and it became a uff colour. When this new molecular form was placed in the spectrum, we got exactly the same result as we do here, showing that we have a new molecule of chloro-iodide of silver. I think this will very likely throw a great deal of light upon some of the phenomena which are met with in ordinary dry-plate work.

Nw I crave your attention to one thing. You may ask if chlorine always undoes the work done on the iodide. The fact is, that it does not, if you have free nitrate of silver present; since this salt is able to take up the iodine and bromine, therefore the bromine cannot act on the sub-iodide of silver; it leaves it there, and you have the impressed spectrum totally different; in fact, the bromide and iodide spectrum are superposed one on the other. There are a great many facts I could show you to prove this. We come to the conclusion, then, for sensitiveness, you must have a sensitizer present. In gelatine plates, you may say that gelatine is a sensitizer, but it certainly is a very feeble one; anyhow, if you want to get sensitiveness in a plate, you must have a sensitizer present which will mop up, not only iodine, but bromine. When this is the case, bromine cannot go and destroy the work done on the iodide.

Before concluding this part of my lecture, I may also say that I have found that the printed image and the developed image have precisely the same characteristics. Thus, if you get pure iodide of silver, you get the termination of both the printed and developed spectrum close to G. A curious thing with regard to iodide is this: if you have the smallest trace of impurity in it, it is immediately shown in the spectrum by a prolongation below G, and you can go to the chemist and tax him with having given you iodide which is not pure.

Now there is one point that has exercised the minds of a great many photographers, and that is the illumination of their dark rooms; and I hope I may be excused if I go over what may be apparently well trodden ground, but I believe there are many here present who have no absolute certainty as to why they are using certain glasses to glaze their developing rooms. I want to show photographers the absolutely safest light they can use in developing their pictures. Here we have a spectrum, and beyond it you see the fluorescent rays. I will ask Mr. Woods to pass through the spectrum one or two glasses. First of all we will take ruby glass (No. 2), and you will see that when it becomes very bright indeed, there is a certain amount of blue light comes through the glass; I can see a trace of yellow, and a trace of green. Now I will take the yellow glass; here is one which photographers are very fond of; but I dare say you will see that there is a great deal of blue light comes through that. That was the ordinary glass used for photographic dark rooms within the last half-dozen years, and people were perfectly content if they glazed their rooms with it. But there are yellows and yellows, and I will show you the difference between two. Now we will have a magenta (No. 4), which you see cuts off a great deal more light. The next (No. 6) is a stained red glass, which cuts off the green, too. Now there is one combination which I wish to show you, because people often complain that their photographic studios are not safe as to light, and that they use ruby glass and get foggy plates. I have great doubt about fogging bromide plates with proper red glass where ordinary precautions are taken, though not with the ruby glass, which lets blue light through. If people would only use the spectroscope with a strong light, they would very soon see where their glazing is at fault. Now, I will throw on the screen the light through a piece of blue glass (No. 1), and I think you will see that there are bands in the red and yellow; there is plenty of blue coming through, and some green. Now I will ask Mr. Woods to give us a combination of stained red and blue; you see a red line, and nothing else. If photographers want to be absolutely safe, let them glaze their studios with cobalt glass and stained red, and they will get nothing but the light of that

* Continued from page 461.

particular refrangibility which I will warrant is totally unable to affect any gelatine plate—of the ordinary type, at all events. You may glaze and glaze with ruby, but you will never get rid of blue light entirely. Of course it diminishes with every thickness you take. If you want to use ordinary plates, which are not so sensitive that you cannot look at them, my advice is to use a combination of stained red (No. 6) and ruby glass (No. 2), which

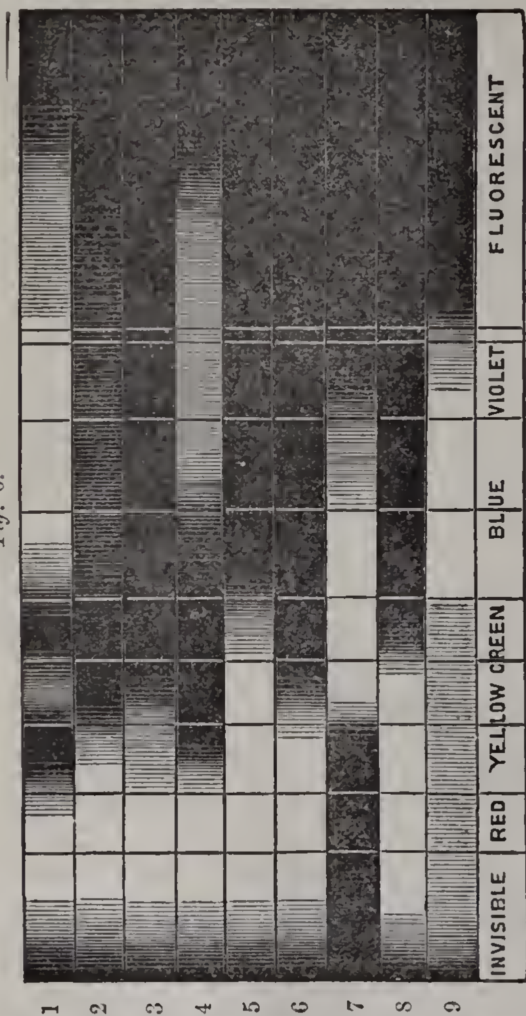


Fig. 6. 1, Cobalt glass; 2, ruby glass; 3, chrysoidine; 4, magenta; 5, flashed orange; 6, stained red glass; 7, bottle-green; 8, aurine; 9, quinine.

will give you a comfortable light to work in, for it cuts off the blue, and leaves the red in a brilliant patch. Those who are using that combination ought to have nothing to fear; but if they still fear, let them use a combination of cobalt (No. 1) glass and stained red glass (No. 6), and then they will only get the colour of that narrow strip of light which you saw just now. I should like to show you the green glass in the spectrum (No. 7), that you may judge what kind of light gets into it. It was at one time seriously recommended as an admirable thing for not trying the eyes, and for being safe to use in the developing room. A combination of red and green is a fairly safe light for iodide plates or ordinary plates, but not for gelatine plates, which are extremely sensitive. Next we come to a series of pretty colours, which may be very useful to us. Here is the spectrum of magenta (No. 4); the yellow is cut out entirely, and the green, leaving the blue, violet, and orange. Now I will try aurine (No. 8) and chrysoidine (No. 3). Here you see the blue is gone entirely. Some have said that the ultra violet rays go through aurine; but I will leave it to you to say whether they do or not. There is no trace here of the ultra violet rays when I apply this card with the sulphate of quinine on it. They should appear if there were any. We have next a combination of magenta and aurine, which is a perfect red light, and is very good indeed for the photographic studio. I think I may say, without a breach of confidence, that I believe a certain "ruby medium" in the market is made according to the directions that I gave some time ago. You may ring the changes of combinations of these glasses; you may have scarlet and aurine, or magenta and aurine, and either one or the other will give you this red band only. If all other means fail, the photographer may use the ferrous oxalate developer. You will see that it cuts off the blue light, at all events. I should not at all mind developing a plate in such a light as that. In fact, you may bring the most sensitive plate out into a white light, when developing in a dish, with a covering of ferrous oxalate over it. I hope that, having seen spectra, you will lay to your heart what I have been saying to you about the glazing of your dark rooms. I thought this was a subject that I ought not to pass over without some reference.

In 1874 we had a most astouishing discovery made, and that was, that by dyeing a film of sensitive collodion you were able to get an increased action by the spectrum. In common with others, I took up that subject and investigated it, and I wish to draw your attention very briefly to it to-night, because I think it is one of the advances made in photography which ought not to be passed over. If you take one of these aniline dyes, such as a blue dye, and expose it to light behind a piece of black paper, with an aperture in it, such as I have here, you get an image on the dye, such as you see. What is the meaning of that? The meaning is that the dye is oxidised, for if you apply an oxidising agent you get the same result. Dr. Vogel found that if you dyed plates with some of these fugitive dyes—they were all fugitive to a great extent which he used—he was able to obtain an extension of the impressed spectrum exactly in those parts of which the dyes absorbed, and he introduced the term optical sensitiser to describe the fact. Now, I am going to quarrel with that expression, because he explains it in this way; he says, in effect, that the sensitive aniline dye is able to take up a vibration, and to direct it to something else; in other words, that when light has done all it can in endeavouring to bleach a dye, that its period is transformed, and it does something else on the silver salt which is in contact with it. Well, that is not a philosopical way of looking at things, because if you could only arrive at the principle, you might just as easily arrive at that principle of perpetual motion, which is a thing which I am not prepared to admit. Now I honestly say, that for a long time these experiments staggered me, and the arguments Dr. Vogel brought forward seemed fully to justify his term of optical sensitiser as applied to the dye stuff; but eventually I was able to come to a different conclusion, and that conclusion I wish to put before you. If you have a substance which is oxidised in the presence of an haloid salt of silver, what do you expect? You expect that the haloid salt of silver would be reduced. If you place pyrogallic acid in contact with the haloid salt of silver, and help it to be oxidised by ammonia, you expect that the haloid salt of silver will be reduced, and I lay the action of the dye to precisely the same principle as the pyrogallic acid, which helps to develop the image; in other words, the oxidation of the dye causes a reduction of the bromide of silver, or iodide of silver, as the case may be, and simply provides a nucleus on which development can take place. I wish, however, to point out that Dr. Vogel has an objection to my explanation. He says, "Oh, but you require time to bleach things; you require time to alter them." So you do; you require time to blacken the chloride of silver; nevertheless, the slightest exposure to light begins the change in it, and so the slightest exposure to light begins the change in the dye, and on this principle, of course, the action of dyes upon sensitive films can readily be explained.

I have got behind the screen three pieces of sensitive bromide paper, one dyed with a blue dye, and another with eosine, the third pure bromide of silver without anything. I propose to develop those on the screen. I must give this rather a longer exposure

Fig. 7.

than last time, because blue dye takes away the sensitiveness to a material extent. You can see the colour; it is somewhat of a lavender grey, which no doubt will show that it absorbs exactly in the same position where the extra length of the spectrum is developed. In the eosine, I dare say you notice a peculiar dimming of light about the green; this is a very fluorescent dye, and it is in that position where we shall expect the action to take place. I will, however, show you where the absorption takes place of these two dyes we have used. This is a spectrum of the dye; it lets the ultra-violet rays through; in the green we have a great cutting off. Here we have the cyanine, which is a different colour altogether. It cuts off the yellow, and also the green; therefore, on the principle of work, we should expect that where absorption takes place in the dye, there dye would be oxidised, and the silver reduced in consequence. I now expose the three slips of paper above alluded to, and I will develop them before you. [The papers were developed in yellow light, as before.] The impression of the spectrum on the eosine dyed paper flashes out; the part in the green comes out very strongly indeed. The blue dyed paper shows, besides the ordinary spectrum of the bromide, a band in the yellow. Finally, we have the undyed paper. The above diagram shows the effect obtained on cyanine blue. Here you see the marked difference in the three cases.

(To be continued.)

UP THE HILLS IN SOUTH WALES; OR, WHERE *NOT* TO GO WITH THE CAMERA.

BY GEORGE BRADFORDE.

Scotland's beauty is proverbial. Her wild, untrodden glens, her towering mountains, her heath-clad vales, her romance, and her grandeur are known to every one. The tourist looks upon her rugged features in awe. The casual, used-up man of the world is even awakened to a sense of insipid admiration when he is medically advised to seek her invigorating air, taste of her heather honey, and sip gently of her mountain dew. The smoke-bound cockney has even a vague idea that Cremorne in its most perfect form was nothing to the *ultima thule* of Britain. That is where I should like to go with camera. Excuse the above outburst, because I have been—— please read the above title once more.

Every one knows that the "odd jobs" that crop up in the general routine of a portrait business—in the out-door line, I mean—are usually attended with sundry difficulties that the professional landscape photographer, when told about them, can only hold his sides and laugh at. For instance, fancy, if you can, a manager of a branch of a big firm borrowing a tripod, background, &c., from the manager of another branch, for the purpose of doing an outside job. On examining the lot, the operator found that there was no screw for camera or tripod. "Bah! what about that?" cried manager No. 1 (who knew as much about photography as a cat about Greek); "get a piece of rope, and tie them together." There are some absurdities that people cannot laugh at, and I fancy this is one. It is quite enough to give you a pain in your face at once, and a sleepless night after, to the tune of—"Tie them together, man; tie them together!"

When one takes all the worry of our profession into consideration (the vagaries of sitters and people who know better, you know), one cannot wonder at medical statistics showing that there are more photographers in lunatic asylums in proportion to other callings.

I have been to Ty-new-ydd!

My manager (don't think that I have mistaken myself for Jumbo) turned up a little late, so that we were just in time to get a nice interesting view of the train as it smoked away from the station. I expect this effect was the cause of being at church or chapel on the previous Sunday night. I can think of nothing else, our departure being fixed at eight something on Monday morning. After having a queer little journey upon a queer little line, where we had to change carriages as often as a utility man has to dress in a five-act play, we steamed up the hills and arrived at our destination amidst torrents of Welsh mountains of mist and stray mountain sheep, the latter about the size of cats and as dingy as Skye terriers.

Now I must explain to you that we did not come out to this Heaven-forgotten place to take views; had such been the case we would have taken our farewell at once. The bleak, uninviting hills, the angry-looking stream in the valley, the patches of pasture with "there and here" a sheep—some with one horn, some with none, some with one eye, and some without a tail (so bellicose are they that they generally get more or less delapidated before they reach the years of maturity), was not the place for a landscape artist to loiter in. In short, I may say, the horrid place is there in all its barren and depressing bleakness and squalor, without a particle of the grandeur and awe that strike one upon first beholding the gloom and sternness that shroud Glencoe. No, sir, we came to photograph the natives for club pictures.

If the scenery was bad, what shall I say about the general tone of the natives? They were absolutely beautiful! It was "pay Monday," and their faces shone as the "shiners" did in their pockets. There were only seven fights and a half, on the level patch on the hill, at the back of the Blandy Arms, during the afternoon. It was sweet—so innocent—to see them go up the hill like lions—tearing off their coats in genuine fury, hurling defiances of a blood-curdling description at one another, and then, when their wind was spent, to come down undamaged, pick up their late discarded garments, and settle down into their normal state like lambs.

As ill luck would have it, the weather broke just as we commenced to put together our backgrounds (?). Down came the mountain mist in clouds, then a high wind that drove it away, and left us as a comfort sundry showers of icy rain. A more miserable day I never tried to do work upon. Now, who but madmen would insist that good pictures could be taken under such circumstances—a puny background tied to a wall and built around with great stones, a camera pitched upon a slope with one leg of the tripod built up with pieces of slate, the camera and focussing cloth held in position by two stalwart pitmen? During the exposure of one picture there came a great gust of wind and flapped the background from its bearings with a crack that made the sitter think his head was split. Another time, the camera, in spite of holding it tight down, managed to rear up on its front leg like an unmanageable steed that was impatient to be off. Take all this into consideration, along with the flouts and gibes of jocose onlookers, and sharp-edged stones that I had to pick my way amidst, then ask me if I should like to go there again, if you dare!

The second day was not much better than the first—black, cold, and miserable still. "You must do them," were my orders. But what folly to insist upon such impossible things. From my inmost soul I pity the poor fellows that "must do" such things. Still, take the negatives one and all, and everything considered, what with pencilling the wavy background, stopping down floating hair, flying ribbons, shutting mouths, putting in eyes, and retouching all over, and then vignetting very close, I dare say they will pass in a crowd.

Some people would think that had we done nothing those two days, and waited for the third, which proved exceedingly fine, it would be better for all parties. Of course, that is a matter of opinion.

The Welsh are very interesting, but not picturesque. Certainly I did not expect to see them in sugar-loaf hats, short petticoats, and home-spun hose; but it was less than I expected to find them, loafing and smoking like Durham pitmen. They are homely, affable, and make even too much of strangers. They make plenty of money, their only difficulty being to spend it. They live in a groove that there seems no possibility of getting out of. I can assure you, sir, there is plenty of room for those philanthropists who gather so much money to send abroad to open a very useful scheme here. I do not allude to those missions that ram tracts and religion down your throat by main force; but were there evening schools, penny readings, lectures upon foreign travel, &c., it would do a deal for the position of the people "up the hills." It speaks well of them when they are so willing to go in for club pictures. A little of this suggestion put into practice would have a more beneficial effect than the closing of the hotels on Sundays for travellers as well as residents.

But I wander. I merely meant by the above that the inhabitants of the hills are not so bad as they seem—or their scenery! I do not include the whole of Wales—only Ty-new-ydd, and that is one of the places where *not* to go with the camera, unless you want to take portraits and make money—only choose better weather than we did.

Correspondence.

STAINS ON GELATINE NEGATIVES.

Dear Sir,—Seeing so much said about stains on negatives, I tried my old solution of sulphuric acid (half ounce to one quart of water). After the negative is taken out of the hyposulphite, I pour some of the sulphuric solution over it, and the negative clears at once, but the negative must not be put in it to soak. I find it clears the negative, and makes it look like a wet negative. I also find it better than using sulphite of soda, as it makes just as clear a negative as if you use the sulphite. I don't find it does any harm, or hurt the negative at all. I have used it now for some months, so have given it a fair trial. I am not chemist enough to know how it acts, but I find it does all I wish, and makes nice clear and good printing negatives.—Yours truly, A. R. Dresser.

FERROUS OXALATE DEVELOPMENT.

Dear Sir,—I notice in this week's News an article on—or, rather, against—the use of ferrous oxalate as a developer. Mr. Wilkinson, the able writer of the article in question, seems to be of the opinion that ferrous oxalate has only been revived by certain manufacturers whose plates will not bear pyrogallol without exhibiting various defects, the principal of these being fog. Now, as I wrote a letter on this subject some weeks back, I may, perhaps, be allowed to reply to some of Mr. Wilkinson's assertions.

In the first place, allow me to state that I have no connection whatever with any manufacturer of dry plates, and that therefore any predeliction of ferrous oxalate cannot be attributed to that quarter; also I am not in the habit of using second-class plates, unless Mr. Wilkinson places those of Wratten and Swan on that list, which I am sure he cannot. Now, my experience is almost exactly opposite to his. I find that, with good plates, having a fairly thick film of gelatine, I can obtain ample density with ferrous oxalate after an immersion of about four or five minutes. With poor plates, on the other hand, for which, according to Mr. Wilkinson's theory, ferrous oxalate is specially adapted, I cannot, as a rule, get density under ten or fifteen minutes. I, however, never use such plates in practice.

What I maintain is, then, that with a full exposure and good plates, ferrous oxalate constitutes a better developing agent than pyrogallol, in that one readily gets clear and brilliant negatives, without any traces of green or other fog, and also that the negatives are of a better printing colour, and quite free from yellow staining. Moreover, if a so-called normal developer be used in the first instance, the addition of a very minute quantity of sodium hyposulphite, or the employment of a stronger ferrous solution, will bring out details that are wanting through slight under-exposure, while bromide has even more restraining power in the case of over-exposed plates than it has with pyrogallol. In the case of much under-exposed plates, Mr. Wilkinson probably knows as well as everyone else that to produce out of them good negatives is equally impossible with both developers. I cannot, therefore, understand anyone maintaining that the oxalate developer allows of no latitude in exposure.

As to Mr. Wilkinson's remarks upon the quality of the several negatives he experimentally developed, I think that he can scarcely have given the ferrous oxalate a fair trial, as "harsh and dirty-looking results" are not the ordinary results of its employment. In fact, I think most people who have given it a trial will agree with me when I say that softness and harmony are peculiar to its use.

Why mercury intensification should not do for good work, I again am at a loss to understand. In the days of wet collodion nearly all negatives were intensified some way or another; and why should it be otherwise with gelatine?

In conclusion, I have only to add that all my work being of the landscape, or at any rate, out-door genus, it is just possible that one reason for the apparent discrepancy of Mr. Wilkinson's and my own experiences may be that while he has been experimenting exclusively with portraits, mine has been all out-door work; from which it may perhaps be concluded that the oxalate developer is more suited for the latter than the former. I do not, however, pretend to account in this way for Mr. Wilkinson's rather sweeping assertion that with "a really first-class plate it is not possible under any circumstances to get as good a negative with ferrous oxalate as with pyrogallol." If some other correspondents would report on their experiences as to the comparative merits of the two agents, I think the results might be highly interesting, if not valuable.—I remain, yours truly, A. A. Campbell Swinton.

ROYAL CORNWALL POLYTECHNIC SOCIETY.

Sir,—I beg to call the attention of your readers to the fact that August 22nd is the last day for receiving exhibits by the appointed agents for the forthcoming Exhibition of the Royal Cornwall Polytechnic Society, to be held at Falmouth on September 5th. I shall be happy to forward prize lists and prospectus to intending exhibitors. Carriage this year will be paid by the Society from the respective agents to Falmouth and back. All exhibits must be delivered into the hands of the agents carriage paid.—I am, sir, yours, &c., Wm. Brooks,

Member of Committee R.C.P.S

Laurel Villa, Wray Park, Reigate.

Proceedings of Societies.

London and Provincial Photographic Association.

At the meeting held at Ashley's Hotel on Thursday, the 2nd inst., Mr. W. Coles in the chair, the following question from the box was read:—"Has anyone present had any experience with ferric oxalate as an intensifier or reducer of gelatine negatives?"

No one seemed to have any experience, but Mr. Debenham found that if a very weak and much over-exposed negative was first treated with bromide and mercury as in Monckhoven's formula, then with Schlippe's salt, he obtained a negative with good printing density, and further, that he believed the result to be permanent.

Some very fine enamel portraits were passed round by Mr. Henderson, who read a letter intended for publication in the Photographic News, and said that in consequence of the correspondence he would defer his promised demonstration till the next meeting.

Mr. W. K. Burton passed round some very fine prints mounted in optical contact with glass, two mounted with glass of a bluish tinge having an especially fine effect.

The following were elected members of the Association:—Rev. S. Rosenthall, Mr. G. Smith.

Amateur Photographic Association.

The annual meeting of this Society was held on Wednesday, the 2nd inst., at York House, York Place, Portman Square, the Right Hon. Lord De Ros in the chair.

The minutes of the last meeting having been read and confirmed, the following members were elected:—Right Hon. Lord Emlyn, Sir Spencer Maryon Wilson, His Highness Veeracarala Vurmah Elia (Rajah of Cochin), Lieut. John Drummond, Messrs. C. W. Prescott, R. C. Carr, Alexander Poole, F. Galton, F.R.S., A. R. Dresser, P. H. B. Bedingfield, and R. Heron. Sir Spencer Maryon Wilson and Mr. Charles Stephens were elected members of the council.

The Secretary then laid before the meeting the pictures for the current year, and Mr. Glaisher read his report, in which all the photographs were arranged in six classes.

Mr. Glaisher remarked that he and his colleague (Mr. Howard) were pleased to find that, although the contributions received last year were high above the average, those of this year were still higher. He called attention to the fact that the number of pictures this year, in the highest class, was no less than 187 against 108 in 1876, 90 in 1877, 73 in 1878, 111 in 1879, 90 in 1880, and 158 last year. The following is an abstract of Mr. Glaisher's report.

Class 1 contains 187 pictures, contributed as follows:—C. Stephens 19, Right Hon. Lord de Ros 1, F. Beasley 25, R. Murray 8, F. Brownrigg 7, F. Lloyd 1, W. S. Hobson 8, W. D. Howard 1, W. Adcock 10, J. H. Ritchie 1, T. R. Shervinton 3, F. S. Schwabe 9, J. Board 2, General Sladen 2, Rev. H. Palmer 1, R. O Milne 9, W. Vanner 6, W. Muller 10, Major Chadwick 6, R. Leventhorpe 14, A. Watkins 1, H. T. Simmons 2, J. C. Hannyngton 3, J. L. Ranking 3, F. H. Shaw 1, G. Brook 4, G. de la Hoyde 3, S. Norman 6, Major Pearson 1, A. Pringle 10, J. W. Robinson 1, E. J. Jackson 2, S. de Brath 2, G. W. Palmer 5.

Class 2 contains 168 pictures contributed as follows:—C. Stephens 6, Right Hon. Lord de Ros 6, F. Beasley 24, R. Murray 1, T. Brownrigg 1, F. H. Lloyd 3, W. S. Hobson 11, W. D. Howard 3, W. Adcock 6, J. H. Ritchie 3, T. R. Shervinton 2, F. S. Schwabe 1, G. W. D. Green 1, J. Board 5, A. Hill 3, Rev. H. Palmer 8, R. O. Milne 10, W. Vanner 3, W. Muller 5, Major Chadwick 5, R. Leventhorpe 5, H. T. Simmons 4, J. C. Hannyngton 9, J. L. Ranking 3, F. H. Shaw 3, G. Brook 2, G. de la Hoyde 4, S. Norman 3, Major Pearson 5, A. Pringle 9, J. W. Robinson 1, E. J. Jackson 2, S. de Brath 2, G. W. Palmer 4, S. R. Majendie 4, and A. R. Dresser 2.

The remainder of the pictures are comprised in classes 3, 4, 5, and 6.

Nearly all the negatives received this year are gelatine plates, and although in many respects superior to the old wet plates, Mr. Glaisher, called attention to the fact that they are often wanting in vigour and crispness.

The following prizes were awarded:—C. Stephens, first prize, a large silver goblet, for Nos. 22, 4, and 2; S. Norman, second prize, a water colour drawing in frame, for Nos. 5 and 9; F. Beasley, for Nos. 366, 382, 385, and 401, a water colour drawing in frame; W. S. Hobson, for Nos. 258 and 259, a large album elegantly bound; F. S. Schwabe, for Nos. 16, 29, and 30, an oil painting in frame; G. Brook, for Nos. 2, 3, and 5, a silver goblet; R. Leventhorpe, for Nos. 59, 63, 64, and 66, a silver goblet; W. Adcock, for Nos. 1, 2, and 8, an oil painting in frame; G. W. Palmer, for Nos. 3, 4, 6, and 7, a large album elegantly bound; Right Hon. Lord de Ros, an album elegantly bound; W. Vanner, for Nos. 61, 65, and 67, an album elegantly bound; and W. Muller, for No. 780, an oil painting in frame.

Certificates of honourable mention were awarded to General Sladen, A Pringle, T. R. Shervinton, T. Brownrigg, Major Chadwick, J. C. Hannyngton, S. de Brath, Rev. H. Palmer, J. H. Ritchie, J. L. Ranking, G. de la Hoyde, R. Murray, and R. O. Milne.

A vote of thanks proposed by Lord de Ros, seconded by the Earl of Rosse, to the referees, for the able manner in which they had fulfilled their unusually arduous task in the arrangement and classification of the pictures, and especially to Mr. Glaisher for his report, was carried unanimously, as was also a vote of thanks to the chairman, proposed by Capt. Lewis and seconded by Mr. Howard.

Sheffield Photographic Society.

The usual monthly meeting of this Society was held on Tuesday, the 1st inst., Mr. Dakin, Vice-President, in the chair.

The minutes of the last meeting having been discussed and confirmed, and other formal business transacted, an excursion was proposed to Beeley and the Oak Forest, near Rowsley, to take place on Thursday, the 17th, when a good attendance of members is expected.

A discussion arose upon the question—"Are we to have another exhibition?" After various arguments *pro* and *con*, it was ultimately decided to have one in the early part of next year, date and other arrangements to be considered at a future meeting. It is hoped that every member will contribute, and will exert himself to produce some good work in the meantime.

Mr. Rawson mentioned that he had had sent to him some dishes made of paper pulp, which were indestructible, and suggested that if they could be supplied white, similar to porcelain, they would supersede all other kinds, being only about two-thirds the price of the *papier mache* dishes, and more durable.

The Secretary was requested to endeavour to get the makers to supply some samples, so as to introduce them.

After an exhibition of negatives developed by various processes, and a discussion thereupon, the meeting adjourned.

Talk in the Studio.

The Dangers of Electric Lighting.—Two men who endeavoured to enter the gardens of the Tuileries, during a recent fête and display of fireworks, by climbing over the fences, incautiously made an effort to raise themselves by holding on to some wires forming part of the system of illumination by electricity. Both received immediately a shock which killed them.

The *St. James's Gazette* says:—"Cetewayo refused to allow himself to be photographed when he visited the House of Commons the other day; and it would be interesting to know from what cause his refusal proceeded. He may have been in a hurry to get home, or he may have wished to be taken in another costume from that which he was wearing, or he may have thought that there were enough photographs in existence of him already, seeing that they are exhibited in all the shop-windows at present. On the other hand, his reluctance may have arisen from superstitious motives; and if so, the circumstance is worthy the attention of anthropologists. At the other end of the world from Zululand, Catlin found the North American Indians very unwilling to let him take their portraits, since they were under the confirmed impression that the images he proposed to carry away on paper or canvas were in reality their souls." Perhaps the dusky monarch was terrified by the array of cameras that awaited his disembarkation.

Electric Lights in Sea Fishing.—A French paper reports a trial by Government permission of an electric lure for sea fish. It consists of an electric light in a glass globe with a device for sinking it the desired depth. As soon as the light is turned on, the sea in its vicinity is illuminated brilliantly, and the fish, over whom light is well known to exercise an irresistible influence at night, come eagerly, and sometimes in large schools, within the rays. They may be seen from above disporting themselves in the unaccustomed brightness, and little dreaming of the sinister purpose with which the little fête is organized for them. It is then that other fishing boats, armed with nets, come up and set to work at the unconscious victims, which they surround as well as they can without interfering with the apparatus connected with the lighted globe. It may be supposed that this device is calculated to operate with much deadly effect whenever it is used; and there seems to be much doubt whether it will ever be allowed as a recognized kind of fishing within territorial waters. Indeed, the license granted by the Government is said to be merely provisional, and for the purpose of testing the new machine.

Indirect Determination of Chlorine and Bromine by Electrolysis. By L. P. Kinnicutt (*Amer. Chem. J.*, 4, 22-25).—The chlorine and bromine having been precipitated together by silver nitrate, the mixed precipitate is heated in a porcelain crucible at a temperature just sufficient to melt it; and the crucible having been cooled and weighed, a piece of platinum-foil connected with a platinum wire is placed in it so as to rest on the melted silver salts. Dilute sulphuric acid (1 part concentrated acid to 3 parts water by volume) is then poured into the crucible until it is two-thirds full, and a second piece of platinum-foil attached to a wire is placed in the acid solution, care being taken that it does not touch the mixed silver salts. The zinc pole of a two-cell Bunsen battery is then connected with the platinum-foil resting on the silver salts, and the carbon pole with the platinum-foil just mentioned. Decomposition begins immediately, and, when it is completed, the reduced silver remains at the bottom of the crucible in the form of a porous mass, which is to be washed, dried, fused, and weighed with the usual precautions. The author finds that this method gives better results than the usual process of reducing the mixed chloride and bromide by heating in hydrogen, or the conversion of the bromide into chloride by heating in a stream of chlorine-gas.—*Journal of the Chemical Society.*

To Correspondents.

*** We cannot undertake to return rejected communications.

R. G.—Will make enquires and let you know.

Pyro.—Thank you for your kindly note; send your specimens by all means.

W. H. (Swindon).—1. Your conclusions amuse us extremely. 2. Our publishing office. 3. A good resolution certainly.

W. Barrington.—The gentleman you refer to is a photographer.

X. Y. Z.—See the Formulary this week.

L. Wood.—The mineral consists principally of alumina, the best samples containing only traces of silica and oxide of iron.

A. Donald.—1. Not till the Medical Schools open in October. 2. No doubt the thread is broken; examine it carefully with a magnifying glass.

Paraffin.—1. Yes, it makes admirable cells for a battery, and we have some that that have been in use for several years. 2. Undoubtedly. 3. It is lighter than water.

Camel.—Not having had experience, we cannot say; but it would certainly be wise to make use of a glass vessel for the first experiment.

C. T. T.—1. Hydrochloric acid would certainly be liberated, but it would ultimately be removed by the oxide of silver. 2. A moderately strong solution of shellac (or sealing wax, if you prefer it) in methylated spirit.

Mariner.—Very much shorter than in the first case; perhaps half.

T. W. Waring.—1. It is obtained by the action of nitric acid on carbolic acid. 2. Use a cylinder of magnesia instead of lime. Although the light is not quite so intense, there is a considerable gain as regards convenience of working.

Alexander Bidwell.—It is evident that you have been working without any definite ideas as to the arrangement of the apparatus. The relation of the arc, the condensers, and the objective must be such that the luminous image of the former shall coincide with the optical centre of the battery, and the position of the diaphragm opening may be taken as corresponding sufficiently near to the optical centre. These being rigidly adjusted, the negative and the screen must be so placed as to secure the requisite degree of amplification.

Bath.—We have tried the sample, and find that it leads to the markings you refer to. Put it on one side for future reduction, and make up a fresh solution.

Oxalate.—It will not dissolve in the quantity named unless the solvent be made hot, and in this case about half will separate out on cooling.

Royal Exchange.—It is impossible to consider that you were harshly used, as you could hardly expect to be allowed to inconvenience a large number of passengers in a crowded thoroughfare.

C. Davey.—It is probable that it would be more convenient to cover it with some inert powder, as starch, before the setting; and if you moisten the place with glycerine you will have no difficulty in making the powder adhere.

J. Snell.—Not for some months.

One Hardly Dealt With.—It is merely a question of business, and depends on the price paid; but the real reason is no doubt the great truthfulness of the portrait. If you give a re-sitting, and, instead of actually taking a fresh negative, you retouch all traces of the ravages of time out of one of the present negatives, the picture will probably be approved of; and you may not only look for a large order, but also expect to be talked of as an unusually clever photographer.

L. C. M.—Certainly not, as an ordinary magnifying glass, costing sixpence, will prove much more useful.

Robert Rawson.—1. Nitric acid is best, but only add enough to give an exceedingly faint reaction. The paper should not turn red immediately, but only after about half a second. 2. The salt has become partially oxidised, and therefore unfit for use. 3. Write direct to the office of the company.

Ceramie.—The only way will be to carefully study the firing, so as to ensure an approximately equal temperature; but in any case, the position of the tile should be occasionally reversed.

P. C.—Such conduct would be ungentlemanly and dishonourable, although strictly legal.

L. Tollington.—1. There is evidently no ammonia left. Keep your stoppers tied down in future. 2. Use oil colours by all means.

C. M. Milford.—It is chloride of silver, and contains about three-fourths of its weight of precious metal.

Norma.—1. A carbon print would be most suitable in such a case. 2. A cold saturated solution.

PHOTOGRAPHS REGISTERED.

Mr. T. C. Turner (Barnsbury Park)—Photograph of Screw Steamer *Hope*.

Mr. R. J. Houlson (Abergavenny)—Photo. Group of Father Ignatius, Monks, and Boys. Photo. of Altar and Interior of Llanthony Church.

THE EVERY-DAY FORMULARY.

The Gelatino-Bromide Process.

Emulsion.—A—Nitrate of silver 100 grains, distilled water 2 oz. B—Bromide of potassium 85 grains, Nelson's No. 2 gelatine 20 grains, distilled water 1½ oz., a one per cent. mixture of hydrochloric acid and water 50 minims. C—Iodide of potassium 8 grains, distilled water ½ oz. D—Hard gelatine 120 grains, water several oz. When the gelatine is thoroughly soaked, let all possible water be poured off D. A and B are now heated to about 120° Fahr., after which B is gradually added to A with constant agitation; C is then added. Heat in water bath for half an hour, and stir in D. After washing add ¾ oz. alcohol.

Pyro. Developer.—No. 1—Strong liquid ammonia 1 oz., bromide potassium 160 grains, water 80 oz. No. 2—Pyrogallic acid 30 grains, water 10 oz. In case of an ordinary exposure mix equal volumes of the solutions.

Iron Developer.—Potassium oxalate solution (1 and 4) 80 parts, ferrous sulphate solution (1 and 4) 20 parts, distilled water 20 parts. To every 4 oz. of the mixed developer add from 5 to 30 drops of a ten per cent. solution of potassium bromide, and 30 drops of a solution of sodium hyposulphite (1 and 200).

Substratum or Preliminary Preparation.—Soluble silicate of soda 1 part, white of egg 5 parts, water 60 parts. After beating, let it settle and filter.

Cowell's Clearing Solution.—Alum 2 parts, citric acid 1 part, water 10 parts. Edwards adds enough of a strong solution of perchloride of iron to give the preparation the colour of sherry.

Eder's Method of Intensification.—The negative is first whitened by being soaked in the usual saturated solution of mercuric chloride, and, after a thorough rinsing, it is immersed in the following:—Potassium cyanide 10 parts, potassium iodide 5 parts, mercuric chloride 5 parts, water 2,000 parts.

The Wet Collodion Process.

Cleaning Preparation for New Plates.—Alcohol 4 oz., Jeweller's rouge ¼-oz., liquid ammonia ½-oz.

Film-removing Pickle for Old Plates.—Water 1 pint, sulphuric acid 4 fluid oz., bichromate of potassium 4 oz.

Substratum.—The whites of 2 eggs are well beaten up with 6 pints of water, and 1 dr. of liquid ammonia is added.

Negative Collodion for Iron Development.—Alcohol 1 pint, pyroxyline of suitable quality 250 grains, shake well and add ether 2 pints. *Iodize this by mixing with* one-third of its volume of following:—Alcohol ½ pint, iodide of ammonium 80 grains, iodide of cadmium 80 grains, bromide of ammonium 40 grains.

The Nitrate Bath.—Water 14 oz., nitrate of silver 1 oz., nitric acid 1 drop. Before using the bath coat a very small plate, and allow it to remain in the bath for about twenty minutes.

Normal Iron Developer.—Water 10 oz., proto-sulphate of iron ½ oz., glacial acetic acid ½ oz., alcohol ¾ oz. The amount of proto-sulphate of iron may be diminished to ¼ oz. when it is desired to obtain full contrasts, or may be increased to 1 oz. when contrasts are likely to be unduly marked.

Intensifying Solution, or Re-developer.—Water 6 oz., citric acid 75 grains, pyrogallic acid 30 grains. When used, add a few drops of the silver bath solution to each ounce.

Eder's Lead Intensification.—After the negative has been well washed it is immersed in distilled water 100 parts, red prussiate of potash 6 parts, and nitrate of lead 4 parts. When the negative has acquired a yellowish white appearance it is again well washed and immersed in liquid sulphide of ammonium 1 part, water 4 parts.

Cyanide Fixing Solution.—Potassium cyanide 200 grains, water 10 oz.

Varnish.—Shellac 2 oz., sandarac 2 oz., Canada balsam 1 dr., oil of lavender 1 oz., alcohol 16 oz.

Printing Processes.

Albumen Mixture for Paper.—White of egg 18 oz., add 500 grs ammonium chloride dissolved in 2 oz. of water. Beat into a froth, allow the mixture to settle, and filter.

Sensitizing Solution.—Nitrate of silver 50 grs., water 1 oz., sodium carbonate ½ gr.

Acetate Toning Bath.—Chloride of gold 1 gr., acetate of soda 20 grs., water 8 oz.

Lime Toning Bath.—Chloride of gold 1 gr., whiting 30 grs., boiling water 8 oz., saturated solution of chloride of lime 1 drop. Filter when cold.

Bicarbonate Toning Bath.—Chloride of gold 1 gr., bicarbonate of soda 3 grs., water 8 oz.

Fixing Bath.—Sodium hyposulphite 4 oz., water 1 pint, liquid ammonia 30 drops.

Reducing Bath for Over-Printed Proofs.—Cyanide potassium 5 grs., liquid ammonia 5 drops, water 1 pint.

Encaustic Paste.—Best white wax 1 oz., oil of turpentine 5 oz.

Sensitizing Bath for Carbon Tissue.—Bichromate of potash 1¼ oz., water 30 oz., ammonia 1 dr., methylated spirit 4 oz.

Enamel Collodion.—Tough pyroxyline 120 grs., methylated alcohol 10 oz., ether 10 oz., castor oil 20 drops.

Mountant for Prints.—A freshly prepared solution of the very best white gum.

Collotypic Substratum.—Soluble glass 3 parts, white of egg 7 parts, water 10 parts.

Collotypic Sensitive Coating.—Bichromate of potash ½ oz., gelatine 2½ oz., water 22 oz.

Collotypic Etching Fluid.—Glycerine 150 parts, ammonia 50 parts, saltpetre 5 parts, water 25 parts.

Various.

Luckardt's Retouching Varnish.—Alcohol 300 parts, sandarac 50 parts, camphor 5 parts, castor oil 10 parts, Venice turpentine 5 parts.

Matt Varnish.—Sandarac 18 parts, mastic 4 parts, ether 200 parts, benzole 80 to 100 parts.

Printing on Silk.—Remove all dressing from the fabric by boiling in water containing a little potash, dry, and albumenize with ammonium chloride 2 grammes, water 250 cubic cents., and the white of 2 eggs, all being well beaten together. A 70-grain silver bath is used, and the remaining operations are as for paper.

Cyanotype Printing.—Water 1 oz., red prussiate of potash (ferricyanide) 1 dr., ammonio citrate of iron 1 dr. Prepare and preserve in the dark. Float the paper and dry. Fixation by mere soaking in water.

THE PHOTOGRAPHIC NEWS.

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CONTENTS.

OPAL GLASS AS A SUPPORT FOR POSITIVE PICTURES.

The special qualities which so notably render paper valuable as a support for positive photographic impressions are lightness and flexibility, both of which qualities are of very considerable importance in ordinary cases. When, however, a picture is intended for framing, these special points are of no great importance, and a more satisfactory result can generally be attained by using opal glass as a basis for the photograph. The advantages of this are considerable, as not only is a picture likely to be far more permanent on an impervious support such as glass, than when on a damp-holding material like paper, but the uniformly even tint and surface of the finely-grained opal glass is not liable to change of colour or darkening by the action of light and time. Another advantage of opal glass depends on the ease with which portions of the impression can be removed by means of ink-eraser, or other abrading substances, without in any way injuring the basis on which the picture has been made.

A circumstance which often serves to render pictures on opal glass more brilliant than prints on paper, is the fact that, in the former case, the image is entirely on the surface—a condition which it is not easy to completely fulfil with paper photographs.

Within the last twelve months the price of the finely-ground opal glass has been reduced to a small fraction of that formerly demanded, so that there is at present no obstacle to its use even for low-priced work.

Opal glass serves as a good basis for pictures by the collodion process, the so-called carbon method, the dusting-on-process, or the gelatino-chloride method of Eder; and by one or the other of these proceedings the photographer can produce any kind of picture which may be required. In every case it is desirable to coat the glass with a thin substratum of insoluble gelatine, the following mixture being suitable:—

Gelatine	... 50 grains
Water	... 15 ounces

dissolve, and add—

Chrome alum	... 8 grains
Water	... 1 ounce

It is important that the glass should be thoroughly clean and free from grease when the substratum is applied, and this is best ensured by first treating with a moderately strong solution of caustic soda, and afterwards with nitric acid. The plates ought to be very thoroughly rinsed, but it is not advisable to dry them before applying the gelatinous mixture. When the substratum is dry, the plate can be used for either one of the methods named; the collodion process being in many cases the quickest and most convenient for the general photographer to adopt. A good negative collodion which has ripened by age may be used, but it is generally well to dilute it with about one-fourth of its volume of un-iodised collodion. The ordinary negative bath answers well, and either an iron developer or a pyrogallic developer: but the latter is to be preferred. The following has given good results in our hands:—

Pyrogallic acid	... 30 grains
Citric acid...	... 15 ,,
Glacial acetic acid ...	... 1 drachm
Water	... 10 ounces

It is better to use hyposulphite than cyanide for fixing; and after thorough washing the picture may be toned in a chloride of gold bath containing about one-third of a grain of the chloride and one grain of acetate of soda to each ounce.

As regards the production of carbon pictures on opal, there is but little to be said excepting that a reversed negative must be used unless a reversal of the picture is of no consequence, as a double transfer to an opal plate is seldom satisfactory. When the carbon print is to be vignetted, care should be taken that the edges of the shade are so arranged as to cut the light off from the picture very gradually, because feeble radiations do not produce so marked an effect as might be supposed.

A series of articles giving full details as to the gelatino-chloride process were commenced in the Photographic News during September last, and we cannot too strongly recommend those of our readers who wish to obtain the most perfect series of gradations, together with the most extensive range of tone, to adopt this process. The chloride emulsion method certainly involves more extensive and complex preparations than either of the others, but the superiority of the results is such as to fully compensate for the extra labour.

Any part of a picture on opal glass can, as already remarked, be readily reduced in vigour by friction with a piece of ink-eraser, and this circumstance renders opal glass of great value when artistically vignetted portraits are required. It is convenient to provide an assortment of rubbers and stamps made of the eraser, some being tapered like a pencil, and mounted; while others are so cut as to present broad flat surfaces.

Opal glass is subject to two disadvantages: these being its considerable weight, and its liability to fracture; but thin sheets of celluloid may be used instead of opal glass in special cases. The surface of the celluloid can be easily roughened or ground by means of pumice powder applied with a cork; and although celluloid consists mainly of pyroxyline, it resists the solvent action of the collodion perfectly, provided that it has been properly roughened and coated with the gelatine substratum recommended above.

PHOTO-LITHOGRAPHY AND PHOTO-ZINCOGRAPHY.

BY MAJOR J. WATERHOUSE, B.S.C.,
Assistant Surveyor-General of India.

MY friend the Editor having asked me to again contribute to the NEWS a short series of papers on photo-lithography, I have endeavoured to bring together some of the latest information regarding it and the kindred process of photo-zincography, derived from such published sources as are available, and from my own experience, limited as it must necessarily be by long residence at a distance from the great centres of progress, and my consequent ignorance of the later industrial development of these processes, though I fear that in their pure and simple form they have made but little progress since I wrote upon them in the twelfth volume of this journal, fourteen years ago. This is to be accounted for by the fact that there was not much scope for improvement by the very nature of the processes and their limited application, which has led to their being superseded to a very large extent for all ordinary purposes of book illustration by the photo-block, Woodbury, collotype, and heliogravure processes, the three latter having the great advantage of perfectly reproducing the delicate gradation of photographic half-tone, so that now the principal use of photo-lithography seems to be in Government cartographic and printing establishments for the reproduction of large maps, plans, and drawings, and to a limited extent commercially for similar work, and for the reproduction of old printed books, and miscellaneous drawings and prints not requiring the superior delicacy and finish of collotype or heliogravure.

Still, with all its defects, photo-lithography is the most suitable and useful process for the reproduction of a large class of subjects, especially maps and drawings of large size, which have to be taken in several sections, and can be turned to very good account for many artistic purposes by applying to it the resources of the skilful lithographic draughtsman and colour printer. The old prejudice against retouching in any photographic process has, I believe, done much to hinder the development of a process which is capable of being made an efficient auxiliary for producing pictures combining all the essential accuracy and truthfulness of photographs with the artistic adjuncts which can soften and relieve the crudeness and want of pleasing effect so often characterizing them.

It is scarcely to be expected that photo-lithography will become more extensively used for general purposes, in face of the powerful rivalry of the newer processes of collotype and heliogravure; but a short *resumé* of the details of the various methods may re-awaken some interest in the process, and be of use to present and future workers; and in that hope I write these papers.

The history of photo-lithography and photo-zincography has been so often written, that there is no necessity for my repeating it, and I shall therefore enter at once on the practical consideration of the subject, commencing with—

The Preparation of the Original.—"With a good original and a good negative, photo-lithograpy is simple child's play," said to me, some years ago, one of the most successfull photo-lithographers I have ever met. At that time the difficulty was to get the good original; the use of photography for reproductions was by no means extensive, and its requirements were but little known. Owing to the introduction of the various photo-block processes now so largely used in the illustrated journals as a substitute for wood engraving, the necessity for suitably-drawn originals has been recognized, and the conditions of success are better understood.

As a rule, photo-lithography is only suited for the reproduction of subjects in black and white, such as manuscript pen-and-ink drawings, maps, plans and charts, prints and engravings, in line, stipple, or chalk—for much the same class of subjects, in fact, as are suitable for treatment by ordinary lithography, only bearing in mind that the original must represent the finished result. The camera will not correct and beautify faulty drawing, as the lithographer is often expected to do, though a good deal may be done by skilful touching up.

From time to time various endeavours have been made to reproduce on stone the delicate gradation and half-tone of a photographic negative from nature, or, rather, break it up, and give it more or less the appearance of a chalk drawing; but they have all been more or less unsatisfactory, and rough work of this kind is now done almost entirely by collotype and heliogravure.

The photo-lithographer has usually nothing whatever to do with the preparation of the original, and as often as not is called upon to reproduce printed or manuscript originals quite unsuited for the process. In such cases he can only make the best of them with the means at his command; but when circumstances permit of the original being prepared specially for the purpose, attention to the following rules, originally drawn up for the guidance of draughtsmen in the Indian Survey and Public Works, will be found conducive to success.

1. The drawings should be made on white smooth-surfaced paper, fresh tracing cloth, or, best of all, fine Bristol board. When possible, the drawing should remain stretched on the drawing board, and in any case should be kept as clean as possible, and free from pencil marks, creases, and wrinkles. Little defects which may scarcely be noticed on the original, frequently attain undue prominence in the photograph.

2. The best ink to use is Indian ink, which should be freshly and evenly rubbed down, and be sufficiently thick to give a good full black line. A little yellow pigment such as gamboge, or preferably, burnt sienna, is sometimes added, and Capt. Hannot recommends rubbing down the ink in a very weak solution of bichromate of potash. In adding yellow to the ink, care must be taken to use some substance which will not spread beyond the lines, especially when drawing on tracing cloth.

3. The lines should be firmly and clearly drawn, not too fine or too close together. Even the finest lines must be quite black. Light effects must be produced by making the lines thinner, and increasing their distance apart, and not by the use of pale ink. In removing pencil marks after the drawing has been inked in, great care must be taken not to destroy the blackness and firmness of the lines by too much rubbing; otherwise they will appear quite rotten and broken when reproduced.

4. Cross-hatching and shading should be open, and in firm clear lines, not too close together or confused by fine lines. Intensity of shade should be shown by an increase in the thickness of the lines rather than by their being placed close together. It must be borne in mind that throughout the process there is a tendency for the lines to thicken, so that if they are too close they are liable to block up in the printing, and the work will appear heavy and unsightly. This rule also applies while shading, the darker portions of which should be drawn in thick distinct lines, but not crossed and recrossed with fine lines.

5. In drawing maps, it is better to leave river courses, coast lines, lakes, ponds, or tanks, blank, and not filled in with fine lines. They may be indicated on the original by a pale wash of blue without detriment to their reproduction.

6. Similarly in mechanical or architectural drawings, ruled tints and shades are better left blank on the original, or shown by light tints of blue, violet, or aniline red. Engraved tints in lines or dots can be transferred on the stone afterwards, and will have a much neater effect than tint lines reproduced directly from the original.

7. Washes of any colour, except pale blue, violet, aniline red, or other colours which will not reproduce,

are absolutely inadmissible in drawing for reproduction by photo-lithography. If necessary, outlines may be drawn in some pigment which will reproduce black, such as strong red, brown, yellow, orange, or green. Details required to be shown in the original, but not in the copy, may be drawn in pale blue, aniline, violet, or red. Spots, stains, and details not required to be reproduced, can be painted out with Chinese white.

8. Whenever possible, the original drawings should be on a larger scale than the reproduced copy. Defects in drawing are lessened by reduction, and the result generally is finer and sharper than a reproduction to scale would be.

9. In preparing drawings for reduction, care must be taken that the lines, lettering, and detail are drawn of sufficient thickness and size relatively to the scale of reduction, so that they may be clear and distinct, and in proper proportion together when reduced, and not be so small as to be either quite lost or illegible. Thus, if it be required to reduce a drawing to one-fifth the scale of the original, every line must be drawn five times as thick, and the writing and details five times as large as required in the reduced copy. Sufficient space must also be left between lines of shading or cross-hatching to prevent their blocking up and running together in transferring and printing. Practically, it is sufficient to draw the original from about one and a-half to twice as large as the copy to secure all the advantages of reduction, and the originals will also serve for reproduction if necessary.

10. It will save confusion and mistakes if the scale on drawings intended for reduction is shown in terms of a single unit of measurement as inches, feet, miles, &c., and not as relative to any second unit, as inches to a foot, mile, &c. It should be shown simply as scale of feet, miles, &c.

11. Drawings or tracings intended for reproduction should not be folded, but kept flat or rolled. Folding causes creases which give shadows on the negative in reproduction, and these may obscure and spoil other details. It is a good plan to pass a creased drawing through a copper-plate or lithographic press before copying.

12. It must be borne in mind throughout that photography will only produce a *facsimile*, and that, as a rule, the original will not be in any way improved upon. Rough, coarsely-drawn work will not appear like fine engraving, or bad writing like letter-press or copper-plate, and therefore, in making drawings for publication, care must be taken to give them the requisite degree of neatness and finish before they are copied, so that the result may be fit for immediate issue, and not require alteration and touching up, which causes delay and expense, besides deteriorating the work before it is printed.

The essence of these rules may be given in a few words:—*White Smooth Paper—Black Ink—Firm, Open Drawing.* Success in the after processes depends entirely upon the perfection of the original drawing and its capability of giving a negative with clear, transparent lines on a perfectly opaque ground; and this cannot be done unless these essentials are carefully observed.

In some processes of photo-lithography, and more particularly photo zincography, by the bitumen processes, now being worked in Paris by the Topographical Brigade at the Invalides under the direction of the Commandant de la Noë and Captain Biny, a transparent original or tracing is used for printing by contact. Such originals should be drawn on fresh white or bluish-white tracing paper of even grain, free from spots or stains, with a good thickness of ink, so that the lines may be quite opaque. The addition of a little yellow to the ink is sometimes recommended. This should be burnt sienna or chrome yellow in preference to gamboge. Great care must be taken to keep the back of the paper clean and free from marks, which might print through.

Old tracing paper is not suitable for these drawings, being generally yellow and brittle.

The tracings should not be coloured, and, as far as possible, should be drawn entirely in firm or dotted black lines; but if the use of colour should be obligatory, lines may be drawn in vermilion, burnt sienna, chrome yellow, and dark green.

Tracing paper is preferable to tracing cloth, which is not so transparent, and shows a strong grain of the cloth.

If drawings are not on too thick paper, they may be made transparent by applying a mixture of one part of castor oil and five parts of spirit of wine. The oil may be removed afterwards by soaking the drawing in spirit of wine.

When type is used for lettering drawings for reproduction, care should be taken to get a fine, clear, black impression. The paper should be indented as little as possible by the type, otherwise the hollows cause shadows which thicken out the letters when reproduced.

It is advisable, if possible, to pass typed drawings through a lithographic or copper plate press before they are copied.

Typing is often done on little slips of paper cut out and pasted in position on the drawing. This saves the denting of the drawing paper; but unless the typed slips are of very thin paper, shadow lines will be thrown round the edges of the slip, and require touching out on the negative.

In typing tracings for contact printing the ink lines are often too pale. The Commandant de la Noë has found an ingenious way of overcoming this by powdering over the freshly-printed names with red bronze powder. This adheres only to the lines, and makes them perfectly opaque. M. de la Noë has also invented a type stamping machine, which is most effective in giving a very clear sharp image without indenting the paper. The type-holder has a rocking motion over a cylindrical support on which the drawing is placed, so that the type is in contact with the paper only when making its impression.

When drawings are prepared specially for reproduction, there need be no difficulty in taking all the precautions necessary for producing good results. It often happens, however, that the photo-lithographer is called upon to copy old prints or manuscripts which may never have been suitable for the process, or, if suitable when fresh, have become dirty and stained by age. With entirely unsuitable subjects nothing much can be done, but with proper precautions, originals that are only dirty and stained may be cleaned and made fit for reproduction.

Yellow or otherwise objectionable spots should be carefully covered over in the spaces between the lines with Chinese white, and, when possible, weak lines should be strengthened.

Old engravings and lithographs may be bleached by immersing them in a solution of chloride of lime or eau de javelle (1 to 10 or 15 of water), then soaking them in water for some hours, after which they are treated with a weak solution of hyposulphite of soda, and finally well rinsed with clean water.

Another plan is to sprinkle finely-powdered salt all over the engraving, then squeeze lemon juice upon the salt so as to dissolve most of it. Boiling water is then poured on till the salt and lemon juice are washed off. The surface will then be quite clean and free from stains. The engraving should be allowed to dry without heat, and gradually, on a board or other smooth surface (*Spon*). A short soaking with very dilute hydrochloric acid (1 to 20) or acetic acid, followed by plentiful washing, will clear up a print very much.

Mr. W. Brooks recommends the use of "Holmes' Ozone Bleach" as superior to any chlorine bleaching, and not so liable to injure the original by traces of chlorine remaining in the fibres of the paper. The best strength is about one part to ten of water, and the engravings may be left in it from half-an-hour to four hours if very brown. With a stronger solution, the time would be somewhat less. After all the stains are removed, the bleach is poured off, and the print well washed in several changes of water or in running water for about two hours, then blotted off and dried.

Grease stains, if fresh, may be removed with chloroform, benzine, or ether, or with a weak alkaline solution of caustic potash or its carbonate. Old stains can be removed with a more or less strong solution of potash applied at the back of the subject.

Iron moulds and ink spots may be taken out with solution of oxalic acid or salts of sorrel.

Originals printed or drawn on rough paper may be smoothed in a copper-plate press, and if dirty, should be carefully cleaned with india-rubber or bread, with the precautions noted in the foregoing Rule 3.

(*To be continued.*)

FRENCH CORRESPONDENCE.

Some Recent Patents—M. Borlinetto on Photographic Instantaneity—Captain Biny's Latest Experiments—Poitevin Subscriptions—Legal Proprietary in Photographs.

Some Recent Patents.—As we have already stated several times, we patent here every possible thing, and M. Hutinet has just patented a system of distinguishing gelatino-bromide plates one from one another. With the aid of bichromated gelatine, or, in fact, any other similar paste, cardboard cuttings, or any other distinguishing mark rendered impermeable by gum lac, are stuck on the surface of the plate. This is the whole thing. The idea may be excellent, but really patents are greatly abused, of which this is a striking example. M. Lapré has just invented and patented a match-box photographic apparatus. Do not imagine, estimable readers, that this is a pocket camera. It is simply a match-box having a receptacle for invisible photographs, rendering them visible by means of a gaseous emanation. A special drawer at the back of the box contains the substance destined to cause the invisible image to appear. Take notice, however, that M. Lapré's patent is annulled by the sole fact that he has omitted to name the preparations used, and the patent law enjoins that the patented processes must be fully described under pain of being rendered void. M. Paul Edouard has taken out a patent for the production of portraits on opal glass. A sheet of thick cardboard is covered with a thin solution of gelatine, dried, and afterwards coated with a thick film of collodion treated with chloride of silver, and again allowed to dry. A picture is printed and fixed on this surface, and subsequently applied to a plate of opal glass or porcelain covered with gum, by softening the gelatine in hot water, thereby causing the paper to be detached, leaving the print on the glass. And this M. Paul Edouard has thought worthy of patenting. Really, the ignorance of the greater number of these inventors must be very great, since they imagine they have found out what everyone knew and practised years ago. We will not enumerate any more of these discoveries.

M. Borlinetto's Remarks on Photographic Instantaneity.—M. Borlinetto, professor at Padua, has written telling us of his experiments made with M. Paul Boca's chronometric shutter, and has sent an instantaneous print about 7 by 5 inches in dimensions, in which it is easy to see that the people in movement in the foreground are not so sharp as those at the back. This evidently proves that the same length of exposure gives different results according to whether the planes farther from or nearer to the objective are reproduced. A veritable and complete instantaneity cannot exist in any case, and one cannot realise reproductions having an equal degree of sharpness unless with lenses regulated so as to produce an automatic effect; and further, the angular variations of a being in motion would be more appreciable nearer the objective. It is therefore necessary, in order to reproduce instantaneously moving figures, to take account of rapidity of exposure required to give as sharp definition as possible of persons and animals nearest to the lens. M. Borlinetto reckons the exposure at $\frac{1}{500}$ of a second for figures traversing the field of vision in the foreground.

Captain Biny's Latest Experiments.—Captain Biny, whose very remarkable works we have before had occasion to speak of, has just made some new experiments of great interest. He holds, in the preparation of gelatine plates in daylight, that the nitrate of potash must be first eliminated from the emulsion, as the cause of crystallization occurring on the surface of plates treated with bichromate of potash. Theoretically, nothing seems easier of employment as reagents acting one upon the other than neutral chromate of silver, ammonia, bromine, and gelatine. Practically, too, we are assured that the experiment is exceedingly simple. The two following mixtures are taken:—

A.—10 per cent. solution of ammonia saturated with chromate of silver...	80 c.c.
Gelatine	5 grammes
B.—Alcohol	10 c.c.
Distilled water	10 c.c.
Bromine	2 grammes

The gelatine is dissolved in the solution of ammonia by the aid of a spirit lamp, until the lumps have disappeared, when it is allowed to cool down to 30° or 35° C., and the liquid B is added in daylight. It is then vigorously shaken, and the chromated emulsion is made. It is filtered twice, and spread on plates covered with soluble glass. The plates must be allowed to dry upon a horizontal surface during the whole of one night, in a dark place, and the next day one can state with certainty that they show no trace of crystallization. They only contain gelatino-bromide of silver mixed with chromate of ammonia, but no bichromate. In order to use the plates for negatives or positives, they must be washed in complete darkness until they have lost all the chromate of ammonia, and be left to dry in a dark, ventilated place; thus gelatino-bromide plates will be made, having the advantage of being prepared in daylight and in a short time. Captain Biny has remarked: 1st, that the ferrous oxalate developer containing 10 per cent. of hyposulphite of soda preserves its properties for months; it is, he says, very active, and does not fog the plates. 2nd, the same developer, acting after the ordinary oxalate, without hyposulphite, upon a negative half developed, transforms it into a positive. This fact is very curious, and is worthy of being more closely studied.

Poitevin Subscriptions.—The Poitevin subscriptions already exceed 4,000 francs. It is probable that the sum will be devoted to the raising of a monument in a public square at St. Calais, a town in the department of Sarthe where Poitevin studied. The municipal council of that town have just granted 500 francs, and have nominated a committee to collect local subscriptions.

Legal Proprietary in Photographs.—The law relating to the proprietary of photographic works has just received a support in favour of French photographers. Two conventions have just been signed, one between France and Belgium, and the other between France and Switzerland, by which it is stipulated that photographic prints shall be treated on the same terms as works of art. After this it will be impossible in France to encounter a legal difference between French photographers. Leon Vidal.

By-the-Bye.

CONTINENTAL RAMBLES WITH A CAMERA.

A Visit to the Italian Lakes.

"The Italian lakes may be done in a day; you start early from Milan to catch the first boat from Como, land at Menaggio, take omnibus across to Lugano lake, steam from Porlezza to Lugano, whence a trap is taken to Luino, on the Lago Maggiore, where you arrive in time for the last boat to Pallanza or Baveno." This was the advice given us, we remember, exactly twenty-four years ago by a travelling Briton who was "rushing" the Continent, and to whom we had turned for advice; and if we repeat it here, it is not to urge any of our readers to take it, but to show how convenient to one's hand the Italian lakes lie. Moving leisurely with a camera—and a camera, if it makes one move leisurely, has, at any rate that advantage—you can see the lakes very well in a week, so that the tour may be taken as an addendum either to a Swiss, Tyrol, or Italian trip.

Coming from Switzerland you may either take the new railway over the St. Gothard, or, if you prefer the old-fashioned diligence travelling, which has much to recommend it, cross either the Simplon or the Splügen. From the Tyrol, the best plan is by Verona to Lecco; while if you are in Italy, Milan makes the best starting point. We will choose the last-named city, its many-pinnacled cathedral, each pinnacle a statue of white stone, being one of the most charming architectural objects at which a camera can be levelled. An hour's journey brings you to the shores of Lake Como, and there we take steamer forthwith. The town of Como has little to recommend itself to the photographer, who will do well to make his first stopping-place either Cadenabbia, Bellaggio, or Menaggio. All these spots are within a couple of miles of one another, and are delightfully situated beside the deep blue waters. Our quarters have always been at an *albergo* at Menaggio; for from the terraced vineyards above the little port is seen a panorama that, in our experience, has not its rival in Europe. There, in the clear sunshine, lie the azure waters at your feet—a glorious mass of colour, dotted here and there with tiny white-canopied boats. To your right is the green promontory of Bellaggio, dividing the rich blue expanse into two portions; while right opposite, reaching down to the verge of the lake, is the bright little town of Varenna. Along the shores are picturesque villas, half hidden by the massive foliage that fringes the blue water. The upper part of the picture is filled with the velvet outline of a range of hills that rise high above the lake, while as foreground are the green clustering vines that shut out Menaggio, with the exception of its diminutive port, and the sailing craft drawn up upon the strand.

This picture we have in two successive years sought to do justice to with the camera, but in vain; and here we may at once say that in no country is photography so disappointing as in Italy. The wealth of colour and gorgeous contrasts that seduce the eye are naturally lacking in our sun pictures, and it is the former that are so characteristic of Italy. Still, a picture of Mr. Woodbury's which we have seen—he has fixed his point of view nearer Cadenabbia—reproduces the soft sweetness of the picture we have attempted to describe, and indicates much of its charm. He has secured the trellised vines as a foreground, and loses none of the beauty of Bellaggio Point.

The arm of the lake on the other side of Bellaggio is termed the Lago di Lecco, the town of Lecco being romantically placed at its termination. A charming view of the town may be had from the opposite shore. We embarked camera and stand in one of the white-canopied boats, and landed whenever a presentable picture presented itself. As the boats are flat-bottomed they are easily dragged from the water, and we frequently employed our craft in this position as an attractive and steady foreground. The tiny white houses of Lecco, the line broken by green tufted trees, are so bright and clear seen across the placid lake, that Lecco looks like a fairy city, the idea being still further countenanced by the lofty and massive mountain rising beyond, whose every outline falls upon the lake.

The northern end of Lake Como is flat and marshy, so there is no need to visit it; but if you take the camera ashore at Bellaggio, be sure you secure a picture of the town of Varenna opposite, whose spires and buildings seem to rise out of the still water. The trim villas at Bellaggio and at Cadenabbia, with their white marble landing steps, gay flags, and numberless verandahs, are too modern and too town-like to tempt the photographer; but some of the village ports, with their swarthy sailors in striped shirts and broad straw hats, will make a picture.

From Menaggio it is a nine mile walk through green luxuriant country to Lake Lugano. The deep greenery of the vineyards and maize fields are most refreshing to the eye, for it is generally very hot hereabouts. The sunny land of grapes and figs is before us, and a more rich and fertile country it would be difficult to conceive. At times the road leads through the narrow street of a village, and children with legs and arms as brown as mahogany come clustering round with a plaintive cry of "Carità, Carità!" In the background are dark-eyed women, and black-bearded men whose attire requires merely the addition of a belt and a pair of pistols to make them into brigands of the conventional type. Indeed, we are now passing a country as famous as that of Rob Roy in Scotland, for around the shores of the Lake of Como and Lecco passes the action of Manzoni's world-renowned work, "I Promessi Sposi." These men, in their rough picturesque costumes, we can well picture as the Bravi, or outlaws, that the Italian Sir Walter Scott has described; and the mountain pathways, rocky terraces, and green sequestered nooks we pass, are fitting scenes for the enactment of a drama like "The Betrothed."

Strong stone-built dwellings, bearing a date several centuries back, with coats of arms now crumbling to decay wrought over their lofty portals, and delicate green vines climbing about the portico, and seeking an entrance through the barred windows; little white-washed cottages, with painted frescoes executed by the village artist, and representing some saint or holy personage; tiny chapels, with altar-pieces and models of our Saviour on the Cross, such are the most striking objects in the villages and hamlets we pass through.

Half-way, we come to the little Lake Piano, beyond which a glimpse of Lake Lugano is seen. You cannot do better than set up your camera here on the high road, at the moment you sight the little lake. A farm out-building serves for the left of the picture, and then you look at Lake Piano through a gap in the trees, which serves to frame the sheet of water in a most picturesque fashion. The border of the high road which becomes a portion of the foreground does not detract from the view, for it helps further to localize the spot. Indeed, with the little picture lying before us now, we can realize very keenly our tramp along that pleasant road.

There is a steamer from Porlezza, on the shores of Lake Lugano, to the town of Lugano; or if you have time, and there are several in the party, it is not more expensive to be rowed there. The journey, in these latter circumstances, but takes two hours, and it is a most pleasant one, gliding close under the precipitous banks, and almost under shadow of the leafy fig trees which seek to dip their dark green branches into the cool water. Here and there you pass a cluster of cottages hanging like swallows' nests to the high banks, with which the only communication is by water, for the sides of the lake are too steep for any road between Porlezza and Lugano. These village scenes are most inviting to the photographer, but they are all so picturesque that it is difficult to make choice. You are now on the confines between Italy and Switzerland, so that it is well to make no mystery when you land with your apparatus, for fear of raising the suspicions of the Italian Custom House officers; the Swiss Custom regulations—Lugano is in Switzerland—are not so strict.

That green smooth-topped hill, shaped like a bell, rising precipitately from the shores of the lake at the foot of the glittering little town, is the Monte Salvatore; it is but two thousand feet high, by no means an arduous climb, and commands a magnificent view of the lovely district below. From the top you seem almost surrounded by water—for the mountain is on a promontory almost running into the lake—and beyond are green fields and vineyards; far away to the north, may be seen the snowy spires of the Alps. The violent contrasts between the dark green and the hazy snow outlines are difficult enough to manage in a photograph, and only skilled photographers are likely to succeed with such a scene.

Some quaint bits of Italian architecture are to be found in Lugano itself, with which the photographer may busy himself during a brief stay. To Luino, on the banks of the Lago Maggiore, is rather further than from Menaggio to Porlezza, and, if it is hot weather, as it usually is, we recommend a conveyance, which is easily found. The country is still of a luxuriant green, the road, for the most part, overshadowed by trees and shrubs of magnificent growth. Steamers ply frequently on the Lago Maggiore, and to Pallanza—an Italian town with arched market-place and piazzas—is but an hour's journey.

Maggiore's banks are not so lofty and picturesque as those of Lugano and Como; but the gorgeous colouring of the shores at eventide is not to be surpassed. The translucent, ultramarine water, with the white cottages and villas at its margin—nitched apparently out of chalk—is a magnificent sight, and art aids nature in the colouring wherever it can. The smart steamers of the lake are manned by grand officers in gold-laced caps and white trousers, and the flat-bottomed wherries drawn up on the sunny strand, with their snow-white canopies, red cushions, and coloured flags, make the landing-places gay and picturesque to a degree.

The photographer, like most other visitors, will be tempted to visit Isola Bella, one of the Borromean islands, which is famous for its tropical plants and shrubs, for its terraced gardens where myrtle trees, aloes and cacti, as well as the sugar cane, may be found growing. But he may well leave his camera behind him, for the gardens are very trim—inclined to be mathematical, in fact—and scarcely likely to give a satisfactory picture. In any case, permission should be asked before landing, for Isola Bella is private property.

Pallanza is within a few hours' drive of Domo d'Ossala, at the foot of the Simplon, or the St. Gothard railway may be reached by taking boat to the northern end of the lake.

PHOTOGRAPHY IN AND OUT OF THE STUDIO.

Daguerreotypes and Mercury—Balloon Photography—Cheap Albumenized Paper.

Daguerreotypes and Mercury.—An old Daguerreotypist, writing in reference to the volatilzation of mercury at low temperatures, says:—" Your remarks in the News of the 4th inst., calling attention to the doubt which appears to exist as to how Daguerre really did discover mercurial development, reminds me of my early experience with Daguerreotype plates, when the development with mercury caused me at first no end of perplexity. In my anxiety to have the very latest improvements, I got a mechanic to construct for me a conical metal developing dish on the pattern of those used by the American Daguerreotypists, then as much the pioneers of the photographic art in regard to Daguerreotypes as the English now are with respect to gelatine plates. The conical dish was made, the mercury was poured in, the spirit lamp was applied to the apex (the cone was of course inverted), the plate was placed on the top, but—not the shadow of a ghost of an image would appear. Ten minutes was supposed to be the orthodox time; but half-an-hour, an hour, and more, were equally useless. The mercury obstinately objected to volatilize, and this, too, when the thermometer, the bulb of which went to the bottom of the cone, registered a high temperature, and the spirit lamp was kept burning the whole time. I was in despair; I sought counsel of my instructor in the art, but the master was no wiser than the pupil, and he was forced to confess that he could not explain the reason. At last it so happened that in one of my experiments I left the plate over the mercury so long that it went clean out of my recollection, and when I again thought of it and rushed to see the result, I found that the prolonged heat had burst the bulb of the thermometer, but had at last developed the picture. This gave the cue as to what was in fault. The metal of which the cone was made was far too thick, and though the portion nearest the flame became hot, the temperature of the bulk of the mercury was scarcely affected. I must own that the discovery was rather a shock in the face of what Mr. Robert Hunt had written on the subject, and to me throws considerable doubt upon the "chemical cupboard" theory of Captain Abney, or rather his authorities, unless the temperature of the cupboard was unusually high. And yet mercury does volatilize at the common temperature, and can even develop a picture, though not in the way desired by the Daguerreotypist. It is a curious fact that Daguerreotypes which are kept covered over by the same piece of glass and left undisturbed, will, in the course of time, set off the image on the glass, thus showing that those portions of the picture to which mercury is attached have given off fumes. I believe that this is the first time the phenomenon has been recorded, but I should think it must be familiar to most photographers who have had old Daguerreotypes to copy."

Balloon Photography.—Balloon photography may before long furnish the latest novelty in the way of sun pictures. Why should not the attempt be made to photograph London as seen from the balloon? If the latter was kept stationary, there should practically be no difficulty. A view of the whole of London, from Shepherd's Bush to the Isle of Dogs, from Muswell Hill to the Crystal Palace, would be a decided curiosity, and, after all, it is only a matter of length of rope. Such a picture would probably require Sam Weller's memorable "patent double million magnifyin' gas microscopes of hextra power" to enable any one to make out the details, but this would only add to the curiosity. Any way, London in sections could easily be represented, and be of use to map-makers. In fact, there is no reason why such balloon pictures should not be able to save a good deal of trouble in the way of surveys. An ordnance survey is a matter which takes an interminable time; and in places where rapid building is going on, the map when produced is, owing to the necessary delay, very incomplete. It was mentioned in the House of Commons a few days ago that the survey of Great Britain now going on would not be completed for some years—a statement which was received with laughter, and it would certainly be desirable if some method could be devised to hasten the proceedings. The Parisians attach considerable importance to balloon photography, and the Academy of Aerostation are at the present time organizing means to carry out the idea, the corporation of Paris voting £40 towards the cost. The Balloon Society meeting at the Westminster Aquarium appears to devote itself to every subject save that of ballooning, or it might take up the matter practically. Whether the Corporation of London would be found guilty of the extravagance of voting, say, £50 in furtherance of such an object may be doubted, even though a balloon picture of London would contain a representation of the extreme tip of the Griffin's tail.

Cheap Albumenized Paper.—The difficulty which manufacturers of albumenized paper have always felt is, what to do with the yolks of the eggs they use. This added considerably to the cost, for at whatever price they might offer the yolks to the pastrycooks—the only consumers—they could not get rid of all their stock. There was also the drawback that the yolk of an egg exposed to the action of the air is one of the most unstable substances, for unless it is speedily made use of, it passes into a stage which necessitates instant removal. Latterly the yolk of the egg has become an important agent in the dressing of skins, and the drawback to the manufacture of albumenized paper is at an end. A further advance in regard to the use of the yolk may now be noted. According to a French chemist, M. Carles, the yolk is as efficacious when in complete putridity as when fresh. The leather dresser cares nothing for unpleasant odours; all he concerns himself about is homogeneity and richness in fatty matters. To get rid of the former, some collectors of the yolk apply water, and, to raise the density (thus lessened), a few handfuls of marine salt; others have recourse to alkaline sulphates, alum, &c., to retard putrefaction. None of these matters seriously affect the skins; but they undoubtedly diminish the value of the mucilage by lowering the proportion of oil of the egg, and it becomes an important matter for the leather dresser to ascertain how far this proportion has been altered. To ascertain the purity of the mucilage, measurement of density is of course fallacious. The presence of foreign salts is best detected by comparing equal quantities of typical yolks and of suspected mucilage. But the surest, if not the quickest, plan is to determine successively, in a few grammes, the quantities of water, organic matter, and mineral salts; lastly, the proportion of fatty matter. This is the advice of M. Carles to the leather dresser. The photographer is interested in it to the extent that the more valuable the yolks of eggs become, the cheaper should be albumenized paper.

Review.

Ausführlichen Handbuch der Photographie, Part III., by Dr. J. M. Eder. (*Knapp, Halle, Germany*).

This third part of Dr. Eder's exhaustive work on photography fully maintains the high reputation of the author. It treats of lenses in a most thorough manner, not only imparting the history and theory of photographic objectives, but describing minutely, one by one, the well-known lenses of the different makers with which photographers are familiar. Many forms of lenses that possess merit, and yet have passed into the limbo of forgottenness, are here not only discussed, but depicted along with the most modern forms of instruments with which we are acquainted. In a word, Part III. of Dr. Eder's work is the most perfect treatise on photographic lenses extant.

A chapter on the testing and choosing of lenses is not the least valuable portion of the pamphlet. Dr. Eder carefully points out the defects to be found in faulty lenses, and how they are to be discovered; and in many cases he makes valuable comparison between the well-known instruments of commerce.

We heartily commend the work to all thoughtful photographers. The parts are to be purchased separately for 2s. 6d.

COLD EMULSIFICATION WITH UNIFORMITY.

BY A. L. HENDERSON.*

It is not my intention to lay an elaborate or exhaustive paper before you; I would rather court a discussion, and try, if possible, to elucidate the curious action that takes place when bromide of silver is formed in the presence of gelatine in an acid or alkaline state.

I have previously stated that if bromide of silver is precipitated in an aqueous solution, it only requires time to soften the particles; but if an alkali or acid is introduced, this softening effect will take place much quicker; heat will also help it.

Now, it is well known that gelatine being a very variable complex substance (no two samples being alike), great difference must take place when a precipitate of bromide of silver is made in gelatine. If we use a small quantity of gelatine to begin with, more or less of it is decomposed before the desired result is obtained.

I venture to say that boiling or stewing is not only unscientific, but uncertain. Now, if we add something that will prevent decomposition, one element of failure is got over.

Of the various substances tried, I find alcohol and ammonia the best.

Here I have a solution of gelatine 10 grains dissolved in 1 ounce of water; when the gelatine is dissolved by gentle heat, I add ammonia carbonate 20 grains (the ammonia causes effervescence):—

Bromide of potassium	150 grains
Iodide " "	2 "
Alcohol	3 ounces
Ammonia ·880	60 minims

Mix ammonia and alcohol before adding to gelatine.

This may be kept in bulk, ready for use; it will keep a long time good. When it is quite cold, I stir in—

Nitrate of silver	200 grains
Water	2 ounces

I occasionally shake it, and in one hour it will be ripe enough for all ordinary purposes; in fact, when finished, it will give results twice as rapid as most commercial plates. The maximum sensitiveness seems to be reached in about ten hours. No further advantage is to be derived by prolonging the emulsification, except that of convenience.

It should be apparent that, to have a large reservoir of emulsion made in this way, to draw from daily, or at will, adding fresh to keep up the stock, perfect uniformity must be obtained.

To the above quantities I add 4 to 5 drams of dry gelatine, and warm gently to dissolve the same. When the gelatine is thoroughly dissolved, I stir in 12 ounces of warm methylated alcohol (100°). The emulsion, when cool, will precipitate on the bottom of the vessel; it is to be broken up and well washed in a running stream from two to twelve hours. Make up bulk to 8 or 10 ounces.

Gelatine dissolved in alcohol, ammonia, and water, will not set so firmly as the same amount of gelatine in water; yet, if the salts and ammonia are removed by precipitating with excess of alcohol, the gelatine recovers its setting powers.

* Read before the London and Provincial Photographic Association.

Notes.

The Technical Meetings of the Photographic Society are to be continued throughout the year on the fourth Tuesday in every month.

The French Government has decided on spending no less a sum than £18,000 upon the astronomical and photographic expeditions sent out to observe the transit of Venus.

A costly album. Colonel Oswald, of the Canadian Volunteers, presented as a prize at the Shoeburyness meeting an album containing 220 views of Canadian scenery valued at £60.

The well-known photo-astronomer M. Janssen has been nominated President at the next meeting of the French Association for the Advancement of Science.

This Association meets, contemporaneously with the British Association, at La Rochelle. A memoir on the photometry of light of different colours is among the papers to be read, and is likely to interest photographers

The Duke of Albany is expected at Southampton when the British Association meets there next Wednesday. His Royal Highness is President of the General Local Committee.

Some time ago we announced a winter Electrical Exhibition at the Westminster Aquarium. It opens on November 1st, and prizes will be given, among other things, for the "best application of electric light fittings to photographic studios."

The good people of Sunderland cannot, apparently, make up their minds whether it is a wicked thing to take photographs on a Sunday, for last week, when a photographer was indicted for so doing, "the case was *dismissed*, on payment of costs." Of course the magistrate must have known what he meant by his decision, though we frankly admit we do not; but then a judge, being wise by tradition, naturally knows more than most of us.

The mirage was frequently observed by the French army in Egypt early in the century, and it is interesting to find that one of our special correspondents has now witnessed the optical phenomenon. Sandy plains are particularly suitable for the formation of the mirage, the eye generally witnessing a vast lake in which trees and villages are to be seen reflected. The phenomenon is due to the heating of layers of atmosphere, and consequent unequal refraction of the sun's rays. All pronounced objects appear as if they were in an immense lake, the aspect of the clear sky completing the illusion.

The correspondent of the *Standard* tells us that the mirage he saw, brought into view all the forts round Aboukir Bay—even the white flags flying over each could be distinctly seen. The forts looked like so many islets rising out of a glassy sea. Around these, white specks showed where the Egyptian soldiers were busily engaged on their entrenchments.

The *Deutsche Photographen Zeitung* has reproduced our tour in Thuringia under the title of "Eine Tour durch den Thüringer Wald mit der Camera."

The Royal Cornwall Polytechnic Society's Photographic Exhibition opens early in September, and next Tuesday is the last day for receiving pictures. We hear that during the gathering Mr. William Brooks will lecture on "The Rise and Progress of Photography."

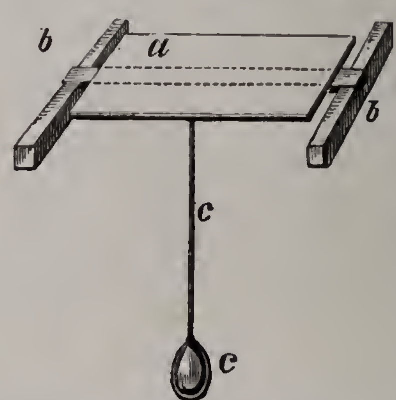
The portrait of Mr. Woodbury, by Ives' process, which we were able to publish last week through the courtesy of Mr. E. L. Wilson, of the *Philadelphia Photographer*, has brought us numerous enquiries as to the nature of the method and the possibility of practising it in this country. We may mention, therefore, that the patent for Great Britain is still unsold, and that any application respecting it, addressed to our office, will receive attention.

It is to be feared that next week's meeting of the British Association at Southampton will not be a brilliant success. The inhabitants, says *Truth*, do not seem disposed to show hospitality to the visitors, and there is still a very large deficiency in the amount required to pay expenses. Lord Mount-Temple is to entert.in a party at Broadlands, and it is expected that a garden party will be given there. Canon Wilberforce has already issued invitations for a garden party on the largest scale in the grounds of the Deanery.

A notice, which only reached us on Wednesday, gives the particulars of a dry plate competition to be held at Eisenach, in Germany, during the convention of German photographers. Manufacturers and dealers may both compete, and those interested will find particulars on another page. The plates must reach Eisenach, carriage paid, on the 20th inst., so that competitors should send immediately. Parcels forwarded express on Saturday afternoon would probably reach Eisenach during the night of the 20-21 August, but it would be better still to send this evening, viâ Flushing.

In our *Studios of Europe* we mentioned that MM. Benque et Cie., in their Paris studio, employ a rocking tray, or rather table, set in motion by a pendulum, for developing their gelatine plates. The oxalate developer is used, and after an idea has been gained from one of the plates as to strength of developer, &c., half a dozen clichés are put together in a tray upon the rocking table and developed at the same time.

MM. Benque et Cie. have the same arrangement at their Trieste studio; and our friend Dr. Eder, who lately visited the establishment, sends a sketch of the rocking table. Here it is. The table, *a*, rests by means of triangular



wooden supports, or trunnions, upon the cross-pieces, *b b*, and if the weight, *c*, is moved, attached by the rod, *d*, to the bottom of the table, the latter naturally oscillates. One developing tray after another is put on the table as the work of development necessitates.

Captain Pizzighelli, of the Austrian Engineers, has made an exhaustive report of the present state of photography for the use of the Austro-Hungarian War Department. The report appears in the official magazine of the Artillery and Engineers published in Vienna. Our readers are familiar with the name of Captain Pizzighelli as an earnest co-worker of Dr. Eder.

It is interesting to compare the prices charged for cartes and cabinets in the various capitals of Europe. Paris at present secures the highest prices for cartes-de-visite, several studios in the French capital making a charge of thirty francs for a dozen portraits. It is only fair to say that this, in most instances, is for *carte emaillées*, and that Paris houses *du premier rang* are to be found with prices commencing at 20 and 24 francs (say sixteen to nineteen shillings) per dozen cartes.

In London, first-class studios almost invariably charge a guinea; in Berlin, generally fifteen marks or shillings; and in Vienna, about the same or a little less. In the smaller capitals, such as Brussels, Munich, Pesth, Dresden, &c., the prices are less, just as with us in England, where the best studios in the provinces charge more moderately than in town.

In the case of cabinet portraits, many studios charge for the sitting; but supposing a dozen pictures are required, the highest fee in Paris would be 80 francs, and in London three guineas. Some of the best Paris houses do not, however, ask more than 40 francs per dozen, while with us in London from 31s. 6d. to £2 2s. are prices quoted by first-rate houses. Thirty marks or shillings a dozen is the Berlin price in the best studios, and fifteen florins (say 25s. 6d.) in Vienna.

"I always insist on a broad base to my camera," says Mr. England. Out-door photographers who desire their apparatus to be free from vibration might well make a note of this.

The photo-chemical laboratory of the Vienna Technical High School has just come into possession of a valuable relic—the first camera that Daguerre sent to Germany in 1839. It bears a label with Daguerre's own handwriting upon it. The first Daguerreotype camera introduced into England, in the same year, is, we believe, at this moment in the possession of Sir Hussey Vivian.

Another photographic relic of value in this country belongs to Mr. H. P. Robinson, of Tunbridge Wells, this being the first silver bath made use of by Archer in the collodion process.

Sulphate of iron, acidified with acetic acid, is declared by M. Le Bon to be a most powerful antiseptic, more so indeed than carbolic acid. Photographers, who always have a stock of the two former by them, should note this.

An immovable head-rest is advertised in a continental contemporary, adapted for restless sitters. We do not know its action, and, truth to tell, have little curiosity to try its powers. "No one moves in our portraits," used to be the proud boast of a Texas photographer; and he brought about the result, if we remember rightly, by cocking a pistol at the sitter, and threatening to blow his brains out if he so much as moved an eyebrow.

TWELVE ELEMENTARY LESSONS IN PHOTOGRAPHIC CHEMISTRY.

No. IV.—Photographic Chemicals.

Albumen is the principal constituent of white of egg and the serum of blood. White of egg consists of cellules containing a solution of sodium albumenate, together with sodium chloride and calcium phosphate. In order to prepare pure albumen, the white of fresh eggs is briskly agitated with water, whereby the cellular compound separates out, and the sodium albumenate enters into solution. To remove the mineral substances a small quantity of basic lead acetate is added to the solution, producing a bulky precipitate of lead albumenate, which is thoroughly washed in water, and carbonic acid gas passed through the pasty mass. The carbonic acid decomposes the lead albumenate, forming lead carbonate, which separates as a precipitate, leaving the albumen in solution. In order to free it from the last traces of lead, a few drops of an aqueous solution of sulphuretted hydrogen are added, and the solution heated till the albumen begins to coagulate. It is then filtered, and evaporated at a temperature not exceeding 110° F.

When a solution of albumen is heated to 140° F. (60° C.), a white flocculent precipitate of an insoluble modification of albumen separates, the chemical composition of which is apparently the same.

Commercial albumen is simply dried white of egg, and consequently contains a considerable portion of mineral salts.

Ammonium bromide, NH_4Br, is produced when hydrobromic acid is neutralized with ammonia. The salt is very soluble in water, slightly deliquescent (*i.e.*, absorbs water), and gives off brown fumes of bromine when heated with strong sulphuric acid.

Ammonium chloride, NH_4Cl, commonly known as *sal ammoniac*, is manufactured by neutralizing the ammoniacal liquor obtained from the gas works with hydrochloric acid, and, after evaporating the liquid, the residue is heated to sublimation, and the salt condensed, in iron domes, in the form of a white, tough, crystalline mass. The chief impurity which is met with in commercial ammonium chloride is iron, for if a strong solution of the salt is allowed to stand, a brown flocculent precipitate of oxide of iron will be deposited on the bottom of the vessel.

Ammonium chloride forms a white precipitate with a solution of silver nitrate, and evolves ammonia when treated with caustic soda or potash.

Cadmium bromide, $CdBr_2H_2O$, is prepared by dissolving cadmium oxide or carbonate in hydrobromic acid, or by attacking the metal cadmium with bromine water, and the salt crystallizes in white efflorescent (*i.e.*, gives off water) needles, which are very soluble in water and alcohol. Cadmium salts form with a solution of ammonia a white precipitate soluble in excess, and, with ammonium sulphide, a yellow precipitate, insoluble in excess.

Cadmium iodide, CdI_2, is made in a similar way to the above salt, substituting hydriodic acid for the hydrobromic acid.

Copper sulphate, $CuSO_4 5H_2O$, is prepared on the large scale by roasting sulphide of copper, and treating the mixture of cupric oxide and sulphate with dilute sulphuric acid, the crystalline product being obtained by evaporating the liquid. When copper sulphate is heated, it gives off its water of crystallization, and the blue crystals give way to a white powder. A solution of copper sulphate forms with ammonia a white precipitate of cupric hydrate, which re-dissolves, on adding excess, to a brilliant blue liquid; if ferrocyanide of potassium be added, a chocolate brown precipitate will be produced.

Ether, $C_4H_{10}O$, is prepared by distilling a mixture of alcohol and sulphuric acid, when the latter, having such a strong attraction for water, subtracts it from the alcohol, and thus leaving the compound known as ether. On the large scale, ether is prepared by heating a mixture of equal quantities of alcohol and strong sulphuric, and then gradually adding thirty parts of alcohol, and distilling, when the ether will condense, together with traces of alcohol and sulphurous acid. The crude product is mixed with a weak solution of potassium carbonate, which dissolves the alcohol, and absorbs the sulphurous acid, leaving the ether, which is of lower specific gravity than water, to rise to the top. The upper liquid is drawn off, and distilled with quicklime, when absolutely pure ether distils over. This process is very dangerous, from the fact that a mixture of ether and air is explosive, and, when distilling, a certain amount is very apt to escape condensation. For greater safety the heat should be applied through a water bath.

Methylated ether is prepared in the above way, substituting methylated spirit for the alcohol. Pure ether is of specific gravity ·74 at 0° C., and boils at 95 F. It dissolves oils and fats, and may be identified by its characteristic odour of collodion.

Gelatine is obtained from bones, hide, horn, hoof-cartilage, &c. On the Continent gelatine is made by digesting bones in dilute hydrochloric acid, whereby nearly the whole of the mineral matter, consisting of calcium phosphate and carbonate, is dissolved out; it is then washed in running water for some hours, and the cartilage, which consists for the most part of ossein, is boiled with water, converting it into gelatine. In England, gelatine is prepared from buffaloes' hides. The skins are first treated with water to wash them, dried, and cut up; the pieces are then soaked in lime-water for some time, and afterwards thoroughly washed in running water, and then boiled in water, and allowed to stand, when the clear liquid is decanted off, and cooled down, the resulting jelly being finally dried on nets. Gelatine is very variable in composition, from the fact that it is a mixture of two substances—glutin and chondrin—in different proportions; and since glutin is more soluble than chondrin, the solubility of a given sample of gelatine will depend chiefly upon which of these two substances is in excess. Glutin produces a white precipitate with a solution of mercuric chloride, while chondrin behaves in a similar way with lead acetate.

Dry gelatine is a yellowish substance, elastic, vitreous, hard, and brittle. When a gelatinous solution is heated for a long time it loses its power of setting, and is gradually converted into meta-gelatine—a substance apparently having the same composition as gelatine.

Gold trichloride, $AuCl_3$, is obtained by dissolving gold in a mixture of hydrochloric and nitric acids, and evaporating the solution to dryness. This compound forms yellow crystals, which are very deliquescent, and its solution is reduced by ferrous salts, many vegetable and animal substances, oxalate of potassium, &c., the gold being precipitated as a purple powder. Gold chloride is soluble in alcohol and ether, and its solution forms a purple or brown precipitate with stannous chloride.

Gum Arabic is a vegetable substance, which exudes from the *acacia*, growing in Arabia. It forms transparent globules, usually having a yellowish tint, which are very soluble in water, and when mixed with dilute hydrochloric acid and alcohol it deposits a flocculent precipitate of *arabin*. When a solution of gum is added to a salt of zinc, copper, calcium, &c., a precipitate consisting of arabate of the metal is formed. This property is made use of in photo-lithography.

Iron perchloride, Fe_2Cl_6, is produced by dissolving iron in a mixture of three parts hydrochloric and one of nitric acid, and evaporating the solution to dryness. The salt is very deliquescent, and dissolves in water and alcohol. Its solution forms a dark blue precipitate with ferrocyanide of potassium, and with silver nitrate a white precipitate of silver chloride.

Iron oxalate, FeC_2O_4, otherwise known as ferrous oxalate, is precipitated when a solution of oxalic acid or potassium oxalate is added to ferrous sulphate. It forms a pale yellow powder which is almost insoluble in cold water, and only sparingly soluble in boiling water. Ferrous oxalate is readily soluble in a solution of potassium oxalate, with which it forms a double oxalate of potassium and iron, $K_2Fe(C_2O_4)_2$.

Iron protosulphate, $FeSO_4.7H_2O$, is obtained by dissolving iron or ferrous sulphide in dilute sulphuric acid, but on the large scale it is prepared, simultaneously with alum, by decomposing aluminous schists containing iron pyrites. Pure ferrous sulphate can be obtained by adding its aqueous solution to a large bulk of alcohol, when the salt is precipitated in the form of a bluish white powder. When the green crystals of ferrous sulphate are kept for some time, they gradually become covered with a brown powder consisting of basic ferric sulphate. A solution of ferrous sulphate forms, with silver nitrate, a grey precipitate of metallic silver, and with potassium ferrocyanide a light blue precipitate.

Kaolin is a porcelain clay, consisting for the most part of silicate of alumina. Its chief use is for decolourising the silver printing bath.

Mercury bichloride, $HgCl_2$, commonly known as *corrosive sublimate*, may be obtained by dissolving mercury in hydrochloric acid mixed with a small amount of nitric acid. On the large scale it is prepared by heating a mixture of mercuric sulphate, sodium chloride, and a trace of manganese dioxide, and collecting the resulting sublimate. When a solution of mercuric chloride is shaken with a small quantity of mercury, a white precipitate, calomel, is formed, which blackens on the addition of ammonia. Washed over a photographic negative it has the property of converting the reduced metallic silver into a white double chloride of silver and mercury, which is insoluble in water.

PHOTOGRAPHIC EXPERIENCES IN EGYPT.

An interesting account of an Eastern photographic expedition, in which Mr. Edward L. Wilson and others took part, appears in the *Philadelphia Photographer*. Mr. W. H. Rau, who writes the paper, is an old hand at photography far away from home, and our readers will not only be interested by his lucid descriptions, but also gather many practical ideas as regards photographic matters. He says:—

I first made out as complete a memorandum of everything that I could think would be required, and carried this in my pocket, together with a blank block of paper on which I jotted down at once every new thought that would help, or any article overlooked in the first memorandum. The first things ordered were the plates, of which we selected two rapidities, for instantaneous and groups, and for ordinary views, &c. The boxes for the 5 by 8 plates were made 5½ inches deep, 5½ by 8½ square; the corners were slotted to hold a triangular piece of cardboard, on which the plates were to rest, face down, in the box, each plate being thus placed by the use of a pneumatic plate-holder; four cardboard corners were inserted between the plates, so that no part of the face would be touched, excepting, of course, the corners which were outside the margin generally used. The boxes were lined with black canton flannel, nap side out; the lid was telescopic—that is, it closed over the box to the bottom—and handles were placed on the outside in such a position that the plates would always carry standing on edge. After the box was filled with plates, a soft pad of cotton batting and canton flannel was packed on top, the lid placed down snug, and a breast screw put in through the lid near the bottom into the box on each side, taking care to have the screws short enough not to penetrate to the inside. The first plate on the bottom rested on its corners on blocks a trifle above the bottom of the box. The boxes for the 8 by 10 plates were the same, only allowing an eighth of an inch above the size of the plate for margin. The wood was poplar, three-eighths thick, and the corners were dovetailed. Glue was not depended on, as experience in dry climates has demonstrated that it does not hold. After the boxes were filled, a tag with the number and rapidity of the plates enclosed was fastened on each strap handle, the boxes were numbered, and the bottom crack around the lid sealed with black "needle" paper, fastened or held on with ordinary negative varnish, as paste would not hold. Tin boxes were made large enough for two boxes in each, the wooden boxes placed therein; the lid was now hermetically sealed by placing a coat of rubber solution (thick) around the lid and an inch below it, then coating strips of rubber cloth long enough to go entirely around the box with the same rubber solution, applying it to the gum side of the cloth. After it had set, the tin lid was pressed down hard, and then the rubber strips were attached, taking care to press down every part, and lapping the ends so that no air could get in. Then the boxes were lettered with a prominent and large letter, so as to keep a record of every case or box as used, &c. Leather cases, made of good solo leather, with extra leather corners, riveted with copper rivets and sewed in every part, were made to carry two tin cases each of the 5 by 8 plates, or one tin case of 8 by 10 plates. These leather cases were also numbered. Around each tin box was wrapped a piece of ingrain carpet, which answered the double purpose of packing and giving an easy means of lifting them out of the leather case. Next in order came the cameras, tripods, lenses, &c. Our 8 by 10 camera is a model of strength and beauty, also the two stereoscopic cameras, all of which we had made with extra long bellows, and an extension bed that slips on and off very easily. The 8 by 10 camera will focus full 26 inches, and the 5 by 8 full 14 inches. The corners are all mounted with brass sheets, not strips. Although at first I objected to the cam motion, I have found since that it was very convenient, and not likely to get out of order. I will first give the points about the 8 by 10 camera. The front was made to slide higher than usual, and the back to swing a trifle more, although I have found that still a little more swing would have helped wonderfully in some of the narrow streets of Cairo and Alexandria. The plate-holders were made the actual size of the plate, a movable frame fitted in the back of the camera, on which the ground glass and plate-holders were in turn fitted, so that in making a vertical picture the whole of the movable frame was swung around. This not only made the holders more portable and lighter, but also gave the actual size of the picture, so that when focussing, all that was seen on the ground glass, which was 8 by 10 inches, was sure to come on the plate. The holders, of which we had three, of 8 by 10 size, were fitted in a box, but this was rather too weak, so we have a stronger one now, carrying the plates in a horizontal position, thus lessening the risk of the slides or partition slipping out. Every holder was numbered in a distinct manner over the slide, each slide having its own number. Several extra fronts were taken, besides those on which the lenses were mounted; also several extra slides for the holders, and extra ground glass, a duplicate set of screws for every part. Finally, the holders were made of mahogany well seasoned, no pine or soft wood being used in any part. (I have thought since that a box could be fitted in the space which is usually empty, viz., the inside of the camera; this box could carry extra lenses, screws, &c., and could be made so that it would not chafe or bear on the bellows.) Our stereoscopic cameras are mounted also with brass corners. The holders, of which we have 18, are all of mahogany and numbered. We have with us several extra stereo. divisions, in case of loss, &c., extra ground glass, extra screws, extra fronts, extra slides for plate-holders, and a bed-board for supporting the camera when making a vertical single 5 by 8 view.

In selecting tripods, I took only those that had the lower ends short enough to double up with the head or top on, as they could be folded without unshipping every time; also chose those that had the grain running straight, as a short grain will break very easily. Extra tops for each were taken, and had I had the time, should have taken the screws out and riveted the irons on the tripod tops that hold the legs—this should always be done, when possible. Of lenses we have the following:—a No. 2 Euryscope, for quick pictures, groups, &c.; a Hermagis, 10-inch, for general views, architecture, &c.; a Morrison 8-inch lens, and a Ross 5-inch symmetrical for very close quarters; all the above for 8 by 10 size. For stereoscopic, 1 pair Ross instantaneous carte-de-visite lenses, one pair Morrison $5\frac{1}{2}$-inch, 1 pair Darlot single view about 7-inch focus, 1 pair 3-inch Ross symmetrical. For the Morrison and Ross stereo. lenses we have exposing flaps or boxes, which are not only convenient, but protect the lenses from dust, &c. For the Darlot and carte lenses, we have flaps made that slip on over the front brass mounting, and have a thumb-screw on the right hand side for turning up the flap. Finally, an instantaneous drop for the Ross half-size lenses. After examining a number of instantaneous shutters, the old drop seemed the simplest and best, so we have such with us. I had the loose stops rivetted together for safety and convenience, and carry all the lenses in a light wooden box with ordinary lid. They are fitted in with padding, so that they will not jam, scratch, nor break, and strap the lid down, the strap making a convenient handle for carriage. For headcloth the black waterproof cloth (not rubber) is the best. I have tapes about 18 inches long sewed on the two corners, so that in windy weather it will not be blown away, and in carrying short or even long distances the cloth can be so tied around the camera that no dust, dirt, nor rain will damage them. This little trick is one of the best I have ever met with, very simple and quick. For the 8 by 10 lenses, where they varied very much in size, we have a flange made within a flange, so that small lenses could be screwed in a brass flange, which in turn fitted in the flange of the larger lenses; this saves carrying extra fronts, which at times do not pack very well. Another very important item for our journey was a dark tent, in which to change the plates in and out of the plate-holders, and perhaps for general use on the desert. It must necessarily be compact, strong, and not easily broken, and large enough to work in comfortably. After long deliberation and study I adopted the one I will now describe. A three-sided tent was made to fit inside or under the legs of our 8 by 10 tripod; the legs were spread about $4\frac{1}{2}$ feet apart at the bottom, in order to give plenty of floor space. The tent was made of rubber cloth (not gossamer) of the widest to be obtained; each side was a single piece. The inside was lined with a double thickness of Turkey red silesia; the bottom was enclosed same as the sides. One side was made rather full, and had an opening about 12 inches from the bottom large enough to admit the upper half of the body. Around this opening, which lapped over the body when the operator was inside, was a strong draw-cord, which could be drawn firm and taut and exclude all the light. On the left side, opposite the entrance, is a ruby silk window, about 9 by 10 inches; outside of this is a curtain to regulate the quantity of light; outside on the bottom, at each of the three corners, are three iron rings, in which the three points of the tripod legs fit; half way up, or where the tripod leg is riveted, are three wooden buckles fastened to the tent with strong tapes, one on each of the three sides; these buckles keep the tent from hanging down, as they fit in between the two top pieces of the tripod leg. Inside on top, or just in the point, is a triangular block about four inches each side; the cloth is drawn well over this and fastened with double-pointed tacks; on this board is screwed a brass nut by which the tent hangs fastened to the ordinary camera screw put down from the tripod top. This completes the tent. It is very strong, roomy, and can be packed almost anywhere, as it takes any shape. I found great difficulty in obtaining the proper colour and quality of silk for the window. Finally, I saw some very close-grained heavy white silk. In order to operate in this tent it is, of course, necessary to kneel down and enter only the upper part of the body. We have a number of pieces of rubber cloth and some rubber cement, in case a tear is made in the outside; also an extra piece of ruby silk for the window. As we wish to develop occasionally and see if everything was working well, a supply of chemicals sufficient was packed to take with us. Oxalate of potash in half-pound bottles; iron was powdered very fine and dried, also in half-pound bottles; a bottle of powdered alum; a four-ounce bottle of oxalic acid, saturated solution; in fact, I nearly filled the bottle with oxalic acid, and added water to fill up to the neck, and corked well. A four-ounce bottle of bromide of potassium solution, half a pound of the dry salt, and hyposulphite in half pound bottles. Litmus paper was folded in tin-foil and carried in a box. All the bottles were well corked, and a piece of pure rubber cloth tied over the corks, making them air-tight. Also about three extra six- and eight-ounce empty bottles and corks; one eight-ounce wide-mouthed bottle I marked on the outside for measuring taking the place of a graduate. Four rubber 8 by 10 developing dishes, a sponge, towel, and a folding negative rack completed the outfit for development. The following list of articles and necessities come next in order: lump of beeswax, a cake of opaque, small brush for same, two bottles of "Stratena," a bottle of rubber cement, two broad camels'-hair dusters (from which cut off the long handles), one good soft chamois skin, a good diamond, two balls of thin, strong twine, one pneumatic holder, one box rubber bands, a large number of record books, small bottle of parlour paste with brush, one dark lantern (ruby bull's eye), one box candles for same, three boxes of safety matches, twelve sheets needle paper, six heavy treasury blotters, a yard of canton flannel (brown), extra rubber cloth strips enough, cut ready for sealing, tin boxes for return voyage, several straps, and two shawl straps (very strong and long), one bottle of Pond's extract for wounds, two mouth-drinking filters for the desert, one thirty-three foot tape measure, a mariner's compass, a magnifying glass, a box of tools, which contained all of those most necessary to have in time of need, viz., hammer, plane, screw-driver, gimlet, file, pincers, scissors, metal shears, whetstone, saw, copper wire for repairs, one pill-box of small French nails, two boxes of brass screws, a paper of pins, box of assorted screw eyes and screw hooks, one paper double-pointed tacks, one Aiken's tool handle, several strips of sheet brass, and a paper of fine tacks. All the tools were small, and took up very little space. We also took six sheets of ruby paper, rolled on a round stick. A few small tags for marking we found quite handy. And since we might wish to photograph inside the pyramids and in some of the tombs, for underground work we took with us one pound of magnesium wire, made into small torches by twisting in some iron wire, which was hermetically sealed for the voyage. A stylographic pen for making the records in the books is a very good thing, as the mark is in ink, and will not rub like pencil. Everything was packed in leather cases, each case numbered, and an inventory taken of every case with its contents, so as to be able at any time to get any article that was wanted. Joseph paper was packed wherever anything soft and yielding was required, as it could be used in many ways afterwards. Each case had a printed label pasted in a prominent place, with name and destination, and cautionary words as to handling. As to personal luggage, a small valise each served us for all we needed.

Everything being ready, the lenses were taken aboard the steamship *Illinois*, safely stowed in a vacant room so that no shifting would take place, and we sailed for Egypt. During the voyage to Liverpool we made a few instantaneous exposures on deck, and while doing so, the crew were drilling in the life-boat service, so that we made several negatives of this very interesting scene. The waves were so very beautiful over the stern of the ship, covered as they were with foam, that we made several exposures in that direction, and, just as I was about to release the drop, a flock of sea-gulls came before the camera, one of them turning his body full, when I made the exposure. In due course of time we left Brindisi on the *Bangalore* for Alexandria. The cooks on board were lascars, many of the crew were from Goar, in India, some were Turks, some Egyptians; in fact, a more motley crew could scarcely be imagined. The captain requested a picture of them, so we mustered them all on deck on the top-gallant forecastle, and, with the ship for a background, a number of exposures were made. A few were instantaneous, several had two and three seconds' exposure. We passed several of the Ionian islands on the coast of Greece, on one of which is mount Saint Elias, which had its peak capped with snow. Of this we made a few exposures, and finally on the passengers of the vessel. Among them were two English amateur photographers, who were armed with an outfit of gelatine plates, of small size, to be used in India and Australia. Arriving in Alexandria on January 4th, we were surprised to find a gentleman who assisted very much in the custom-house, a Mr. Fervest, an Englishman, who was chief inspector, and who, fortunately, is also an amateur photographer. He understood our bulk of luggage, and passed it through at once. We arrived early in the morning at the hotel, about 9.30, and were out ready to work at 10 o'clock. We had with us a dragoman to show us the points of interest and act as interpreter. He was a fine old man, with full white beard, and, of course, wore his picturesque native costume. Our first point was the harbour, and, by climbing a stairway leading on top of a house, we obtained a grand view looking out seaward, and showing the lighthouse and the Khedive's palace. As there was a great deal of motion of vessels and figures in the foreground, it was necessary to make instantaneous exposures. Thence we drove around the bay as far as the arsenal, and from there obtained a fine view of the city, showing some shipping in front. A number of prisoners chained together in couplets were leaning aimlessly around the arsenal grounds; so, to make a picturesque foreground, we placed several in our picture, and afterwards, while Mr. Wilson was getting out money to pay *backsheesh*, they made a tumultuous rush towards me, tangling me up in their chains, and trampling and kicking the lens-box and some plate-holders in a most alarming manner. Our dragoman's stick being brought to bear well on them, they were soon driven away. I found that no damage had been done to any of our plate-holders or lenses; still, it taught us a lesson in taking care not to distribute the *backsheesh* until everything of ours was secure. Our next point was Pompey's Pillar, or the Column of Diocletian. On our way there our springs in the carriage gave out, and we were obliged to spend some time in a Moslem cemetery, where we secured some beautiful pictures, a high bluff surmounted with bright Oriental buildings forming a fine background. We were strictly cautioned not to step on any of the graves or tombs, and were refused permission to mount a tomb in order to get a better view. Men are always here on guard; whole families were encamped in the cemetery, moaning and crying. Another carriage arriving by this time, we soon arrived at Pompey's Pillar, which does not offer much of beauty for the camera, but its history is interesting. It stands entirely alone, nothing, not a palm, close by to break the sky or fill in the sides. Arabs are here innumerable; one wonders where they come from, so suddenly do they surround you. They are a very good-natured set, but extremely inquisitive, crowding close around you. In making the exposures it was necessary, in order to keep the place clear around the base of the column, to employ several policemen and our dragoman, after which they one and all demanded *backsheesh*, so that we soon found that the very least service had to be paid for with *backsheesh*. Just as we were leaving, we saw a very picturesque old woman, suckling a babe, carrying it astride her hips. After much coaxing and promise of *backsheesh* we made several exposures on her, with an Oriental doorway as a background.

Of mosques there are few fine ones, the better ones standing in the suburbs; they are odd-looking, and are surrounded generally with palm trees which frame them into beautiful pictures. We secured a very characteristic picture of a village of mud-houses (very much like our Pueblo Indian houses), the walls of which were covered with the droppings of cows and camels. This is their fuel, as wood is scarce in Egypt. A very beautiful part of Alexandria is the street in which the consuls live; fine large Oriental palaces line it for several blocks. The buildings are bright and nicely decorated, so that one is tempted to stop before each one with the camera. In the centre of the city is an open square, called the Place Mahomet Ali; in the centre is a large bronze equestrian statue of Mahomet Ali, the great general, great grandfather of the present Khedive. In making negatives of this statue, we had no sooner planted the camera than we were surrounded with hundreds of curious Arabs—in fact, the crowd was so dense that police officers were required to clear the street. Having done Alexandria, we took the train for Cairo, which we reached after six hours' ride. Our first day's mark we spent in the famous Boolak Museum, the most complete and largest collection of Egyptian antiquities in the world. Mr. Brugsch Bey, who was in charge of the museum, gave us much valuable assistance. He stood up and arranged several mummies of the old Egyptian Pharaohs, so that we were enabled to make large portrait heads of them. The camera certainly had some rich food spread before it. Here is a black basaltic statue of Cephum, the founder of one of the great pyramids; it is a difficult subject on account of its colour, but was in quite a good light. Again we have two mummy cases, ten feet high, made by wrapping one layer of linen over another, and fastening with pitch, until the thickness of several inches was reached. Another mummy case has the entire face covered with burnished gold, and the case as brilliantly coloured as when it was first applied. Several very perfect sphinxes of syenite granite adorn the grand vestibule, also a dark-green statue of Ramases II., the great Sesostris. Many cases of nicely-arranged bronze, terra cotta, and stone images of Egyptian gods and goddesses, of royal jewelry and gold work, of fruit, vegetables, furniture, &c., of hundreds of "Scarabees" stood crowded close together. Still, by using good judgment and skilful handling, we secured the most important objects. An especially interesting collection is gathered in the room, dating back to the ancient empire, six thousand years ago. In this room is a wooden statue of a man standing, which undoubtedly is the oldest piece of sculpture in the world; it dates before the great pyramids; also a painting in brilliant colours, one foot wide by six long, which is six thousand years old, and many other statues and stone sarcophagi used for holding the mummy cases. Mr. Brugsch, who is an amateur photographer, wished a few negatives for his own use of several very dark statues, which he was unable to get on account of their very black colour and the poor light on them. So we exposed with a Euryscope, smallest stop, twenty-five minutes, for 8 by 10, and with Morrison 5½ in full opening, twenty minutes for stereos. These negatives, on development, came up beautifully, and gave Mr. Brugsch intense pleasure. They were made on the brand A plates. Mr. Brugsch furnished us with a vacant room in an outhouse attached to his residence, in which were tap and water-sink for developing plates.

I was very anxious to see how the plates would come up, as they looked well and free from spots before development. My method of proceeding was as follows. I took with me the necessary chemicals, bottles, and dishes, first measured out fifteen ounces of water, then three ounces of oxalate, added to the water (cold), and shook until dissolved; it did not take more than a few minutes. In one dish I mixed some hyposulphite solution, and in a bottle a little saturated alum solution; to the oxalate solution I added a few drops of oxalic acid, tested with litmus paper for acidity, found it acid. Now for development. I poured five ounces of oxalate into the wide-mouthed bottle, measured out one hundred and twenty grains of powdered iron, added this dry to the oxalate, which took it up quite readily, shook a minute, then added ten drops of a sixty-grain solution bromide of potassium: finally added water to make up to eight ounces for the A plates, while had they been B plates, should have used it without adding any more water. The first plate developed was an 8 by 10 of a double statue of very dark colour, almost black; in a half minute it began to come, and developed up slowly and full of detail, showing the cut in hieroglyphics in the deepest shadows; the half-tones were soft, and the shadows clean—in fact, it was a perfect negative. The intensity was just right. I washed well under running water, and put it into the hypo-solution. Next I developed an 8 by 10 of a black sphinx, which was equally difficult, but, like the first, equally successful. After developing a few more with like result, I went back to those that were fixed, and washed well and flowed from the bottle a minute or more with alum solution, washed, and stood on rack. Mr. Brugsch expressed great surprise and extreme pleasure at the simplicity and beauty of working gelatine, and although he had almost decided to abandon photography on account of the bother it gave by the wet method to the amateur, he will now take fresh hold with gelatine plates. He requested to have some of the same make as ours to be sent him from America.

(*To be continued.*)

Correspondence.

PHOTOGRAPHY AT SEA.

Dear Sir,—By last mail I sent you a hasty sketch of my two forms of instantaneous shutter. I hope the description was intelligible, but I had not time to write it carefully.

It may interest some of your readers to hear how the ship was taken on the open ocean. She was sailing about six knots an hour, with a steady wind and slight swell broken by small cross waves. The sky was dull, but as we were getting out of the calm tropical regions, and towards the Cape of Good Hope, I thought it better not to wait for fine weather, so the captain launched his gig (a twenty-foot boat, horribly leaky), and in it descended four sailors, the captain, three passengers, and myself. The ship's yards were kept aback until we had rowed and sailed about a mile ahead, and then the captain waved a flag and she sailed up past us. I took two shots at her from the starboard side, then the same manœuvre was repeated, and I had three more tries from the port side. Only two of the plates were rapid enough to give a printable result.

Although the sea seemed fairly smooth when aboard the big vessel, we found the gig jumped about considerably. We were often hidden in the trough of the waves from the sight of those on board, and it was very difficult to stand steady while focussing. If it had not been for a little "finder" (made out of a toy lens and hollow two and-a-half inch cube of wood) that I had fixed on the top of the camera, I could never have got the ship into the field at all except by chance. As it was, I had only to watch her flitting up and down and in and out of the finder's ground glass, and easily saw the best opportunity. The shutter was held up by a piece of thin string passing over to the back of the camera, and held by a catch. There are many other ways in which this shutter could be "fired off," but I think the string is the simplest and handiest. A quick enough exposure for many moving objects can be got by taking off the india-rubber band, and simply pressing the shutter down with a finger. Two bands of velvet fastened one on each side of the shutter will keep it in position, and also prevent any light leaking in.

The two photographs of the bows were taken from the dolphin striker as the ship was running before the wind about fifteen miles an hour. I sat on a netting fixed in the angle of the stays, held the camera against my chest with one hand, and pulled the string of the "rotating shutter" with the other. The first view represents her plunging into, and the second rising out of, the water.

I did not like to risk my half-plate camera out there, so I used a quarter-plate one which I constructed on board by fixing a few extra fittings on to the half-plate extending front, with sciopticon dark slides and a walking-stick tripod; this front contrives "a double debt to pay" in a very satisfactory manner, but I had to give the tripod a greater splay, and otherwise strengthen it, before it was steady enough. With it, I hope to be able to get about in the interior of Japan without attracting much attention; but for places where any ordinary camera would be viewed with suspicion, I constructed during my spare time on the voyage a sort of detective camera, taking plates $2\frac{1}{6}$ by $1\frac{1}{2}$. The changing box holds eighteen plates in a very small compass, as the grooves were made by sticking slips of ferrotype iron into knife cuts in the sides. The sliding spring shutter serves for this too. I am a bad sailor, but it is wonderful how soon one gets used to the ship's motion in a few weeks; it was quite easy to do mechanical work as accurately in the heavily rolling ship as on shore. Development was not quite so easy, especially as the plates had to be carried in the dark from cabin to cabin to get them washed; my friends' basins having to be utilised for that purpose.

A good climber might get some very interesting photographs from the rigging, but it is difficult to find a safe place for the camera. I never got it up higher than the foretop, and it was not pleasant work lying down focussing there.

Land views taken from a ship seldom make good pictures, owing to the absence of foreground. I have coasted nearly all round New Zealand, and found hardly any really "takeable" subjects. The best view of Mount Egmont, however, is from the roadstead, and I spent two hours watching for a chance of taking it, and lost the opportunity through greediness. Not satisfied with having the mountain itself wonderfully clear, I waited for the sun on the town (Taranaki) in the foreground. Alas! when the sun came on the town, the clouds came on the mountain, thus adding one more to my list of interesting photographs *not* taken by an amateur. In the evening again it was most tantalizing; the brilliant snowy peak would occasionally clear for one or two hundred feet down, and then cover up again, till at last the sun set, the anchor was weighed, and Mount Egmont became to me one of the visions of the past.

I believe good views of Mount Cook might be got from the sea, and there is a very narrow channel, called the French Pass, which would make a good picture taken from the west side; but the steamers generally go through at night. Herbert Green.

Ohinemutu, N.Z.

FERROUS OXALATE REDIVIVUS.

Sir,—Being abroad I had not seen the article by Mr. W. T. Wilkinson, bearing the above title, till a day or two ago. Perhaps you will permit me to make a few brief remarks thereupon.

Mr. Wilkinson commences his paper by an imputation which is not argument, and by no means fair and courteous. He says that a return to ferrous oxalate is advocated especially by some manufacturers who find it impossible to make plates free from chemical fog. This assertion would be entirely beside the mark if it were true, which it is not, but it shows the animus with which Mr. Wilkinson starts out.

I have not a copy of my article which you did me the honour to extract for your journal quite without my knowledge, but in it I made certain claims on behalf of this method of development; I stated that it was employed in France by the very best men, both in Paris and the provinces, to the entire exclusion of pyrogallic. I made this statement on my own personal knowledge. I have had opportunities of seeing bromide plates developed in first-class Parisian studios, and having had some little experience in photographic work, I may take some credit for knowing a good negative when I see it, and I have seen negatives of the highest possible excellence developed in three or four minutes, full of detail and vigour, and of a quality not to be surpassed by any method of producing a negative.

Any one who will take the trouble to look at Reutlinger's studies of children—instantaneous pictures, as shown by the wonderful variety of expression on the faces, and the exquisite naturalness of pose—cannot but come to the conclusion that it is fine work; but nothing but ferrous oxalate is employed in his studio. Again, take the exhibits of Monsieur Walery, now a successor whose name I do not know; take the exhibits of Monsieur Liebert; we see nothing so fine in London, in my judgment; yet these are all on bromide plates developed with ferrous oxalate.

I will not take up time and space by giving names, but I have had hundreds of fine negatives through my hands, from all parts of France, from photographers whose names I do not know, and from many whose names I do know and recognize as princes of the profession, and I say that amongst these have been many of the highest technical excellence, and all developed with ferrous oxalate. The fact is, a Frenchman will not have anything to do with pyrogallic, and developing with ferrous oxalate has been worked out in France to a perfect system.

But what seems to have been the last straw on the camel's back to Mr. W. T. Wilkinson, was Mr. Alexander Campbell Swinton's letter in the News of July 14th. Now this gentleman put his statement in a perfectly straightforward and lucid way, but he has the misfortune to agree with the article in *Autotype Notes*. I have not the pleasure of Mr. Swinton's acquaintance, but felt the pleasure that one naturally does feel by a public expression of opinions agreeing with one's own. But Mr. Swinton has the advantage of Mr. Wilkinson, inasmuch as Mr. Swinton sends specimens of his work, which are characterized by the editor as "admirable out-door studies, fully detailed in the shaded parts, yet well gradated and vigorous." Perhaps these may be taken to balance Mr. Wilkinson's cricketer; but I must beg Mr. Swinton's pardon for the suggestion.

Now ferrous oxalate was introduced, I think, by Captain Abney; it was adopted exclusively by Dr. Von Monckhoven; it has been from time to time, and is in fact, being now, discussed by well known names; but yet it is left for Mr. Wilkinson to discover that it is defunct, and that certain manufacturers are, for their own purposes, striving to revive it.

If Mr. Wilkinson will turn to the advertisements of some of the best makers, he will find the statement that their plates can be developed either with pyrogallic or the ferrous oxalate developer; if he will set himself up with sample boxes of plates from the best makers, he will find in some of them formula for development with ferrous oxalate; if he will try some of the continental plates he will find them quite equal to any he has ever touched, and they give a ferrous oxalate formula exclusively. Permit me to detail the experiments that were made in my laboratory, and upon which I formed the opinions given in the article in *Autotype Notes*. Plates were purchased from every maker. I do not give names, as I object to making the pages of your journal a medium for praise or dispraise of any article offered commercially. Suffice it to say, there was no maker of any repute not represented. Two of each of these plates were exposed most carefully to a sensitometer scale, with a standard and constant source of light. One plate of each was developed by the exact pyrogallic formula given by the maker, the other with the ferrous oxalate formula as given by the maker, or, if he did not give one, then my own formula was employed. This experiment was carried through with all possible care, and the results were, that in some cases the ferrous oxalate had a slight advantage, in others the pyrogallic was quite equal, and in about two makes of plates the pyrogallic had an advantage: such was my experience.

There were about thirteen different makes of plates experimented upon, and these were the results obtained. The scales themselves are carefully preserved, but, not having access to them at present, I cannot give exact particulars. There is one thing, however, I should mention, that, whereas all the scales developed with pyrogallic were affected with the well-known yellow stain, the ferrous oxalate were entirely without it.

On behalf of the ferrous oxalate, I urge that it was introduced by a well-known chemist and scientific man in England, adopted exclusively by an equally well-known chemist and scientific man on the Continent, that it is used exclusively in France, and that the finest possible work is daily produced by its means; that it will develop a picture on any well-made dry plate as rapidly and as full of detail as alkaline pyrogallic, and with more vigour; that there is a total absence of yellow stain; that it is much more cleanly, and presents greater conveniences; that it is just as easy to control the picture by the addition of bromide as it is with pyrogallic. The ferrous-oxalate developer seems to me to present these advantages. I may be entirely mistaken. If Mr. Wilkinson is of a different opinion, he has the most perfect right to hold and to express it, but not to impugn the conduct of, and attribute unworthy motives to, those who may, perhaps, be as capable of forming an opinion upon this or any matter as Mr. Wilkinson himself.

THE AUTHOR OF THE ARTICLE ON FERROUS OXALATE IN "AUTOTYPE NOTES."

SIR,—Mr. Wilkinson's letter on "Ferrous-Oxalate Redivivus," in your issue of August 4, is so injurious to progress, and so opposed to facts known to all successful workers of this beautiful process, that I cannot help, with your permission, putting in a protest. The experiment tried on a cricketer—given without data as to lens, light, &c.—is almost useless; but I should say it probably was much over-exposed in three seconds (Swan's twenty-five times). About one second would have been nearer the proper time, and would have given a picture for which a development of about eight minutes would have sufficed; being so much over-exposed, it would be difficult to bring up to printing density.

The extraordinary statement that ferrous-oxalate negatives are harsh and dirty-looking—well, after that it seems wasting time to say more; but who, I may ask, has so found them, excepting some very bad workers indeed?

The statement that the only plates suitable for ferrous-oxalate development are those that are faulty in manufacture, is funny; at any rate, personally I much prefer the faulty plates. I should think several manufacturers would have a word to say on this subject.

I cannot pass over so quietly as Mr. Wilkinson the fact that the best Continental artists do use the ferrous oxalate; their doing so should at least be something in its favor. They are not in the habit of doing things in the wrong way.

Then comes the third point in Mr. Wilkinson's letter, which he thinks not worth arguing, but I think very important. I always use my old developer for starting and bringing out the image, and use it over and over again, not for three or four plates, but for all I develop. This statement of course requires some explanation; but I have worked out the process carefully, and have given it about two years' trial, so can claim to have some knowledge of the matter. I also gave a year before that to pyrogallic—and gave it up in disgust—for the ordinary work in studio and landscape. I will not say for very quick work pyrogallic may not be best; but I do say that in the ordinary way ferrous oxalate gives all that can be desired. Half-tone is perfection, and a general keeping in the picture which is most artistic. Can we say the same for any but the very best pyrogallic work?

I want to see ferrous oxalate taken up with half the care that pyrogallic has had bestowed upon it, and then we should hear that it, after all, did *not* give harsh and dirty results. I beg to enclose you a carte I took recently; I think you will say it is fairly good. This was one second ordinary light, Britannia plate, oxalate developer.—I am, yours sincerely, O. C. Smith.

[Our correspondent sends a charming little group picture of children.—Ed. P.N.]

Proceedings of Societies.

London and Provincial Photographic Association.

At the meeting held on August 10th, under the presidency of Mr. Collier, a paper was read by Mr. A. L. Henderson, on "Cold Emulsification with Uniformity" (see page 487).

The Chairman said that from the reports that had appeared in the photographic papers of the meeting on the 27th ult., he seemed to have been misunderstood as to the details of the method he had described of obtaining gelatine from parchment cuttings. What he actually did was not to add three quarts of water to half a pound of washed parchment cuttings, but to make up the quantity to three quarts in all. He claimed that by making emulsion directly with newly extracted gelatine, decomposition was avoided.

Messrs. G. Hare and G. Taylor were elected members.

Talk in the Studio.

Dry Plate Competition in Germany.—During the convention of German photographers at Eisenach, Saxe-Weimar, a dry plate competition will be held. All manufacturers and dealers may compete, but the latter must mention the name of the manufacturer in their sealed letter. Each competitor must send by the 20th August one dozen of each of the following sized plates, addressed to Herrn Photograph Remde, Eisenach, Germany (carriage paid), namely, 10 by 13 centimetres, 13 by 21 centimetres, 18 by 24 centimetres. Advice respecting the plates (for identification of package, &c.), with name of sender, manufacturer, &c., is absolutely necessary; but this must be contained in a sealed envelope, bearing outside a motto. The package of plates will also bear the same motto, but *no name*, together with the words "Concurrenz von Trockenplatten." Details respecting development of the plates, &c., should accompany each packet. A sum of thirty shillings should also accompany the packages, to meet expenses, but this sum may not all be spent. The result of the competition will be published in the *Deutsche Photographen Zeitung*. A silver medal may be awarded to the most deserving competitor, and a diploma to the next. The jury will consist of four persons, two chosen by the committee, and two by the convention. The president has the right to serve on the jury, and to give a casting vote.

Maritime Photography.—Messrs. G. West and Co., of Gosport, whose fine panoramic picture of Portsmouth Harbour will be remembered, send us some capital views of H.M.S. *Bacchante* with the Royal Middies on board, returning from their cruise round the world.

Photographic Society of Great Britain.—In consequence of the success of the technical meetings of this Society, it has been arranged that they shall be continued during the recess (August and September). They will now, therefore, take place on the fourth Tuesday of every month during the year. The next technical meeting will be held on Tuesday, August 22nd, at 8 p.m., at the Gallery, 5a, Pall Mall East.

Cetewayo's Photographs.—Upon Mr. Vaughan taking his seat at Bow Street on Tuesday, Mr. Crewes, of Cape Town, South Africa, stepped into the witness-box, and said that he was the proprietor of the original photograph of Cetewayo, taken at Oudo Moulen, South Africa. He had registered the copyright, but on his arrival in England, recently, was surprised to find that copies of the photograph he had taken could be purchased in the streets at 1d. each. He produced a copy, and stated that at the place he had purchased it he had been told that he could be supplied with large quantities. The object of the present application was to ascertain what steps he could take to uphold his right to the sole sale of the photographs through his agents in England, Messrs. Marion and Co., of 22, Soho Square, as he had been put to a considerable expense, and had sustained great damage by the sale of the copies complained of. Mr. Vaughan asked if the applicant knew who had published the prints. Applicant stated that he did not know definitely, but had been informed that it was a German. Mr. Vaughan said he could not do anything until the name of the publisher had been ascertained. If this were done, applicant could have a summons.

Return of Mr. Muybridge.—"Our old friend Mr. Muybridge of San Francisco, Cal.," says *Anthony's Bulletin*, "has returned from Europe laden with honours, having exhibited before the royalty of England and the *savans* of France. Meeting with universal success, and being the recipient of many honours hitherto seldom conferred on photographers in the old world, he proposes to gratify, during the coming season, the American public with an exhibition of his remarkable productions, of which we hope to give timely notice. Mr. Muybridge is, perhaps, the most indefatigable and adventurous photographer of the day, and his efforts in securing admirable photographic results have never been exceeded. Intensely devoted to his profession, he has braved many climatic perils on the western coast, in the Farrallones de los Frayles Islands, and among the coffee plantations of Panama; also on the coast of California and in the Yo Semite Valley and the Upper Sierras, where he succeeded in procuring immense views of the magnificent scenery of those vast elevations at untold risk of life and limb."

New Ferric Sulphates.—P. Marguerite-Delacharlonny.—The author enumerates 15 ferric sulphates. Six of them are soluble, and contain respectively 2, 3, 4, 5, 6, and 7 molecules of ferric oxide to 12 mols. sulphuric anhydride. The remaining 9 sulphates are insoluble, and contain, along with the same quantity of sulphuric acid, from 9 to 84, or rather $84+y$ mols. of ferric oxide. The author recognises 11 aluminium sub-sulphates—those with 2, 4, 6, 8, and 10 mols. aluminium sesquioxide to 12 mols. sulphuric anhydride being soluble, and the remaining insoluble with 12, 16, 18, 20, 24, and 30 mols. alumina to 12 mols. of acid. He finds that if alumina is added to a solution of ferric sulphate, the ferric sulphate may be entirely displaced, yielding a solution of aluminium sulphate perfectly free from ferric salts. —*Chemical News*.

The Hektograph.—This is the well-known copying process in which gelatine transfer pads are used. Contests were carried on for a long time after its invention, before the United States Patent Office, to determine who were the original and first inventors. A mass of testimony was taken; but the priority of invention was finally awarded to Vincenz Kwaysser and Rudolf Husak, of Austria, to whom Letters Patent were granted June 1, 1880. During the progress of the interference proceedings hundreds of dealers began to make and sell the article, and it was difficult for them to understand that, now a patent had been issued to the inventors, they must cease to manufacture or assume the liabilities of infringers. In some cases it became necessary for the Hektograph Manufacturing Company, the owners of the patent, to bring suit for damages. One of these suits has lately been brought to a conclusion, the patent being fully maintained by the United States Court.—*Scientific American*.

Acid-Proof Cement.—Make a concentrated solution of silicate of soda, and form a paste with powdered glass. It will be found invaluable in the operations of the laboratory where a luting is required to resist the action of acid fumes.

To Correspondents.

*** We cannot undertake to return rejected communications.

J. Byron.—Add a few drops of a solution of nitrate of silver; if a milky precipitate ensues, it contains salt. Most waters do contain it, but only in very slight quantity.

Colchester.—The "Studios of Europe" contains the most practical and latest formulæ about collotype; if you study the articles on Löwy, Albert, and Obernetter, you will be posted up in the most recent methods.

Albumen.—The process employed by Levy for his transparencies has not been published, and this is, we presume, the method you desire. Printing upon films of sensitized albumen upon glass is a difficult process, and great skill and experience are required to ensure success; but any practised photographer taking up the matter seriously should succeed. There is no difficulty about getting density with the collodio-chloride process, if you have recourse to fuming the film with ammonia before it is put into the pressure frame.

G. G.—Because it is a restrainer.

Cape Wrath.—1. We cannot recommend. 2. We can only say that we have employed sulpho-pyrogallol with success.

Nitrate.—So slight an impurity would not matter in a bath for sensitizing paper, although wo should not employ it for a dipping bath. Our lessons in photo-chemistry will teach you something on this subject.

Pyrogallol.—Thank you.

T. A.—1. Our Year-Book for 1882 has been advertised as out of print for some weeks past. 2. 2s. 3d.

Gelatine Amateur.—The percentage is, of course, *dry* albumen; in an egg, of course, this is not the case.

Collodion.—We advise a preliminary coating of albumen; see our Everyday Formulary.

B. B.—No, thank you.

Feed.—Do not employ your solution so strong; 3 per cent. strength is ample.

C. Green.—1. Chrome alum is far more energetic in its action than ordinary alum, and it is probable that 45 grains dissolved in about two ounces of water would be quite sufficient. 2. Tho third on your list.

F. Barrington.—1. It is quite easy to take a cast in plaster from the wet relief, but before trying to separate the cast, it is as well to dip the whole in water. 2. It is not much use telling you how many grains per ounce, as samples differ much as to the proportion of soluble matter. Break the bitumen in small pieces, and just cover it with benzole, after which adjust matters so that you get a solution having about tho consistence of thin syrup. One part of this and four of benzole will probable answer your purpose.

Max.—1. The starch granules swell, and finally burst. 2. Principally lactic acid. 3. Add oxide of silver until the solution is neutral. 4. No.

A Constant Subsciber.—We are sorry wo cannot give you any definite information. Mr. Notman's studio is at Montreal, as you state.

Student.—1. The City Guilds, at their Cowper Street laboratory, are, we believe, making arrangements to give instruction, theoretical and practical, in photography. 2. "Almost touching" is rather difficult to understand; your best plan will be to make a practical experiment, for it depends much on the nature of your lens.

G. Canald.—We think your spots must be due to defective filtration; see if anything is visible before development, holding plate against a ruby light. Your emulsion appears otherwise so good, that we cannot but believe it is a mechanical difficulty only that you are troubled with.

Enquirer.—Your best plan would be to look at tho Melbourne and Sydney Directory.

Eltham.—Wo have seen them in several of the wholesale fancy warehouses in Houndsditch and the immediate neighbourhood.

Sicah.—You will find it more convenient to make use of one combination of tho lens you already have. If you employ the back half, leaving the diaphragms in front of the lens, barrel-like distortion will occur; but if, on the other hand, you remove the back combination, the direction of tho distortion will be reversed. In ordinary cases the distort on is unimportant, providing there are no straight lines near the margin of the picture.

A. B. C.—1. For first trial you had better uncap and cover as quickly as practicable. 2. Often as short an exposure as one-thirtieth of a second.

PHOTOGRAPHS REGISTERED.

Mr. C. W. Smartt (Leamington)—Photograph of Shakespeare's Baptismal Register. Photograph of Shakespeare's Register of Death.

Mr. Eskett (Lindall, York)—Group of Females of Salvation Army. Three Photos. of Rev. D. Hill, and J. R. and E. Hill.

Messrs. Appleton and Co. (Bradford)—Two Groups of Prince and Princess of Wales, Mr. Titus Salt and Family.

THE EVERY-DAY FORMULARY.

The Gelatino-Bromide Process.

Emulsion.—A—Nit. silver 100 grains, dist. water 2 oz. B—Bromide potassium 85 grains, Nelson's No. 1 gelatine 20 grains, dist. water 1½ oz., a one per cent. mixture of hydrochloric acid and water 50 minims. C—Iodide potassium 8 grains, dist. water ½ oz. D—Hard gelatine 120 grains, water several oz. When the gelatine is thoroughly soaked, let all possible water be poured off D. A and B are now heated to about 120° Fahr., after which B is gradually added to A with constant agitation; C is then added. Heat in water bath for half an hour, and stir in D. After washing add ¾ oz. alcohol.

Pyro. Developer.—No. 1—Strong liqnid ammonia 1 oz., bromide potassium 160 grains, water 80 oz. No. 2—Pyro. 30 grains, water 10 oz. In case of an ordinary exposure mix equal vol.

Iron Developer.—Potassium oxalate sol. (1 and 4) 80 parts, ferrous sulphate sol. (1 and 4) 20 parts, dist. water 20 parts. To each 4 oz. of the mixed developer add from 5 to 30 drops ten per cent. sol. potassium bromide, and 30 drops sol. sodium hyposulphite (1 and 200).

Substratum or Preliminary Preparation.—Soluble silicate of soda 1 part, white of egg 5 parts water 60 parts. Beat to froth and filter.

Cowell's Clearing Solution.—Alum 2 parts, citric acid 1 part, water 10 parts. Edwards adds enough strong solution of perchloride of iron to give the preparation the colour of sherry when it is required to reduco intensity.

Eder's Method of Intensification.—The negative is whitened by being soaked in the usual saturated solution of mercuric chloride, and after thorough rinsing is immersed in potassium cyanide 10 parts, potassium iodide 5 parts, mercuric chloride 5 parts, water 2,000 parts. As the film becomes dark brown, the actinic opacity is enormously increased; but prolonged action causes the brown tint to become lighter, until at last the negative is no denser than previously to its treatment.

Fol's Backing Sheets.—A chromographic paste is prepared with gelatine 1 part, water 2 parts, glycerine 1 part, and a very small addition of Indian ink. Strong paper or shirting is coated, and the sheets are laid, face downward, on waxed glass to set. One of these pressed into optical contact with the back of the glass is an effectual preventive of halation.

The Wet Collodion Process.

The Nitrate Bath.—Water 14 oz., nit. silver 1 oz., nitric acid 1 drop. Before using coat a very small plate, and allow it to remain in the bath for about twenty minutes.

Cleaning Preparation for New Plates.—Alcohol 4 oz., Jeweller's rouge ¼-oz., liquid ammonia ½-oz.

Film-removing Pickle for Old Plates.—Water 1 pint, sulphuric acid 4 fluid oz., bichromate potassium 4 oz.

Substratum.—The whites of 2 eggs are well beaten up with 6 pints of water, and 1 dr. of liquid ammonia is added.

Negative Collodion for Iron Development.—Alcohol 1 pint, pyroxyline of suitable quality 250 grains, shake well and add ether 2 pints. *Iodize this by mixing with* one-third of its volume of alcohol ½ pint, iodide ammonium 80 grains, iodide cadmium 80 grains, bromide ammonium 40 grains.

Normal Iron Developer.—Water 10 oz., proto-sulphate iron ½ oz., glacial acetic acid ½ oz., alcohol ¾ oz. The amount of proto-sulphate iron may be diminished to ¼ oz. when it is desired to obtain full contrasts, or may be increased to 1 oz. when contrasts are likely to be unduly marked. When a new bath is used, the quantity of alcohol may be reduced to ¼ oz.; but when the bath is very old, it may be necessary to add rather more than recommended above.

Intensifying Solution, or Re-developer.—Water 6 oz., citric acid 75 grains, pyro. 30 grains When used, add a few drops of the silver bath solution to each ounce.

Eder's Lead Intensification.—After the negative has been well washed it is immersed in dist. water 100 parts, red prussiate potash 6 parts, and nit. lead 4 parts. When the negative has acquired a yellowish white appearance it is again well washed and immersed in liquid sulphide ammonium 1 part, water 4 parts.

Cyanide Fixing Solution.—Potassium cyanide 200 grains, water 10 oz.

Varnish.—Shellac 2 oz., sandarac 2 oz., Canada balsam 1 dr., oil of lavender 1 oz., alcohol 16 oz.

The Ferrotype Process.

Collodion.—Ammonium iodide 35 grains, cadmium iodide 25 grains, cadmium bromide 20 grains, pyroxyline 70 grains, alcohol 5 oz., ether 5 oz.

Bath.—Silver nitrate 1 oz., water 10 oz., nitric acid 1 drop.

Developer.—Ferrous sulphate 1 oz., glac. acetic acid 1 oz., water 16 oz.

Fixing Solution and Varnish.—Same as for the ordinary wet collodion process.

Printing Processes.

Albumen Mixture for Paper.—White of egg 18 oz., add 500 grs ammonium chloride dissolved in 2 oz. of water. Beat into a froth, allow the mixture to settle, and filter.

Sensitizing Solution.—Nit. silver 50 grs., water 1 oz., sodium carb. ½ gr.

Acetate Toning Bath.—Chloride gold 1 gr., acetate soda 20 grs., water 8 oz.

Lime Toning Bath.—Chloride gold 1 gr., whiting 30 grs., boiling water 8 oz., saturated solution chloride of lime 1 drop. Filter when cold.

Bicarbonate Toning Bath.—Chloride gold 1 gr., bicarbonate soda 3 grs., water 8 oz.

Fixing Bath.—Sodium hyposulphite 4 oz., water 1 pint, liquid ammonia 30 drops.

Reducing Bath for Over-Printed Proofs.—Cyanide potassium 5 grs., liquid ammonia 5 drops, water 1 pint.

Encaustic Paste.—Best white wax 1 oz., oil of turpentine 5 oz.

Sensitizing Bath for Carbon Tissue.—Bichromate potash 1¼ oz., water 30 oz., ammonia 1 dr., methylated spirit 4 oz.

Enamel Collodion.—Tough pyroxyline 120 grs., methylated alcohol 10 oz., ether 10 oz., castor oil 20 drops.

Mountant for Prints.—A freshly prepared solution of the very best white gum.

Collotypic Substratum.—Soluble glass 3 parts, white of egg 7 parts, water 10 parts.

Collotypic Sensitive Coating.—Bichromate potash ½ oz., gelatine 2½ oz., water 22 oz.

THE PHOTOGRAPHIC NEWS.

Vol. XXVI. No. 1251.—*August* 25, 1882.

CONTENTS.

THE BRITISH ASSOCIATION.

No better president could have been nominated to the British Association this year at Southampton than Dr. Siemens, who delivered the inaugural address on Wednesday evening. The past twelvemonth has been marked for the advancement of practical science, and singularly prolific in electrical discoveries and inventions; and as Dr. Siemens is one of our foremost authorities in this province, his advent to the chair of the Association was indeed fortunate.

It is impossible within the limits of our space to print *in extenso* the presidential address, but we may at least call our readers' attention to some of its more important points. Speaking on the subject of the general advance of scientific knowledge and the relation between theory and practice, Dr. Siemens said:—If the facilities brought home to our doors of acquiring scientific information have increased, the necessities for scientific inquiry have increased in a greater ratio. The time was when science was cultivated only by the few, who looked upon its application to the arts and manufactures as almost beneath their consideration; this they were content to leave in the hands of others, who, with only commercial aims in view, did not aspire to further the objects of science for its own sake, but thought only of benefiting by its teachings. The advance of the last fifty years has rendered theory and practice so interdependent that an intimate union between them is a necessity for our future progress. Take, for instance, the art of dyeing, and we find that the discovery of new colouring matters derived from waste products, such as coal-tar, completely changes its practice, and renders an intimate knowledge of the science of chemistry a matter of absolute necessity to the practitioner. In telegraphy, and in the new arts of applying electricity to lighting, to the transmission of power, and to metallurgical operations, problems arise at every turn, requiring for their solution not only an intimate acquaintance with, but a positive advance upon, electrical science, as established by purely theoretical research in the laboratory. Our increased knowledge of the nature of the mutual relations between the different forms of energy makes us see clearly what are the theoretical limits of effect; these, although beyond our absolute reach, may be looked upon as the asymptotes to be approached indefinitely by the hyperbolic course of practical progress.

Electrical progress was, as might be expected, treated of at considerable length, and with a thoroughness characteristic of the speaker. Dr. Siemens pointed out that although the ultimate nature of electricity, the youngest scientifically investigated form of energy, is yet wrapt in mystery, its laws are the most clearly established, and its measuring instruments (galvanometers, electrometers, and magnetometers) are among the most accurate in physical science. Nor could any branch of science or industry be named in which electrical phenomena do not occur, to exercise their direct and important influence. If, then, electricity stands foremost among the exact sciences, it follows that its unit measures should be determined with the utmost accuracy. Yet, twenty years ago, very little advance had been made towards the adoption of a rational system. In 1862, the Electric Unit Committee was appointed by the British Association, at the instance of Sir William Thomson, and it is to the long-continued activity of this Committee that the world is indebted for a consistent and practical system of measurement, which, after being modified in details, received universal sanction last year by the International Electrical Congress assembled at Paris.

Regarding the transmission of power to a distance, the electric current has now entered the lists in competition with compressed air, the hydraulic accumulator, and the quick running rope as used at Schaffhausen to utilize the power of the Rhine fall.

The deposition of metals from their solutions is perhaps the oldest of all useful applications of the electric current, but it is only in very recent times that the dynamo current has been practically applied to the refining of copper and other metals, as now practised at Birmingham and elsewhere, and upon an exceptionally large scale at Ocker, in Germany. The dynamo machine there employed was exhibited at the Paris Electrical Exhibition, its peculiar feature being that the conductors upon the rotating armature consisted of solid bars of copper thirty mm. square in section, which were found only just sufficient to transmit the large quantity of electricity of low tension necessary for this operation.

With respect to electric light, the President said:—Assuming the cost of electric light to be practically the same as gas, the preference will in each application be decided upon grounds of relative convenience, but gaslighting will hold its own as the poor man's friend. Gas is an institution of the utmost value to the artisan, requires hardly any attention, is supplied upon regulated terms, and gives with what should be a cheerful light a genial warmth. The time is not far distant when both rich and poor will resort to gas as the most convenient, cleanest, and cheapest of heating agents, and when raw coal will be seen only at the colliery or the gasworks.

The use of the mild steel as a constructive material was discussed at some length, and the conditions under which land and water communications might be made to cross each other without serious detraction from the usefulness of either highway was treated of at some length.

Dr. Siemens alluded to several other matters bearing on past and present scientific progress, and his discourse will long be remembered as a far-sighted and able exposition regarding the main foundations upon which modern progress rests.

IODIDE IN EMULSIONS—THE DRYING OF GELATINE PLATES.

Those who have had any experience in emulsion work will have read with special interest the communications on the subject of "Iodide in Emulsions," which have recently appeared in our columns from the pens of Captain Abney and Mr. A. L. Henderson.

We propose to say a few words as to the result of our experience in the use of iodide since the time when Captain Abney first published his investigations on the subject.

We do not propose to enter into the theoretical question of whether or not there is an actual chemical combination between the silver, the iodine, and the bromine, or merely a mechanical mixture of bromide of silver and iodide. We believe that there is no proof, either one way or the other, and that it is a question of mere assertion on one side and on the other.

There are two separate and distinct functions which iodide performs in emulsions: in the first place, it changes the position of maximum sensitiveness of the emulsion to the spectrum, and destroys entirely its sensitiveness to the rays of lower refrangibility. Besides this, it has a most decided action in making it possible to secure plates which will give transparent shadows. This action is quite apart from the mere fact that the emulsion containing iodide will be less affected by the light used in manipulation. We consider this last by far the most valuable property of the iodide. Doubtless it is useful to be able to work freely in a comparatively well-lighted room; but it is quite easy, especially to those who have not been demoralized by the luxurious light used in working collodion, to work pure bromide plates in what is a practically safe light.

Admitted an advantage in the use of iodide, the natural questions are, in what proportion should it be used, and how introduced? We have used all quantities, from 10 per cent. downwards; we have found the distinctive action of the iodide in giving a clear and vigorous plate to be evident even with very small quantities of the haloid. One per cent. gives a plate quite perceptibly differing from a pure bromide one, and 2 per cent. has a very considerable effect.

We have now settled down to the use of about three to four per cent., as giving as great clearness of shadow as is to be had, and as retarding the sensitizing process less than a larger quantity. We are now talking of percentage of the silver haloids. The quantity mentioned will be got by using from two to three grains of iodide of potassium to every hundred grains of nitrate of silver which is to be converted. We believe that the small quantity mentioned makes no great difference as to the light which may be used in manufacture and development. At any rate, it is best to err on the safe side. Too safe a light cannot be used in the manufacture of emulsion and coating of plates.

The iodide may be brought into contact with the bromide in any of three different ways. The two soluble haloids may be mixed, and the silver solutions may be added to them; the bromide and silver may be emulsified, and the iodide immediately added in a separate solution or a bromide; and an iodide emulsion may be made separately, and mixed in any desired proportion.

We much prefer the second method. If the first be adopted, the iodide of silver is very apt to be formed in a granular mass, and to go to the bottom of the vessel. If the last be used, the great advantage of the iodide as a fog preventive is lost. With the second method the iodide replaces the bromide already formed, and is always in a fine state of division.

Now as to the objections which are urged against iodide. There are only two that we know: the first is, that it gives less sensitive emulsions than those containing pure bromide; the second, that plates made by it will not keep.

With regard to the first of these we are decidedly of opinion that *with the same treatment* a bromo-iodide emulsion will be slower than a pure bromide one; but we are equally sure that whatever is the process used to secure sensitiveness, that process may be pushed to a greater length in the former than in the latter case, without the advent of fog; and that it may be pushed to such a length as will in all cases make the bromo-iodide emulsion as sensitive as it is possible to make the pure bromide one, and this with far less chance of fog. With the boiling process a bromo-iodide emulsion, if it be never allowed to be alkaline, may be boiled for hours without showing fog. As to the keeping qualities of bromo-iodide plates, we may say that we have ourselves kept them for a year and a half without their showing any signs of deterioration. Of course it is necessary to keep any gelatine plate in a moderately dry place.

We would call special attention to a remark made by Mr. Herbert Berkeley in a recent article as to the drying of plates. He is on the subject of green fog, and points out the fact that a frequent cause of it is the method used to dry the plates. He advises that a plentiful current of air at the ordinary atmospheric temperature be employed. We think that this is a point which cannot be too strongly urged. Green fog is by no means the only evil that results from using artificial heat and an insufficient current of air. It is inconceivable what different qualities of plates it is possible to get from the same emulsion by drying them in different ways. There is no need for artificial heat except in very cold and damp weather, and then a very little of it will do; but the current of unheated air must be ample. Plates will dry quicker with such a current than with an insufficient one heated to any temperature below that at which the gelatine will melt and run.

FLAMELESS COMBUSTION.

The exact physical nature of flame is a point upon which physicists and chemists are by no means agreed; but there is a general notion that the clearly visible portion of flame consists of solid matter heated to incandescence, and the nearly invisible portion—comparable to a hydrogen flame or that of a Bunsen burner—is merely highly-heated gaseous matter. Such a view is incompatible with many well-known phenomena, as, for example, the fact that metallic arsenic burns in oxygen with an extremely brilliant light; and it is well known that Professor Frankland has made careful investigations which throw considerable doubt on the popular view.

It is established that a given weight of fuel yields a definite and easily-estimated amount of heat when completely burned; but the intensity or heat-tension varies according to the rate at which the oxidation takes place, and the area over which the action is spread; hence the aim of those who wish to attain to high degrees of heat tension or temperature is to burn fuel with the utmost rapidity, and in such a manner as to produce as small a flame as possible. In the case of the usual blowpipe, these ends are partially attained by injecting air into an ordinary flame; while the most perfect exemplification of this principle is that form of the oxy-hydrogen blowpipe in which the mixed gases are burned at a jet. The insignificantly small and scarcely luminous flame thus obtained is intensely calorific, and when it is directed on to a cylinder of lime, the brilliant incandescent light known as the lime-light results.

Mr. Fletcher, of Warrington, whose improvements in gas furnaces and heating burners have been from time to time described and illustrated in our columns, has recently found that by increasing the air supply to a blast gas burner, which is being used to heat a solid body, a point is arrived at when the flame entirely disappears, and combustion without flame results. A vague something appears at the mouth of the burner and playing around the heated body, but it has no clear outline, and is certainly not flame in the ordinary sense of the word. When this condition of flameless combustion sets in, the intensity of the heat increases to an extraordinary extent, the temperature attainable being comparable to that of the oxy-hydrogen blow-pipe; and we may expect practical results of considerable value to result from the new method of burning gaseous fuel.

Mr. Fletcher, in a communication to the Institute of Mechanical Engineers, writes as follows:—

My efforts have been turned to the reduction of size of flames, as I had practical proofs that a higher duty was to be obtained from a small flame than from a large one burning the same quantity of gas. Carrying this idea out to as great an extent as possible, I found that under the most perfect conditions the flame would totally disappear, and this invariably happened when the conditions for perfect combustion were fully complied with. The whole matter is so new in its practical form that no great amount of experimenting has yet been done, but it is quite evident that flame and smoke have no connection with combustion, further than an accidental one. If we examine a flame from this point of view, we find that the visible part of it is nothing more nor less than solid matter, which is being heated up by the work done by that part of the fuel which is already burnt; it is made up of solid particles in a state of incandescence, and this incandescence is not combustion.

The part which flame plays is, under certain circumstances, an important and peculiar one, *i.e.*, to continue the combustion or chemical combination already commenced by supplying heated matter to make the combination continuous. This appears to be proved by the fact that flame can at any point be cooled down so as to totally stop combustion, simply by putting a cold substance in it, and the fact that flameless combustion instantly ceases on the removal of the heated solid body such as iron or fire clay, or on its temperature being sufficiently lowered. The flame, in fact, plays the mechanical part of the action in the absence of other heated solid matter, and no doubt it will be found that combustion is impossible except in the presence of heated solid matter of some kind; at all events it is so with those substances which only combine at a high temperature. Flame is, in fact, a fuel in an intermediate state between perfect combustion and smoke, and it may either go on to perfect combustion, or degenerate into smoke, according to the conditions present.

If we take gases which contain no solid matter or dust—for instance, pure oxygen and hydrogen—and burn them, we get a flame certainly, but so insignificant that it can be accounted for, probably, by the difference in the refraction of the heated space as compared with the outer air, added to the dust in the air drawn in, and, possibly, other accidental circumstances.

I have, as yet, made no experiments, except with gases or the vapour of petroleum; but there appears to be no doubt whatever that the same results can be obtained from solid fuel easily, ensuring not only the complete disappearance of the black smoke nuisance, but also perfect combustion of the whole of the fuel instead of the production of poisonous carbonic oxide, which at present appears to be the special aim of most of the smoke consumers now in use. I will show you the consumption of coal gas at the rate of about 70 or 80 cubic feet per hour in this ball of iron wire, and as you will see the iron will fuse easily, with a total absence of a trace of flame. Using this blowpipe will enable you to see the complete transition from a large and comparatively cold flame, which does very little towards heating the wire. As air is added in increasing proportion you will see the temperature gradually rise as the flame becomes smaller, until, by pinching the gas tube for an instant, the flame is extinguished. At the instant of extinction you will see the sudden glare of heat and the instantaneous fusion of the iron, the difference in temperature, with and without flame, being strongly marked, the conditions in other respects remaining precisely the same. I use, as you will see, a foot-blower, because it is desirable to show you an effective experiment quickly, and having no hot chimney stack at hand, a draught must be got by some other means, so as to obtain a high temperature.

Where a moderate heat is required, such as an ordinary domestic firegrate, it is quite possible that this system of combustion is to be obtained in practice without any forced draught, and we may yet come to a clean, flameless, and, of course, smokeless, incandescent fire in our houses.

I select iron wire, because it is easiest to show as a lecture experiment, as both the iron and the coal gas can be burned; but I will also do the same thing with lumps of fireclay, both with coal gas, and petroleum vapour. An examination of the results shows at once that the combustion takes place by simple contact of the gases with a surface sufficiently hot to cause combination, and that flame as flame has no existence. Since the first note on this subject was published, a friend, who is a large brewer, tells me that on drawing the fire from his coppers he has noticed the contents suddenly boil up furiously, and there is a visible glare of heat all over the hot lining of the firehole. This he never could account for until the hint gave him a clue to the fact that gases from the drawn fuel were burning without flame by simple contact with the red hot fire bricks.

A NEW PHOTOGRAPHIC GELATINE.—TESTING COMMERCIAL OXALATE OF POTASH.

BY DR. J. M. EDER.

The quality of the gelatine employed exercises a notable influence on the quality of an emulsion, and, although emulsion may be made with hard gelatine alone, especially in the summer, and when the ammonia method is employed, it is not unusual to add a certain proportion of soft gelatine, in order to ensure clearness of the film and rapid development. Makers of plates are, as is well known, often tormented with dull and generally round spots when hard gelatine is alone used; but this defect arises notably when the proper relation between gelatine, water, and silver bromide is not properly regulated—a point which has not been sufficiently considered up to the present time.

The gelatine factory of Winterthur, in Switzerland, which is under the direction of Mr. C. Simeons, is now sending out a soft quality of gelatine which has no tendency, even under unfavourable circumstances, to give rise to spots, and can be used alone for the preparation of emulsion. Such emulsion also gives uniform and satisfactory films when one-half of the soft gelatine is replaced by the hard quality of Winterthur gelatine, and the admixture of the two qualities is very convenient and satisfactory. The hard Winterthur gelatine is sold in packets having white labels, while the softer quality is sold in packets with green labels.

Testing of Potassium Oxalate.—Now-a-days the oxalate of potassium is manufactured in many factories, and can be purchased at a low price; but, unfortunately, we often find samples which have been carelessly and badly prepared. A strongly alkaline reaction is far more objectionable than a slight degree of acidity, and one does not often meet with a completely neutral preparation. The use of alkaline oxalate often leads to the production of a yellow fog or stain, especially if there does not happen to be any free acid in the iron sulphate employed, or no care has been taken to neutralise the stock solution of potassium oxalate.

The presence of a notable amount of potassium chloride is especially objectionable, as this salt is almost as powerful a restrainer as potassium bromide. For this reason many samples of oxalate (those containing chlorine) tend to give hard and glass-like negatives, while others give soft, well gradated, and satisfactory pictures. The above considerations indicate the propriety of testing all oxalate for chlorine before admitting it into stock; this being easily done by dissolving a few grains in distilled water, acidifying with a moderate excess of nitric acid, and adding a few drops of silver nitrate solution. If more than a slight turbidity arises, the sample of oxalate should be rejected.

By-the-Bye.

CONTINENTAL RAMBLES WITH A CAMERA.

By Fjord and Fjeld in Norway.

There are two ways of getting to Norway: you may go there by boat direct from Hull or Leith, and this is the cheapest and most direct way; or you may journey *viâ*

Copenhagen and Sweden, a picturesque route enough, and to be recommended especially to those who love the sea most from a dry-land point of view. If you go by water it is best to land at Bergen or Trondjem, on the western coast, for here are situated the grandest fjords; but coming from Christiania, there is the advantage that you traverse the rugged Fille Fjeld, as the southern part of the Scandinavians is termed.

We made the journey by Denmark and Sweden, and in this way not only got a glimpse of those countries, but were able to secure some photographic sketches of them into the bargain. In forty-eight hours, travelling by Cologne and Kiel, you are in Copenhagen, and thence a steamer brings you in a couple of hours to Malmœ, the most southern point of Sweden. Travelling by rail, if you do not go by express, is of a very free and easy kind, and during the journey to Christiania the periods of waiting are frequent and long. At Falkoping, where a rest of two hours is permitted, we sallied forth with our camera and secured a view of the wooden-built village, located, of all places in the world, in a wilderness of big rocks. We chose some of these massive boulders for a foreground, showing the pine dwellings beyond, and now that we look at our picture, we marvel still more at the natives taking up their abode in such an un-get-at-able spot. They would certainly be proof against any sudden rush of cavalry, but no other advantage is apparent from the situation.

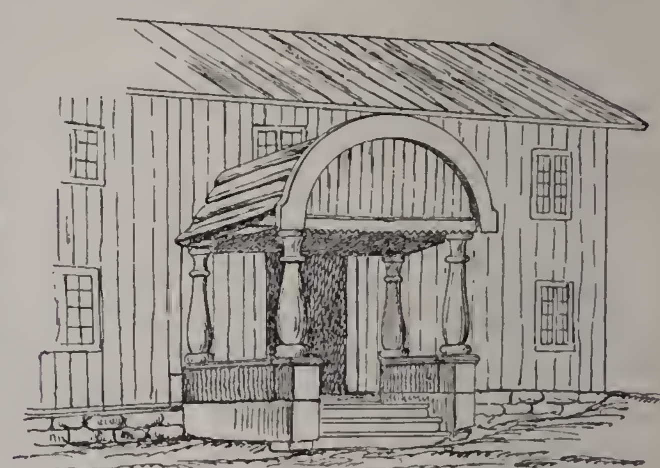
Of Svarta in Sweden we have another view, secured while the engineer leisurely repaired his locomotive and took in water; and of Amot lake, a placid water bordered by undulating forest land, and green hills, we have also a picture, albeit the wooden roof of a railway building—we set up our camera on the platform during a half-hour's wait—rather interferes with the foreground. You do not get into Norway until you are within a few miles of Christiania, the division of the twin-kingdoms being plainly marked by a broad belt of open land which has been cut through a dense forest of pines to indicate the boundary.

The cold granite buildings of Christiania remind one of towns in the north of Scotland. There is little of interest to depict in the camera, for the public buildings are square and modern, and the streets offer no characteristic feature. But the out-look towards the Christiania fjords makes a delightful picture; the craggy headlands of grey rock jutting out of the smooth water, and the forest-clad hills, their foliage in many parts sweeping down to the very edges of the fjord, constitute a scene especially Norwegian, and give one a foretaste of what Scandinavian scenery is likely to be. Perhaps the best view of the Christiania Fjord is obtained from the roof of the king's palace.

By rail and boat to Hamar, and thence we begin our journey to Bergen and the west coast. But a word on Norway-travelling before we start. When once in the interior, there are but two ways of locomotion, by foot or by carriole. The carriole only holds one—there are sometimes double conveyances to be found, but not frequently—so the passenger must drive himself. It is a little shell or cup, perched upon a couple of shafts, the recess being large enough for your body, while the feet rest upon supports like those of a "trotting" cart. The carriole is hired like the old post-chaise by the stage, so that if you are tired of walking at any time, or wish to get over your journey fast, the convenient little vehicle is at your disposal. So far, then, in respect to conveyances; now as to accommodation. There are no inns or hotels in Norway except in towns and large villages. In lieu, there are so-called "stations." The stations are generally good farm-houses appointed by government to receive travellers, and they are at convenient distances of about eight or ten miles on the road. There are comfortable reception rooms in some of them, and good sleeping accommodation, and here it is that you may hire your carriole. There are ordinary stations and "fast" stations, the difference not only being that the accommodation in the latter is much better, but that at the fast station the owner is bound to have horses ready for the traveller, while at the ordinary station you must wait till the steed has been caught on the hill-side, or brought home from the plough. Another thing should be noted in respect to these "stations": the traveller must remember he is not lord and master, as in an hotel; he is simply there on sufferance, and it is the owner of the farm-house to whom he is under an obligation. So he had best be upon his good behaviour. It is no good your rapping on the floor, or pulling the bell, when there is one; it is far better for you to go to the good people, wherever they may be, in the kitchen or in the store-room, and ask them politely for what you want.

But it must not be supposed for a moment that they are churlish or ill-natured—quite the reverse. They are always trying to please you, and sometimes, indeed, their kindness becomes embarrassing. They bring you your coffee and fladbröd to the bedside, and come and go through your sleeping apartment without the slightest hesitation. There are seldom locks on the doors, but if there are it makes no difference, for the worthy people knock away at the panel and wait outside until admitted.

Although it is so far north, Norway is not cold. Our first day's walk to a hamlet called Lien was one of the hottest walks we remember. Fortunately, the path lies through groves of monster firs, their stems rugged with mossy lichen. The air is pure and crisp to a degree, and, despite the warmth, the walk is most exhilarating. We should have done better, so we hear afterwards, to have stayed for the night at Musted, but, like all pedestrians on a first day's tramp, we are anxious to get well on the way. So, only stopping once on our journey to secure a reminiscence of Ransfjord, a sweet scene of wood and water, we decide on a few miles more, and halt at the station at Lien. We here give an outline sketch from a photograph we took



"Station" or Inn, at Lien. Norway. (from photo)

of the homely hostelry; built exclusively of wood, and with a portico supported by pillars that seem to have come out of a toy-box, the house looked as if it had been piled up from a child's box of bricks.

We only wish, by the way, we had made it a practice, in our wanderings as a tourist-photographer, to take a picture of every quaint inn at which we have tarried. One's pleasantest reminiscences of a tour are sometimes connected with the halting-places on the road, and, supposing the traveller is not passing through a land of modern hotels, his photographic sketches, in the end, of this kind, would be full of interest, and probably of some value from an artistic stand-point. We do not wish to point out our little inn at Lien as an artistic pile, but it is certainly a primitive one, and we doubt if a more simple house-of-call is to be found now-a-days except among the log-huts of the bush.

Our way lies through the Etnadal to Gravdalen. A photograph we secured of the valley of Etnadal, and another of a tearing white torrent in the midst of black pines in Gravdalen—taken on collodio-bromide plates—turn out particularly sharp and clear on development when we reach home, so that we have no difficulty in securing tolerable enlargements of them to the extent of five diameters.* We suspect the purity of the Norway atmosphere has something to do with the clear detail in the distance shown in the negatives, for although in many respects the plates leave much to be desired, this feature is decidedly a prominent one.

We need scarcely point out that once fairly started in Norway, the tourist photographer has only himself to rely on in respect to chemicals or apparatus. It is quite impossible for him to purchase even the most conventional of chemicals, supposing he wishes to develop a plate *en route*, or perform other simple operation. In the same way, if his apparatus requires to be augmented or modified, he must do it himself. Fortunately, in our case, there was a party of four, for besides the photographer's kit, other necessaries required to be carried. The weight of camera, dark slides, and stock of plates amounted to less than six pounds, and for tripod, three mountain staves of the party were fitted together. This remarkably solid tripod did other duty besides supporting the camera. A hook underneath permitted the attaching of a wire, whereon could be hung a *pot-au-feu* for cooking purposes (made, by the way, out of a stout biscuit-tin), for, truth to tell, living in Norway is generally of a most frugal kind. During a ramble of three weeks, our party only tasted fresh meat once (some reindeer steaks at Nysteun on the Fille Fjeld), and if tinned provisions are obtainable at a station, you may consider yourself decidedly fortunate. For this reason a supply of extract of meat, groats, condiments, &c., for the making of soup by the way-side, wherewith to make bread or biscuit palatable, is very requisite for a tour in Norway if you mean to rough it. The staple food, indeed, may be said to be fladbröd and butter, or smoer, as it is called. This fladbröd, with which travellers in Norway soon become on intimate terms, is an exceedingly thin rye or oat cake, prepared in disks some two or three feet in diameter, and so papery in consistence as to be capable of being folded into sheets like cardboard. It keeps good for weeks and months; to the taste it is not unpleasant, but the annoying part of the matter is that, if at all hungry, you become tired of eating long before the cravings of appetite are satisfied. Quire after quire may be consumed of this edible stationery, until the lips are parched and the jaws aweary, and yet one's hunger is unappeased.

There is a succession of charming lake scenery all the way to the Fille Fjeld; at Gravdalen it is a silent mere encircled by tall sombre pines; at Freydenlund a smiling blue lakelet, with islands of tufted foliage and undulating green hills, dotted here and there with white farm buildings. A big cloud above, as a background, puts Freydenlund lake half in shadow half in shine, as we photograph it, but we lack, unfortunately, the ability of an England or Bedford to make the most of our chance.

It is uphill all the way to the Fille Fjeld, and snow on the neighbouring mountains and a keener atmosphere tell us how rapidly we are ascending. The hills grow bare, foliage ceases, and only scrub and moss are met with. At Nysteuen the scenery is that of one of the high passes in the Alps, and in the photograph we secure from the station, snow is shown on every side, and it even covers the inhospitable shores of the lake that is here to be found on the summit of the ridge.

(*To be continued.*)

* Our readers may remember seeing these and others in 1877, when we showed them at the Photographic Society of Great Britain, in illustration of a paper on "Photography from a Holiday-maker's Point of View."

PHOTOGRAPHIC EXPERIENCES IN EGYPT.*

Our next day was to be spent at the great pyramids of Ghizeh; so early in the morning we started, crossed the beautiful Kasr-el-Nil bridge at Boolak, over the Nile, and after a drive under beautiful acacia and palm trees arrived at the foot of the great pyramid about 8·30. One is so filled with wonder and admiration that it takes a few minutes to bring one's self to work; however, we opened up our traps at once, and after being placed by Mr. Brugsch in charge of the Sheikh of the Arabs, who gave us eight men to assist iu carrying, we began work. It was, indeed, a full day's work with no idle moment. The pyramids are very deceptive in size, and do not look so large until one tries to focus, when he finds he had but part of the pyramid on the ground glass. The Sphinx I was rather disappointed in; I had my impression, from pictures which made it loom high up in the sky, that it was very much higher. Our best pictures of it were made with single lenses; thus for 8 by 10 the back lens of the euryscope was used, which doubled the size and gave better perspective; the time of exposure with the smallest stop is trebled, but the resulting image is very sharp and clear cut. For stereoscopic size, the back lenses of the Morrison stereo, five and a-half inches, gave a fine image; exposure, also, three times as much as ordinary combination. In making the close view of the entrance to the great pyramid, a lens of exceptionally wide angle must be used; so one five-inch Ross was put on, and found to embrace an angle of fully 90°. We made the circuit of all the pyramids on the Ghizeh platform, and made negatives of all of them; in one general view all were embraced; but our foreground was a vast desert, unbroken for hundreds of yards. To break this monotony, a group of Arabs, with their white turbans and striped cloaks, were carefully placed in the foreground. Many bits of the construction which were not beautiful nor picturesque, but would aid the student in architecture, &c., were taken, and special pains were taken to show the great pyramid in every part—looking up from the bottom, down from the top, along the long layers of stone, up the corner, &c., &c. A group climbing the pyramid was made to show how the Arabs assist. The ascent, although not so very tiresome at the time of climbing, tells in a day or two, when every bone in the body aches. On the top, the Arabs insist on cutting your name. Many famous persons have indulged in this fancy; among others is the name of Jenny Lind, in very large letters. The point or top is rather large and flat, about twenty feet square, in the centre of which stands a staff about forty feet high, placed there by General Stone Pasha for triangulation. Here we waved our American flags, emblems of the youngest nation, on the monuments of the oldest in the world. After all outside work was done, we prepared for the interior, which was much more tiresome than the ascent. We were given eight Arabs, two a-piece, as helpers in climbing, and four to carry our instruments. A supply of magnesium was also taken; and in we started, down an inclined, slippery opening, about four feet square. Notches were cut in the stone, which served as steps. Suddenly we are stopped by a huge stone; we turn to the right, climb hand over hand up the smooth, polished limestone, and find ourselves in a similar tunnel—only now we ascend, soon reaching the grand gallery, which is twenty-eight feet high, inclined at an angle of about 40°. Here we depended entirely on the Arabs pulling us up, as our shoes would slip and slide, so that it was impossible to stand; but the bare feet of the Arab clung fast, and, while one pulled and the other pushed, we soon reached a part where notches in the bottom served as a foothold. Suddenly one of the Arabs shouted "Look out!" cautioning us to lower our heads. We again entered a four-foot opening, and twenty feet further on entered the famous king's chamber, with its broken sarcophagus. The heat was intense, the darkness so thick you could feel it. After a hasty inspection, the cameras were pointed, the magnesium lighted, and exposure commenced. In focussing I used the candle, focussing on the light, and getting the size by first holding it on the one side, then on the other extreme of what was wanted in the picture. A general view can not be made, as there is nothing but the stone sarcophagus that would give relief; even this, like all else inside, is intensely black. For 8 by 10, the euryscope was used; for stereo, Morrison, full opening, both cameras exposing at one time. The exposure given was about five minutes. Sometimes there were six double tapers burning at once time. Great care was taken not to get the light immediately in front of the camera, or quite a spot or streak will result. After duplicating the exposures we

* Continued from page 493.

found the chamber so full of smoke that we were forced to leave. But during our stay in the king's chamber (which lasted an hour) our Arabs kept up much yelling and gesticulating, which in this close, pent-up place, under thousands of tons of masonry, gave one an idea of the nether regions. In returning nearer to the open air, we could not resist making an exposure in the grand gallery. This was more difficult; as the light did not reach far, and was necessarily in front of the camera, we were obliged to place the magnesium behind a figure; in this way the gallery was quite brightly lit up. We paid a visit to the queen's chamber, which contained nothing but a few bats flying about, after which we came out, having been inside about two hours.

We photographed the pyramids and sphinx and surroundings thoroughly, and needed changes of plates, so my dark tent came into use for the first time, and I confess I was more than pleased with its working. I had plenty of room inside.

And now back to Cairo, which offers much more that is picturesque and beautiful than Alexandria, many beautiful mosques, some of them very old, reaching their minarets high towards the sky. One of the oldest is that of Sultan Hassan, which is 535 years old; it is falling into decay, no one seeming to interest himself in its preservation. On entering, large straw slippers are put on our feet to cover the unholy dust of the Christian, and, after winding about several avenues or halls, we enter the large open court, facing which is the niche, which faces Mecca, where the Mahomedans pray to the east; finding a number of Moslems at prayer, we arranged them in positions and made several pictures of them, after which the inevitable *backsheesh* had to be paid, the men running after us as we left, begging for a piastre. Just as we were leaving, and had just entered our carriage, we saw coming down the narrow street a Moslem funeral; this we wished to have a picture of more than many others, and as they were already close on us we were hurried our utmost. The steps at the entrance of Mosque Sultan Hassan offered the only available elevated spot; to this we scrambled in all haste; one opened the tripod legs while the other brought out the holder; no time to adjust instantaneous drop; so focussing on our carriage, which was in line with the funeral when it reached the proper distance from us, the plate-holder was put on, and just in time, for the crowd of mourners had reached the spot, and the flap was thrown up, the plate-holder turned, camera moved on its pivot a trifle to gain on them as they moved, and another exposure made; the whole time occupied was not over three minutes. Where would a wet-plate worker have been? Here was a large funeral procession, such as one might not see again, and one that would make a good picture. We saw quite a number of smaller ones, but none so picturesque and impressive as this. Immediately opposite, across an open park, is the citadel; it affords a commanding view of Cairo, the Valley of the Nile, the distant pyramids, and the sand hills of the desert beyond.

The single lens of both 8 by 10 and others were used, as the distance was considerable, and required such treatment. A rail-iron fence interfered with the use of a tripod so much that we were obliged to make a stand of our leather cases. Within the limits of the citadel is the beautiful alabaster mosque of Mahomet Ali, with the tomb of this unscrupulous tyrant, who died in 1849. It was completed in 1857. It is certainly one of the noblest structures of the kind, and, being new, it is exceptionally clean and elegant. The minarets are of all proportions, being very slender and very high (280 feet). In making negatives of its exterior, the swing-back and sliding-front were used to their utmost limit; even then there was scarcely enough sky to make a well-balanced picture.

On trying to enter the mosque we were at first refused admission, but finally succeeded on promise of liberal *backsheesh*; large red slippers were put on our feet over the shoes, and we entered with our traps. We first enter a large open court with a magnificent fountain for ablution in the centre; immediately in front of the mosque, on one of the four sides, is a square tower with a French clock, presented to Mahomet Ali by Louis Philippe of France. As the sun shone obliquely into this open court, it made a truly fine picture; everything was pure white, dazzling alabaster; in fact, so bright is the glare, that on entering the mosque (which is quite dark) we were unable at first to distinguish anything. The interior, consisting of a single large quadrangle, the domes of which rest on four huge pieces of alabaster, presents an imposing appearance; the ceiling is effectively painted and gilded. At the south-east angle is the tomb of Mahomet Ali, enclosed by a handsome railing. We made negatives of the interior, but I am doubtful if the 8 by 10 will develop up enough detail, as we were obliged to leave after having given but half-an-hour, when at least one hour was necessary. The greatest charm of Cairo is the street life. It is as exciting, amusing, and bewildering as the Arabian nights' entertainments. It is a moving panorama of all nationalities, creeds, languages, and costumes, with a strong preponderance of the Oriental and semi-barbarous element. It is a perpetual carnival which defies description. The old houses are high and narrow, with upper stories projecting. The streets are covered in many places with rafters and matting, to keep out the glare of the sun, and are lined with open shops of every variety. They are alive with gaudily dressed and half-dressed men and veiled women, water carriers, peddlers of all kinds of wares, braying donkeys, camels, horses, and carriages—jostling against each other in endless confusion. In the mosque the crowd is so dense that it seems impossible to get through, and the noise is so loud that you cannot hear your own voice. The men as a rule wear the red fez or tarboush, with turbans of all colours. The women are imprisoned in long veils of silk or muslin, white, black, or blue, according to rank; the veil is divided about the forehead, and fastened to a pin or cylinder of brass, silver, or gold over the nose, so as to leave the dark, restless eyes free to satisfy curiosity. Many of the lower rank carry naked babes on their shoulders or in baskets, and the eyes of the poor children are in undisturbed possession of swarms of flies. The bazaars are simply impossible to describe; there are bazaars for gold and silver work—for silks—for shoes—for fez caps—tobacco and pipes—each thing in its own special place. Every carriage and aristocratic donkey is preceded by one or more fleet runners (seris) in short trousers, bare legs, Tunisian fez with very long tassel, and with a tall staff to clear the way. We had the good fortune to make the acquaintance of a young English lady, who wished us to make a picture of a fine Arab horse, white as milk; she had quite a garden attached to the house, and in this, with some shrubbery behind, and the seris, decked out in his best gold-embroidered costume, holding the bridle of Dervish, we had indeed a picture. Our plan of working was to take a carriage for the day, get a dragoman, an Arab who speaks enough English to explain and assist, then drive around through the crowded streets, and snatch anything or anyone that we wished to photograph.

Coming through one of the narrow lanes, not much wider than an alley-way, we found some rare old latticed windows—every style, every shape, and form seemed to be located close together—and in making negatives of them I sincerely wished for a front that would slide an inch or two more, and a swing-back that would go another inch. A person who has never seen Cairo can scarcely conceive how very narrow and winding the streets are. Occasionally, on making a short turn, one faces a beautiful high minaret, which seems to block the street, and even high up into the sky. We long to make a picture of it, but are almost powerless. Again, on planting the camera, we are at once surrounded with such a crowd that the passage is completely blocked, reminding me of the Centennial, where similar occurrences so often took place. Early one morning we drove over to the market on the Western bank of the Nile, just near the end of the Kasr-en-Nil bridge. Here we were at once assailed by the irrepressible donkey boys, at least ten of whom were shoving and fighting each other for our patronage. We, instead of hiring their donkeys to ride, grouped them, with a fine palm grove as a background, and photographed them, much to their delight, after which they had their usual fight over the *backsheesh*, which was given one of them to divide among the rest. In the market we grabbed many picturesque groups, all the more natural because they were captured with the instantaneous drop. One old fellow, holding two goats, especially interested us—his costume of striped goat's hair-cloth was simple yet graceful. An old woman seated on a high table, selling bread, was caught on the fly, just as she was reaching over some loaves to a little girl close by. Just beyond the market begins the noble avenue of acacia trees, which shade the drive to the great pyramids. We caught a picture of this avenue just at a happy time of the day; that is, when the sun was low and lit up under the trees.

On our return to the city we saw, on crossing the Kasr-el-Nil bridge, an unusual stream of passengers, donkeys (loaded and unloaded), and many camels loaded with immense piles of long grass. We could not resist the temptation to make a number of instantaneous exposures. By climbing up the trestling to the broad top a good solid stand was reached, which commanded a view of the entire length of the bridge, and as each group of camels, or donkeys, or carriages, would come in place, flash would go the drop. A police officer stood ready, when we clambered down, to receive his *backsheesh*. A few minutes' drive into the city brings us to a newly-erected dwelling-house that is a marvel of beauty and fine workmanship. It is indeed a palace—is surrounded by a magnificent garden, and is strictly Arabic and Moorish in architecture. The owner, Mons. St. Maurice, a wealthy French banker, has bought up, during fifteen years' residence in Egypt, every rare old bit of lattice-work, inlaid doors, floors, fine tiling, fountains, &c., that he could procure, stored them away, and finally built his palace, using all his gatherings to beautify and furnish it. We made several exterior views of it, taking each end separately, and, as usual, introducing a few Arab figures to locate it and assist in the composition. We could not gain admission, as the proprietor was in Europe. We wished to make a picture of an Arab woman, as we saw them every day riding on their donkeys. This was rather a delicate matter, as they are very shy, and besides, the men would scarcely allow it; but *backsheesh* will procure almost anything; so we sent our dragoman in search of a woman who would unveil and allow us to photograph her on a donkey, veiled and unveiled. He reported one afternoon that he had a wife for us (meaning woman), so he took us through many winding streets, where we saw many women; he bargained with a handsome girl that we picked out of the crowd, and after promise of an extra *backsheesh* if she behaved well, we went to work right there in the street, selected an arched door as background, and placed her on a donkey, and made several negatives of her in various positions illustrating the Oriental mode of conveyance for Arab women of the middle class. The crowd was simply awful—yelling, hooting, and many cries of *backsheesh*. We were kept busy calling Imshee! Imshee! (clear out) and driving them away. When ready to make an exposure, I'd cry out, Estana! Estana! (stand still) and then watch the opportunity.

Our last afternoon in Cairo, before going on the Nile voyage, was spent among the tombs of the Caliphs. On reaching them, the sky had clouded over and the wind sprung up, so that we did not make as many as we wished, but still caught enough to satisfy ourselves with in between the gusts of wind and when there was a little brightening up of the light. While climbing about among the ruins, an officer of some soldiers quartered there came and ordered us to leave, as we might set the place a-fire. The absurdity will be noticed from the fact that the buildings are all of stone. Doubtless he thought we had explosive chemicals, or that our cameras were a new army engine of destruction. In one of the old mosques built over a tomb we got some bits of old inlaid and Saracenic work that well repaid us for the trip out. One old mosque is kept in quite a good state of repair, and is the only one that is complete. Its dome and minaret are very high, and, like all mosques, it is built closely surrounded by other buildings, so that it was almost impossible to make a picture of it and not show bad lines. After packing up our traps for the return to the city we missed our dragoman, and in hunting him up we found him down on his knees before a niche in the wall of an old mosque, facing Mecca, his slippers lying beside him. We at once opened our camera and caught him in the act, just as he was posed in his praying position. In one of our strolls we saw a dwarf about the size and age of Tom Thumb. Of course we must have him in our list of subjects; he fought shy at first, knowing his worth, and bargaining how much *backsheesh* he was to get before standing for his picture. After a satisfactory bargain had been made, we stood him, with a bit of wall as background and his cane in hand, beside our dragoman, who stood about six feet four inches high: the contrast, of course, dwarfed the dwarf. We found afterwards that he was a favourite at the court of the Khedive, where he acted the part of clown and jester. We took with us in our trips through and about the city, one of our larger leather cases, in which our long box, containing the 5 by 8 plate-holders, the lens-box, and a few other small articles were carried; also the dark-tent, a case of 8 by 10 plates, a box with the 8 by 10 holders, 8 by 10 box, and small camera, which we always carried screwed on the tripod, the legs bent up and the head-cloth tied around with the tapes on the corners. We were very choice and careful of our instruments, always carrying the 8 by 10 wrapped in the large waterproof head-cloth, with a shawl-strap around it. On the bed of the 8 by 10 camera, near the back end, I fastened, with gum bands, a roll of Joseph paper, which saved the ground glass, and spring which held the ground-glass frame and holders.

On finding that our Hermagis lens was needed more than the others, we always carried it on the camera, turned in towards the ground glass. The single lens of our euryscope was not often needed, but, when wanted, only required the slipping on, without screwing of the extension bed of the camera, which then gave full length of focus, even for a tolerably close subject. In some of the narrow streets, and in making the mosques and other high buildings, we found the eight-inch Morrison lens to give a clear-cut, sharp image, embracing an angle of fully ninety degrees. For dark interiors, moving subjects, figures, &c., we invariably used the euryscope, as it will make a full-timed negative on a B plate in two to four seconds. The 8 by 10 plate-holders we carried in a box we had made in Cairo, so they would stand on their side, always handling them so; otherwise an accidental opening of the catch that holds in the division may allow plates and division to drop out. In exposing we began always on plate-holder No. 1, using them in consecutive order, excepting when we carried two rapidities of plates, when we filled six holders with B, or extra rapid, and the balance with A, or ordinary rapid, at the same time always putting them in the register in their regular order, beginning at No. 1. Immediately on making the exposure a record of it was made by Mr. Wilson in one of the Scovill Manufacturing Company's books, with the date, time of stop, remarks, and title of subject, before making another exposure, thus preventing possible mistakes. An operator using gelatine plates should always have his wits about him, and keep cool, especially where two rapidities of plates are used. Just before exposing, think a moment: first, which lens and stop you are using; second, which kind of plate—rapid, extra rapid, or instantaneous; third, the lighting of your subject; then expose, always for the shadows. The great trick in exposing, especially on a view or subject in which there is an occasional movement—unless the exposure is instantaneous—is to know just when to open the flap. Practice only can teach this, as your eyes soon learn to note the moment all is still, then open and expose. Don't allow any one standing near by to affect you in the least, but only expose when you see all is still and ready. In making instantaneous exposures, I could see what was before the camera and in the scope of the lens by looking over the top, from behind, through the holes in the drop, as it was drawn up ready for an exposure; in this manner being able to judge of the subjects moving before us, and thus having a choice. We found our 5½-inch Morrison lenses served for the majority of views, although we were many times forced, in narrow quarters, &c., to use the three-inch Ross. In making instantaneous single figures or groups we always used the half-size Ross portrait lenses, nearly always using the fourth stop, rarely the fifth; while the exposure was being made, or immediately afterwards, I dusted the slide on both sides with a camel's-hair brush, which I always carried in my pocket; also often brushed off the camera, as the soil and dust was gritty, and soon would grind varnish and polish away. I also always carried with me in my pockets a diamond, a screw-driver, several gum bands, a few brass screws (various sizes), and the loose stops of our lenses. I never parted with them, so they were never missing. We began at once to mark by system, and never deviated from it, as this, we found, would be the only safe method, travelling constantly as we were, and using dry plates in quantities, as we might otherwise expose the same plate more than once. We found a good plan to keep track of the holders was to carry them in regular order, beginning at one and with the slide up; then, as soon as a holder was used—both plates having been exposed—place it back in the box reversed, or slides down. In this way, if you are hurried, you are always sure of taking up the right holder.

As we carried eighteen 5 by 8 plate-holders, we generally had a sufficient number of plates for an ordinary day's work, and left the changing, packing, and re-filling of the holders until night. The method of marking was to take a whole sheet of ruby paper, pin it in the shape of a cylinder, fold over one end only, allowing a small vent for air, placing this over a candle around which stood a round box which prevented the light slanting down around the bottom of the ruby cylinder. The round box was afterwards used as a carrier for the pneumatic holder. The room being all ready, we opened out two plate boxes, one with unused plates and another for exposed plates, and at once adopted a uniform method of placing and arranging things, so I could find anything wanted at once. The boxes were opened in front of the light, with the fresh plates on the left and the packing box on the right, then the plate-holders were piled up on the left of the light, in the order they had been exposed and registered, so the plate in holder No. 1 went in first, &c.; as soon as a box was full of exposed plates, a note was made in the register, marking the number of the following box, so that no mistakes and blunders would occur; and, to insure safety, I detached the tag telling the contents from the box as soon as it was empty, and marked *negatives* plainly on it, in one corner, as soon as we began filling it with exposed plates.

As each plate was put into the box from the holder, with the pneumatic holder, four pasteboard corners were inserted, then another plate, &c. When a box was only partly filled, a board with a spring at each corner was placed in next to the plates, and the corners filled in to the top with triangular wooden blocks, of which we had varions thicknesses. In this way they always carried without shifting or rubbing their faces in the least.

(*To be continued.*)

Notes.

The present meeting of the British Association at Southampton is the fifty-second since its formation.

Our "Everyday Formulary" we propose to publish two or three times a month, keeping it under constant revision, so that it shall always be abreast of the times.

The setting properties of a gelatine is very materially influenced by the presence of salts. Dr. Vogel tells us he prepared an emulsion with nitrate of ammonia which refused to set at all, even when chilled with ice; but, curiously enough, on diluting it to three times its volume, the emulsion set rapidly.

The *Mittheilungen* contains, by way of illustration, a series of micro-photographs of the hair of various animals, a most interesting set of pictures, for few of us have imagined that hair is so different iu colour and shape that the student could name the beast if he but saw a single hair. In these photographs, of which the detail is of the most delicate nature, we see that some hairs are twenty times as thick as others, while iu construction and tint they vary as much as Indian grasses. Indeed, a perfectly new research is here opened up for the student of Natural History, in pursuit of which micro-photography renders material assistance.

One of the principals of a firm of "Photographers to the Queen" has just purchased an estate for £45,000. Evidently there are some who make money out of photography.

It was the little *Willem Barents*, the familiar schooner in which Mr. W. J. A. Grant has made so many photographic trips to the north, that found Mr. Leigh Smith and the missing crew of the *Eira* on the coast of Nova Zemlia, although the two relieving ships, the *Hope* and the *Kara*, were close at hand. The *Hope*, with Mr. Leigh Smith on board, reached Aberdeen on Sunday; but it will be some weeks yet before we can hear of Mr. Grant's return in his sailing yacht.

The Brattice stand recently introduced by Mr. George Smith, and already described in the News, has many points to recommend it over so-called alpenstock stands, as it is lighter and more rigid than any stand of the same weight which we have seen. Although five feet high, it only weighs one pound-and-a-half. Of course no one supposes that it is possible to employ a tripod for arduous climbing in the same fashion as a strong mountain-pole, but Mr. Smith's compound stock would help a lady up Montanbert.

Dr. Hermann Vogel, of Berlin, has just completed a work on "The Progress of Photography since 1828"—*Die Fortschritte der Photographie seit dem Jahre* 1828—which will be published in a few weeks. He is now engaged on a volume relating to the different modifications of bromide of silver.

The Egyptians are quite alive to the advantages of photography in the field, according to the *Morning Chronicle* of yesterday. Our outposts at Alexandria cleverly caught on Wednesday ten of the enemy who were sketching our advance works, and who had with them a photographic apparatus to aid them in the task. Our troops fortunately were able to appropriate the camera as well.

The Postal Photographic Society has sent us their first scrap-book for inspection. It naturally contains both good and bad photographs; but many of the latter are interesting as results, if not as pictures. Some of the prints are exceedingly good; to wit, an out-door portrait by Mr. Withall, and a sailing lugger by the same gentleman. We must also say a good word for the village scene (Wigmore) of Mr. Watkins. The chief fault of the faulty photographs is over-development, and hence flatness.

Some well-executed photo-enamels produced by M. Cacault, of Colombes, seem to have attracted attention in France. M. Cacault, we are told, takes his photographs upon the fine hard faience of Creil, and they are burnt upon enamel at a single heat, at a temperature about equal to that of boiling varnish. This is all we know about the enamels, except that we are informed they are very beautiful. If M. Cacault's process is indeed a simple and certain one, it will be warmly welcomed.

Schlegel recommends the addition to the developer of a solution of cyanide of silver in cyanide of potassium; he says that a few drops of it is exceedingly advantageous, and gives the negative all the character of a wet plate.

M. Marey is continuing his interesting experiments in photographing movement. M. Marey, as our readers know, works differently to Mr. Muybridge, although he aims at the same results. Mr. Muybridge employs a series of cameras, exposing them rapidly one after another. M. Marey has but one camera, the lens directed against a black background, or, rather, a dark cavern, which answers the same purpose. A man runs across the field of vision, and M. Marey's plate remains exposed until the end of the run; but, during the running, the lens is capped at intervals by a rotating wheel, which interferes between the object and the plate, something like one hundred times in a second. The consequence is that, when the film comes to be developed, it does not exhibit a long, blurred image of a man running, but a number of sharp images of the man, the images separated from one another by intervals of darkness.

The picture of the man running we reproduced in these columns a few weeks ago, and now M. Marey has applied his camera to recording other movements. Thus, the trajectory of bodies has engaged his attention; he has photographed a stone wrapped in white paper and thrown across the field of vision, and a stone whirled at the end of a string. The path of these objects has been accurately recorded in the photograph, and since the speed of the rotating wheel (which interferes between object and sensitive plate) is accurately regulated, as also the time that the plate is exposed during the whole experiment, M. Marey has been able to deduce from his photographs the velocities of the moving object at each instant of its flight, as also the trajectory curve taken in the air. Verily, Mr. Muybridge's experiments are bearing good fruit.

Mr. Muybridge, we hear, lectured on instantaneous photography, and what it has revealed, at Indianopolis, on the occasion of the meeting of the Photographers' Association of America, a fortnight ago. After being so well received in Paris and London, Mr. Muybridge is likely to command due attention in the United States.

Deaths from touching electric wires are unfortunately becoming common. A fortnight since we reported two casualties in Paris, at the Tuileries Gardens, and now it is said that on board the *Inflexible* two seamen have died through touching the electric connections employed for illuminating the ship. It is surely easy enough to employ for the most part covered wire—we see that a composition of asbestos has recently been proposed—and this ought always to be done, when possible. Indeed, if electric ighting becomes general, it is not unlikely that a law will be passed, making the use of covered wire compulsory.

Touching H.M.S. *Inflexible*, which has done most of the hard work of bombardment in Egypt, with her four stupendous eighty-ton guns, that hurl a mass of iron weighing three-quarters of a ton at every discharge, it may be mentioned that she is termed the *premier* battle ship of the British navy. This name has been given her simply because she happens to be the most heavily armed and armoured of our war craft; but the scientific illumination on board gives a further claim to the title. Not only is the *Inflexible* provided with powerful electric arc lights, to sweep the sea at night, to detect danger, whether this is breakers ahead, or a torpedo's launch meditating attack; but every cabin and bunk below, as well as the gloomy 'tween decks, are lighted up by Swan's beaming incandescent lamps.

To fit a thousand strange pack saddles upon a thousand strange animals, especially if those animals chance to be mules, is a task that would be difficult at any time; and when it has to be undertaken at a depôt alive with all the bustle of warlike preparations, and by soldiers who have never perhaps harnessed a horse in their lives, it is one most likely to be done badly and clumsily. Where this strap goes and that buckle fits, how the head fastenings are adjusted and the tail straps put on, are matters that might bewilder a hostler, let alone the men of a baggage train; and the worst of it is, that if everything is not in its place, the result, after a few days' travelling, is that the animals get sore backs, and break down. The difficulty is, however, solved by photography; two or three views of a mule properly harnessed sent with every score of saddles, demonstrate at once the method of adjusting every detail in the equipment.

CURE FOR BAD PERSPECTIVE, AND A NEW ADJUSTABLE DIAPHRAGM.

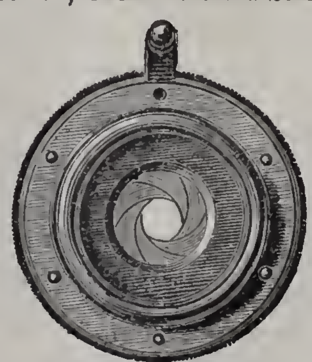
BY ARNOLD SPILLER.

Almost every photographer has experienced at one time or another the difficulty of photographing high buildings, such as churches, monuments, &c., especially when situated on high elevations or in confined situations. Again, there are several amateurs who have at one time or another taken photographs with somewhat imperfect apparatus; as, for instance, photographing St. Paul's Cathedral from Ludgate Hill with a camera not fitted with a swing-back or rising front, the only alternative being to tilt the apparatus, and of course spoiling the resulting negative from an artistic point of view.

Now, as far as I am aware, no method is known for correcting the bad perspective thus produced, but if our readers will try the following process, they will find that it is as simple as it is successful.

The defective negative when dry is placed in contact with a gelatino-bromide plate, exposed, and developed in the usual way, thus producing a positive: this is then placed, bottom upwards, in a copying frame, and the camera tilted to exactly the same extent as was necessary in taking the original negative. If the copying camera be provided with a swing-back it is preferable to tilt it, rather than the camera itself. A plate is then exposed in the ordinary way, and the resulting negative will be perfect as regards perspective.

Mr. Collins, of 157, Great Portland Street, is the maker



of an adjustable stop for microscopes, known as the "graduating diaphragm" (see fig.); and I feel certain that the same, if adapted to photographic lenses, would prove far more convenient than the designs now in use.

In the first place, there is no chance of losing the stop; secondly, one is not obliged to move from under the focussing cloth in order to try different sized stops, the aperture being adjusted by means of a pinion; the apparatus has advantages over the rotating diaphragm, as there is at one's disposal a large variety of sizes, and the aperture is diminished or enlarged without the usual interval of darkness.

In conclusion, I should advise that a scale be marked on the pinion, so that one can tell at once what the exact size of the aperture is.

RENDERING WEAK AND PARTIALLY FOGGED NEGATIVES VIGOROUS.

BY DR. J. M. EDER.

It occasionally happens that in the case of landscape photographs, those parts of the negative corresponding to the dense foliage and other deep shades are somewhat fogged or obscured. This may happen when too long an exposure has been given, or reflected light penetrates into the apparatus. Such pictures lack brilliancy, and the foliage portions are deficient as regards modelling, and the following is a useful method of treating such defective negatives.

The fixed negative is well washed, soaked in alum solution, and once more washed. After this it is placed in a sulpho-cyanate and gold toning bath, such as one would use for toning albumen pictures or glass dia-positives. The following may be given as an example of a suitable solution: Half an ounce of ammonium sulpho-cyanate, five ounces water, and thirty to fifty drops of gold chloride solution (1 to 50); or the double chloride of sodium and gold may be used.

While in the gold bath, the feeblest shades of the image first become acted on, becoming bluish in the first place, and indigo-blue afterwards; while the slight fog gradually clears. The deeper shadows preserve their brownish colour for an hour or more in this toning bath, so that, by removing the plate at the proper time, a virtual intensification is obtained, as those parts which have become blue have acquired considerable actinic transparency. As the bath acts very slowly, it is quite easy to watch the changes with great exactness.

It is desirable to place the plate in a new hyposulphite fixing-bath, in order to ensure permanency of the image. An old bath, which may contain traces of developer, should not be used.

These experiments were made with plates which had been developed with Berkeley's pyro-sulphite developer.

RECENT ADVANCES IN PHOTOGRAPHY.

BY CAPTAIN W. DE W. ABNEY, R.E. F.R.S.*

I finished my last lecture by showing you the effect that dyes had upon sensitive salts. In my previous lectures I have not touched on the method of producing sensitive surfaces, except by the calotype or paper process, or by the wet collodion process; but I should be remiss if I did not mention the subject of collodion emulsions, which have been in vogue now for seven or eight years, but which have been supplanted, to a large extent, by gelatine emulsions. Whether that be an improvement upon the collodion process, except for certain things, I hesitate to say; but certainly, in a collodion emulsion process, we have a process which is admirably adapted, at all events, for landscape work. The collodion emulsion was originated, I believe, in September, 1864, by Messrs. Bolton and Sayce, and a new era was opened out when they made their first emulsion.

Now, an emulsion is very simply formed, particularly a silver bromide or chloride emulsion: but, as far as I know, it has been rather a crux amongst photographers to make an emulsion with silver iodide. However, this is a very easy thing to do, and I propose roughly to show those who are initiated in emulsion-making how an emulsion can be made, and further, how iodide of silver can be made amenable to treatment. The point in emulsion-making seems to be to get the precipitate in as fine particles as possible, and it is said that this can only be obtained, except at very great cost of time and trouble, by first adding the soluble bromide or iodide to the collodion. If you take the trouble to add the silver to the collodion first of all, the aspect of emulsion making is entirely changed, and you can get any amount of fineness by adding the iodide or bromide to the silver contained in the collodion so long as you keep the silver nitrate in excess. In this bottle is some ether, and some gun-cotton which is not dissolved up. In this test tube I have some nitrate of silver dissolved in alcohol containing a very little water. I simply pour this solution into the mixture of ether and gun-cotton, shake it, and I find an emulsion of nitrate of silver in collodion, since the alcohol and ether dissolve up the cotton. In the old days, emulsion makers would have said there is something wrong in having an emulsion of silver nitrate, but I think I shall soon demonstrate to you that in reality it is all right. Now I will add an iodide to this silvered collodion. I pour a solution of potassium iodide into it, not drop by drop, but somewhat carelessly, and shake it up in the bottle at intervals, and as a result we get a very fine emulsion. You would find if you reversed the operation, and put the iodide into the collodion first, and then added silver nitrate, you would have precipitated the iodide of silver at the bottom of the bottle, and in a form which would not emulsify at all. My advice to those who wish to make collodion emulsion (and gelatine emulsion) is to add the silver to the collodion (or gelatine), and then add the haloid salts afterwards, and you will get as perfect an emulsion as you choose. This formation, in so simple a manner, of an iodide emulsion, is a practical lesson which I hope will not be thrown away. I would just remark that if you examine this newly-made emulsion, you will find the iodide is in most minute particles, and that by transmitted light it is perfectly orange.

I have already showed you the colours of different haloid salts of silver under different conditions. I showed you two bromides, two iodides, and two chlorides, one of each of which had been boiled in gelatine, and the other unmodified, and you saw the different colours they transmitted. To night I wish to show you a new form of emulsion, which is adapted to certain purposes, and which is sensitive to the red and the ultra-red rays of the spectrum. If I had time I could show you that green is the most likely colour to absorb all above the red, and it was for this reason that I worked till I obtained a green-blue colour for the purpose I had in view. [The colour of the new form of bromide was shown on the screen.] I propose to try and take a photograph with the dark rays of the spectrum which lie below the red. These rays, which were discovered by Sir W. Herschell, and whose properties were examined by Tyndall by means of the thermopile, we can now analyse by means of photography. I will first, however, show you how very sensitive this form of bromine is to the ultra-red rays. There is what looks a very uninteresting picture on the screen, but still it is sufficiently interesting for me to explain it to you. There are now, apparently, four black smudges, and these smudges were produced as follows:—A film of green bromide was prepared, and over it was put a card punctured with holes of the same shape as the smudges, one-eighth of an inch away from it. Above the card, and about half an inch away, was placed a kettle of hot water, having a blackened surface. After considerable exposure on development, I got the image of those holes in the card developed on the plate, and the result is the photograph on the screen. So you see that the dark rays of the kettle, or rather the energy of radiation from the kettle, was able to produce an image. This particular kind of bromide is very difficult to manipulate in a lecture, but I am going to be so bold as to make an experiment. I dare say some of you here who had the satisfaction of hearing Professor Graham Bell in his late visit, heard him discourse about the photophone; that is, as you know, an instrument which produces sounds in a telephone connected to a selenium cell acted on by light. In one form of this instrument the light is intercepted by a revolving disc with alternate opaque and transparent sectors, which is traversed by a beam of light impinging on the selenium. He found when he introduced between the source and the rotating disc a piece of ebonite, he still got the same effect, which was a matter of some interest. There were all kinds of explanations given about this remarkable fact. Some people supposed the ebonite took up the radiation and gave it out on the other side, but I hope to show you that ebonite is transparent to the dark rays of the spectrum. I have some of this green bromide as a film on a plate. In front of that I have a piece of moderately thick ebonite. I propose to let the image of the carbon points forming the electric arc fall on the plate through the ebonite by means of a lens. If the ebonite be permeable by the dark rays, we ought to get an image of the points on the bromide film when it is developed. As the rays have to penetrate through a mass of ebonite, I propose to give an exposure of about thirty seconds, and I dare say we shall then find we get the points fairly delineated. It would be impossible to develop this plate in this light, so I will give it to Sergeant Jackson, and ask him to place it in the developer, and by-and-bye I will throw it on the screen. [This was subsequently done.]

For the sake of those who are uninitiated, I will show how very easy it is to develop an ordinary collodion emulsion plate. I am going to develop it with ferrous oxalate by means of a brush.

* Continued from page 477.

Behind a negative is a plate coated with a collodio-bromide emulsion, and I will illuminate it by the magnesium wire. On taking it away from the negative, I place it in a little water, in order to make the developer flow, and then I brush the developer on the surface. It is rather a bold proceeding to manipulate a collodion film with a brush, but still I dare say it will answer. [The image was developed and shown.] The usual plan of developing these plates is to place them in a dish, and pour the developer over them. They can also be developed in the hand in the same way as a wet plate.

Now there is a great comfort in the collodio-bromide process, in that you are able to give local intensity to the image ; and I hold that, for real artistic work, the great object is to be able to give local intensity to any part which the manipulator may judge expedient, so as to give it that tone and that vigour which an artist may think necessary. I have often asserted this before, and I am glad of the opportunity of repeating it. I do not believe any process is perfect until that power is placed in the hands of the manipulator ; and the fact is that in the next process which I shall describe, you are at the mercy of your plate, and you must let come out what will.

The process which I refer to is the gelatine process, which may be described as silver bromide, held in suspension in gelatine, in the same way that it is in collodion. The origin of that, I believe I am correct in stating, was due to Dr. Maddox, who took the first picture on gelatine. I know there have been other claimants for the credit ; but I believe, after consideration of the subject, that Dr. Maddox was the first person who used the gelatine emulsion with success. But of all people to whom we are indebted, there is no doubt, first of all, we are indebted to Mr. Bennett for the very perfect way in which he brought the emulsion before the public Mr. Kennett laboured many years in improving gelatine emulsions. He, no doubt, bore the burden and heat of introducing this process commercially ; but for the extreme rapidity with which gelatine plates can at present be prepared, Mr. Bennett must be credited with the full honour. Mr. Bennett showed how a gelatine emulsion could be rendered very sensitive by keeping it at a comparatively speaking low temperature in a liquid condition for many days. Seven days were not too long a time to get full rapidity of a gelatine emulsion. Colonel Wortley afterwards claimed that he could get the same sensitiveness with heating up to 150° Fahr. for a short time, and then Mr. Mansfield capped it by showing that in a very few minutes you could get the same sensitiveness by boiling. Another method was then introduced of producing very sensitive gelatine emulsions, by Dr. Monckhoven, and that was by the introduction of ammonia with the bromide of silver. The ammonia process found many admirers, amongst whom was Dr. Eder, and no doubt the process which he has described lately, of adding a large quantity of ammonia, has given very sensitive plates, and at the same time has given very vigorous pictures when the sensitiveness was not too great. But I think I may say that in England, a gentleman who is well known amongst photographers, Mr. Cowan, has introduced an ammonia process which certainly beats that of Dr. Eder. He emulsifies his bromide in a very small quantity of gelatine with ammonia, and then adds sufficient gelatine when the emulsion is ripened. Dr. Eder's method was to add the full amount of gelatine with the ammonia, by which means, of course, he got a certain amount of rapidity. By Mr. Cowan's method, you certainly get greater rapidity, and greater certainty. I thought it necessary to enter into this, because it has been imagined that your lecturer has been always an opponent of the ammonia process. I am not ; but I honestly say I prefer what is called the boiling process in gelatine emulsion making ; and if anything would convert me to the ammonia process, it would be Mr. Cowan's method.

Now what is the reason of this sensitiveness in the gelatine emulsion, for pictures can be taken in a tenth of the time necessary for a wet plate, and perhaps a thousandth that necessary for an ordinary dry plate ? First of all, we have seen on the screen, in the last lecture, that it has a blue form. But you must not run away with the idea that because anything is blue, therefore the molecules composing that emulsion are blue. It may be an agglomeration of red molecules, agglomerated together in such a way, that when light is scattered by it, it gives you the effect of blue light ; and I believe I am right in stating that the most sensitive emulsion is that in which the agglomeration is in a red state, that is to say, the molecules themselves are red, and the agglomeration appears blue—the blue is there by accident, if I may say so. One reason why the gelatine emulsion appears so much more sensitive than the collodion emulsion is, that you can use a more powerful developer. If you separate bromide of silver which has been emulsified in gelatine, and which gives very rapid plates, from the gelatine—and there is an easy way of getting bromide of silver out of gelatine—and place it in collodion, the extreme rapidity will be found to be gone, simply because you cannot use as strong a developer as you can with the gelatine emulsion ; in fact, the property that gelatine possesses of acting as a physical restrainer comes into play ; each little particle, or aggregation of particles, is surrounded by gelatine, which prevents the developer acting rapidly on them.

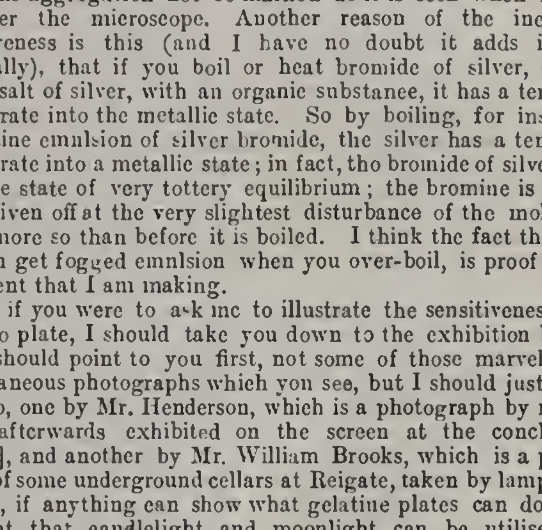
Again, the fact that by boiling, or by the ammonia process, you get a coarser deposit of bromide of silver, also points to increased sensitiveness, for the reason that I tried to give point to in my first lecture. For when sub-bromide of silver is acted on by the developer, you have bromine, the last atom of bromine being taken away from the silver ; and the moment you have freshly-reduced silver in the presence of bromide of silver, and in contact with it, the bromide of silver can no longer exist, and, therefore, you have fresh sub-bromide formed, thus :—

$$Ag_2+Ag_2Br_2=2Ag_2Br,$$

and this, in its turn, is reduced, and so on, until the whole of the bromide is reduced. The faintest action of light on one of these particles will therefore show itself, which it would not do were this aggregation not so marked as it is seen when looked at under the microscope. Another reason of the increased sensitiveness is this (and I have no doubt it adds it very materially), that if you boil or heat bromide of silver, or any haloid salt of silver, with an organic substance, it has a tendency to separate into the metallic state. So by boiling, for instance, a gelatine emulsion of silver bromide, the silver has a tendency to separate into a metallic state ; in fact, the bromide of silver then is in the state of very tottery equilibrium ; the bromine is ready to be given off at the very slightest disturbance of the molecule, much more so than before it is boiled. I think the fact that you so often get fogged emulsion when you over-boil, is proof of the statement that I am making.

Now if you were to ask me to illustrate the sensitiveness of a gelatine plate, I should take you down to the exhibition below, and I should point to you first, not some of those marvellously instantaneous photographs which you see, but I should just point out two, one by Mr. Henderson, which is a photograph by moonlight [afterwards exhibited on the screen at the concluding lecture], and another by Mr. William Brooks, which is a photograph of some underground cellars at Reigate, taken by lamplight. I think, if anything can show what gelatine plates can do, it is the fact that candlelight and moonlight can be utilised for impressing the gelatine surface with an image.

I have here another proof, perhaps, which will interest you, as showing you how rapidly a gelatine plate can act. I propose to take an image of a rotating disc, having alternate transparent and opaque sectors, when illuminated by the light of a single small spark. I have here an ordinary plate electric machine, and



six small Leyden jars, together with a discharging machine, the knobs of which are placed five millimetres apart. If the Leyden jars are charged to a certain point, the spark will leap across between these two knobs. The light from that feeble spark will illuminate the rapidly rotating disc which I hold in my hand, behind which is placed a gelatine plate. [The apparatus was charged, and the spark passed between the knobs, illuminating the disc. The plate was then developed and shown.] The image, you see, of the rotating disc is perfectly sharp. [The disc was apparently motionless.] I dare say it will interest you to know with what speed that photograph was taken. The duration of the electric spark, for a distance such as I have here, has been measured, and found to be 42-millionths of a second. You have now some idea of the immense velocity with which the spark travels, and the extreme sensitiveness of the plates which I employ. This recalls to my mind a very early experiment, made in the Daguerreotype days, where a piece of newspaper was placed on a rotating wheel, and by the light of a spark obtained from a battery of fifty largo Leyden jars, a photograph was taken of the rotating uewspaper. I believe the words were tolerably well defined. The time of passage of tho spark was greatly longer that that which I showed you first, and immensely thicker and more luminous. I should suppose the spark from the large battery at the Royal Institution would take not less thau a thousandth part of a second to travel, so that you see they were labouring under better circumstances than we are. I have taken a photograph of this rotatiug disc in the camera, with only a spark from one jar, but it was rather a ticklish thing, so I preferred to carry out the experiment in the way I have done, rather than to risk a failure. But you may take my word for it, that if you had fifty Leyden jars, you could take a portrait of our Chairman with the greatest ease, by a flash from the spark, in about a thousandth part of a second.

Dr. Vogel has recently introduced a new kind of emulsion, which is a sort of a mongrel between collodion and gelatine emulsion. It is made with acetic acid, gelatine, pyroxyline, and bromide of silver; but I will not coat a plate to-night with it, as the smell of acetic acid is very strong. It is a very good emulsion, very clean, and very fairly rapid. I pass on from this, merely saying that plates are more readily coated thau by gelatine emulsion, but less so than with collodion emulsion.

But we come now to a decided advance in photography, and that is the doing away with glass as a support for the emulsion. Anybody who has travelled, and had to make mountain ascents, will know perfectly well that glass is a serious drawback to the mountaineer; he would do anything to save himself the infliction of taking twelve whole plates up to the top of Mount Blanc. My friend Mr. Warnerke, who is generally to the fore in all matters of photography, was to the fore in doing away with glass for carrying collodion films, and is now to the fore in doing away with glass for gelatine films. He has perfected a process by which the photograph is taken on paper instead of on glass, and he has kindly brought me here some illustrations to show the method pursued. First of all, he has a sensitive tissue, which can be of any length. I do not know whether he has made it a mile long, but certainly a great many yards, and it can be rolled on a roller, and exposed in the dark slide. By simply turning another roller, a fresh surface is brought into the plane of the focussing screen. The sensitive tissue is developed in tho ordinary way with alkaline development. Here we have it in the developed state. The film can be either stripped off, or else transferred to glass. In the latter case, we come to another point, which is a distinct advance in photography. Mr. Warnerke has found that when you develop a gelatine plate with alkaline development—hat is to say, with pyrogallic acid and ammonia—the parts which have been acted upon by light, and which have been developed, become insoluble in hot water. He thus is able, after development, instead of using the hyposulphite bath to fix the print, to transfer it to glass, and wash away with hot water the parts of the film which have not been acted upon by light, and he gets a transparency such as I hold in my hand, and which no doubt you will examine with great interest by-and-bye. It should be noticed that, to do this, it is necessary that the back surface of the gelatine film should be exposed to the water, as in carbon printing, and this is secured by transfer to glass. Mr. Warnerke is not satisfied with doing away with glass for the camera, but he does away with glass for printing; and in order to accomplish this, he re-transfers the negative from the glass to a sheet of gelatine. I may say that the glass is freshly collodionised, which enables the film to strip off readily. In the picture before you we have an illustration of the gelatine film ready for printing, and here we have the print taken from negative. An advantage of these film negatives is, that you can print from either side, each one yielding sharp prints, which is a desideratum when using the single transfer carbon process, and other such processes where reversed negatives are required. I think that Mr. Warnerke has really made a very great advance by enabling us to do away with glass. I only hope the time will come, before very long, when not only he himself, but his friends and the public at large, will be able to avail themselves of this excellent invention, which he has now been cogitating for some time. I myself know he has been working at it for nearly two years. There is another part of his process which I shall have to speak about presently. But before leaving this part of the subject, I wish to call your attention to the "reason why" of the invention. I do not like taking anything on trust, and I do not liko seeing a thing and not knowing the reason of it. I hope that Mr. Warnerke will agree with me, when I say I think I have fonnd the explanation of the insolubility of the film which has been acted upon by alkaline development after exposure to light. If you take a gelatine plate and expose it from the back very strongly to the sun-light, behind a negative, and then put it in tepid water, you will find there is a tendency for the part which has not been blackened by light gradually to dissolve away, and to leave the black image formed by light undissolved. What is the meaning of that? It means this, that bromine is liberated from the silver bromide, and the bromine renders the gelatine insoluble. If you take bromine and brush it across a plate, and put it in hot water, you will find where the bromine has acted, there the film will refuse to wash away. Again, if you take bromine water, and act in the same way upon gelatine emulsion with which plates have been coated, you will find the gelatine emulsion becomes insoluble. I believe the rationale of Mr. Warnerke proves that bromine is liberated in the gelatino during the act of development. Now, you may say that the bromine is absorbed; so it is; but what becomes of it? If you add sulphite of soda, as in Berkeley's developer, I think Mr. Warnerke will bear me out in saying that there is no insolubility created by development. If you use a ferrous oxalate developer, there is no insolubility of the film created by such development. Why is that? Simply because the sulphite of soda is able to mop up the bromine, as is also the ferrous oxalate developer, as quickly as it is liberated, whereas the pyrogallic acid and ammonia is not able to do so. I have thrown this out as a hint for experimenters who wish to work further in this direction.

In the matter of gelatine films, we have Prof. Stebbing's, which are really workable. The gelatine emulsion is apparently flowed on an insoluble gelatine film on glass, which is then stripped. They are developed by placing them on glass. I have here examples of negatives taken on such films.

But I must now hurry on. The next point I am going to touch upon is the enlargement of negatives. Now, the question arises, how are you going to get an enlarged negative? Of conrse you will at once say, get a transparency by contact, and then enlarge it in the best way you can. The best way you can is, of conrse, to do it very perfectly indeed; but, unfortunately, by the wet process, an enlargement is very often sadly defective. The best way which I know of getting an enlargement of a negative is one which was brought forward a few years ago by Mr. Valentine Blanchard, and it is this. He takes the original negative which he wishes to enlarge, and places it in an enlarging camera. He then takes a transparency of the exact size which he wants his negative to be. He next takes a piece of common albumenised paper, and prints that transparency upon it, and by this means gets a very soft and beautiful negative. If you have a hard negative, it is almost impossible to get a soft transparency by the wet plate process, but by this artifice of "printing out" your transparency, and using that as a negative, you get a decidedly soft paper negative. If you trace the reason of this, it is as follows:—When the albumenized paper is acted upon by light, we know it blackens immediately, and, of course, light acts less violently on the underneath portions where it has been blackened. Thus, in printing from a transparency, the most transparent portions first blacken, then the next most transparent part blackens, before the first blackened part becomes too intense, and so on. So you see, by the shielding of the film by the blackening action, you are able to get a softness which you otherwise would uot get. I have here such a negative, which I prepared several years ago, by which you see we get some of this softness. Mr. Blanchard, I am sorry to say, has gone back from his old love, and recommends now that you should use a gelatine plate instead of the albumenised paper. A gelatine plate is a very good thing, but I think the albumenized paper negative beats it when you have to enlarge from a very small negative to a very large one. I think the grain of the paper, too, is an improvement in large photographs, and you get no grain in a gelatine negative. I will next show you how to obtain a paper negative by the ordinary lantern, but I must ask you to bear with me if I keep you rather long. I will make an enlarged negative from a transparency taken from one of my Egyptian negatives, developing it before you. This is ordinary paper to which a couple of washes of bromide of potassium were given, and which, when dried, was floated on silver nitrate. Half a minute's exposure to the light coming through the transparency will be sufficient. I shall use the developer which I recommended to your notice some time ago, the ferrous-citro-oxalate. [The negative was developed and shown to the audience.] So much, then, for paper enlargements. We now come to another great advantage of the gelatine process, which is, that by it you can get soft transparencies. I am aware that it is said there is a certain amount of blurring in gelatine transparencies, but I am not prepared to say that is necessary—in fact, I should say it ought not to be the case, as I think

I shall be able to show you in the next lecture. Therefore, if you have a hard negative by the common process, it is always possible, by the gelatine process, to get a soft negative from a gelatine transparency, in which case you can substitute for the paper such as I used just now, a gelatine plate, or a collodion plate, or a wet plate, whichever you prefer. The main point to aim at in getting enlarged negatives is to get thin, delicate transparencies, with every atom of detail present in them. If you get that, you can always get a decent enlarged negative from them. If the detail is blocked up you will not do so, unless you use a paper printing process, such as I showed you, with the albumenized paper negative.

After these preliminary remarks, I propose to show you one of the new applications of the gelatine emulsion process, and that is the development of a print on paper coated with gelatino-bromide. The paper is prepared by coating ordinary paper with gelatino-bromide (of the most sensitive kind if you like). Such paper can then be exposed to the image formed by an ordinary magic lantern; by that means you can get an enlarged print. The lantern before you is a triple-wick oil lamp, and I think you will be able to see that I shall get a very good print indeed from the negative, which is at present placed in front of the condenser. [The negative in the lantern was a view taken by the lecturer of one of the caves of Ellora, in Western India. An exposure of half a minute was given, and then it was developed by the brush with a ferrous oxalate developer.]

For my own part, I prefer gelatino-chloride paper, as it gives a very black image, which beats the bromide out of the field altogether. The reason why the tone is black is, that chloride of silver, when developed, is developed in two states, in a red or ruddy state, and also in a green state, and when you put red and green together, the result is not far from black. I think you will see, when this is developed, that we shall have the ruddy state first. I use the ferrous-citro-oxalate. It will not bear the ferrous oxalate at first, although it may be brought out more quickly with it. Now, if I turned up the light, you would see it in the pinky state; as it goes on, the pinky state gives place to the green, and the two together make up the black, and you will see afterwards that this black is of a most beautiful hue. I want particularly to call attention to the beautiful black tone it has. On the table there are some plates prepared with gelatino-chloride, to show the same black tone.

[An enlargement on gelatino-chloride paper was here made, and developed before the audience, the developer used being the ferrous-citro-oxalate.]

We may thus say that an advance has been made, when, by an ordinary magic-lantern, with a good negative, you can get a perfect enlarged paper print by development. Perhaps they will not have that lustre which albumenized prints have, but it is a matter of taste whether you like that gloss or not.

I have now to allude to Mr. Warnerke's invention again. He has found that he is able to mix with his gelatine emulsion colouring matter, and you will at once perceive the value of this. When you wash away the unaltered bromide of silver that is not acted upon by development, you get silver left behind, *plus* the colouring matter embodied in it. I have a developed print containing colouring matter, and, to save time, I have placed it on a transfer paper. The image was developed with alkaline pyrogallic acid, and was placed in contact with gelatinized paper rendered insoluble by chrome alum. I propose to wash away the soluble gelatine containing the bromide of silver and the pigment, to show what a power this discovery places in our hands. I first place it in hot water, and, as soon as it has soaked a little, the outside paper on which it was developed will peel off, leaving the gelatine film on what we may call the transfer paper. The subject is one of Mr. England's statue subjects, of which he was kind enough to give me the negative. Stripping away the paper on which the print was developed, the picture remains on the transfer paper, and we have the image waiting to be freed from the soluble matter. The print before you was taken in my laboratory with the electric light, and had a very short exposure. The soluble matter is now gradually washing away, and the whites are gradually coming out, and we get a picture in the colour of alizarine. You can get almost any variety of colour, but it is not every colour the operator can use, because some would destroy the sensitiveness of the gelatino-bromide; but most colours he can use. I can hardly thank Mr. Warnerke enough for the trouble he has taken in illustrating this part of my lecture for me. He has furnished me with pictures showing a variety of tints, from sepia and photographic purple to almost any colour. This I may claim as a great advance in photographic printing.

PHOTOGRAPHY WITH THE MICROSCOPE.*

There are two kinds of micro-photography, viz., that in which an enlarged photograph of a minute object is produced by the agency of the microscope, and that in which the conditions are altogether reversed, and a very minute photograph is produced by the same agency. The former of these may fittingly be designated as a "megatype," the latter as a "microtype," the one being the direct antithesis of the other, and both terms, it is well known, belong to the Greek language. To an ex-President of the Royal Microscopic Society of England the world owes the former term, and probably the second also.

The microtype has its own special uses, but they are social rather than scientific. The production of an enlarged photograph of an object which may in many instances be quite invisible to the naked eye possesses a high degree of scientific and educational value.

The mode of producing an enlarged photograph of a microscopic object is simple. It is only necessary to remove from an ordinary camera the lens, and insert in the aperture in front the eye-piece end of a microscope, the body of which has been adjusted to a horizontal position.

It frequently happens that an image which is focussed so as to be exceedingly sharp on the ground glass screen of the camera is not quite so sharp in the negative. This arises from the object glasses of microscopes having to be a little "over-corrected" for colour; in order to compensate for the correction of photographic lenses, the visual and chemical foci have to be brought into coincidence; in the microscope all that is aimed at is to have a visual image of the most perfect nature possible, no attention being paid to the chemical rays. Hence, in consequence of this, the blue or chemical rays are projected beyond the yellow or visual rays. The distance between the foci of these groups of rays is not great, but it is sufficiently so to interfere with securing sharpness of the highest order.

This may be obviated in several ways. A common way is to find by experiment with each object glass the amount of difference, and shifting the sensitive plate away from the microscope to that extent. A better way is to remove the object glass a little distance away from the object, and this distance must be regulated by the fine adjustment of the microscope, bearing in mind that the lower the magnifying power of the object glass the greater will be the distance which it will be necessary to move it. With the high powers, such as a one-fifth and upwards, the difference is practically nothing with the majority of objects.

The kind of adjustment we have found most convenient is the insertion of a simple crown glass lens at the upper end of the objective. Of these we possess half a dozen, any of which can be screwed into the objective, and all of which vary in foci. They are composed of ordinary spectacle glasses, which are found to answer this purpose quite as well as lenses specially ground. The manner of using these is as follows. Any one of them having been screwed in the place of the upper diaphragm of the objective, a trial is made, and if the effect has been to bring the chemical sharpness to coincide, well and good; if not, another is substituted, a trial again made, and when the result is entirely satisfactory, a memorandum is made to the effect that such or such an object glass requires a No. 3 (or other) correcting glass when being used for photography.

Concerning the light to be employed, the sun's rays are to be preferred, especially when using very high powers and photographing difficult subjects; but for these subjects requiring only the lower powers, of which an insect like a flea may be assumed as a type, a kerosene lamp answers the purpose in a satisfactory manner, and enables a good negative to be taken on a four-inch gelatine plate with an exposure of from one minute to three or more minutes, according to the colour and density of the object.

Occasions sometimes arise in which it is necessary that the camera be pointed upward or downward to a much greater degree than is possible by the usual method of pulling out one of the legs a little way. This sloping of the camera is useful when one desires to photograph anything situated at an angle of considerable altitude, such as a cloud of the upper portion of a high building. It is useful when one has the camera at a high elevation, and desires to secure a picture of something at a much lower level, such as a very steep ravine taken from above.

Seeing that by the usual method of adjusting the camera for such requirements—that is, by the legs—there is so much danger of the camera "toppling over," expedients of various kinds and devices have been had recourse to, with a view to enabling the

* Condensed from *Philadelphia Photographer*.

camera to be tilted to a considerable extent without endangering the stability of the stand, which depends upon the relation of the centre of gravity to the base. It is unfortunate that all such expedients prove inimical to portability, as they increase the bulk of the tripod head.

While conversing a few years ago on this subject with an ingenious English amateur, Sir Thomas Parkyns, and showing him a new device which had just then been introduced for the purpose of tilting the camera upward, that gentleman showed us a means he had hit upon some time before for securing the same end without any special appliances, or, indeed, any addition whatever to the ordinary camera stand.

Let a camera be mounted upon an ordinary tripod stand in the usual way, the legs being well spread out to insure stability. The camera will then be level and quite rigid. Now, grasp one of the legs of the camera stand, any of them, and pull it right through between the two which stand opposite, as far as it will go. The effect of this is to place the moved limb in a diametrically opposite position, as regards the remaining two, to what it previously occupied, to retain the camera on as firm and secure a basis as before, and to impart such a slope to the top of the tripod head that the camera shall possess either a high or low angular elevation, as the case may be.

This plan is so simple and so excellent as to insure its meeting with the warm plaudits of those who try it for the first time. To the clever amateur who introduced this method of crossing the legs of the camera stand in order to secure the effect of tilting, much credit is due.

FERROUS-OXALATE DEVELOPER FOR GELATINE PLATES.

BY JOHN CARBUTT.*

In the old wet collodion process, photographers, when asked what strength of developer they used, would reply : " Oh, a twelve, fifteen, or twenty-grain iron solution, as the case may be." Ask a gelatine dry-plate photographer the strength of his iron developer, and I question if there are many who could answer as to the number of grains of iron to the ounce of developer he was using. My experience teaches me that to be successful in working gelatine plates, it is important to know the strength of your developer best suited to the plate and subject in hand, a knowledge not at all difficult to acquire. The first to use ferrous-oxalate developer recommended saturated solutions of the oxalate of potash and sulphate of iron. The writer early saw that a solution under saturation would be preferable, so as to maintain the same strength under varying temperatures.

The simplicity of preparation and use of the ferrous-oxalate developer has made it a general favourite, and the object of this article is to give a few notes from the writer's experience in making and using this developer.

First, in the preparation of the oxalate solution : the neutral oxalate of potash sold as such will be generally found slightly alkaline; this should have added to it sufficient oxalic or citric acid (the writer prefers the latter) to give a decided acid reaction to blue litmus paper ; we take then to make our stock solution of oxalate of potash—

Neutral oxalate of potash ...	... 16 ounces
Clear water	... 64 „
Citric acid	... ½ ounce

When dissolved, and at a temperature of 60°, test with the actino-hydrometer ; if it tests over 80, add a little water, well mixing with bulk, until the hydrometer just stands at 80 grains to the ounce.

If it is thought best to make the oxalate solution from the raw material, proceed as follows :

Carbonate of potash (sal-tartar)	... 16 ounces
Dissolve in warm water... ...	... 50 „

In an earthen or glass vessel capable of holding at least twice the quantity, add by degrees oxalic acid, 14 ounces ; when dissolved, test with litmus ; if it remains blue, add of a strong solution of citric acid sufficient to redden it, then add water until it tests 80 of the actino-hydrometer ; the bulk will be a little larger than that made from 16 ounces of oxalate of potash, but not much ; do not suppose that, because you use 30 ounces of dry material, you will get, if it were evaporated, 30 ounces of oxalate of potash, for much passes off as carbonic acid ; nor take 2 pounds of oxalate of potash to replace 1 pound each of carbonate of potash and oxalic acid, as was recommended by a writer some time ago in one of our journals.

The above strength of oxalate solution we have found a very useful one.

Stock iron solution we make of a strength of 100 grains to the fluid ounce. Select clear, light-green, and fresh crystals of sulphate of iron, 8 ounces ; dissolve in hot water, 28 ounces ; then add water to exactly measure 35 fluid ounces ; add sulphuric acid, 30 drops ; filter into a clean bottle, and cork for use. Bromide solution of 10 per cent. ; potassium bromide, 1 ounce ; dissolve in water sufficient to make 10 fluid ounces ; add of this 1 drachm for each 6 ounces of oxalate solution. Now as to the strength of the iron to the oxalate, I am guided by the character of the plate I am using, slow, rapid, or of the instantaneous kind, and also subject, light, and exposure ; for general use, a mixture of 1 part of iron solution to 5 of oxalate will be found to work well on a 5 to 6 times wet-plate rapidity ; for a landscape, I would add 2 or 3 ounces of water, and ½ drachm more bromide solution, with a view to slow development, passing it into the stronger developer if found to require it from under-exposure ; where a developer of greater energy is required, as for on and off exposures in the studio, and instantaneous out-door views, the iron can be added to the oxalate solution in a dry state, as recommended some time ago by Mr. H. J. Newton, of New York.

Pulverize fresh and clear crystals of sulphate of iron, and keep in a closely corked wide-mouthed bottle ; to form a developer of great energy, add twenty grains of powdered iron to each ounce of oxalate solution, stir with a strip of glass, and use at once.

Our experience, both with wet and dry-plate photography, leads us to the conclusion that a very close similarity exists as to the number of grains of iron required to the ounce of fluid developer in the wet and the dry. Therefore I use for landscape time exposures, using A plates, a developer composed of—

Oxalate solution	... 5 ounces
Water	... 2 „
Iron solution	... 1 ounce

which makes about 12 to 13 grains of iron to the ounce of developer ; when using B plates omit the water, and the developer will contain about 15 grains of iron to the ounce. I prefer the image to be 20 to 30 seconds before putting in an appearance. Where it is desired to obtain a thin, clear negative for solar printing, omit any use of bromide, and in place, as a restrainer, add to each ounce of developer one drop of sulphuric acid. Finally, we find a general expression of opinion by those using ferrous oxalate, that a developer fresh mixed for every six or eight plates is the better plan.

* *Philadelphia Photographer.*

EXAMINE YOUR CAMERAS.

BY DAVID ROBERTSON.*

I wish to call the attention of amateurs (and professionals also, for that matter), of whom there are, no doubt, many starting out on a summer's tour with camera and dry plates, to the necessity of carefully examining their apparatus before concluding that everything is all right, and, perhaps, returning with a batch of plates more or less fogged, or, in other words, lacking " wet-plate brilliancy," of which we hear so much against the dry plate. I refer to light that reaches the plate without coming through the lens.

Noticing that some of this season's negatives, compared with last year's, lacked " something " shown by the latter, I took my camera out into the bright sun to examine for leaks, suspecting that as the cause of the fog. I capped the lens, inserted the smallest stop, removed the ground glass, put my head into the camera, drawing the focussing-cloth well about me to exclude all light, and saw nothing but perfect darkness. I then shut my eyes, and waited in this position for a few minutes, and opened them. Beautiful streams of pure white light greeted my sight, coming from around the edges of the square front piece, from under the sliding front (when well up), and from the top (when well down) ; also through the stop-slot. I tried other lenses with rotating stops, and found one of a celebrated English maker (made in wet plate days) that let in enough light for me to read the numbers of the stop-opening by. The quantity of light coming in at all these points was something considerable, and if one-quarter of the amount had reached my plates in the dark-room, when coating, I should have considered them spoiled. How, then, about every plate going through such an ordeal? I had examined for such before, as no doubt many others have done, and noticed nothing wrong; but one must take a long look until his eyes are accustomed to the darkness. Loose woodwork will shrink and sometimes warp.

I need not say more; but take my advice, and look into these matters before you take it for granted that everything is all right with your camera and lenses. The result may cause you to feel more friendly towards the dry-plate maker, and be the means of your producing what some think cannot be, viz., brilliancy on a dry plate.

PS.—I might add that I have three first-class makes of cameras, and that only two of them leaked.

Correspondence.

NORTH WALES.

Sir,—If there should be any amateur photographers carrying the camera in this charming neighbourhood, I would earnestly recommend them to make a call on Mr. James Leach, photographer, Dolgelly, whom I have found most obliging in placing his dark-room and its contents at my disposal. There are some fine glens and waterfalls to be secured for the camera near Dolgelly, if you are careful to give a long enough exposure.—Yours obediently,

J. D. Leader, F.S.A.

THE USE OF CAMERAS BY PAINTERS.

Sir,—My attention has been called to a paragraph in a number of your paper published June 16th, in which you state that I and some other painters whom you name are expert photographers, and use photography extensively in obtaining studies and subjects for our pictures. Will you allow me to say that so far as I am concerned you have been entirely misinformed? In the early days of photography I amused myself as an amateur, and have always admired the art as practised by some of its professors; but I have never copied a photograph, or relied upon one to furnish me with incident for my pictures. My "instantaneous views of passing craft" are done direct from nature with pencil or brush as the case may be.

May I add that I have not taken a photograph for twenty-five years, and am quite innocent of the development of dry plates? I am obliged to ask you to publish this disclaimer, as I find other papers have copied, and in one the quotation is inexact.—I am, your obedient servant,

Henry Moore.

Yacht "Dawn," off Poole, Dorset, Aug. 22.

[We regret to hear that Mr. Moore has of late given up practising photography, for he would have found the modern dry plates much more easy of employment than collodion films.—Ed. P.N.]

Proceedings of Societies.

Bury Photographic and Arts' Club.

The members of the above Club held their second out-door meeting at Bolton Abbey, on Thursday, the 27th of July. The morning being fine, there was a good muster of members, who proceeded by the 6·8 train to Skipton, where breakfast was awaiting them at the Devonshire Hotel. The members afterwards went per waggonette to Bolton Abbey, where a portion of the members proceeded to photograph the ruins from various points of interest, whilst the rest proceeded up the river to the strid, taking numerous views. The weather, unfortunately, changed early in the afternoon, the rain beginning to fall rather heavily. The members then returned to Skipton, and left for home by the 8·15 train. We understand the results of the day's work were some beautiful negatives. The vice-president, Mr. E. Eccles, secured a good group of the members.

Talk in the Studio.

The Precipitation of Alum by Sodium Carbonate.—Some interesting points regarding the precipitation of alum by sodium carbonate have been noted by Mills and Barr, a considerable addition of carbonate being necessary before the alumina is precipitated at all; but afterwards the amount precipitated proceeds according to laws which have been formulated by the investigators in question.

The Atomic Weight of Carbon.—This important chemical constant has been carefully re-determined by Professor Roscoe, and he used Cape diamonds, which possess the peculiarity of containing no trace of hydrogen. An allowance was made for the ash or mineral constituents present, and the mean of six experiments gave the number 11·97, oxygen being taken as 15·96.

Oxidation of Pyrogallol in Presence of Free Acid. By P. da Clermont and P. Chautard (*Compt. Rend.*, 94, 1,189-1,192).—When pyrogallol is oxidized in presence of free acid, by silver nitrate, chromic acid, or potassium permanganate, the reaction is complex, purpurogallin being the principal product. When the oxidizing agent was potassium permanganate mixed with sulphuric acid, the authors were able to isolate, in addition to purpurogallin, pyrogallo-quinone, and a third substance, the composition of which has not been determined, but which forms small needles and transparent prismatic tables with a silvery lustre. Analysis of carefully purified purpurogallin, of the barium and sodium salts, and of its acetyl-, ethyl-, bromo-, and nitro-derivatives, proves that its true formula is $C_{20}H_{16}O_9$, as found by Gerard, and not $C_{18}H_{14}O_9$, as found by Wichelhaus. Heated with hydriodic acid in sealed tubes, purpurogallin yields a hydrocarbon containing C_{10}, and probably higher homologues containing C_{10n}.—*Journal of the Chemical Society.*

Memoir on Hydrocellulose and its Derivatives. By Aimé Girard.—Under the influence of acids, both mineral and vegetable, both dilute and concentrated, and in variable conditions of temperature and time, cellulose, $C_{12}H_{10}O_{10}$, before becoming saccharified, and even before taking the state of soluble cellulose, is transformed into a new compound, $C_{12}H_{11}O_{11}$, exceedingly friable, but retaining many of the properties of normal cellulose. The conversion is most easily effected by immersion for twelve hours in sulphuric acid at sp. gr. 1·420. The author remarks that Mercerised fibres present the same physical state as those treated with acids. Hydrocellulose possesses special tinctorial aptitudes. It takes up readily colours which can only be fixed upon normal cellulose with great difficulty.—*Chemical News.*

The British Association.—The sections and their presidents are to be as follows:—Mathematical and Physical Science, Professor Lord Rayleigh; Chemical Science, Professor G. D. Liveing; Geology, Mr. R. Etheridge; Biology, Professor A. Gamgee; Department of Anatomy and Physiology, Professor A. Gamgee; Department of Zoology and Botany, Professor M. A. Lawson; Department of Anthropology, Professor W. Boyd Dawkins; Geography, Sir R. Temple, Bart.; Economic Science and Statistics, Right Hon. G. Sclater-Booth, M.P.; Mechanical Science, John Fowler, C.E., F.G.S.

Electricity in Breweries.—A curious instance of electrical development by friction has been observed in a Berlin brewery, though not without causing a good deal of alarm among the workmen. The building is constructed of stone and iron, the floor being laid in asphalte. In the upper storey of the malt-house was a malt-cleaning machine from which the malt was taken through an iron shoot to waggons below for distribution through the works. It was found that if this machine remained in operation for a length of time, electricity was developed by the friction of the malt with the shoot, and in the most isolated portions of it the tension of the electricity was such as to cause a continuous stream of sparks. The malt itself crackled, while the sparks flew from it to the hands of those standing by, who looked upon the manifestation as one of demoniacal origin. An expert was called in to examine the phenomenon, and the subject was brought before the Electrical Technical Union. Dr. Werner Siemens showed how, through the influence of the asphalte floor, the malt room was so insulated from the other portions of the building as to become a large Leyden jar.

Nitrite Solution of Potassium Iodide and Starch Mixture.—The author has examined this mixture as regards its behaviour with acid liquids. He used a very dilute potassium iodide starch paste, to which he added so much potassium nitrite that the liquid was coloured deeply blue by a few drops of acetic acid. It was coloured a deep blue by dropping in moderately dilute solutions of most inorganic and organic acids and acid salts, while weak and sparingly soluble acids, such as the carbonic, boracic, arsenious, uric, carbolic, tannic, had no action.—*A. Vogel.*

To Correspondents.

All Communications connected with Advertisements and Business to be addressed to Messrs. Piper & Carter, "*Photographic News*" *Office, 5, Castle Street, Holborn, E.C. Advertisers are requested to make all Cheques payable to* Messrs. Piper & Carter, *and crossed* "*Union Bank, Photographic News Co. Account.*"

⁂ We cannot undertake to return rejected communications.

E. S. K.—It is an article of commerce, and can be obtained from any large glass merchant.

A Retoucher.—The only work on the subject is Piquepe's "Enamelling and Retouching," price 2s. 8d. by post from our Publishers.

H. Spink.—The case is a somewhat difficult one, but it is probable that by considerably increasing the amount of bromide used, matters may be partially mended.

Leodiensis.—The return motion is generally a disadvantage, as unless great care is taken, some motion of the camera results. but there is a notable advantage as regards prolonged exposure of the foreground; and judging from what you say, your mechanical arrangements are calculated to overcome the first difficulty. Will you let us have a drawing and short description of the shutter?

3988.—Ventilate by two large ∩ shaped wooden pipes passing through the partition, one low down in the room, and the other high up. If you *thoroughly blacken* the inside of the pipes, and select suitable positions, these ventilators will be quite safe.

A Gleaner.—1. Write to the Secretary of the City and Guilds Institute, Gresham College, London, E.C. 2. Yes. 3. Add excess of hydrochloric acid, and it will be deposited as chloride; but you should perform the operation out of doors, and be careful to avoid the fumes of the hydrocyanic or prussic acid.

Bromo.—Test it with litmus paper. Blue litmus becomes red when exposed to the action of an acid, and red litmus becomes blue when treated with an alkali. See also Dr. Eder's article in our present number.

Glasgow.—We are inclined to attribute the spots to contact with some foreign body—perhaps the fingers or packing paper.

H. K.—1. Certainly not. 2. Each part is 2s. 6d. post free (by P.O.O.) and can be had from Wilhelm Knap, Halle, Germany. (See advertisement).

T. Howard.—Both equally. 2. Sometimes, but the addition is not desirable. 3. No. 4. Not so well as the wire. 5. A one-twentieth part is sufficient.

C. Glassford.—1. It is generally true of ferrous salts, but ferric salts have quite a contrary action. 2. Fine hard bank-post paper. 3. Excess of ammonia will do no harm. 4. It should be dry in about two hours. 4. The addition of a silver salt is altogether unnecessary.

A Beginner.—They are merely thin tin plates, coated with a bituminous varnish; but you will find it much more convenient to purchase them ready for use.

R. T. Kennedy.—Either your lens does not work to focus, or the position of the focussing screen does not correspond with that of the sensitive plate. Expose with full aperture on the middle card of a long series arranged at different distances from the camera, and notice which is defined best in the picture. Now alter the position of the focussing screen in its frame, until that card which was sharpest in the photograph is clearly depicted on the surface of the ground glass. Care must be taken not to shift the camera while doing this, and it must be understood that the adjustment only holds good for the camera and lens when used together.

M. McArthur.—No. 2 is much better when looked at from a theoretical point of view; but the greater simplicity of No. 1 renders it a much more useful instrument for every-day use.

M. M. (Widnes).—Keep it from the action of light, and your trouble will cease.

J. Bell.—In all probability the "cyanide" consists almost entirely of carbonate. Try another sample.

Printer.—1. When the sensitizing bath is weak, it often happens that the albumen coating is dissolved instead of being coagulated. This not only renders the paper unfit for use, but also deteriorates the solution. 2. Undesirable unless a moderate excess of acid is present.

James Fullwell.—Ultramarine is the pigment most ordinarily used for the purpose, but you must not forget that weak acids, even if considerably diluted, discharge the colour.

A. G. B.—1. Because it rapidly absorbs oxygen from the air. 2. Methylated spirit answers admirably. 3. Excess of alkali is very prejudicial.

THE EVERY-DAY FORMULARY.

The Gelatino-Bromide Process.

Emulsion.—A—Nit. silver 100 grains, dist. water 2 oz. B—Bromide potassium 85 grains, Nelson's No. 1 gelatine 20 grains, dist. water 1½ oz., a one per cent. mixture of hydrochloric acid and water 50 minims. C—Iodide potassium 8 grains, dist. water ½ oz. D—Hard gelatine 120 grains, water several oz. When the gelatine is thoroughly soaked, let all possible water be poured off D. A and B are now heated to about 120° Fahr., after which B is gradually added to A with constant agitation; C is then added. Heat in water bath for half an hour, and stir in D. After washing add ¾ oz. alcohol.

Pyro. Developer.—No. 1—Strong liq. ammonia 1¼ oz., bromide potassium 240 grains, water 80 oz. No. 2—Pyro. 30 grains, water 10 oz. In case of an ordinary exposure mix equal vol.

Iron Developer.—Potassium oxalate sol. (1 and 4) 80 parts, ferrous sulphate sol. (1 and 4) 20 parts, dist. water 20 parts. To each 4 oz. of the mixed developer add from 5 to 30 drops ten per cent. sol. potassium bromide, and 30 drops sol. sodium hyposulphite (1 and 200).

Substratum or Preliminary Preparation.—Soluble silicate of soda 1 part, white of egg 5 parts, water 60 parts. Beat to froth and filter.

Fixing.—Sat. sol. of sod. hypo. 1 pint, sat. sol. of alum 2 pints, mixed.

Cowell's Clearing Solution.—Alum 2 parts, citric acid 1 part, water 10 parts. Edwards makes this sherry coloured with perchloride iron.

Eder's Method of Intensification.—The negative is whitened by soaking in sat. sol. of mercuric chloride, and after thorough rinsing immersed in potass. cyan. 10 parts, potass. iod. 5 parts, mercuric chloride 5 parts, water 2,000 parts. As film becomes dark brown, the actinic opacity is increased; but prolonged action causes brown tint to become lighter, until at last the negative is no denser than at first.

Fol's Backing Sheets.—A chromographic paste is prepared with gelatine 1 part, water 2 parts, glycerine 1 part, and a very small addition of Indian ink. Strong paper or shirting is coated, and the sheets are laid, face downward, on waxed glass to set. Press to back of glass plate.

The Wet Collodion Process.

The Nitrate Bath.—Water 14 oz., nit. silver 1 oz., nitric acid 1 drop. Before using coat a small plate, and immerse it for 20 minutes.

Cleaning Preparation for New Plates.—Alcohol 4 oz., Jeweller's rouge ¼-oz., liquid ammonia ½-oz.

Film-removing Pickle for Old Plates.—Water 1 pint, sulphuric acid 4 fluid oz., bichromate potassium 4 oz.

Substratum.—Whites of 2 eggs well beaten, 6 pints of water, and 1 dr. liq. ammon.

Negative Collodion for Iron Development.—Alcohol 1 pint, pyroxyline of suitable quality 250 grains, shake well and add ether 2 pints. *Iodize this by mixing with* one-third of its volume of alcohol ½ pint, iod. ammon. 80 grains, iod. cadm. 80 grains, brom. ammon. 40 grains.

Normal Iron Developer.—Water 10 oz., proto-sulphate iron ½ oz., glacial acetic acid ½ oz., alcohol ¾ oz. The amount of proto-sulphate iron may be diminished to ¼ oz. when full contrasts are desired, or increased to 1 oz. when contrasts are unduly marked. With new bath quantity of alcohol may be reduced to ¼ oz.; but when bath is old more is wanted.

Intensifying Solution.—Water 6 oz., citric acid 75 grains, pyro. 30 grains. When used, add a few drops of the silver bath to each ounce.

Lead Intensification.—After neg. washing, immerse in dist. water 100 parts, red pruss. potash 6 parts, and nit. lead 4 parts. When it is yellowish white wash and immerse in liquid sulph. ammon. 1 part, water 4 parts.

Fixing Solution.—1. Potass. cyanide 200 grains, water 10 oz. 2. Sat. sol. of sod. hypo.

Varnish.—Shellac 2 oz., sandarac 2 oz., Canada balsam 1 dr., oil of lavender 1 oz., alcohol 16 oz.

The Ferrotype Process.

Collodion.—Ammonium iodide 35 grains, cadmium iodide 25 grains, cadmium bromide 20 grains, pyroxyline 70 grains, alcohol 5 oz., ether 5 oz.

Bath.—Silver nitrate 1 oz., water 10 oz., nitric acid 1 drop.

Developer.—Ferrous sulphate 1 oz., glac. acetic acid 1 oz., water 16 oz.

Fixing and Varnish.—Same as wet collodion process.

Printing Processes.

Albumen Mixture for Paper.—White of egg 18 oz., 500 grs. ammon. chlor. in 2 oz. of water. Beat to a froth, stand, and filter.

Sensitizing Solution.—Nit. silver 50 grs., water 1 oz., sod. carb. ½ gr.

Acetate Toning Bath.—Chlor. gold 1 gr., acet. soda 20 grs., water 8 oz.

Lime do.—Chl. gold 1 gr., whiting 30 grs., boiling water 8 oz., sat. sol. chl. lime 1 drop. Filter cold.

Bicarbonate do.—Chl. gold 1 gr., bicarb. soda 3 grs., water 8 oz.

Fixing Bath.—Sodium hypo. 4 oz., water 1 pint, liq. ammon. 30 drops.

Reducer for Deep Prints.—Cyan. potass. 5 grs., liq. ammon. 5 drops, water 1 pint.

Encaustic Paste.—Best white wax 1 oz., oil of turpentine 5 oz.

Sensitizing Bath for Carbon Tissue.—Bichromate potash 1¼ oz., water 30 oz., ammonia 1 dr., methylated spirit 4 oz.

Enamel Collodion.—Tough pyroxyline 120 grs., methylated alcohol 10 oz., ether 10 oz., castor oil 20 drops.

Mountant.—1. Fresh solution of best white gum. 2. Fresh starch.

Collotypic Substratum.—Soluble glass 3 parts, white of egg 7 parts, water 10 parts.

Collotypic Sensitive Coating.—Bichromate potash ½ oz., gelatine 2½ oz., water 22 oz.

Collotypic Etching Fluid.—Glycerine 150 parts, ammonia 50 parts, saltpetre 5 parts, water 25 parts.

Printing on Silk.—Remove all dressing from the fabric by boiling in water containing a little potash, dry, and albumenize with ammonium chloride 2 grammes, water 250 cubic cents., and the white of 2 eggs, all being well beaten together. A 70-grain silver bath is used, and the remaining operations are as for paper.

Cyanotype Printing.—Water 1 oz., red prussiate of potash (ferricyanide) 1 dr., ammonio citrate of iron 1 dr. Prepare and preserve in the dark. Float the paper and dry. Fixation by mere soaking in water.

Various.

Luckardt's Retouching Varnish.—Alcohol 300 parts, sandarac 50 parts, camphor 5 parts, castor oil 10 parts, Venice turpentine 5 parts.

Matt Varnish.—Sandarac 18 parts, mastic 4 parts, ether 200 parts, benzole 80 to 100 parts.

THE PHOTOGRAPHIC NEWS.

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CONTENTS.

THE BRITISH ASSOCIATION.

The session just concluded, although the papers brought forward have possessed quite as much intrinsic importance as is ordinarily the case, was characterised by an element of dullness which is a little unusual. Possibly this may be due to local circumstances, or from the failure of the Southampton townspeople to display much activity and energy in making arrangements for the comfort and convenience of the members of the Association.

A series of visits to the Ordnance Survey Offices were organised by Major General Cooke, the General Director; and an unexpectedly large proportion of the members availed themselves of the opportunity thus afforded of inspecting the various methods employed for map reproductions—photo-lithography and photo-zincography taking an important part among these.

The Mathematical and Physical section was perhaps rather more practical as regards its programme than usual, but few recondite or highly theoretical papers being communicated. Some considerable interest centred round a communication by Professor G. Forbes, in which he detailed experiments which convinced him that different rays of light travel with varying velocities.

A preliminary account of results obtained by Professor Schuster and Captain Abney during the late total eclipse in Egypt was given by Professor Schuster, who exhibited three admirable photographs obtained of the corona. In these photographs the comet seen close to the sun is visible, and so great was its motion that on comparing the first and third photographs it is seen to have changed its position. In the protuberances, calcium lines were more prominent than hydrogen lines, and variations in the temperature of the corona were detected. Some unknown lines appear in the photograph.

Professor Schuster also read a paper on some of the results arrived at by recent studies of solar physics.

Mr. W. H. Preece brought under the notice of the section a form of hand dynamo machine worked by two men. Mr. Preece showed a small arc light, and produced a good light with three Edison lamps. The success of the experiments was testified to by the general applause of the audience. The electromotive force of the machine at full speed was 70 volts. The resistance of the field magnet was 4 ohms, and the resistance of the armature was 4 ohms. One capital Swan light would be produced if only one man worked the machine. The price of the dynamo itself, without the mechanical gearing, was only £15. He strongly recommended the machine for its usefulness in home work or in the demonstrations of the lecture-hall. The results obtained were, however, unsatisfactory in comparison with those obtainable with the modified Paccinotti machine which we recently described.

Captain Abney read an interesting paper on the light of the sky at high altitudes, based upon observations made in the Alps, on the Riffel, at a height of 8,500 feet. His investigations proved that in high altitudes the light of the sky diminishes very much, so as to make photography difficult; and that it is only a tenth or a twentieth of that which is found on the surface of the earth. There was a remarkable absence of the rain-band spectrum. On the Riffel he only saw it once, and that was during a shower. The solar spectrum was the same on the Riffel as in London. He did not believe that aqueous vapour was present in the upper regions, at all events in the form in which it exists below. In the red part of the spectrum he found that the benzine and alcohol which had been found to exist in the atmosphere actually increased in strength in the higher regions, and he could only suppose that benzine and alcohol are not of terrestrial formation, but come to us from space.

Professor S. P. Langley, of the United States, in a paper on the distribution of energy in the solar spectrum, stated that he had investigated the infra-red spectrum at a height of 13,000 feet in a very dry region, and found that it extends very much further than had been mapped heretofore. The wave lengths of the visible part of the red end of the spectrum are only one-fourth of those in the infra-spectrum, so that three-fourths of the energy were invisible. His observations proved the existence of great gaps in the spectrum, and he was inclined to support Abney's conclusions on the existence of benzine and alcohol in space.

The Chemical section was well attended, but the absence of several familiar faces could not fail to be noticed.

Professor Liveing, in his address, remarked that if he were asked in what direction chemical science had of late been making the most important advances, he should reply that it was in the attempt to place the dynamics of chemistry on a satisfactory basis, to render an account of the various phenomena of chemical action on the same mechanical principles as are acknowledged to be true in other branches of physics. He could not say that chemistry could yet be reckoned among what are called the exact sciences, that the result of bringing together given matters under given circumstances could yet be deduced in more than a few special cases by mere mathematical processes from mechanical principles, but that some noteworthy advances have in recent years been made, which seem to bring such a solution of chemical problems more nearly within our reach.

Professor Abel communicated an interesting account of the legal flashing test for petroleum, and described the various tests which had from time to time been employed to ascertain the temperature at which petroleum and the mineral oils of this country gave off an inflammable vapour.

The present test, legalized in 1879, which was regarded as extremely accurate, required some modification to regulate it according to the varying conditions of barometric pressure. At his suggestion Mr. Redwood visited Switzerland for the purpose of experiment, and discovered that the variation of the flashing point was two degrees Fahrenheit for one inch of the barometer.

The report of the committee on the photographing of the ultra-violet spark spectra emitted by metallic elements and their combinations was presented by Professor Huntington. It stated that the chief objects to be gained from a knowledge of the character of the spark spectra of metallic elements were the means of readily identifying the metals by photographs of their line spectra; a knowledge of the alterations producible in the spectra of metallic salts by the presence of various non-metallic elements; a knowledge of the alterations in spectra caused by the dilution of metallic solutions; the possible means of performing rapid quantitative determinations of metallic substances by the aid of photography, and obtaining permanent records of the results.

In a paper on the reversal of metallic lines as seen in over-exposed photographs of spectra presented to the Royal Society, Professor Stokes said an under-exposed plate was likewise difficult to develop, and was liable to cause the strong lines to appear reversed. Any strong lines might be reversed by over-exposure without materially altering the appearance of the rest of the spectrum. The reversal took place in the centre of the line, and was where the radiation was most active and subject to reversal by over-exposure. The subject was one well deserving the attention of those who were engaged in the study of solar physics. Comparative exposures should be methodically employed to confirm the accuracy of the observations made entirely by the aid of photographic representation and of spectra. Professor Hartley had stated that some fourteen years' practice in photography had convinced him that when a plate was properly exposed the development of the image was the simplest of all operations. In order to simplify spectroscopic work he had carefully ascertained the time of exposure required to produce the spectra under various conditions, such as intensity of spark and conductivity of the electrodes. He preferred a general period of half a minute. It was a remarkable fact that at the present time they knew little or nothing of the sensitiveness of the spectrum under certain various conditions, notwithstanding that such knowledge was absolutely necessary for the purpose of giving stability to numerous theories and arguments which were based on spectrum observations.

The president of the Mechanical section, Mr. John Fowler, discussed at some length the unnecessary waste of mechanical energy in various industrial operations, and, making special reference to the dynamics of a railway train, said that on the Metropolitan Railway, no sooner has a train acquired a reasonable speed, than the brakes have to be sharply applied to pull it up again. Sixty per cent. of the whole power exerted by the engine is absorbed by the brakes. In other words, with a consumption of 30 lb. of coal per train mile, no less than 18 lb. are expended in grinding away the brake blocks, and only the remaining 12 lb. in doing the useful work of overcoming frictional and atmospheric resistances. Comparatively high speed and economy of working might be attained on a railway with stations at half-mile intervals if it were possible to arrange the gradients so that each station should be on the summit of a hill. An ideal railway would have gradients of about one in twenty, falling each way from the stations, with a piece of horizontal connecting them. With such gradients gravity alone would give an accelerating velocity to the departing train at the rate of one mile per hour for every second; that is to say, in half a minute the train would have acquired a velocity of thirty miles an hour, while the speed of the approaching train would be correspondingly retarded, without the grinding away of brake blocks. Could such an undulating railway be carried out, the consumption of fuel would probably not exceed one-half of that on a dead-level railway, while the mean speed would be one-half greater.

Arrangements have been made to hold the next meeting at Southport, under the presidency of Professor Cayley; and the proposal to hold the following meeting at Montreal is well received.

THE UTILISATION OF THE SOLAR HEAT.

Although the sun is the main source of that physical energy which is available for the use of mankind, it is remarkable that the direct use of the solar rays is rather the exception than the rule. It is true that the photographer is especially interested in the immediate utilization of the solar radiations; but the dynamic equivalent of the rays absorbed by the sensitive preparations used in photography is extremely small, and may be disregarded as a factor in estimating the energic magnitude of the solar radiations. Only a small proportion of those solar rays which reach the earth serve to enable plants to store up force through the agency of the carbon and hydrogen which they separate from water and carbon dioxide; but it must be remembered that small as this proportion is, it nevertheless has been the means of accumulating or storing up that force which we are now freely using through the agency of steam, gas, and hot air motors.

Few can form a just notion of the enormous dynamical energy of the full solar radiations as now expended in heating large expanses, where the heat is, at any rate as regards immediate use, practically wasted. Although up to the present time few attempts have been made to directly utilise the immediate radiations of the sun as a source of motive power, an experiment recently carried out in the gardens of the Tuileries at Paris, by M. Abel Pifre, affords abundant proof that in latitudes where sunshine is intense and tolerably constant, considerable use might be made of the solar radiations as a source of heat for industrial purposes.

A parabolic reflector about eleven feet in diameter was mounted with a small boiler placed axially, and the steam generated in this served to actuate a motor, this in its turn driving a small printing press, which, between one o'clock and half past five, struck off copies of the "Solar Journal" at the rate of five hundred copies an hour.

Such experiments as that of M. Pifre, although perhaps not likely to lead to immediate results of industrial value, possess great importance, insomuch as they call prominent attention to vast stores of force which are ready to yield to the controlling hand of man.

PHOTOGRAPHY IN AND OUT OF THE STUDIO.

Photography and Tricycles—The Hoeschotype Process—Photographing the Sea.

Photography and Tricycles.—The stock of the photographic dealer is continually increasing in variety. It will not be long before he will be called upon to keep the photographer's tricycle; that is to say, when tricyclists have decided amongst themselves which is the best, by no means an easy matter, as it is rare to find in one tricycle all advantages combined. Passing through Guildford the other day, we came upon a couple of photographers, each with his tricycle, and each tricycle bearing its load in the way of impedimenta. To see cyclism—if we may coin a word for this mechanical science, yet in its infancy—in conjunction with photography was quite sufficient to make us stop and pick up a wrinkle or two. The photographers, we found, were professionals, and, therefore, their tricycles were likely to be well and truly tried. They had come from Farnham that morning, had executed their commission at Guildford, and were going back with their exposed plates to Farnham—in all, a distance of over twenty miles. Cameras, lenses, plate-boxes, and plates weighed about a hundred pounds, and this baggage was divided into two portions, so that each tricycle carried, besides the rider, fifty pounds—altogether no light weight. As we ourselves had had some experience on an Excelsior tricycle, we naturally had some curiosity as to the effect of the extra weight. "It makes very little difference, we find," said the photographers, "save in going up a hill. If the hill is a long one, it is better to get off and push the machine; but with short hills this is not necessary." The tricycle used by these gentlemen was the Rapid, fitted with a hill-climbing gear, which, they said, answered very well, and with the baggage disposed on a light iron frame placed at the rear of the seat. This frame was, of course, made specially and fitted, as there is no tricycle in the market which could be used by the photographer as it is bought. "We have had these tricycles a little over six months, and we are quite sure we have paid the cost in the extra work which we have been able to do," said they. Now, this is valuable experience. It is certain that, in country districts, where houses lie at long distances from railway stations, the tricycle will be found of immense service. It is not every photographer who can afford to keep a horse; but a tricycle does not entail an enormous outlay, and, in many cases, can be purchased on very easy terms. The only question is, which is the best kind?

The Hoeschotype Process.—The attempts to combine photography with a mechanical printing process have been endless in numbers; to many of these attempts must be ascribed a fair amount of success. Most of these processes are confined to reproduction of line subjects, and so far a practical and easy method of reproducing tints has been wanting. Photo-lithographic and photo-zincographic processes are now worked commercially, but only in monochrome, and hitherto little has been done in the way of printing pictures in two or more colours. This problem has, however, now been boldly attacked, if we may judge from the admirable specimens of what are termed Hoeschotypes, which last week we had the pleasure of inspecting at Messrs. Gladwell Brothers, 21, Gracechurch Street. The Hoeschotype is the invention of Herr F. C. Hoesch, of Nuremberg, who has spent the last three years in bringing his process to perfection. The method by which Herr Hoesch works is at once simple and rapid. A photograph is first taken of the picture. From the negative six gelatine prints on glass are made, and a colour plan having been made on one, on each of the other five a separate colour scheme is worked out corresponding to the particular tint desired, all the portions not required being painted out. The colours used are the three primaries, a neutral grey, and a brown, and with these five tints any combination can be produced. The gelatine is made insoluble with bichromate of potash, and thus can be printed from in an ordinary lithographic press. The advantage which Herr Hoesch claims is that where a chromo-lithograph of an extended scale of tints may require from a dozen to twenty printings, the Hoeschotype may be produced in five printings. The various stages of the colour printing by which the finished print is built up are exceedingly interesting. The print we examined was the portrait of a girl. Plate No. 1 showed only the yellow tint graduating from the deep points of colour in the hat to the light tints in the hair. The outline of the features was only just discernible, while the cheeks were left white. In the next printing the colour was red. Here, where necessary, the red mingled with the yellow, producing orange. No 3 was blue, and the greens and purples made their appearance in their proper places. No. 4 was a neutral tint of grey, which toned down the crudeness of the three primaries. Finally came the brown, which gave a mellowness and warmth to the shadows, and completed the picture. For the result we have nothing but praise; and if examples like the ones we saw at Messrs. Gladwell's can be produced rapidly and at a small cost, chromo-lithography will be almost superseded. It is evident that some artistic skill in manipulating the gelatine plate is absolutely necessary, for herein lies the power of being able to produce graduated tints at one working; but whether the gelatine is worked upon before or after being bichromatised we are unable to say. So far as the artistic element is concerned, we understand that Herr Hoesch is certain that any South Kensington student of average skill could, with three months' practice, acquire proficiency. If this be so, there is no insuperable difficulty for the artist. We believe that no attempt has been made in connection with enlargements of portraits from life, but we saw several Hoeschtypes of vases from the objects themselves, which left nothing to be desired. Of course it is not necessary to use five tints in every case, and in the reproductions of the vases three only were employed. To ensure absolute accuracy in the matching of tints, the inventor has prepared a scale in which every combination of the five colours in certain proportions is shown. Herr Hoesch divides his five colours into fifths, and having thus twenty-five portions to ring the changes upon, he gets 1,600 tints, each of which has a number attached to it which shows on reference to a table that it is composed of so many fifths of one colour and so many fifths of another, as the case may be. The equality of the prints may therefore be depended upon. So far as we could see from the results shown by Messrs. Gladwell, there is hope that the Hoeschotype may take its place before long as one of the recognised art processes of the day.

Photographing the Sea.—Photographs of the bed of the sea some time ago caused a little sensation. There was the usual nine days' wonder, and then they went the way of all wonders. To those who may be desirous of repeating the experiment, it will be interesting to learn something of the distance to which light can penetrate water. A series of observations has been lately made on the subject by MM. Secchi, Pourtalis, and Bougner, who have found that the depth to which light can make its way in sea water is between forty-three and fifty fathoms. These observations have, however, not been made by means of photography, but by examination of the fauna. The deep sea fauna are beings of darkness, and these are first met with, according to another naturalist, Herr Frichs, at about fifty fathoms. In some places, where the light limit is higher, the deep sea fauna extend higher, and in fresh water lakes, where the light penetrates to greater depths, the shore fauna reach further down. Again, many deep sea animals have either uncommonly large eyes, like nocturnal animals, or are quite blind. It is quite possible that by means of photography the distance of this penetration of light could be ascertained with absolute accuracy.

FRENCH CORRESPONDENCE.

Scarcity of Photographic News—Captain Biny's Researches—Numerous Gelatine Processes—Ferrous Oxalate Developer—Boca's Chronometric Shutter—Necessity for a Chronometric Shutter—Portability of Apparatus—Paris Exhibition—Bibliography.

Scarcity of Photographic News.—We have now arrived at the time of year when one finds a dearth of news in photography. The photographic societies have suspended their meetings, professional photographers have neither more nor less to do than at other seasons, while amateurs are travelling with their apparatus of more or less portable form and gelatino-bromide plates or pellicles.

Captain Biny's Researches.—Several good workers, however, still continue their researches at home, and among them Captain Biny, from whom we hear of such interesting experiments. We cannot recommend too highly his last work relating to the means of preparing emulsion in open daylight, of which we have spoken in our last letter (page 481). After relating his experiments of adding hyposulphite of soda to the ferrous oxalate developer, and thereby increasing its properties, he has stated that this powerful agent should be used in the developing bath when working instantaneously.

Numerous Gelatine Processes.—For some time past every meeting has given itself up to the subject of the gelatino-bromide process, and it is certain that of all the different methods, one will be found excelling all others, and be universally preferred. Each moment brings forth a new way of mixing the emulsion, or a new developer. Being often obliged, professionally, to answer questions —for it is supposed that we ought to know the best —we often find ourselves greatly embarrassed. We wish to indicate the last improvement, and no sooner is it produced than it is replaced by another which seems superior. Notwithstanding all these improvements, there are no essential formulæ, and we continue to recommend the use of the ferrous oxalate developer, composed of three parts of saturated solution of neutral oxalate of potash and one part of sulphate of iron, to which add one or two drops of sulphuric acid per litre. With certain plates—Von Monckhoven's among others (the most used in France)—it is useless to add bromide of ammonium to the mixture unless when certain of having over-exposed; but with other plates liable to fog it is advisable, and often necessary, to add to the developer a few drops of a solution of bromide of ammonium. With regard to the ferrous oxalate bath, care must be taken to keep in a special vessel in open daylight, and to mix a few grammes per cent. of tartaric acid, as we have already stated, as indicated by M. Audra. By this means the developer will last until exhausted, particularly when kept in a brilliantly lighted place. To our mind this seems the most economical and cleanest process of development. The pyrogallic developer also offers advantages, but it appears unquestionable that in the majority of cases it is preferable to employ the ferrous oxalate.

Boca's Chronometric Shutter.—With Monckhoven's plates and diaphragm of 20 m.m. we have worked instantaneously, exposing for one-hundredth of a second. The focal length was 23 c.m. Boca's chronometric shutter was used to measure the length of exposure. This shutter would be excellent if it did not cause the camera to vibrate, resulting in a notable loss of sharpness. We had obtained very good pictures with an aplanatic lens by M. Hermagis, using a large diaphragm; but, after fitting on the shutter in question, the results were not nearly so good. The cause of this failure we have put down to the vibration of the apparatus. A shutter so perfect in other respects ought not by any means to shake the camera during its use. We can only greatly regret that M. Rédier, maker of Boca's apparatus, has not yet been able to arrive at a method for suppressing all vibration. Assuredly this desired improvement will not be long in forthcoming, and the instrument will then be perfect. It is so useful to be able to measure the length of the action of light, and so difficult to know what one is doing without having at disposal something of this kind. How may fractions of seconds varying from $\frac{1}{10}$ to $\frac{1}{100}$ be judged approximately? It is difficult, but, at the same time, necessary, to be able to expose with precision for such short spaces of time. For instance, we have an aplanatic lens, with a diaphragm of 20 m.m., requiring an exposure, in full daylight, of $\frac{1}{50}$ of a second; but, with dull illumination, it may be lengthened to $\frac{1}{10}$ or even $\frac{1}{5}$ of a second, but beyond this it passes into destructive over-exposure. To work with successful utility it is, therefore, indispensable to employ a precise shutter such as Boca's, which marks with accuracy the length of exposures from $\frac{1}{100}$ up to five seconds. Beyond this limit recourse may be had to the seconds hand of a watch without fear of erring

Difficulty of Solving the Problem of Portability of Apparatus.—The question of portability has not made visible progress. It is, however, one of the most important questions of the moment. M. Enjalbert's photo-revolver does not seem to offer a sufficient solution on account of the minute dimensions of the plates. One cannot, unless accustomed to delicate manipulations, work properly upon such a small surface; we therefore require the size to be extended to 6 by 5 c.m., in order to obtain useful pictures. It is, unfortunately, essential to produce an apparatus which can be used while held in the hand, for which a considerable rapidity is necessary, as at least $\frac{1}{100}$ of a second, and this can only be obtained with a lens of short focal length and a large aperture. These small pictures being, as a rule, intended for enlargement, they cannot be too sharp and rich in detail. This problem is less easy to solve, as with such rapidity it is necessary to work with full aperture, sacrificing some of the detail because the instrument vibrates so much when in the hand, and this movement is added to those of the object to be reproduced. Hence, it is only upon rare occasions that a really good negative is obtainable, and perfect results may not be counted upon when employing apparatus of this kind. The question is one still meriting a long research.

Paris Exhibition.—The Paris exhibition (photographic section) has taken a long time to establish itself; it is now nearly ready, and we hope soon to be able to give a detailed account.

Bibliography.—A fourth edition of the "First Lessons on Photography," by M. Perrot de Chaumier, has just been published at Gauthier Villars' library. This treatise is excellent, but, unfortunately, has for its aim the wet collodion process, which tends more and more to disappear; it would be useful if the author felt inspired to publish a similar treatise on the use of gelatino-bromide, as this is the only process employed now by amateurs, with very few exceptions. LEON VIDAL.

By-the-Bye.

CONTINENTAL RAMBLES WITH A CAMERA.

By Fjord and Fjeld in Norway.*

We have now crossed the highest portion of the Fille Fjeld on our way to the west coast of Norway. Snow and ice is no longer seen by the wayside, but the scenery is still very wild and grand. You must not be deceived by well-sounding names or well-marked localities on the map. We travelled by Waligorski's, and we cannot recommend it; for paths are marked of which we found no sign, and empty huts only were discovered where dwellings were supposed to exist; thus Kogstadt, notwithstanding its town-like name, consists of but three log huts. We take a photograph of the little plank erections, standing high upon a dark rocky eminence, with a big mountain side flecked with snow for a background; and Halne, which we reach later on, being marked by a little circle on the map, is but a wooden shed, six feet square and about four feet high.

But we are still on the highway as yet, where good "stations" abound. At Bergund we secure a picture—a very bad one, it turns out, unfortunately—of a famous old church that is reported to have stood here for many centuries past. Built of oak, its beams are as black as ebony, and, although we knew of its whereabouts, its tint harmonized so thoroughly with the sombre landscape, that there was some difficulty in finding it. We give a sketch taken from our photograph of this quaint edifice, whose outline is well known to archæological students.

At Leirdalsoeren we reach the Sogne Fjord, and here a steamer may be taken to visit the wonderful coast, and to reach Bergen if necessary. The scenery on the Sogne Fjord goes beyond the magnificent—it is appalling.

* Concluded from page 501.

Mighty rocks tower up like giant walls out of the green water, appearing, as one looks up at them from the little steamer below, to reach right into the heavens. Your boat is dwarfed to insignificance as it creeps along the narrow channels under shadow of these mighty cliffs, that assume the most fantastic shapes as they rise skywards.

You understand now why people come all this way to get a peep at the fjords, for nowhere else are there such rocky chasms, such wild defiles, such bright green waters to be seen. Now you sail into a dark inland lake surrounded apparently by nature's stern walls; now you pass the opening of a smiling valley, all green fields and verdant pasturade; now you approach a gigantic cascade that comes tumbling out of a black cleft in the rocks, the white foam rippling the placid water as it falls.

We do not go to Bergen, but land at Gudvangen. Before bidding adieu to the Sogne we take a photograph of our landing-place, where the cliffs rise higher than ever at the water's edge. Then we pursue our way through the sweet green valley of the Naerodal to visit another not less famous fjord—the Hardanger. Vossewangen is the only good "station" between the two fjords, those at Vinge and Twinge being mere squalid hovels at which only milk and fladbröd are obtainable; but at Vassewangen there is good brown bread to be had, and tinned meat. We attended service here, and the marvellous costumes of the peasants, gathered from many quarters, are most picturesque. The clergyman, a grave Lutheran priest in a long black robe and white frill, is himself a relic of the past; of his congregation, the men wear, for the most part, knee breeches, bright green vests, and red night-caps, while the women have the shortest of skirts and whitest of stockings. In some cases the women's dresses had waists coming right up to the armpits, like those worn in this country at the beginning of the century; others had gaily-stitched corsets, meeting high up the neck, with smart embroidered aprons, and white head-dresses, and full white sleeves. Blue eyes and straight flaxen hair are everywhere to be seen, and certainly Scandinavian features are more like our own than are those of any foreign people.

In fact, you soon get "at home" with the simple Norwegians. To pledge a glass of beer to "Gamle Norge" will make their friendship at once, for as we say Old England, so they say Old Norway. When they are especially pleased, they shake you by the hand or pat you gently on the arm. Shaking hands, indeed, is a universal sign of gratitude. If you give your carriole boy a few skillings, he at once shakes hands, or if you hold out a bit of fladbröd to a beggar, he employs the same token of friendship.

There is, however, one drawback the tourist photographer experiences in Norway, at any rate in the summer time; that is, the absence of darkness in which to change his plates in safety. It was very strange the first time we became aware of this. We waited patiently hour after hour on our arrival at Christiania for the light to fade. We sat chatting together, talking over our plans, but still the daylight lingered; presently, looking at the time, we found it was one in the morning. Then the truth came very strongly upon us, and we at once saw that our old plan of leisurely changing plates under cover of the night could no longer be practised. It was no easy matter to get a cupboard that did not admit light, and on several occasions it was necessary to drape a bed all round with thick hangings and get underneath, to pack and unpack in safety.

Eide, on the Hardanger, is a convenient spot to take boat to visit the Fjord and the mammoth waterfall, the Vöring Foss that is near at hand. The steamer calls but rarely, but a row-boat may be hired, with three or four men, for a reasonable sum. The shores of the Hardanger are less rugged than the Sogne, but not less attractive on that account; in truth, there are few things pleasanter than being propelled along over the sea-green waters of these glorious fjords watching the fine panorama of mountain and lake glide past you. Now a flock of wild geese fly straight over your head in two lines, foring an acute angle; now something splashes into the fjord from a low rock just ahead of the boat, and the men turn quickly to see if they can catch a glimpse of the seal that has dived into the translucent water; now you start some screaching wild fowl as the boat sharply rounds a headland.

Presently the boatmen begin to sing. What is that well-known part song they are trolling? Listen; how familiar it is! They all join in chorus, and so could we, if we only remembered the name of the song. Hurrah! we have it:

> "The hardy Norseman's home of yore,
> Was by the stormy sea."

The boatmen are delighted at their passengers joining chorus; they check their oars for a moment and wave their hands. "Gamle Norge," our party shout in return, and then we all laugh and shake hands. Presently the boatmen start another song; this is also familiar, and we join once more:

> "O, who will o'er the downs so free—
> O, who will with me ride?"

And so the time passes pleasantly upon the Hardanger Fjord; you row on and on through the live-long day, and it is only when you arrive at Vik at the head of the loch, and find the people at the little inn are fast asleep in bed and want rousing up, that you begin to realise it is two o'clock in the morning.

The Vöring Foss, called the lion of Norway—is a good walk from Vik—beware of the charges here, by-the-bye, for they incline to be extortionate—and the way is so steep at times, that it is difficult work even for a horse; there is no such thing as a carriole to be secured. The best way, therefore, is to foot it, and so our party mean to make way across the Scandinavians, by the Hallingdal Valley, and the borders of Tellemarken, to the lower Christiania road. We fill up with provisions before starting. And we may at once say that although our maps showed a path all the way, we found it in the end a trackless waste, over the wildest country, and a distance at the least of ninety miles.

A short walk to the Saebo lake, over which you are ferried, and then up a very wall of a mountain, that leads you, like Jack's beanstalk, into another world apparently, a vast table-land. You follow to where a cloud of mist spray hangs over the plain, to be observed miles away. The fall, or Voss itself, is not seen until you approach close to the fissure or chasm in the rock, in which the torrent foams and chafes in its headlong career. A fierce tearing rapid, broken up into hissing foam, dashes over a yawning abyss with desperate force, and, falling into space, disappears out of sight in a halo of spray and vapour. What becomes of the torrent after its terrific leap, you know not; but the deafening thunder of the water below, and the cloud of mist that rises to the brim of the awful cauldron, conveys to the shuddering senses some idea of the strife below.

Of course we get out our camera. The stand cannot be used from this point, for in order to see as much as possible of the fall—the Voss can be viewed at full length lower down, but it is then further from the spectator—you must approach the precipice on your stomach and crane your head. To secure a proper focus, we regard the opposite shore, for we cannot put our head where we mean to put the camera; as it is, our position is a dizzy one, the stormy blast of the fall, the terrible thunder, and the wet foam rising from the vast abyss, all combining to attack the senses. A sudden gust comes that bids fair to blow camera and lens into the foaming water; we seize it as we lay there at full length, but at the cost of our wide-awake, which goes flying over the black precipice, never more to be seen by mortals.

We do not advise any of our readers to follow in our footsteps further across the Hardanger Fjeld unless provided with a good guide, and perhaps a pack-horse, with food and camping equipage. We travelled by map and compass only; within a few miles of the Vöring Foss, the map left us in the lurch, or rather our track did, while the glaciers, fierce mountain streams, and broad waters, prevented one from travelling in anything like a straight line. In these circumstances it took us three days' hard walking to reach the nearest hamlet—Tufto—at the head of the Hallingdal Valley. After you have passed Maursaet, there are only half-a-dozen little wooden huts between you and civilisation; these are so much the colour of the big grey boulders strewn in all directions that they are difficult to find, and when found they are sometimes without inhabitants. A good-natured farmer whom we providentially met, the first day (the only individual we did meet on our three days' tramp), directed us to one of these huts, writing a line of recommendation on our note-book: "These are Englishmen; they are not vagabonds," a passport that was several times of value to us in the district.

But the scenery of the Hardanger Fjeld is well worth many hardships. One of the most charming natural effects in Norway is the midnight sunshine glowing upon the interminable wastes of snow and rugged grey peaks. In these districts, in midsummer, the sun merely dips down out of sight for half-an-hour or so, and during this period you may observe the most lovely effects of sunset or sunrise, whichever it may be called, for the same phenomenon answers both purposes. To see the cold white landscape gradually become tinged with rose colour and purple as the lurid rays of the sun strike aslant the snowy regions is a sight that will never escape the traveller's memory. You watch from some eminence the gorgeous colours as they change and modify, the white snow-fields and distant glaciers now shining like burnished gold, now bathed in the violet haze of sundown. The orb of day has been lost to view for some time, but presently the colours, instead of growing fainter, become vivid again. It must be the moon, we think, that is coming up to take the place of the sun during its brief retirement from the scene. The tints brighten perceptibly, and the gilding upon the mountain-tops shines out as brilliantly as ever as the luminary rises. But it is not the moon; it is the fiery sun again that proclaims another day has come, and that the night is over before it has begun.

Fortunately the mountain air is so crisp and exhilarating that no such thing as fatigue comes over the traveller. Perhaps the excitement of travelling on one's own responsibility has also something to do with it; but although the second night is passed in a lonely hut, with but little food and a half-hearted fire—for the juniper bushes afford the only fuel to be got—our party keeps up its energy and spirits. In front stretches an endless moorland covered here and there with broad fields of white, the higher valleys filled with congealed snow or glacier. To the north is seen the mountain peaks of the Fille Fjeld and Northern Scandinavians, some of them grey and craggy, others with snowy hoods and closely drawn mantles of white, with broad glaciers streaming down their sides like white lava.

It is only when at last your journey is done, and you see the smiling fir-clad Hallingdal Valley at your feet, and behold the white farmhouses at Tufto, that fatigue creeps over your frame. There is no "station" at Tufto, but, fortunately, hospitality is a marked feature of the Norwegians. Rest and food we are welcome to, and ten miles further on—a weary trudge—Sundre is reached, which is a "station," if only a slow one. The lower Christiania road is now not far off, and this being reached, we face for home.

A RAPID-VIEW INSTRUMENT FOR MOMENTARY ATTITUDES.

BY FRANCIS GALTON.*

The wonderful photographs by Muybridge of the horse in motion, and those by Maret of the bird on the wing, induced me to attempt the construction of apparatus by which the otherwise unassisted eye could verify their results, and catch other transient phases of rapid gesture. Its execution has proved unexpectedly easy, and the result is that even the rudest of the instruments I have used is sufficient for the former purpose; it will even show the wheel of a bicycle at full speed as a well-defined and apparently stationary object. This little apparatus may prove to be an important instrument of research in the hands of observers of beasts, birds, and insects, and of physicists who investigate such subjects as the behaviour of fluids in motion.

My object was (1) to transmit a brief glimpse of a moving body, (2) to transmit two or more such glimpses separated by very short intervals, and to cause the successive images to appear as simultaneous pictures in separate compartments in the same field of view.

The power of the eye to be impressed by a glimpse of very brief duration has not, I think, been duly recognized. Its sensitivity is vastly superior to that of a (so-called) "instantaneous" photographic plate when exposed in a camera, but it is of a different quality, because the impression induced at each instant of time upon the eye lasts barely for the tenth of a second, whereas that upon a photographic plate is accumulative. There is a continual and rapid leakage of the effect of light upon the eye that wastes the continual supply of stimulus, so that the brightness of the sensorial image at any moment is no more than the sum of a series of infinitesimally short impressions received during the past (say) tenth of a second, of which the most recent is the brightest, the earliest is the faintest, and the intermediate ones have intermediate degrees of strength according to some law which an apparatus I shall describe gives us means of investigating. After the lapse of one-tenth of a second the capacity of the eye to receive a stronger impression has become saturated, and, though the gaze may be indefinitely prolonged, the image will become no brighter unless the illumination is increased.

This being premised, let us compare the sensitivity of the eye with that of the rapid plate in the photographic camera, under conditions in which the eye is just capable of obtaining a clear view, let us say during an overcast day in a sitting-room whose window does not occupy more than one-thirtieth of the total area of wall and ceiling, which is the light under which most of us habitually write and read. A glimpse under these circumstances of one-tenth of a second in duration suffices, as we have just seen, to give a clear view; but the sensitive photographic plates sold in the shops as "instantaneous" will not give a portrait in that light under thirty seconds' exposure. In other words, the sensitivity of the eye is fully 300 times as great as that of the plate. Of course, I am aware that more sensitive plates than these have been made, and I have seen a rapidly-revolving wheel photographed under the momentary illumination of an electric spark; but I never heard of that being done

* *Nature.*

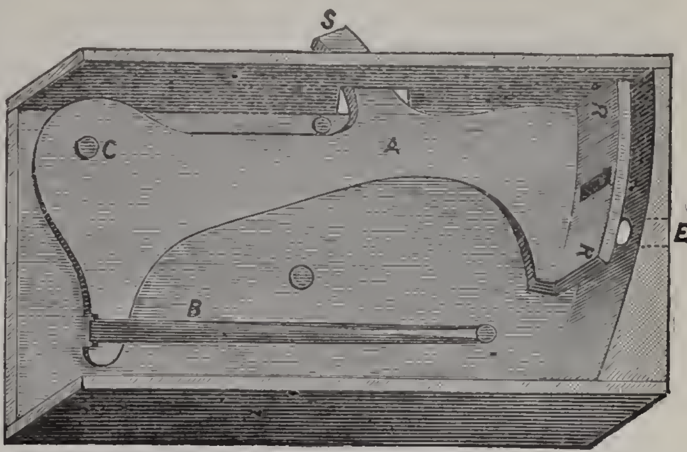
when, at the same time, the revolving wheel was not perfectly distinct to the eye.

The range of ordinary illumination is very great. The photographer who requires thirty seconds in a dim window-light would photograph clouds in some minute fraction of a second, showing that the illumination of the latter is fully one thousand-fold greater. If, then, the eye has been shaded and adapted to a dim light, an object in bright sunshine may require no more than the thousandth part of the tenth of a second to be visible, and, in saying this, I am confident that I am under-estimating what could be done. Consider what even this means: a cannon ball of ten inches diameter, in its mid career, travels with a velocity of little more than 1,000 feet in a second; in one ten thousandth of a second it would shift its place through only one-tenth of its diameter, and would present to the eye, if it could be viewed under the above-mentioned conditions, the appearance of an almost circular disc elongated before and behind by only a slight blur.

It may be said, how is it possible to give such brief exposures as the above? I see no difficulty at all in the matter. Let us take two examples, (1) of quick movement, and (2) of very quick, but by no means the quickest possible, movement. As regards the former, I can flip with my forefinger, and with the greatest ease, a light weight—such as a very small stone—nine feet up in the air; now the maximum velocity of the tip of my forefinger is that of the initial velocity of the stone, which is calculated at once by the usual formula, $v = \sqrt{2 f s}$, or taking $2 f = 64$, which it is very nearly, $v = 8 \sqrt{s}$, the units being in feet and seconds. The velocity in question is therefore 24 feet, or 288 inches, per second. As regards a very rapid movement, we may take that of the wing of a bird, which can undoubtedly be rivalled mechanically. A pigeon is by no means the swiftest of birds, but it can fly easily at the rate of 35 miles an hour, and the part of the wing by which it is chiefly propelled, and which cannot be its extreme tip, must move much more rapidly than this; let us say, very moderately, at 70 miles an hour, or 1,232 inches per second.

Now, the duration of an exposure depends on three data, namely, the rapidity with which the screen moves past the eye, the width of the slit through which the momentary glimpse is obtained, and the diameter of the available portion of the pupil of the eye. I prefer not to limit the pupil by using a small eyehole, which is a source of much trouble in actual work, but to have as large an eyehole as is in any way desirable. I find the width of the pupil of my eye in an indoor light, as measured by holding a scale beside it, and reading off in the looking-glass, to be about 0·1 inch, and I use a slit of the same diameter. The exposure begins when the advancing edge of the slit is in front of the near edge of the pupil, and it ceases when these conditions are reversed; in other words, it lasts during the time that the screen is occupied in moving through one-fifth of an inch. In the cases just taken of velocities of 288 and 1,232 inches per second, the duration of the exposure would be the 1,440th and the 6,160th part of a second respectively. There is therefore no difficulty, either theoretical or practical, about shortness of exposure and sufficiency of illumination. The power exists, and can be utilized, of seeing bodies in motion by a rapid-view instrument, showing them in apparent stillness, and leaving a sharply-defined image on the eye, that can be drawn from visual memory, which, in some persons, is very accurate and tenacious.

I find on trial that great rapidity of exposure is in nowise essential for analysing the attitudes of a galloping horse or a flying crow. The instrument I commonly carry with me is a very rude one, but convenient for the pocket, and is shown below. The duration of the exposure given by it under the action of its spring is the 360th part of a second, but the beginning and end of the exposure ought not to count, so little light passing through the edges of the pupil at those times that what is then seen is relatively faint and is disregarded. I estimate its practical duration at about one 500th of a second, and it is rather less when the finger acts with a sharp tap in opposition to the spring. The instrument is shown in the figure, without its sliding lid, which protects it from injury in the pocket. A is an arm which turns through a small angle round C, its motion being limited by two pins. Its free end carries a vertical screen, R R, which is a cylindrical (or better, a conical sheet) described round an axis passing through C perpendicular to the arm. As the arm travels to and fro, this screen passes closely in front of the end of the box, which is cut into a hollow cylinder (or cone) to correspond. There is a slit in the middle of the screen, and an eyehole in the centre of the end of the box. When the slit passes in front of the eyehole E, and the instrument is held sideways, a view is obtained. A stud, S, projects upwards from the arm, and an india-rubber band, B, passing round a fixed pin and a descending spoke of the arm, acts as a spring in causing the stud S to rise through a



hole in the side of the box, where the finger can press it like the stop of a *cornet-a-piston*. Nothing is then visible, but on pressing or tapping the stud the slit passes rapidly in front of the eyehole and the view is obtained.

After this, the stud is released and the arm springs backwards, when a second view can be obtained, or the eye may be purposely closed for the moment.

I measured the velocity of the instrument by filing a nick on the stud and laying a light weight (a small bent nail) upon it, after having temporarily put in a peg that checked the arm in its recoil when the slit was opposite the eyehole. Then, holding the instrument firmly against the wall with the projecting end of the stud as vertical as might be, I drew back the arm and released it, and noted the height to which the weight was tossed. It was three inches. This gave the velocity of the stud in the central portion of the arm, and from this datum the velocity of the more distant screen was easily calculated. I have made more elaborate instruments with multiple levers and with revolving discs, but am not as yet prepared to recommend any of them in particular. Different sorts would be probably be wanted by different persons. For instance, it might in some cases be convenient that the trigger should be pulled at the right moment by a bystander, the eye of the observer being in the meantime kept closely shaded from the surrounding light. Again, there are periodic movements which would be best analysed by a slit in a rotating disc whose period of rotation was a little slower than that of the movement, so that each exposure should show a phase one step in advance of the previous ones; or, again, the rapidity of the periods or that of the motion may be such as to make it necessary to expose only at each second, third, or longer periodic interval. This would be effected by the use of two discs rotating at different velocities. Suppose, for example, one to revolve three times while the other revolved twice, then two slits would be in accord in front of the eyehole only once in three revolutions.

In order to present the images formed by two successive glimpses as simultaneous pictures seen side by side in the field of view, I took a prismatic eyeglass of the sort sold by spectacle-makers to correct want of parallelism in the optic axes. I cut it in two pieces, and placed these in opposite ways in front of two horizontal slits, lying one above the other in a shutter that fell vertically between slides. When the first slit came in front of the eye, the image it transmitted was deflected four degrees to the left; and when the second slit followed it, its image was deflected four degrees to the right, and two apparently simultaneous pictures were produced. Also, by crossing the prisms I found it would be easy to construct an apparatus with four successive slits showing four images; 1, up to the left; 2, up to the right; 3, down to the left, and 4, down to the right. I doubt, however, whether this would be often found a useful development of the instrument, owing to the difficulty of watching more than a small area with attention.

I noticed an important optical effect, namely that the image first seen was always considerably fainter than the others, showing that its brightness had faded in the brief interval that elapsed before comparison began. It would appear that the law of the rate of fading could be investigated by this apparatus. I have not now the opportunity of doing so myself, but if I had, I should mount two prisms below radial slits in a disc that was revolving steadily at a known velocity, and I should watch a circular wafer through them. The width of the slits would be adjustable, and so would the angular distance of the prisms, and I should measure under various circumstances the width of the second slit that was necessary to tone down its image to an equal brightness with that seen through the first. Or the investigation might be made without prisms, by using two wafers and watching them with the same eye through slits at different radial distances, separated by various angular intervals, the adjustments being such that only the outside wafer should be seen through the outer slit, and the inside wafer through the inner one.

Notes.

A commercial treaty between France and Switzerland specifies photographic pictures as works of art. In a word, they are classified with paintings and engravings. Recognition by government in this way is an important gain to photographers.

Incandescent electric lighting is on its trial in the press-telegram room of the General Post Office, where no less than 1,200 persons are employed. Fifty-nine Edison lamps serve to illuminate the apartment, and satisfactory accounts are given as to the diminished heat of the atmosphere, and the personal comfort of the staff.

In the United States a considerable saving can frequently be effected by the use of electric lighting instead of gas, as this latter illuminant is charged from seven shillings to sixteen shillings per 1,000 feet; but in this country, where gas averages about one-third the American prices, things are more evenly balanced.

At the Liverpool Street station of the Great Eastern Railway, where everything is favourable for electric lighting, the cost of each method has proved about the same—viz., £600 to £700 per annum.

Many of the high-class Paris photographers, having no means of exhibiting specimens at their semi-private residences, rent a show-case or shop-front in some fashionable thoroughfare. There is no attendant, and no business is carried on there; it is a display of pictures for passers-by to look at, and nothing more. A lamp-lighter, who does not need to enter, lights up the place at dusk, and puts out the lamps late at night. Thus, an attractive little exhibition is provided, early and late, at the expense only of the rental of a shop front or window.

The recent experiments of M. Demarçay on the easy volatility of metals *in vacuo* possess interest as calling prominent attention to the previously published researches made by Mr. Parry, of Ebbw Vale, regarding this matter; and although M. Demarçay makes no mention of Parry's work, most photographers will remember his curious experiments on the volatilization of iron at a low temperature. Mr. Parry is now engaged on a new and remarkable series of photo-spectrographic investigations.

A work on "Natural History" illustrated by photography is announced in France. If this book is well executed, it will be the first time boys and girls have been presented with true illustrations of the animal kingdom. Early impressions of lions, tigers, crocodiles, &c., are always very wide of the mark, simply because our educational works are full of exaggerated pictures of these creatures.

The United States Engineers recently photographed the explosion of a wreck, which was blown to pieces by submarine charges of dynamite, to ascertain, among other things, how long the spectacle really lasted. The result was exceedingly interesting. There were six cameras employed, and the instant of the explosion, as also the several instants when the exposures were made by shutter, were electrically timed by a chronograph.

A photograph taken $\frac{1}{10}$ of a second after the explosion showed the vessel broken, and a column of water 70 feet high; a photograph secured 1·5 second after the instant of explosion showed a column of water 160 feet high; a third photograph, taken 2·3 seconds after, showed the column at its full height of 180 feet, while fragments of wreckage were in the air, but none had fallen to disturb the surface of the water; a fourth picture, taken 3·3 seconds after, showed the column falling, and the surface of the water disturbed; while a fifth photograph, secured 4·3 seconds after, showed that all was over.

Of course these times would be slightly modified by the nature of the submarine charge and the depth at which it is exploded; but still the experiment is warning enough to the photographer never to be in a hurry when securing pictures of this kind. A simple drop shutter worked by hand is all that is necessary, together with a little coolness and patience. He need only watch till his eye tells him the full effect is before him—in the above instance he would have leisurely waited two seconds before exposing—and then press the bulb in his hand. M. Charpentier has just told us we can repeat a signal within thirteen hundredths of a second of seeing it, so that very little time is lost when the moment for action comes.

Our readers may like to know something of the chronograph employed for timing the exposures, especially when we tell them that such an instrument is capable of recording intervals of one-millionth of a second. From each camera shutter, as also from the submarine charge itself, leads an electric wire to the chronograph. This may be best imagined if you think of a wheel spinning round at a high speed, but at a speed that is well known, say ten feet per second. There are several wheels in reality, but one is enough for our purpose. The margin of the wheel is of metal covered with a fine deposit of soot, so that an electric spark passing on to it makes a bright pin point, the electricity flicking away the soot. The ends of the wires leading from the shutters are close to this revolving wheel, and as the shutters act one after the other, they send an electric current, which is recorded by a pin-point upon the moving wheel. At the end of the experiment the wheel is stopped, and the distance between the points is then measured; as it is known that every ten feet means one second, it is easy enough to convert any distance into time; and, as we have said, a millionth part of a second may be recorded in this way.

Printed matter on the back of a sheet of paper often interferes very seriously with the work of the copyist; but those who are troubled by ghost-like images of the reverse side should try the simple expedient of blacking the whole of the back. If this is undesirable, the sheet can be fastened up over a black ground.

The interesting discovery that light shining upon selenium alters its resistance to an electric current—a fact made use of, as our readers know very well, by M. Vidal in his photometer, as well as in other photo-electric apparatus—has caused an increased demand for this substance, which a short time ago was very rare, and consequently very costly. One thousand francs per lb. (£40) was the price quoted for the element a few years back, notwithstanding the circumstance that there was no useful or scientific application of value for it, the greatest call being for museums and collections in the form of specimens. But now, selenium having been diligently sought for on every hand, and with considerable success, its price has rapidly gone down, and you may purchase it at forty francs a pound. Should a steady demand for the material arise, a still further reduction is likely, for an ore has been found in La Plata, containing no less than 30 per cent. of selenium. So that photometers in selenium need not cost very much on account of their material.

Even at the present time the highest praise which can be bestowed on a gelatino-bromide picture is to say it is "like a wet plate"; this probably explains why wet plate work holds its own when rapidity or convenience in working are not primary considerations.

Out-door photographers may be glad of a hint as to preserving matches and vesuvians from damp. Left in a dark-tent or in packages in the open air, matches become useless in twenty-four hours, and all attempts fail to strike a light with them. If, however, they are varnished—ordinary photographic varnish will do—they will resist the dampest weather, and may be always depended upon. The heavy sea fogs encountered in the Polar seas are especially mischievous to fire-making appliances, and a film of varnish has been found effectively to shield them from injury.

We have recently seen several examples of fog in gelatine plates, due, without doubt, to the admission of light into the camera through the Waterhouse diaphragm. Our readers will remember that in our "At Home" with Mr. H. P. Robinson, we stated that gentleman had unfortunately met with the phenomenon repeatedly, and accordingly he now always secures his dark-cloth round the lens with an elastic band. In the case of very rapid exposures there is little danger, but when a small stop is employed and an exposure of some seconds, sufficient light may get into the camera by the diaphragm slit to spoil a plate. A searching examination—keeping the head under the dark cloth some minutes with the lens capped, while an assistant alternately covers and uncovers the diaphragm with his hand—will soon show if a camera admits light or not.

The extemporisation of a non-actinic lantern by the following method may often be of advantage to the continental traveller. A small drinking glass is placed inside a larger one, and the interspace filled with red wine. A small night-light or taper is burned inside; and a metal funnel, so placed as to allow a sufficient circulation of air, completes the arrangement.

Patent Intelligence.

Application for Letters Patent.

4071. William Chancellor Haigh, of the city of Manchester, Artist, for an invention of "Improvements in apparatus for printing.—Dated 25th August, 1882.

Allowance of Provisional Protection.

3329. William Patrick Bruce, of Kinleith Currie, Midlothian, for an invention of "A new process for the reproduction of designs applicable to the illustration of books and the like."—Dated 13th July, 1882. Notice to proceed also given.

Patents Sealed, August 25, 1882.

1166. Joseph Julius Sachs, of Sunbury, in the county of Middlesex, for an invention of "Improvements in the production of surfaces for printing, stamping, and embossing."—Dated 10th March, 1882.

Patents Void through Non-payment of Duties.

3336. Thomas Salkeld Borradaile, of 7, Union Court, Old Broad Street, in the city of London, Gentleman, for an invention of "Improvements in the construction of autographic printing apparatus."—A communication to him from abroad by Michael Flürscheim, of Gaggenau, in the empire of Germany.—Dated 19th August, 1879.

Patents Granted in France.

147,376. Lacroix, for "Photographic paper for obtaining proofs in black lines on a white ground."—Dated 15th February, 1882. Class 17.

147,377. Lacroix, for "Photographic paper for obtaining proofs in white lines on a brownish-black ground."—Dated 15th February, 1882. Class 17.

147,398. Roze and Maurel, for "Obtaining photographic stained windows."—Dated 16th February, 1882. Class 17.

147,399. Roze and Maurel, for "Heliographic stained windows."—Dated 16th February, 1882. Class 13.

147,504. Dewe, for "Means of and apparatus for exhibiting framed photographs."—Dated 23rd February, 1882. Class 17.

147,506. Day, for "Flexible negatives for artists, lithographers, designers, &c."—Dated 23rd February, 1882. Class 17.

147,546. Renet, for "Reproducing drawings in black lines on white ground."—Dated 24th February, 1882. Class 17.

147,600. Osterneth, for "A photo-electrotype and photo-electroplastic process."—Dated 28th February, 1882. Class 17.

Specifications issued during the Week.

395. Richard Schroer, of Vienna—"An improved proceeding to prepare photographical copies on the surface of all matters."

This invention consists in the production of photographic images on wood, leather, paper, india-rubber, tissues, porcelain, stoneware, metals, and other materials by applying to their surface a sensitive coating containing tanned glue, and developing the image after exposure in the following manner. I dissolve one part of alum in 300 parts of water, and add 16 parts of glue best quality, or of isinglass, leaving it in the solution about twenty-four hours, during which time the liquid is frequently stirred. Subsequently I pour out the solution of alum, wash the glue well with water, and allow it to dry. By this process the glue is tanned, and obtains a very high melting point. I then dissolve in a bottle 2 parts of potassic iodide, 1 part of potassic bromide, 1 part of sodic chloride, 16 parts of the tanned glue with 200 parts of water, and at the same time in another bottle 6·5 parts of argentic nitrate with 50 parts of water; both solutions are then heated to 35° centigrade, and mixed together. This mixture is kept in a water bath of 30—38° centigrade for about twenty-four hours, and frequently agitated. Afterwards I add 20 drops of ammonia, agitate again, and filter the mixture through fine muslin. The proportion of chlorine, iodine, and bromine salts may, however, be varied to suit certain requirements, and replaced by other compounds of iodine, chlorine, and bromine. Non-metallic but compact materials, such as glazed porcelain and stoneware, to which the photographic image is to be applied, are first slightly heated, after which the sensitive mixture is poured over their surface, and left to dry. Metallic surfaces are first coated with a dull white lac or other dull lac; after the coating is dry, it is cautiously polished, and the sensitive coating applied. Porous materials, such as wood and paper, are first coated with a solution of tanned glue (one part of glue in 15 parts of water), after which the sensitive coating is applied. The photographic image is then prepared on the sensitive surface by an exposure of two to five seconds to diffused daylight or electric light, and subsequently developed by a mixture of the following solutions:—(*a*) 1 part of pyrogallic acid, 2 parts of citric acid, 1 part of alum, 300 parts of water; (*b*) 5 parts of argentic nitrate, 6 parts of citric acid, and 100 parts of water, six parts of the solution (*a*) being mixed with one part of the solution (*b*). After the image has been slowly developed by applying to the surface the above mixture, it is washed with water, and fixed by a solution of 1 part of sodic thiosulphate in 8 parts of water. Finally it is treated for five to twenty minutes with a solution of alum, and again washed. (*Provisional protection only*).

TWELVE ELEMENTARY LESSONS IN PHOTOGRAPHIC CHEMISTRY.

No. V.—Photographic Chemicals.

Platinum dichloride, $PtCl_2$, may be obtained by dissolving platinum in nitro-hydrochloric acid, and, after evaporating to dryness, the platinic chloride is gradually heated to 400° F., when chlorine is given off, and the platinous salt remains as a brown residue. A simpler method of preparing the salt is to treat a solution of platinic chloride with sulphurous acid, when the platinous chloride will separate out in the form of a yellow crystalline mass. It is insoluble in water or nitric acid, but is readily soluble in a solution of potassium chloride, with which it forms a double salt, known as *chloro-platinite of potassium*, $PtCl_2{\cdot}2KCl$, which is the compound used in the platinotype process.

Potassium bichromate, $K_2Cr_2O_7$, is obtained by heating chrome-iron ore with chalk, and constantly stirring the mass. After about twelve hours the compound is mixed with water and filtered, sulphuric acid being added till the solution is distinctly acid; it is then agitated with chalk to precipitate the sulphate of iron, and, after allowing the liquid to stand, potassium carbonate is thrown into it, and the bichromate of potassium is crystallized out. The salt forms orange-coloured crystals, which dissolve in about ten parts of cold water and in about five parts of boiling water. A solution of potassium bichromate produces a red-brown precipitate with silver nitrate, and the characteristic odour of aldehyde, when heated with alcohol and sulphuric acid.

Potassium bromide, KBr, is prepared by adding bromine to a solution of caustic potash; when a certain amount of bromate is simultaneously produced, the liquid is evaporated to dryness, and the residue heated to fusion; this converts the bromate into bromide, and the salt is finally purified by crystallization. The salt forms white cubical crystals which are very soluble in water, but only sparingly so in alcohol. The commercial salt generally contains iodide of potassium as an impurity; it may be detected by adding one drop of a very dilute solution of silver nitrate (one grain to the ounce) to about ten grains of the sample to be tested dissolved in half an ounce of water. If the ordinary cream-coloured precipitate of silver bromide is produced the salt is free from iodides, but should a bright yellow precipitate of silver iodide be formed, the above impurity is present.

Potassium cyanide, KCN, is prepared by igniting the ferrocyanide; in this way it is decomposed into carbide of iron, nitrogen, and potassium cyanide, the latter being purified by crystallizing either from an aqueous or alcoholic solution. Cyanide of potassium is very soluble in water, and slightly so in alcohol containing a small proportion of water; the salt is deliquescent, and is decomposed by the carbonic acid of the atmosphere in the presence of moisture, thus accounting for its odour of hydrocyanic acid (prussic acid). Commercial potassium cyanide is very impure, containing a large quantity of potassium carbonate; both the pure and impure samples are very poisonous, from the presence of prussic acid, the best antidote being a mixture of protosulphate and perchloride of iron in solution.

Potassium ferrocyanide, $K_4Fe(CN)_6$, otherwise known as *yellow prussiate of potash*, is manufactured on the large scale by heating together animal matter, such as horn, dried blood, and leather, with iron filings, and potassium carbonate; the fused mass is then treated with water, and the potassium ferrocyanide crystallized by evaporation. With ferrous salts potassium ferrocyanide produces a pale blue precipitate; while with ferric salts a dark blue precipitate of Prussian blue is formed.

Potassium ferricyanide, $K_3Fe(CN)_6$, otherwise termed *red prussiate of potash*, is obtained by passing chlorine through a solution of potassium ferrocyanide, and purifying the salt by crystallization. Potassium ferricyanide forms beautiful red crystals which are converted by light into the yellow potassium ferrocyanide; the solution produces a dark blue precipitate with ferrous salts, and a brown colour with ferric salts.

Potassium iodide, KI, is prepared by adding iodine to a solution of caustic potash, and, after evaporating the solution, the residue is gently heated to decompose the iodate formed in connection with the iodide. Potassium iodide forms white cubical crystals, which are very soluble in water and alcohol; the solution produces a bright yellow precipitate with silver nitrate, and liberates iodine with the production of a brown colour when added to chlorine water. The only impurities that are likely to be present are potassium iodate and carbonate; the former will give a slight brown tint if hydrochloric acid is added to the solution, while the latter impurity produces an effervescence when the acid is added.

Potassium oxalate, $K_2C_2O_4,H_2O$, or *neutral oxalate of potash*, is obtained by neutralising a solution of potassium carbonate with oxalic acid. The salt is moderately soluble in water, and, when pure, it is neutral to test-papers; but it generally exhibits a slightly alkaline reaction from the presence of potassium carbonate. A solution of potassium oxalate forms a white precipitate with chloride of calcium, which is soluble in hydrochloric acid.

Pyroxyline, $C_{18}H_{22}(NO_2)_8O_{15}$, or *nitro-cellulose*, is prepared in a similar manner to gun-cotton, but with the addition of a small quantity of water. Several kinds of soluble cotton are prepared to suit different requirements. One method is to make a mixture of three parts nitric acid, two parts water, and nine parts sulphuric acid; the mixture is kept at a temperature of 140° F., and tufts of cotton-wool are placed in it for about five or ten minutes; the cotton is then thoroughly washed for some hours in running water, and finally dried by exposure to the sun's heat. Pyroxyline, when pure, is perfectly soluble in a mixture of equal parts of alcohol and ether, forming the liquid known as collodion; the cotton is also soluble in methylic alcohol (wood spirit); but it should be totally insoluble in ethylic alcohol.

Silver bromide, AgBr, may be prepared either by acting upon silver with bromide, or by precipitating silver nitrate with a soluble bromide. The compound is a cream-coloured powder slightly soluble in ammonia, and when acted upon by iodine water it forms the bright yellow silver iodide, and liberates bromine. If absolutely dry chlorine is passed over dry silver bromide, bromine is set free, and silver chloride is formed.

Silver chloride, AgCl, is prepared in a similar manner to silver bromide, substituting chlorine and a soluble chloride for bromine and a soluble bromide. Silver chloride forms a white powder, very soluble in ammonia, potassium cyanide, and sodium hyposulphite. When acted upon by moist iodide or bromine, silver chloride is converted into iodide or bromide of silver; but dry iodine or bromine has no action on dry silver chloride.

Silver iodide, AgI, may be obtained in a like manner to the two preceding compounds; it is a bright yellow substance, insoluble in water, but moderately soluble in sodium hyposulphite and potassium cyanide. Silver iodide is unacted upon by moist bromine or chlorine; but dry chlorine or bromine converts dry silver iodide into silver chloride or bromide. If a solution of silver nitrate be percipitated with a mixture of potassium, iodide, bromide, and chloride, silver iodide will be first formed, then the bromide, and finally the chloride.

Silver nitrate, $AgNO_3$, is prepared by dissolving silver in nitric acid, and evaporating the solution to dryness. The salt is moderately soluble in water, and slightly so in alcohol. The solution produces a white precipitate with sodium chloride, which is soluble in ammonia, but re-precipitated on the addition of nitric acid.

Sodium chloride, NaCl, or *common salt*, is the principal salt in sea water, and also rock salt. It is—as, of course, every one knows—very soluble in water, but practically insoluble in alcohol. A saturated aqueous solution precipitates soap and several dyes when dissolved in water. When sodium chloride is acted upon by strong sulphuric acid, hydrochloric acid gas is given off, and may be recognized by its pungent odour and the white fumes produced when ammonia gas is mixed with it.

Sodium hyposulphite, $Na_2S_2O_3$—or, more correctly speaking, *sodium thiosulphate*—is prepared by boiling sulphur in a solution of caustic soda, and then passing sulphurous acid into the liquid till it is decolourized. The crystals contain four molecules of water, and, when heated, the salt dissolves in its own water of crystallization. Sodium hyposulphite dissolves the silver haloids—*i.e.*, bromine, chlorine, and iodine—forming silver hyposulphite and the haloid of sodium.

Tannin or tannic acid, $C_{27}H_{22}O_{17}$, is a vegetable product contained in the bark and other parts of several plants. Tannin is the astringent principle of gall-nuts, from which it may be extracted by water, as in the preparation of ink. Its chief use is for tanning leather, the gelatinous membrane forming an insoluble substance with the tannin.

Uranium nitrate, $U_2N_2O_8 6H_2O$, is produced by dissolving uranium or either of its oxides in nitric acid. The salt forms bright yellow crystals, which are extremely soluble in water and alcohol. The solution forms a brown precipitate with ferrocyanide of potassium. When acted upon by light, in the presence of organic matter, uranic nitrate is reduced to uranous oxide.

A PHOTOGRAPHIC EXCURSION ALONG THE VALLEY OF THE WYE.

A correspondent, who writes under the easily recognizable initials "H. T. W.," sends us the following interesting notes about this charming and romantic part of the country.

The district round the Wye is ground well-trodden by the photographer, but perhaps you may be willing to receive notes of some experience gathered in an excursion down the river from Ross to Chepstow.

You lately had an account of how a party of photographers were withstood by a sexton, who sought to protect his church from the attack of other lenses than those of his employer; but as a set-off to this, let me give due credit to the clerk of Ross church, who received with enthusiasm the suggestion that the view from the tower ought to be photographed. Not till I had carefully adjusted the camera upon the edge of the parapet did he come up to inform me that this very identical spot had been hallowed by the camera of the great Bedford. "There, sir," said this excellent servant of the church, in awe-struck tones, "there was where Mr. Bedford took his views." This was the first time I crossed this gentleman's trail, but during the remainder of my little tour I found myself continually following him. Let me say that whether from the pleasant impression left by his behaviour, or from some other cause unknown, the photographer is well received just now in the valley of the Wye. Perhaps the inhabitants think we are all as clever as Mr. Bedford. At all events, I shall be careful not to undeceive them by sending any of my own pictures into the country.

Those of my successors who decline to clamber up the narrow (very narrow) staircase of the tower will probably take the south-west view of the church, a view which, it is hardly needful to remark, will best be taken in the afternoon. If they like interiors, they will find excellent subjects within the church, notably the monuments of the Rudhalls. I felt that my excellent friend the clerk was a little disappointed because I could not spare a plate for them, so I hope some reader of this will make up for my remissness. The market-house (two hundred years old) is curious, if not specially beautiful, and there are other bits in the town capable of being made into pictures; but the hurried photographer will probably reserve his plates for the country outside. From the meadows just below the town several good views can be taken. So well recognized a fact is this, that the old boatman whom I engaged to convey me and my traps about seemed almost hurt when I told him the points to which I wished to go. He gave me to understand that he knew the proper places, and that he was of course going to take me there. The ruins of Wilton Castle are just out of the town, and the best view of them appears to be from the other side of the river, and here the morning light would be required.

The time-honoured way to see the Wye is by boat, but the railway which has been open for some few years has greatly lessened the number of travellers by water. This same railway, too, has by no means increased the beauties of the scenery, for, except when it disappears into a tunnel, or cuts off a corner, it seems to follow the river all the way. I went from Ross to Monmouth one day, and from Monmouth to Chepstow the next, by river all the way, but I am not sure that I should recommend anyone who is anxious to secure many views of the river to adopt this plan for the second half of the journey. The Wye, before reaching Tintern, becomes a tidal river, and during most of the second day's journey it is not easy to get ashore with the camera; still there is much beautiful scenery that would be missed by rail, and I should be inclined to try the road.

The two principal objects of interest during the tour are Goodrich Castle and Tintern Abbey. The former is easily accessible by river, rail, or road from Ross, the latter from Monmouth or Chepstow. Either ruin might well occupy a photographer for a day, and would justify the expenditure of as many plates as his carriers will hold. I managed to re-charge my dark-slides at the little inn of Lydbrook (between Ross and Monmouth), and it was with fear and trembling that I developed two of those thus treated; but changing plates in a small cupboard in what is darkness to the eyes, but may be light enough to fog, is unsatisfactory work. I was sorry I had not provided myself with some sort of changing box or bag, which could, of course, easily have been conveyed in the boat.

Monmouth Castle, and the curious old bridge with a gate on it, should not be neglected, and a fine view of the town may be got by crossing the Monnow river into the "Castle Fields." This view is from the N.E. Chepstow Castle also, as you approach it from the river, deserves a plate. By spending a day at Monmouth, Raglan Castle may be visited, but as I did not go there I cannot say much about it.

It will be evident to the meanest comprehension that the above notes are the result of nothing more than a hurried scamper through the country, but perhaps they may induce others to thoroughly go over the same district.

RECENT ADVANCES IN PHOTOGRAPHY.

BY CAPTAIN W. DE W. ABNEY, R.E. F.R.S.*

I have already shown you the example of a production of a positive from a negative, having previously to that demonstrated the production of a negative from a positive. I wish to commence this evening by showing you the productiou of a positive picture from a positive picture; not that there is anything essentially novel in it, but it points to a moral to which I shall preseutly have to draw your attention. What I propose to do is, to take some sensitive iodide paper, expose it to light, and then soak it in a weak solution of potassium bromide, and next expose it behind a positive on glass. On developing, I think, the probabilities are that we shall get a positive picture. It is perfectly immaterial, as I am going to expose it to light, whether the paper sees the light now or not, and the small modicum of light we have here will make very little differeuce to this comparatively insensitive paper. [The paper was shown to the audience.] I now burn a small quantity of magnesium wire, in order to fully expose the sensitive surface. If I were to put a developer on that paper as it is now, it would at once blacken. Instead of applying the developer, I will place it in the solutiou of potassium bromide, then expose it under a transparency, and subsequently develop it. I will give it rather a prolonged exposure, for this paper is not very sensitive, aud, of eourse, the time in which this positive is produced depeuds on the sensitiveness. [A lantern image was thrown ou the paper.] Half a minute with this light would be sufficient, but, for safety's sake, I will give twenty seconds longer. I will now develop the picture with ferrous oxalate, and a positive instead of a negative appears, as it would do in the ordinary way. In other words, the lights are reversed.

Before I draw any conclusion as to this, I will show what part of the spectrum produced this positive picture, because this is an important item in the deductiou I shall have to draw. I will take another similar piece of paper, and throw the spectrum upou it. You will recollect that we applied a solution of bromide of potassium to an exposed piece of paper, aud that it was theu exposed to the image. I will, therefore, expose this second piece of paper to the light from the magnesium wire, as before, and immerse it in a dish in which there is a solution of potassium bromide, and place it in the spectrum. I leave it to be acted upou for about half-a-minute. This I propose to develop on the screen, so that you may see absolutely the part of the spectrum which affects the paper. If everything goes right, there ought to be a bleaching action in the blue rays, and the red rays also will exert a bleaching action if the exposure is continued for some time. I am not going to enter into that part of the subject during my lecture, as it will carry me into too much theory; I simply want to show you the practical result of bromide of potassium on an exposed paper. On developing, you see we have the bleaching action caused by that portion of the spectrum which I mentioned.

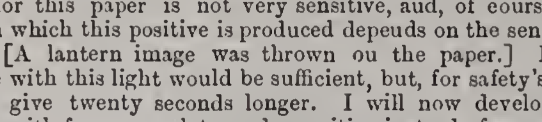


Fig. 1.

Now, if you will allow me, I will point the moral. These may seem paltry experiments to bring before an audience; but those of the audience who aro interested in gelatine plates—and I believe there are a great many here who are—will now, perhaps, be able to draw an inference equally well with myself. All gelatine plates, without exception, I believe, are prepared with an excess of soluble bromide, and I will now ask you to consider what happens, supposing any bromide is left in the film. While the light is acting on the film, the bromide of silver is decomposed and, at the same time, the bromide of potassium (or ammonium) is also being decomposed, and undoing the work that the light has done upon the bromide of silver; so that you see that the sensitiveness really got by gelatine plates with an excess of soluble bromide is only the difference between the effect of the light on the silver bromide, and on the bromide of potassium (or ammonium). I think those two experiments ought definitely to settle that gelatine plate makers have not, as yet, obtained the highest sensitiveness possible, simply because they prepare their emulsions with an excess of soluble bromide. I may say, with reference to this, that Dr. Eder has recently shown that on immersing gelatine plates in a weak solution of silver nitrate (in which there is a little citric acid), though stroug enough to neutralize any soluble bromide which may be left behind, an increase of sensitiveness—two or three-fold—is produced. The problem to be solved by gelatine plate makers is this: how to get rid of any possible excess of soluble bromide in their gelatine films. When they do that, no doubt they will get more rapid plates even than they have done at present. I hope the effect on the minds of the audience of these two experiments will not be thrown away, as now you have seen that the same rays which act upon the silver bromide act upon the potassium bromide. I will now show on the screen those interested in the chemistry of the subject the formula which represents the action which takes place:—

$$(1)\quad 2Ag_2I + 2KI + H_2O + O = 4AgI + 2KHO$$
$$(2)\quad 2Ag_2Br + 2KBr + H_2O + O = AgBr + 2KHO$$

In the first equation (1) we have silver iodide, but a similar formula (2) applies to bromide of potassium and bromide of silver. In 1 there is sub-iodide of silver, iodide of potassium, water, and oxygen, and that forms iodide of silver, potash, and iodate of potassium. When you have more iodine or bromine liberated, we get—

$$(3)\quad 6I + 6RHO = 5KI + KIO_3 + 3H_2O$$

or the iodine aud potash combine, and form fresh potassium iodide, water, and iodate of potash. When this reaction is finished, we have to go back to the equation (1), and the samo decomposition is repeated. The oxygen, of course, is a crux; where does it come from? It comes from the air. It will find its way through the gelatine. Gelatine is not impervious to the air. Dr. Eder has very recently found that this reaction does not take place when there is no oxygen present. So that you see, in order for this reaction to take place, there must be oxygen obtainable from some external source. If you prepare your emulsiou with hydrochloric acid, as some do, you have nitric acid left in the film, and that will supply the necessary oxygen for this formula to take effect. I need not enter into details of what takes place with the nitric acid; it is sufficient to say that the nitric acid will supply the oxygen.

This leads me next to consider what causes the destruction of the photographic image. You may destroy the image on a photographic plate, or photographic paper, by any substance which will readily part with oxygen. You can destroy it, for instance, by bichromate of potash; you can destroy it by any of the ferric salts; or you can destroy it by oxygen-yielding substances, like permanganate of potash; ozone, per-oxide of hydrogen, or hydroxyl; in fact, there is hardly any substance which will part with oxygen which will not destroy the developable image; the photographic image remains behind, as a rule, though not always, but these reagents prevent it becoming developable. Here is paper prepared with bromide of silver, which has been already exposed behiud a negative. After immersion in water, I propose to apply to it some of theso destructive agents which I have already mentioned. First, I will give it a streak of bichromate, next ferric oxalate, and next permanganate of potash. If everything goes right, on those parts to which these solutions have beeu applied the image will be destroyed, or almost destroyed, and a little longer application of the solution would entirely destroy it. I now develop; part of the image appears, and you see those parts which have been brushed over with the above solutions entirely refuse to appear. This demonstrates, then, that oxidising agents will destroy the developable image.

Now, I do not wish to detract from any developer, but this shows you the care you should take in seeing that your ferrous oxalate developer is tolerably fresh, for if you have a large pro-

* Continued from page 509.

portion of *ferric* oxalate present with it, it will be very liable to "slow" your plates, and those who are photographers will know what that means. If you take your pyrogallic acid which has been fully oxidised you will find that it will play you the same trick as this ferric oxalate does, so that neither the ordinary alkaline developer nor the ferrous oxalate developer is certain to give you the best results unless it is fresh. Photographers! take warning, and when using a ferrous oxalate developer, use it fresh. If you use the ferrous-citro-oxalate which I have introduced so often to your notice, you get the same result; it has the same bad qualities that the ferrous oxalate has.

I now come to the one other destructive agent of the photographic image, and that is bromine; and while I am on the subject, I should like to show you a neat way of exposing a transparency. It is not mine, and, therefore, I can praise it. Through Mr. Bolas's kindness I have here a phosphorescent plate made with calcium sulphide, which I propose to expose to light, then to use it as a source of illumination for obtaining a transparency. I now expose the phosphorescent plate to the light from magnesium wire, and then, placing it over a negative behind which is a sensitive plate, expose for 30 seconds. I next take a little bromine water, and brush it across the exposed sensitive plate; I rinse with water, and develop with ferrous oxalate. As I showed you in a former lecture, the ferrous oxalate is a very fair medium for cutting off the radiations which affect a bromide plate, and so I can develop it before you. The image begins to appear, and by degrees we have the image pretty perfect, except that, where the bromine has acted, there the image is totally destroyed, or very nearly so. This is a very simple experiment, but I did it for the purpose of leading you to another important point with regard to gelatine plates. Most of you are aware that when you have a pure bromide plate it is very easily reversed, as they call it; that is to say, instead of a negative there is a tendency for it to become a positive. The reason of that, I think, will be found in a measure in the experiment which I have just showed you. When you expose a bromide plate to the effects of light, anybody who has at all a keen sense of smell will perfectly well know there is some substance liberated which is somewhat pungent, and it will be found that it has a smell of bromine. If, therefore, you expose a plate for a considerable period—longer than it should be, that is to say—to light, what is the first effect? The first effect is for the bromide to be decomposed at the surface, and bromine to be liberated in a gaseous state, part of it ascending into the atmosphere, and part of it having a tendency to go down into the film. As the light penetrates still further, the energy of the radiation will split up the bromide below into bromine and sub-bromide, and so on, and the part beneath the first part will be passed over by bromine liberated from the molecules immediately below; so that, by a continuation of this emission of bromine, you get, first, the top practically saturated, as it were, with the bromine from the lower particles, and, as we have just seen, when you have bromine applied to a plate that has been acted upon by light, it destroys its developable powers—in other words, it forms fresh bromide of silver. If such is the case, you ought to have a reversal of the image at the top at the plate, and non-reversal, probably, at the bottom. I think I can show you this in the lantern. I exposed two gelatine films, such as are prepared by Mr. Stebbing, behind a plate which is prepared with squares of different thicknesses of coloured gelatine; that is to say, it allows different gradations of light to pass through. On these graduated thicknesses of gelatine are painted opaque numbers. No. 1 shows the thinnest amount of gelatine, and No. 25 shows the thickest amount of gelatine. With a moderate exposure to light of a gelatine plate behind such a screen, the whole of these opaque numbers ought to appear transparent on a more or less opaque background plate, when developed and fixed.

Now I will show you an experiment demonstrating what over-exposure will do. Two of Stebbing's films were placed face to face, and exposed for a considerable time to light behind a graduated screen. The results are before you. On the film nearest the graduated screen, the whole of the numbers as far as 20 are reversed; that is, appear opaque on a transparent background. On the bottom film, except No. 1, the whole of the gradations are perfect; that is to say, there is not a reversed image at all. Thus you see that a reversal takes place in the top part of the film, and not at the bottom. That is the point I wish to bring before you. No doubt this reversing action is partly due to the bromine which passes over the molecules which lie immediately below it. Not only that, however, but, if you enter into the chemistry of the thing, you will find that gelatine will take up the bromine, as it is liberated, though slowly; and that, when bromine combines with gelatine, one of two things happen—it either replaces and liberates hydrogen, or else a molecule which has the properties of hydroxal. Either of these will combine with bromine to form hydrobromic acid, or yet another compound of bromine, which is equally ready to destroy the photographic image as bromine itself, or as any oxidising agent such as I showed you just now.

Now, before I quit the subject of oxidising agents, I should like to introduce to your notice a very remarkable utilisation of this oxidising process of photography which was proposed, and not only proposed, but carried out—there is a great distinction between the two, for we often hear propositions made by men who perhaps never have the pluck to carry them out—by Mr. Bolas. He, first of all, took an ordinary gelatine negative with proper gradations of light and shade. Then he wanted to reproduce it, so he took a gelatine plate, and immersed it in bichromate of potash, allowed the film to dry, and then exposed it to light behind the negative to be reproduced. You will see that in this exposure to light he had an oxidising agent present in his film, and that the oxidised parts were acted upon by light, leaving the other part intact, and by that means he got a reversed image. Now, he was aided by the fact that the gelatine is rendered insoluble to a large extent by bichromate of potash, but still that is not everything. On the screen is the original negative, and also the reproduced negative. These I had the pleasure of seeing manipulated at the Photographic Society. In regard to this process, we have a curious case of re-invention. We have lately had in the papers devoted to photography letters from France, in which a certain Captain Biny has been supposed to have invented this process. Across the Channel they have not the same facility for reading English, I am afraid, that we have for reading French. However, the discovery of Captain Biny's is nothing more nor less than Mr. Bolas's discovery, and I hope Mr. Bolas will put in a claim for it.

Another use of oxidising agents is to enable us to get rid of fog. If you have a gelatine plate which has been exposed to light, and so has been fogged, you can get rid of that fog by immersing it in bichromate of potash, I have here a fogged emulsion plate of which the upper half has been immersed in bichromate of potash, the bottom half being completely veiled; but you will notice how beautifully clear the top half is, where the plate has been immersed in the bichromate.

(*To be continued.*)

THE FIRST PHOTOGRAPHIC PORTRAIT.

The *Field Naturalist* contains an article, by Mr. Dudley Armytage, in which the question who took the first photographic portrait is answered in the following way.

The discovery of Daguerre was made known in France in 1839, but the first sun pictures were of inanimate objects only, and its application to portraiture was regarded as somewhat chimerical. When the news of the new discovery reached America, Dr. John William Draper, putting an ordinary spectacle lens in a cigar box, began to experiment, and succeeded easily in obtaining views from the east windows of the New York University Chapel. One day he determined to try the experiment of taking the human face, which it was said Daguerre had not yet succeeded in doing, although M. Arago had stated that he was hoping soon to overcome the difficulties.

In October or November, 1839, having covered his assistant's face with white powder, and taught him to sit still for a long while, Dr. Draper managed to get a likeness. That was the first ever obtained by the Daguerre process. In April, 1839, Professor Morse and Dr. Draper opened a primitive gallery on the top of the University Buildings. Professor Morse was at that time teacher of painting and the fine arts, and Dr. Draper was professor of chemistry in the University of New York. Thus Morse supplied the artistic element, whilst Draper attended to the scientific manipulation. The gallery was not a very elegant one—an old room was used for a workshop, and a hastily constructed shed, with a glass roof, served for an operating room—but nevertheless it was a grand success.

During the summer vacation the firm had all the business they could possibly attend to at £1 a picture. All the best known people of the city sat for their portraits. Among others, a very good picture was taken of Mr. Frelinghuysen, then candidate for vice-president. The main drawback to the business was in the fact that it was only on very bright sunshiny days that they could succeed in getting anything like a satisfactory Daguerreotype. On dark days they used to teach the art to would-be photographers, who came from all parts of the country to learn it.

Dr. Draper recorded his success in the *Philosophical Magazine* for September, 1840. This account is reprinted, with an historical note, in his "Scientific Memoirs." (London, 1878, p. 215.) From these sources and from the *New York Herald* of January 5th, 1881, we have derived the above statements.

Dr. Draper soon found that it was a mistake to suppose that no impression could result unless the face of the sitter was dusted with a white powder. Daguerre required from twenty to twenty-five minutes to take a landscape, but under the brilliant sky of New York, on a bright day, and with a sensitive plate, Dr. Draper was able to take a portrait in the course of five or seven minutes. "The chair," he says, "in which the sitter is placed has a staff at its back, terminating in an iron ring, which supports the head, so arranged as to have motions in any directions to suit any stature and any attitude. By simply resting the back or side of the head against this ring, it may be kept sufficiently still to allow the minutest marks on the face to be copied."

HYPOSULPHITE.

BY J. E. BEEBE.*

Recent experiments have convinced me that the addition of hyposulphite of soda to the oxalate developer is all that is needed to make it the most perfect and desirable developer before the profession.

Every claim made by the most enthusiastic worker of the alkaline pyrogallic developer is met with this new assistant. Softness, roundness, firmness of deposit, quickness of development, rapidity of exposure, rapid cutting, are all included in the list of its virtues.

If any of the sceptical users of dry plates will make the experiment of using the oxalate developer with the addition of this powerful accelerator, they will be compelled to admit that the dry plate can give effects that the most exacting wet-plate man will be forced to admire.

Further experimenting may change my views, or modify the formula, but at present it is as follows :—

Water	10 ounces
Hyposulphite of soda	20 grains

Try a negative with (say) one-half the time usually given to whatever dry plate you are using, and develop carefully ; then make another negative with the ordinary developer, leaving out the hyposulphite, and compare carefully shadow with shadow, and decide for yourself which has the best effect.

* *Philadelphia Photographer.*

Correspondence.

FERROUS OXALATE *V.* PYROGALLOL.

Dear Sir,—In reply to the author of the article upon ferrous oxalate in the *Autotype Notes*, his assertion of animus upon my part is absurd in the extreme. I have no object further than writing against the revival of a developer which under no circumstances will give the best possible results when good plates are used ; that it has its uses when inferior plates are in hand, I do not dispute.

The "Author of the Article" cites the work of continental photographers as being so very good, and being developed with ferrous oxalate. I would remind him that the work of English photographers is better. Let him compare continental and English work in any of the shop windows in London where pictures of celebrities are sold. Compare the work of Van Bosch with that of Bassano or the St. James Studio ; the work of one is hard compared with the other, and I know Mr. Bassano would sooner give up gelatine plates altogether than go back to ferrous oxalate.

Of course, I am aware that some people cannot see the slightest merit in English work, simply because it is English ; whilst all foreign work is good, because, being foreign, it must be so.

That I am not alone in my opinion (and experience) Mr. Burton's admirable and exhaustive article is ample evidence, and he is of opinion that ferrous oxalate cannot hold a candle to pyrogallol.

In reply to the courteous notes of Mr. Swinton and Mr. O. C. Smith, I would ask them to carefully read Mr. Burton's article, and then try ferrous oxalate side by side with, say sulph. pyrogallol, using either Wratten's, Edward's, Swan's, or the Paget plates, and I am confident the verdict will be entirely in favour of pyrogallol.

In this discussion it must not be forgotten that three or four years ago ferrous oxalate developer was almost universal in England, and a perusal of the journals of that time will give a good idea of the dissatisfaction prevalent amongst photographers with the quality of their work. A want of sparkle and difficulty in getting uniformity of results being the principal faults, that time was prolific with its suggestions for various forms of intensifying mercurial and with silver ; but until the ferrous oxalate was shelved, the days of collodion were looked back to with regret. Now all is changed : sparkle and uniform density are easily acquired, and when a negative is stored away, it is put away with confidence, and the assurance that even if not required for years it will not be spoit, like the majority of ferrous oxalate and mercurial negatives, as many photographers know to their cost.

As in England, on the first introduction of gelatine plates, pyro was the developer to be replaced with ferrous oxalate, which, after trying, was found wanting, and had to give way to pyrogallol. I have no doubt but the continental photographers will undergo the same transition, and by another year pyro will be universal, as it deserves to be.

In conclusion, I would wish to be allowed to state that the makers I name above are not the only good ones whose plates are in the market. There are at least a dozen others whose plates are first-class, and will work with pyrogallol, but for obvious reasons could not be listed.

W. T. Wilkinson.

INTENSIFYING GELATINE NEGATIVES.

Sir,—In intensifying weak gelatine negatives with mercury bichloride and potassium bromide, if the solution is used in a dish over and over again, I find when it has been used some little time it causes irregular markings, which print ; but by re-dipping a plate so marked in the hyposulphite solution such marks disappear, and after well washing, the negative can be re-intensified, and there is no trace of the previous marks. Can anyone inform me if these marks are caused by chemical action due to imperfect washing of the negative, or arise simply from weakness of the mercurial solution?—I am, sir, your obedient servant,

H. Spink.

Proceedings of Societies.

London and Provincial Photographic Association.

A meeting of the above Association was held on Thursday, the 24th ult., Mr. A. Cowan occupying the chair.

Mr. W. E. Debenham said it had recently been stated in the photographic press that prints on opal glass were likely to be much more permanent than paper prints ; but he produced a tinted opal picture taken about three years ago, and which was much discoloured (not faded) as though with dirt ; the parts most stained were those covered with the mount ; in consequence of this he now varnished every opal picture he issued.

Mr. Harrison exhibited his bijou camera, to which he had added an instantaneous shutter and a finder. The shutter was a roller one with an elongated opening, and released by a rachet and spring ; the finder consisted of small mirrors placed at an angle of 45°, so that when the eye of the operator was placed to a hole in a small piece of metal fixed in the side of the camera, the objects in the field of the lens were reflected on the mirror ; this finder was considered by those present to be a great advantage in taking instantaneous pictures of moving groups, &c., for which this ingenious little camera is designed, as it enabled the operator to appear to be looking away from the scene he wished to perpetuate.

The question was then discussed why rain drops falling on a gelatine negative destroy the intensity (in fact, act as a local reducer); and various experiments were suggested with a view of testing if this property belonged to rain water only, and, if so, under what conditions.

The Convention of German Photographers.

The eleventh Convention was held at Eisenach, commencing on the 23rd and closing on the 25th August. About eighty members of the Society assembled on the opening day, the chair being taken by the President, Mr. K. Schwier, of Weimar, who gave a very satisfactory report of the general position of the Society.

The ballot for council then took place, when the following gentlemen were elected:—

Chairman.—K. Schwier, Weimar.

Vice-President.—T. Müller, Munich.

Sec.—E. T. Rothe, Cassel. *Treasurer.*—K. Festge, Erfurt.

Council.—Carl Wunder, Hanover, and C. Kiuderman, Hamburg.

Six gentlemen were also nominated by the exhibitors out of twelve elected by the Assembly, as jurors, and these added three more to their number to complete the nine jurors for the general exhibition, whose functions further included the award of the annual prize given by Mr. Festge, of Erfurt, this prize consisting of a gold medal of the Society.

Then the exhibition of photograms contributed by about forty-five members was examined by the members and ladies, and at half-past one o'clock the festival dinner began, which lasted, with the usual toasts, until half-past three o'clock.

The projected excursion to the Wartburg was joined in by all the members, in spite of the rain, so that all again found themselves at the Restaurant of the Wartburg. At seven o'clock it seemed as if the weather would clear up a little, and an attempt was made to take the annual group picture of the "Wanderversammlung," but the endeavour failed owing to the bad light.

A concert at the Tantani kept the members together till after ten o'clock.

Next morning the annual balance sheet was read by Mr. Festge, and a discussion, with ultimate adoption of rules, for the Central Nach-weisungs Bureau (or Employment Register) began the day's work.

About midday a successful picture was taken at the Tivoli, and the afternoon was devoted to a walk which included the Marienthal, Landgrafenschlucht, Drachenstien, and back by way of Drachenschlucht, Annathal, taking a short refreshment at the Lophinau, and in the evening the gentlemen of the party held the Festkneipe at the Tivoli, which was the "Stammsitz" of all the meetings.

A lottery of objects* presented for the benefit of the Wandermapper was first taken in hand next morning, which brought in a pretty good amount to defray expenses for this purpose, and then the awards of the different juries were published, of which the results were as follows:—

(1). A gold medal, given by Mr. G. Brokesch, of Leipzig, for the best collection on emulsion plates, to Mr. Henry Schüren, of Hamburg; to which the jury added, as second prize, a silver medal of the Society placed at their disposal by the council, to Mr. Tiedemann, of Bremen.

(2). A painted background and balustrade to represent sandstone, given by Messrs. Mapmann and Finck, of Frankfort, for the best collection of direct cabinet pictures, to Mr. H. Natmann, and the jury also awarded here a second prize in the shape of a silver medal of the Society to the firm of Laura Lasinzky, of Düsseldorf.

(3). An elaborately-carved album, presented by Mr. Buslar, of Berlin, for the best collection of landscapes in cabinet size, to Mr. H. Astmann.

These prizes were awarded by three separate juries specially elected for each prize.

In the general competition, which included the golden medal annually given by Mr. K. Festge, of Erfurt, the awards were:—

Gold Medal.—Mr. L. D. Grienwaldt, Bremen.

Silver Medals.—Messrs. H. Astmann; Henry Schüren, and D. Wettern, Hamburg; Laura Lasinzky, Dusseldorf; W. Hoffmann, Dresden; and Edm. Gaillard, Berlin, for collotype.

Bronze Medals.—Messrs. Heenreich Fritz, Jun., Greiz; Flottwell, Magdeburg; Louis Held, Weimar; Emil Seelig, Cassel (amateur); Sissmann, for printing of photograms.

Diplomas.—K. Festge, of Erfurt; E. Queck, Weimar; Tellqmann, Mühlhausen; E. F. Rothe, Cassel; C. Remde, Eisenach; Tietschmann, Tauger, and Uhlemann, Dresden, for mounts; C. H. Harbus Leipzig, for photographic papers.

An excursion by carriage was attended by most of the party and brought a very pleasant and successful meeting to a close.

* Photographs are collected in maps, especially all those which obtain prizes at the annual meeting, and circulated afterwards amongst the members who wish to see them.

Talk in the Studio.

The Electric Light in Deal.—We are glad to see that photographers are availing themselves of the electric light for the display of their pictures at night. On Monday last, the evening of the Regatta, we saw the electric light in Mr. Mayland's studio—Mr. Mayland, the photographer to Her Royal Highness the Princess of Wales, has recently opened a branch establishment in Deal—the light in question taking the form of two Swan lamps, which gave a bright, yet very soft illumination. A picture of the fine transport the *Orient*, which conveyed H.R.H. the Duke of Connaught and the Guards to Egypt, was the subject under illumination, and Mr. Mayland is to be congratulated equally upon the excellence of his work, and upon the elegant manner of exhibiting it. We believe, by the way, that this is the first time Deal has seen the electric light.

The Crystal Palace.—Mr. G. Reay-Mackey, late assistant-paymaster, Royal Navy, and secretary to Admiral Rice and Admiral Luard, at Malta, has been appointed manager of the Crystal Palace; and Mr. G. G. Cleather, manager of the Scarborough Aquarium, and late secretary of the Whitby and Scarborough Railway, has been appointed assistant manager. Major Flood Page will leave for Australia in the Orient steamship *Austral* on September 7.—*Times.*

Photography in New Zealand: Prize Awards at the Christchurch Exhibition.—*Photography. First order of merit, certificates of gold medals.*—Lindt, Melbourne; Burton Bros., Dunedin. *Second order of merit, silver medals.*—Tuttle and Co., Melbourne; P. Schoureep, Christchurch; Hart, Campbell, and Co., Invercargill; J. C. Morris, Dunedin; Frith and Co., Reigate, England; Hemus and Hanna, Auckland. *Third order of merit, bronze medals.*—Frith and Co., Reigate, England; Frost, Dunedin; Caire, Melbourne; J. W. Bottomley. *Certificates of merit.*—H. William; F. G. Hawkins, West Coast; J. King, Greymouth; H. Coxhead, Timaru.

An Autographic Printing Method.—A method of reproducing an artist's drawings, which should be as effective and not so expensive as the process of wood engraving, has long been a desideratum. Mr. Crocker, of Tasmania, has invented a process that certainly promises to be successful. The *Southland Times* gives the following interesting description of the invention:—The basis of operations is common window glass—a most unlikely but perfectly reliable material to withstand the rumble and roll of modern printing machines. A solid ink, composed of beeswax, resin, and lampblack is made in proportions about which there is no secret. The drawing medium is a common steel pen, with this important adjunct, that it is constantly subjected to the action of a very tiny jet of gas, or an electric spark, which keeps the pen hot. It is inserted in the stick of ink, and its heat at once dissolves a "dip." The artist now proceeds to sketch on the glass, the fluid ink running as freely as necessary, but the instant it leaves the pen it again becomes solid, and adheres to the glass without blurring or running. As a consequence, shading of any intensity may be executed without risk of forming one big blot. The plate is now ready for an "engraver," whose hand is more potent and swift than that of any of his predecessors. This is hydrofluoric acid, a chemical well known as being about the only "eater" of glass known in practical chemistry. A small portion of this is poured over the face of the glass, and in a very short space of time eats its way downwards. The ink, however, defies the acid, and the glass below the sketch therefore remains intact. All that now remains to be done is to mount the slip of glass on a metal block of the same height as printer's type, where it is secured with a little shellac, and the engraving is ready for the printing press.

To Correspondents.

All Communications connected with Advertisements and Business to be addressed to Messrs. PIPER & CARTER, "*Photographic News" Office, 5, Castle Street, Holborn, E.C. Advertisers are requested to make all Cheques payable to* Messrs. PIPER & CARTER, *and crossed "Union Bank, Photographic News Co. Account."*

*** We cannot undertake to return rejected communications.

S. W. B.—You will find full directions in Mr. Ashman's paper, which was published in our issue of August 11th last.

T. BLAGROVE.—Your view of the case is certainly ingenious, but if you take the trouble to replace the initial w by the letter h, you will read the note as we intended it should be read.

AMATEUR.—1. Such a camera would prove very inconvenient and cumbersome in the field, and it would be better for you to obtain a light bellows camera. 2. The lens will answer fairly well for views, but it is extremely large and heavy when compared with modern instruments.

PRINTER.—The difficulties of the process are so considerable that but few firms practise it regularly; but success is tolerably certain to an intelligent person who is alive to the importance of apparently trivial circumstances.

BUMBLEHEAD.—There is no such compound known; perhaps nitrate of barium is intended.

CHARLES COTON.—They appear to us as if they had been exposed to fumes of sulphuretted hydrogen. Look to your drains.

DANIEL MANN.—You do not say whether you mean the so-called enamelling on paper, or the production of photographs in vitrified pigments. If the former, see p. 97 of our last volume; and if the latter, p. 241 of the present volume.

A. DRESSER.—Thanks for the pictures. That of the storm would have been very successful were not the foam parts of the negative dotted over with black specks, which of course show as clear white on the print. There are also some streaks of a similar nature, and as these defects happen to be abundant just where the spray is fine and wool-like, the picture will be valueless unless you can find some means of removing them. Possibly you might touch them out on a print, and then re-photograph this.

F. N. HAMILTON.—Leave rather more wax on the plate than you have been accustomed to do; but when a plate has been in use for some time, a very small trace of wax is sufficient.

HALL AND SON.—Purely a matter of business, and the price depends on quality. No doubt you could obtain them for half or double the price you name, and yet obtain equally good value for your money in either case.

ANXIOUS.—The picture must be taken with a light background; and after the print has been sufficiently exposed under the negative, all you have to do is to mask the required portion with a reversed vignetting glass (opaque centre), and expose until the required depth of tint is produced.

B. J. G.—Hard water is decidedly better for the purpose, as the lime salts held in solution tend to counteract the effect of heat to some extent.

SAMUEL ALLMAN.—There must be some mistake, as the salt is nearly insoluble, a pint of water dissolving no more than three grains.

AN OLD SUBSCRIBER.—1. It will answer well provided that a little care is taken to shade the plate as far as practicable. 2. A solution of india-rubber in chloroform. 3. Not so convenient as the first-mentioned process. 4. Certainly amusing, but of but little real importance. 5. It has been out of print for some weeks.

D. G. S.—Rather strive to attach exaggerated importance to each detail than to attempt to simplify the process at the present stage of your experience. It will be time enough to do this when you have worked the method with uniform success for some months.

BELTHAL.—1. Nitrate of silver is partially decomposed by fusion, even if considerable care is exercised, traces of nitrite being formed. 2. Purchase the pure potassium iodide, as the commercial salt almost invariably contains an excess of alkali. The pure salt becomes brown, from the liberation of iodine, on exposure to light and air; but the commercial salt remains white, as the excess of alkali balances the tendency towards the liberation of iodine.

C. BERTRAND.—1. It would be an extremely dangerous experiment to try, as the highly explosive chloride of nitrogen would probably be formed. 2. Hot sulphuric acid decomposes it rapidly, hydrofluric acid being evolved.

C. TEAN.—1. Not more than one-sixtieth of a second. 2. Yes, unless the bath is nearly neutral. 3. Probably not. 4. See the Formulary. 5. Add sufficient carbonate of soda to make the solution slightly alkaline, and expose to the light. Before use, a trace of nitric acid should be added.

L. PERRIN.—Write again when you have tried the experiment referred to.

THE PHOTOGRAPHIC NEWS.

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ANGLE OF VIEW.

A few weeks ago, whilst writing on the subject of the "Enjalbert" camera, we gave it as our opinion that the abuse of the power given to photographers by the excellence of modern wide angle lenses has tended to the production of inartistic photographic pictures.

The subject is one of so great importance that we now propose to treat it somewhat more fully.

We may premise our remarks by stating that, if a picture be in correct perspective, and if it be viewed from a certain point, each line or part of the picture will take the exact position on the retina of the eye that the real object took on the eye of the artist; but that this is true for one point of view only. Further, we may state that, except for the very trifling curvature of lines given by certain lenses, a photograph *is always in absolutely correct perspective.* The only reason for the appearance of want of perspective in photographs is that the point from which it is necessary to view the picture is one which no observer would by inclination choose, and is frequently one from which it is impossible to see the whole of the picture.

It is a rule with painters—not an absolute rule, for art knows none such, but very nearly so—that the angle of view included in a picture should never be greater than that which the eye is able to embrace without movement.

At first sight this appears to be almost a truism, and its application to photography seems evident; but the case is a little more complicated than it looks at a glance.

The process whereby we *see* a picture in nature is by no means a simple one. The area which the eye is able to perceive with absolute sharpness is extremely small, and even the angle through which it is possible to distinguish from at all is far smaller than is generally supposed. If we place a printed page before our eyes at a distance of about a foot, and fix our attention on one word, it will be found that without moving the eyes it is impossible to distinguish even the one next to it. The angle of absolutely sharp definition is only about one or two degrees. The angle through which we are able to distinguish form with any accuracy at all is only thirty or forty degrees, and it is this latter which limits the amount of picture which the eye is able to take in without motion. But, as a matter of fact, the eye does move whilst a landscape is being observed. Unconsciously the observer causes it to flit from one object to another, each for the moment forming the centre of a picture, and at first sight it is not evident why the same process should not be put in practice with regard to a picture including a very large angle. In other words, it appears at first sight a question why the effect of glancing from one part to another of a picture, including an angle much larger than that which the eye is capable of taking in at one time, should not be similar to that produced by glancing from one part of the landscape to another.

The reason is this. When the eye, in looking at a landscape, passes from one object to another, the plane of the picture changes, and is always perpendicular to the axis of the eye. In the case of a picture it is not so. To satisfy the conditions, it would be necessary to make a picture in which the vanishing point would change with the eye of the observer. This would occur with a photograph taken on a spherical surface, but is impossible on a plane surface.

It is necessary, therefore, that a picture may give a correct idea of the object represented, that it should take in no wider angle than that which the eye can perceive without motion, and, theoretically, it is necessary that the eye should occupy a certain fixed point, and should be directed at a certain point of the picture. Under no other circumstances will the image on the retina exactly coincide with that which the object itself would produce. Practically, of course, there is considerable latitude; but the principal object in a picture should not be so far from the point indicated—in the case of a photograph that through which the axis of the lens passes—as to cause the attention to be drawn much from it.

The practical lesson to be drawn from this is, that lenses giving a comparatively limited angle of view should be used whenever it is possible. Of course it is not necessary that a lens *incapable* of giving a large angle should be employed; but if such be used, it should never, except in very exceptional circumstances, be made to cover the largest plate which it is capable of covering.

The angle of view given by lenses is entirely governed by the equivalent focal length of the lens and the diagonal of the plate covered. It is more common, however, to take the length of the plate as the base of the triangle, and certainly it is more convenient. When a certain angle of view is talked of, a horizontal line is generally taken as the one which subtends it. The angle given by a lens of focal length equal to one-and-a-half times the length of the plate used gives an angle quite as large as the eye is able to perceive with any degree of distinctness. This is a little less than the maximum angle given by the older form of single lenses, but is much less than that which can be got with almost all modern instruments; it is, however, the greatest which should be, as a rule, included. This gives, as a focal length of lens, for a 10 by 8 plate, 15 inches; for a 12 by 10 plate, 18 inches.

So far, we have been referring entirely to landscape work; but the same rule holds good with regard to portraiture. In fact, the limitation of angle is here even more necessary than in a landscape, for the reason that, if it be exceeded, the effect is more evidently incorrect in a portrait than in a view. For portraits, the rule which, we believe, emanates from Mr. Dallmeyer, is excellent. It is to the effect that the focal length of a lens should be at least twice the length of the plate used. It must, however, be recollected that, in photographing near objects, the focal length of a lens is perceptibly increased, so that, for example, a lens which is about 16 inches focal length for a distant object, may be used for a whole plate standing figure, or for a head and shoulders on a 10 by 8 plate.

MR. PLENER'S SENSITOMETRICAL INVESTIGATIONS.

The more recent papers of Mr. Plener divide sensitometers into two groups, the first comprehending those instruments in which a constant relation (λ) exists between the amount of light transmitted by two contiguous divisions, while the second group includes those sensitometers in which a constant difference or step takes the place of the uniform relation between successive divisions.

The light-screen of Warnerke belongs to the first group, and Mr. Plener arrives at the conclusion that such an instrument always gives the same number of gradations for plates of the same character, the general conditions being of course similar, and all properly exposed plates of good quality will indicate the same number. Mr. Plener appears to regard a proper regulation of exposure and developer as a function of the quality of a plate, and a plate which is capable of depicting all gradations of tint may be called a "good plate" for our present purpose. It is therefore rendered obvious that if a plate is capable of depicting the following four tints, it must be able to depict in just gradation all intermediate tints.

1. Absolute blackness (absence of light, and therefore absence of deposit on the negative).
2. Perfect whiteness.
3. A tint infinitely near to absolute blackness.
4. A tint infinitely near to absolute whiteness.

The case is somewhat different when sensitometers of the second group are concerned, the number of gradations being variable, as it depends on the magnitude of the grades corresponding to the faintest tints.

If the constant λ of any one such sensitometer be known, together with the number of gradations given by the ideal good plate, the corresponding constant of any other sensitometer may be calculated if the number of gradations given by a similar plate is known. This will render it possible to compare the results obtained by constant relation sensitometers, whether made of sulphur, tinted gelatine paper, or any other material; and in order to save the labour of calculation, tables might be so constructed to give the required comparison without trouble.

The practical difficulties centre principally in the construction of the first sensitometer in a thoroughly satisfactory manner; and it is probable that the most accurate results will be obtained by carrying out the principle adopted by Mr. Mucklow, but slits being made use of instead of holes, as it would be easy to regulate the length of these; and by the adoption of slits several collateral sources of error would be avoided. This preliminary work once carried through, the photographer would be put to but little trouble as regards sensitometrical work; and, moreover, the total error of observation and construction should be notably less than those of most other photographic operations.

Mr. Plener further contends that with the photometer now proposed, whatever kind of light is used as a standard, the numbers expressive of relative sensitiveness remain the same, while in the case of sensitometers belonging to the first group it would be necessary to calculate special numbers for each kind of light. Notwithstanding this, the results would not vary with the character of the sensitive compound; similar ratios being obtainable with (let us say as an example) bromide or bromo-iodide plates; it being of course understood that plates of the same kind are compared together.

When plates of a different kind are compared, the case is somewhat different; but if we expose the unlike plates in question simultaneously to daylight and to a special or standard light, and then divide the respective sensitiveness obtained with the special or standard light by that indicated by daylight, we shall obtain a ratio expressive of their relative sensitiveness, which we may express by the sign a. Now a should be constant for any two kinds of plates; and after having determined the relative sensitiveness of two corresponding plates with a standard or special light, we have only to multiply these results by a. The ratio a may be regarded as composed to two factors, one of which varies with the quality of the light, and the other with the chemical nature of the light. Of course it must be borne in mind that this latter characteristic is directly related to the nature of the plates used, and to some special light taken as unity.

By-the-Bye.

PHOTOGRAPHERS BY DIPLOMA.

We have on several occasions compared the position and status of the photographer with that of a painter or author—in a word, with those who receive just that rank and pay to which their individual efforts entitle them. A painter who is simply a painter because he chooses to call himself one, has no claim to consideration any more than he who fills a few sheets of paper with scribble, and dubs himself author. It is only when one or other has produced work of intrinsic value that he begins to assume a certain position, and this position is a high one or a low one, according as the work produced is great or small. So, we contend, it is with the photographer. A man may purchase a camera and dry plates, but does not thereby have any claim to position; he has still this to win, and, what is more, he must do it all, as cricketers say, "off his own bat."

So that he is differently placed from most professional men. There is no serving one's articles, studying for a course, passing through a curriculum, or undergoing an examination. Anybody may become a "special correspondent," Mr. Archibald Forbes tells us, who can buy a bottle of ink and a pen; and anybody may become a photographer, if he can only get the tools to work with. Unfortunately, in neither case, is the aspirant very much "forarder" when he has got them. The master-work has still to be performed, if he is to make any sign, and his outfit has scarcely helped him one jot.

But if this is the case with the photographer who is his own master, it does not altogether hold good with the assistant. The photographer's aim in life is to satisfy the public, that of the assistant is to satisfy his principal; and for this reason the assistant, or operator, as he is most frequently ill-named, may well seek to secure a diploma, in order to help him on his way through life. No doubt the best diploma an assistant can produce is a good picture, but all assistants cannot do this. With time and opportunity at their disposal, they succeed after a while in showing good work, and with this most principals are satisfied; but if in the meantime they could exhibit certificates proving the possession of chemical knowledge and art training, their claims would secure still more attention. In large establishments, especially, is theoretical as well as practical knowledge essential, for it is only by thorough economy, and by keeping an intelligent eye upon improvement in manipulation, that photographic operations can be conducted with profit.

This leads us to the point we wish here briefly to discuss. Of late there have been examinations held in this country under the auspices of the Society of Arts and the

City Guilds Institute. These have been productive of much good, there cannot be a doubt; but we trust they are the pioneers only of more extended operations. The examinations are instituted by bodies having no relations with photographers in general, and are, indeed, organised for the purpose of testing knowledge in photography as a science, without any reference to the photographic profession. But in France, or rather in Paris, although we believe the system is not yet in actual working order, steps have been taken by professional photographers themselves to institute examinations having special reference to a photographer's daily work. The Syndicate of Photography in Paris is anxious that the assistant should at no very distant date be an individual possessing a diploma, this diploma being proof of intelligence in general, and a knowledge of photographic operations in particular. The examination is to be both theoretical and practical, and it has very rightly been decided that unless the candidate shows theoretical knowledge in the first place, he shall not undergo a practical examination at all.

The Syndicate proposes to grant to all who pass its examinations a "brevet de capacité," those holding it being qualified assistants. The "brevets" will be of various kinds—those which are comprehensive and denote that the assistant has proved himself capable in all branches of photography, and those given for special subjects, such as carbon printing, collotype, enamel-photography, photogravure, &c. When a candidate passes, his name is to be published in all the French photographic journals; while those abroad will also be invited to note the name, so that the assistant may be known when applying for a post outside his native country.

The "brevets" or certificates are to be of three classes, according to the manner in which the candidate has passed. Thus:—

300 to 350 marks will entitle the candidate to "fair."
350 to 450 " " " "good."
450 and above " " "very good."

But he must earn 200 marks in his theoretical examination, or he cannot proceed; the theoretical questions having reference to (1) photographic chemistry, (2) applied photograpy, and (3) photographic physics.

The theoretical examinations it is proposed to hold in public, the examiners, or jury, being members of the Syndicate, which numbers among its body many of the leading Paris and provincial photographers. The practical examination will be held in a laboratory under the supervision of the same jury, and this also is divivded into three parts. Of these, the Syndicate attach the greatest importance to (1) negative operations and all appertaining to the manipulation of collodion and gelatine, both wet and dry, and (2) printing in chloride of silver in its various forms.

The difficulty in examinations of this kind is to know where to draw the line, and the only objection that we see to the programme sketched out by the French Syndicate is that it draws the line a little too high up. Perhaps the difficulty might be met by giving two classes of diploma, a "junior" and "senior." Then the assistant who is modest about his attainments might proceed to the first examination, and, passing that, would gain courage to go on to the second. The main thing is to encourage the younger assistants to take an interest in their work, and if they foresee a possibility of passing by moderate exertion they will not object to work harder subsequently, to secure a second step after they have gained the first.

The French Syndicate is so firmly established, and already enjoys such influence among French photographers, that whatever it makes up its mind to, is likely to become law. Consequently, if the examination of assistants is seriously upheld, we may expect that there will be no alternative for the rising generation; but to enter for them. If the members of the Syndicate bind themselves to take no other assistants into their employ but those who hold a diploma or "brevet," then the competing for such honours will become an every-day matter. In this country there is no institution corresponding to the French Syndicate; the societies we have are supported as much by amateur photographers as by those professionally engaged, and consequently the members have no reason to institute tests of this kind. Still, assistants and operators at home should remember that we are now becoming so cosmopolitan in our dealings, that it matters very little what countryman you are, so long as you know your duty; and doubtless French assistants coming across the water armed with diplomas signed by a powerful body would get a more willing ear than those unprovided with any proof of scientific ability.

Of course the mere possession of a diploma does not prove that a man is a good photographer; and this is an argument that we are likely to hear very frequently as soon as photographic examinations are seriously talked about. In like manner, it may be advanced, that a man who has secured a B.A. degree is no more fitted to take up a tutorship or secretaryship than another gentleman who has not secured a degree. Granted; but supposing you know nothing about either candidate, and that they both prove equally eligible on a casual examination, then the chances are decidedly that the B.A. will be chosen, for he carries with him a proof that he has at any rate been thoroughly well educated: you are sure that he possesses knowledge which the other may or may not have. So, if two assistants were to present themselves whose abilities seemed equal at first sight, there is little doubt that the principal would prefer the one of whose knowledge he had a proof, furnished by independent and responsible persons, rather than the other whose abilities he has still to find out.

STRAY NOTES ON DRY PLATES.

BY J. PLENER.

Let us briefly examine the sensitometers with equal differences in size of apertures of any two contiguous divisions. This difference we will designate by c. If we expose under such a sensitometer two plates of different sensitiveness, but of the same kind, to the light of different intensity, then we obtain two equations corresponding to the densest and the faintest tints.

$$\alpha \mathrm{stimc} = \alpha \mathrm{s_1 ti_1 m_1 c}, \text{ and } \alpha \mathrm{sti}(m+n)\mathrm{c} = \alpha \mathrm{s_1 ti_1}(m_1+n_1)\mathrm{c}$$

where m and m_1 are the numbers of the densest tints, n and n_1, numbers of gradations, consequently $m+n$ and m_1+n_1 numbers of the faintest tints. From the above equations we receive—

$$\frac{m+n}{m} = \frac{m_1+n_1}{m_1}, \text{ or } \frac{m_1}{m} = \frac{m_1+n_1}{m+n}$$

This last equation is possible only when

$$m_1\chi = m_1+n_1 \text{ and } m\chi = m+n,$$

where χ is a variable. From this we have—

$$m_1(\chi-1) = n_1 \text{ and } m(\chi-1)n,$$

hence

$$\frac{m_1}{m} = \frac{n_1}{n} \ldots\ldots\ldots\ldots(1).$$

On the other band, from the equation—

$$\alpha \mathrm{sti}(m+n)c = \alpha \mathrm{s_1 ti_1}(m_1+n_1)\mathrm{c}$$

we receive

$$\frac{\mathrm{si}}{\mathrm{s_1 i_1}} = \frac{m_1+n_1}{m+n}$$

Uniting this with the equation (1), we obtain—

$$\frac{m_1+n_1}{m+n} = \frac{m_1}{m} = \frac{\mathrm{si}}{\mathrm{s_1 i_1}} = \frac{n_1}{n} \ldots\ldots\ldots\ldots(2).$$

This shows that for the above sensitometers the numbers of gradations on the plate stand in inverse ratio to the sensitiveness and the intensity of light, and are proportionate to the numbers of the faintest tints. When the intensity of light is the same same for both plates, then

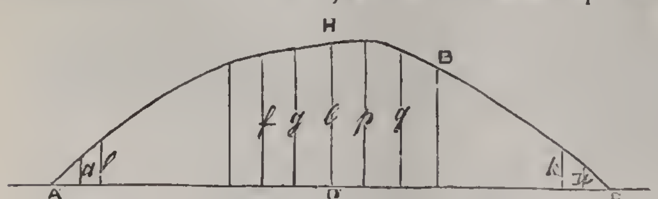
$$\frac{m_1+n_1}{m+n}=\frac{s}{s_1}$$

or the sensitiveness stands in inverse ratio to the numbers of the faintest tints. Therefore, if we were to compare the plates differing greatly in sensitiveness, we would have been obliged to use a sensitometer having a greater number of divisions. This constitutes the drawback of the sensitometers of this type.

When we know the sensitiveness and the number of gradations of any one good plate, then the quality of any other given plate may be easily known, because its sensitiveness and the number of gradations must satisfy the last above equation.

Till now we have compared the sensitiveness only of the plates of the same kind, viz., those in which the shades of spectral impression of a given light stood in the same relation between them. But we must consider the case of two plates of different kinds, such as, for instance, bromo-gelatine and bromo-iodo-gelatine plates. Supposing that two plates of different kinds when exposed under a sensitometer have n for their relative sensitiveness, the question arises, how will change the latter when the light will have been changed? For instance, if, having determined the relative sensitiveness with phosphorescent light, we wished to know how the former will change for the daylight, in order to be able to calculate the time of exposure? By simultaneous exposure of the above two plates to the daylight under two identical sensitomers we will receive the relative sensitiveness of the plates, and dividing it by that obtained beforehand we will have the relation of the relative sensitiveness. If we knew that this relation is constant for all the scale of sensitiveness, that it is the same for the slowest as for the quickest plates, then the calculation of the time of the exposure would be easy. We wish to find an algebraic expression for this relation, and to show that it is constant.

Let us take two different sources of light, and two plates of different kinds. At first we determine the sensitiveness of one plate to the different parts of the spectrum of one light. For this we divide the spectrum in as many equal parts h as we practically can. If the sensitometer of Macklow were accordingly arranged, we think there would be no difficulty in exact determination of the sensitiveness for each part. Suppose we have done this, then we are able to construct the curve A B C, whose ordinates represent



the sensitiveness of the plate to different rays, and at the same time the work done by each ray, because, all other conditions being equal, the work done is proportionate to the sensitiveness. Thus, the work done by all the light will be represented by the plain surface A B C D, which we will designate by Δ_1. To calculate the latter, we must make addition of all the trapeses of which is composed Δ_1. Thus:—

$$\Delta_1=\left(\frac{a}{2}+\frac{a+b}{2}+..+\frac{f+g}{2}+\frac{g+l}{2}+\frac{l+\rho}{2}+\frac{\rho+q}{2}+..+\frac{k+u}{2}+\frac{u}{2}\right)h$$

Or,

$$\Delta_1=(a+b+\ldots+f+g+l+\rho+q+\ldots+k+u)h.$$

For the same plate and the same light, the relations of shades remaining constant, let us designate them as follows:—

$$\frac{a}{6}=r_1\ldots\frac{f}{g}=r_{m-2},\frac{g}{l}=r_{m-1},\frac{l}{\rho}=r_m,\frac{\rho}{g}=r_{m+1},\ldots\frac{k}{u}=r_n$$

hence

$$a=l(r_{m-1}\ldots r_1),\ b=l(r_{m-1}\ldots r_2);\ f=l(r_{m-2}-r_{m-1});\ g=lr_{m-1}$$

$$\rho=\frac{l}{r_m};\ q=\frac{l}{r_m.r_{m+1}};\ u=\frac{l}{r_m\ldots r_n}$$

Substituting this in the above equation, we receive—

$$\Delta_1=lh\left[r_{m-1}\ldots r_1+\ldots r_{m-2}r_{m-1}+r_{m-1}+1+\frac{1}{r_m}+\frac{1}{r_m r_{m+1}}+\frac{1}{r_m\ldots r_n}\right]$$

The ray l being on the line H of the spectrum, therefore we can decompose the last factor into parts; one part,

$$r_{m-1}\ldots r_1+\ldots r_{m-2}r_{m-1}+r_{m-1}$$

which we will designate by γ_1, belongs to the ultra-violet rays; and the other, γ_2, to the luminous rays. Let us call the sum

$$\gamma_1+\gamma_2 \text{ by } \beta,$$

then

$$\Delta_1=l_1 h\beta_1$$

For the other plate, and the same light, we will receive in the same way

$$\Delta_2=l_2 h\rho_1$$

the work done being proportionate to the sensitiveness; consequently,

$$\frac{s_1}{s_2}=\frac{l_1 h\beta_1}{l_2 h\rho_1}=\frac{l_1\beta_1}{l_2\rho_1}$$

Now if we change the light we will obtain

$$\frac{s_3}{s_4}=\frac{l_3\beta_2}{l_4\rho_2}$$

and

$$\frac{s_1}{s_2}:\frac{s_3}{s_4}=\frac{l_1 l_4\beta_1\rho_2}{l_2 l_3\beta_2\rho_1}$$

Here l_1 l_2 l_3 l_4 represent the work done by the ray H of two sources in two plates; therefore

$$l_1=as_1 ti_1;\ l_2=as_2 ti_1;\ l_3=as_1 ti_2;\ l_4=as_2 ti_2$$

Where s_1 and s_2 are sensitiveness of two plates to the ray H, and i_1 and i_2 the intensity of the ray H in two lights. We observe that—

$$\frac{l_1 l_4}{l_2 l_3}$$

is equal to unity; consequently,

$$\frac{s_1}{s_2}:\frac{s_3}{s_4}=\frac{\beta_1\rho_2}{\beta_2\rho_1}=\frac{\beta_1}{\beta_2}:\frac{\rho_1}{\rho_2}$$

From this we see that the relation of the relative sensitiveness is constant, because β_1, β_2, ρ_1, and ρ_2 are constant.

The relations

$$\frac{\beta_1}{\beta_2} \text{ and } \frac{\rho_1}{\rho_2}$$

we have calculated from the spectral impression of two lights. Let us inquire in what relation they stand to the intensity of lights.

Again, we know that, all other conditions being equal, the work done is proportionate to the intensity of light. Then

$$\frac{I}{I_1}=\frac{\Delta}{\Delta_1}=\frac{l\beta}{l_1\beta_1}$$

If we take I_1, the intensity of one source, for unity, we will have—

$$I=\frac{l\beta}{l_1\beta_1}$$

where l_1 and β_1 belong to the source taken for unity. We observe that the expression for I contains two terms, one of which,

$$\frac{l}{l_1}$$

changes with the quantity of light, because had we doubled the luminous surface, the value of

$$\frac{l}{l_1}$$

would have been doubled; but the other

$$\frac{\beta}{\beta_1}$$

is constant for a given source, and changes only when the character of the light is changed; it constitutes the chemical characteristic of light. Of course this characteristic is related to certain kinds of plates. Thus it can be easily seen that the characteristics of the light giving s_3 and s_4 related to the two kinds of plates we had above under consideration will be

$$\frac{\beta_1}{\beta_2} \text{ and } \frac{\rho_1}{\rho_2}$$

respectively. In fact, the relation of the relative sensitiveness,

$$\frac{\beta_1}{\beta_2} : \frac{\rho_1}{\rho_2}$$

is the relation of the chemical characteristics of the light obtained in relation to two kinds of plates.

(*To be continued.*)

RECENT ADVANCES IN PHOTOGRAPHY.

BY CAPTAIN W. DE W. ABNEY, R.E. F.R.S.*

The next subject I wish to treat of is one which has been much misunderstood by many. The theory involved is not new to myself, but I think the results I shall show will be new as far as the audience is concerned. On this plate is pasted tin-foil, with various figures cut on it; first, there is a circle, then a line across, and so on. The image of these figures I now throw on a monster gelatine plate, the thickness of the glass being some $\frac{1}{4}$-inch. Now, I ask you to observe what you see on it. You see every figure surrounded by a halo. Thus, you see the circle is surrounded by a ring. You have a halo round every part of the images. If you come to analyse it, you will

Fig. 2.

find that the halo surrounding the bright cross is made up of a series of rings similar to that ring which surrounds the clot of light. Now, I have here some wonderful elixir to get rid of these haloes. I touch the back of the plate where the cross falls with asphaltum, and the halo vanishes. I move the plate a little, to get a fresh surface, and with red varnish I again touch the back of this plate, behind the cross, and now I have a white cross on a red background; to put the matter in words, according to the medium you place on the back of the plate, so is the reflection toned down. If I use a red varnish, this halation will have but little effect on the photographic plate, because it is red, and these red rays do not much affect the production of a change in the sensitive salt. The most perfect cure for halation is Brunswick black; there is no reflection from the back of

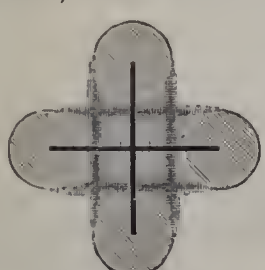


Fig. 3.

the plate, and by that means you get rid of any tendency to fuzziness of the image, which was often a disgrace to photographers' pictures. I will now throw on the screen one or two of the absolute photographs showing different halations. One is from an ordinary plate, the other from a thick glass plate; when the thick one comes on the screen, instead of the cross remaining where it was, it was spread considerably. [Shown.] When you come to analyse it mathematically, you will find the diameters of these rings depend on the thickness of the glass, together with the critical angle of reflection for the glass employed; the greatest intensity in the ring is fixed by the critical angle alone. That is a very important point, because there has been a good deal of controversy about it, which I will not enter into now. I think what you saw on the gelatine plate, and what you see on the screen now, ought to settle that point for ever. I will show you some plates taken with an asphaltum backing; it is of no use giving improper backing; if you have anything

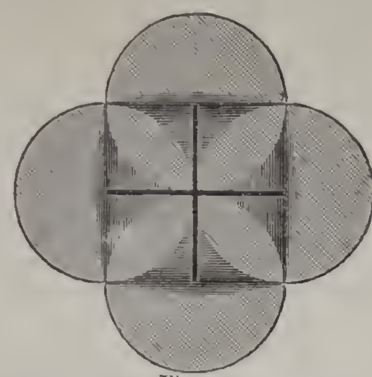


Fig. 4.

which will reflect blue light, you get this blurring of the image. With a plate prepared with a backing of asphaltum, you can even expose it to a bright image of the sun without getting a halo round it. An astronomer in Germany has recently deluded the French Meteorological Office into believing that he has photographed the corona in full sunlight; but when you come to inquire into the matter, this corona is nothing else than the halation; not only that, but he has found the most extraordinary

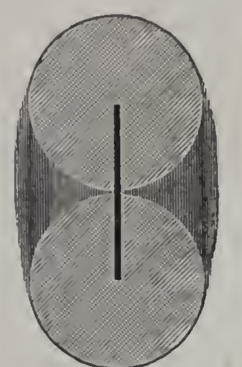


Fig. 5.

rays shooting out from it at certain times. When, however, you come to investigate the question, you will find that these wonderful rays, which are supposed to proceed from the sun, and thus to influence our earth, are nothing more than a certain reflection which the law of optics tell us ought to be there. Here is a simple method by which photographers can always be sure of seeing what amount of blurring they may get. If they take the trouble to place a gelatine plate, or any plate they wish to try, in contact with a slit cut in tinfoil, and then look through the back of the glass at a strong light, they will find it has more or less blurring round the slit.

Having so far digressed, I may say that the reason why you get apparently greater reversal in a photograph taken on a glass plate than you do in a paper negative, is because there is none of this halation to help it.

There is also another reason why reversal is more difficult to secure on paper, in that the bromine has two ways to escape, one through the paper, and the other through the surface of the bromide. I hold in my hand an example of reversal on paper.

Now I will show you how you can get rid of this reversal altogether. The film before you was exposed sixty seconds behind a negative to the full sunlight, yet there is no reversal on it. How is that? Simply because I gave it something which, instead of allowing the bromine to attack the bromide of silver, that had been altered by light, at once took it up. The substance employed was potassium nitrite. This shows that, if you want to get rid of the reversal of the image, you must give the plate something which will very rapidly absorb bromine, and I should say something, if possible, which is not organic, for the reason I have already stated to you. Now, is it possible that you can give a film something of that kind? I say it is quite possible to do so, and those photographers who are experimenters no doubt might turn their attention to this point. In the meanwhile, I may say that the addition of iodide to bromide in a plate is sufficient to a very large extent, because, as I showed you in a former lecture, the sub-iodide of silver acts as a sensitiser to the bromide of silver; the consequence is, that those films which

* Continued from page 525.

contain a large quantity, or even a small quantity of iodide, do not reverse in the same horrible manner as a pure bromine film will do. Perhaps a certain amount of anxiety may have been created in photographers' minds by a recent article in one of the photographic papers, in which a doubt was raised as to whether they can get iodide in their films. Let me once for all re-assure them. If you have iodide of potassium, and bromide of potassium to combine with silver nitrate, iodide of silver will always be present in your films; for the iodide is formed always long before the bromide, and, therefore, the scare as to whether you have iodide in your plates or not, is one which need not be seriously entertained. As far as chloride goes, I leave that for another occasion to remark upon; but once for all, if you have soluble iodide present when making an emulsion, you must have silver iodide in the film, and this will act as a sensitiser to prevent the reversal of the image.

I now come to a description of a most useful instrument introduced by Mr. Warnerke, which is known as a sensitometer; it consists of squares of coloured gelatine of different opacities through which light is allowed to fall on a sensitive plate. This sensitometer is meant to enable you to judge of the comparative rapidity of your plates. You have seen on the screen some of the images produced on glass, on paper, or on films, by the exposure of such a tablet as this, and it is a most useful instrument. To my mind, no photographer, be he amateur or professional, should be without one, or one similar to it. Mr. Warnerke has been the first to adapt this sensitometer to practical purposes. There are others in the field, of which we have a notable instance in that of Mr. Spurge; but for the time being I propose simply to call your attention to Warnerke's sensitometer. The method of operating is very much the way in which I operated just now. First, a phosphorescent tablet is exposed to magnesium light, and then allowed to rest a minute, placed in contact with the sensitometer plate, which is in front of the plate to be tried. The exposure lasts for half a minute, and the plate is then developed. The last distinct number seen upon the plate by reflected light, before fixing, is read off. By a simple table you are able to see the comparative sensitiveness of two particular plates of the same kind. Here, owing to Mr. Warnerke's kindness, I have an enlarged apparatus, showing the way in which you read off the sensitometer. Suppose, for instance, you find the last number on one plate to be 20 in the one case, and 16 on another, if you take two such plates out in the field in the same light, and you want to know how much exposure to give in the one that registers 16, knowing that necessary for the one reading 20, how are you to do it? You take Mr. Warnerke's instrument, such as we have here (but in miniature, of course), you place this opening at 20, you then cast your eye on the ring, look at 16, and find that the one that registers 20 is three times more rapid than the one that registers 16, and expose accordingly; so, in the same way, if you had one that registered 25, which is a very high degree of sensitiveness, and another 12, you would find that you would have to give the one 36 times more exposure than the other. I recommend this to the notice of practical photographers; I do not wish to act as an advertiser to Mr. Warnerke's sensitometer, but I merely advise them to get some sensitometer, so as to prevent groping about in the dark as to what exposure to give to plates of different degrees of sensitiveness. There is nothing like picking a hole in your friends, if you possibly can, and now I am going to pick a hole in Mr. Warnerke's sensitometer; it is not a very grave one, but still, one which ought to be noted; I want to show you what happens, supposing you measure all kinds of plates by such a sensitometer. First, let us examine what kind of light is emitted by this phosphorescent tablet. You will see, if I expose it to the light, it will phosphoresce, and the stronger the light the more it phosphoresces. Now, here we have a spectrum of the phosphorescent light, and when you come to examine it by the eye, it is found that there is one bright band in the indigo; there is a very faint light coming down as far as the red. When you photograph such light in the photo-spectroscope, nothing is indicated except the existence of the indigo band of light, and nothing in the violet or beyond; it is almost a monochromatic light which it emits, as far as photography is concerned. Supposing we have to try some plate, the composition of which is unknown, with such a sensitometer, it will be seen that we may fall into serious error. In fig. 6 the mountain represents the intensity of light which is painted by the phosphorescent light on a plate. Supposing the plate only contained iodide, you will really see that the little mountain, which only affects the iodide, is only $\frac{1}{30}$th part of the whole mountain which would be there if you are using white light. If you only use chloride, it would be showing one-third only; whereas, if you use bromide, it would be unity, or as giving the maximum. If you try a wet plate by the sensitometer, you will find that it indicates only about one-fourth of the true value; that is to say, you would be wrong supposing you went out with a wet plate and a gelatine plate,

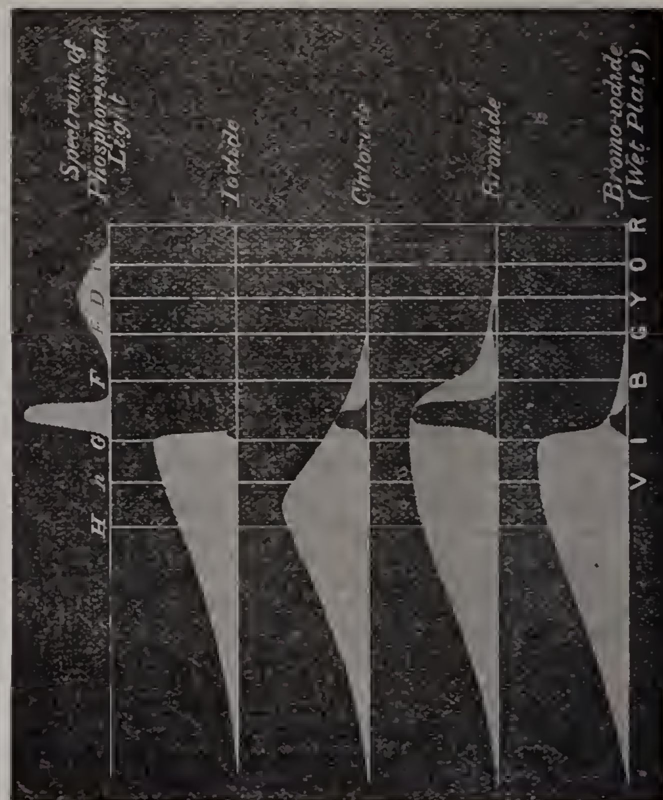
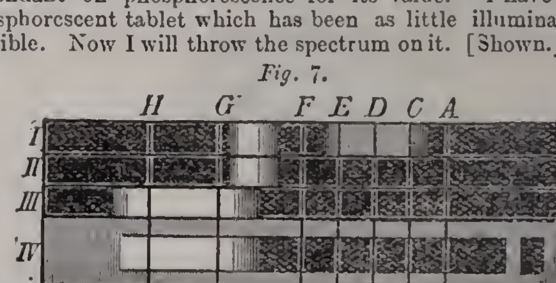


Fig. 6.

and exposed according to the sensitometer; you would find you had given five times too much exposure to the wet plate, simply because the bromo-iodide is most sensitive to those rays of light which are not present in the phosphorescent light. Hence, when using such a sensitometer with phosphorescent light, you must beware what you are about, and hesitate before you draw any exact conclusions.

This leads me on to the measurement of the intensity of light, for if we want to know anything about our plates, we must know what brightness of light we have. I again have to allude to Mr. Warnerke; he is a most facile inventor, and the photographic world is largely indebted to him for many ingenious contrivances. He has introduced an actinometer which is dependant on phosphorescence for its value. I have here a phosphorescent tablet which has been as little illuminated as possible. Now I will throw the spectrum on it. [Shown.] This

Fig. 7.



1. Visual spectrum of phosphorescent light. 2. Photographic spectrum of ditto. 3. Rays exciting phosphorescence. 4. Rays which extinguish phosphorescence.

bright spectrum of phosphorescent light extends into the ultra-violet, but stops short at the place in the indigo, where the phosphorescent light is emitted, that is to say, one spectrum ends where the other begins. Mr. Warnerke has shown us that by exposing such a phosphorescent tablet to the action of light, by an ingenious contrivance, such as you will see downstairs, he is able to tell the photographic value of the particular light. This is a most valuable discovery, because phosphorescence is induced by very nearly the same rays as those which affect bromide of silver. If I allow the spectrum to play on a fully excited phosphorescent tablet, we get another action. You will see that the phosphorescent light is diminished where the red and green have acted. These rays extinguish phosphorescence to a very large extent. With reference to this, there is a curious fact that below the red, as we know, there are rays which exist, and which to a certain extent "de-sensitise" the phosphorescent film, and we have a darkening going on in that region. I have shown you this experiment to demonstrate how you can de-sensitise this phosphorescent plate, viz.,—by allowing white light to pass through red or green glass, since they permit the passage of those particular rays which act as extinguishing rays. There is another very simple way, which I recommend to amateurs, of telling the amount of exposure to give to your plates, and that is by Mr. Woodbury's photometer, which is the

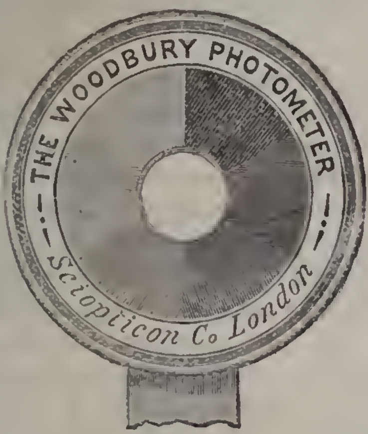
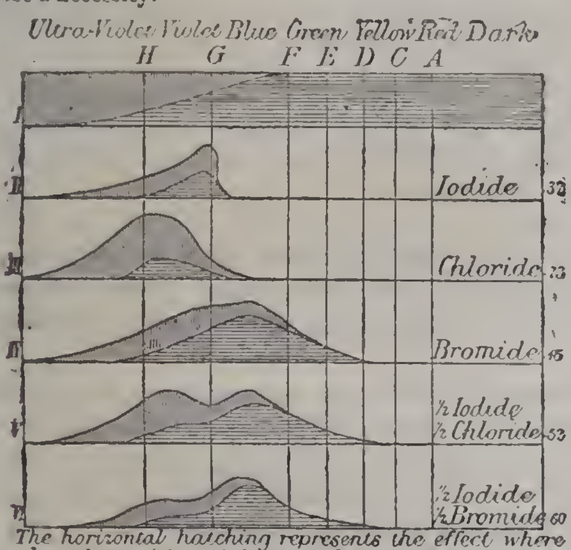


Fig. 8.

simplest thing in the world. Here we have a piece of bromide paper exposed to light for a minute, then read off against one of these tinted circles, according as to whichever tint it agrees with; you know what is the intensity of the light, and, therefore, what to give to a plate. A simple rule to remember is this, that if you use a bromide plate only, use a bromide paper for securing this tint; if you are using a chloride plate, use a chloride paper. Recent researches of mine have shown that the darkening intensity and the developing intensity go hand in hand; therefore, it will be found that when you have the number which gives the right tint, you may always be sure of getting the right exposure. If a tint requires two minutes to obtain, which corresponds with an exposure of a plate of two seconds, and you get that tint, and give two seconds, you will not be wrong. If it requires half a minute to obtain it, give the plate half a second's exposure, and you will be right. This is as useful an apparatus as you can have for the field. I do not know about the studio, but in the field some such device as this is almost a necessity.



The horizontal hatching represents the effect where the ultra violet light is deficient. The standard light is represented by the whole of the shaded figures.

Fig. 9.

I want to show you the theoretical as well as the practical necessity of using a photometer or actinometer of some description. Here we have these little mountains which signify the intensity of different parts of the spectrum. There are some bright days in summer, the light of which, when spread out in a spectrum, let us represent by a rectangle (1); that is to say, they are all of equal intensity. I do not say they are, but you can represent them as such. There are other days in autumn or winter in which the ultra-violets will very much decrease. If you judge the exposure by the eye, you may be entirely wrong, and if you are using an iodide plate, you may only give one-third of the exposure you ought to give; for chloride, only one-fourth; for bromide, about one-half. If you are using one-half iodide and one-half bromide, you would give only two-thirds of what you ought to give, so that the eye is no exact judge of the exposure you ought to give; it depends on the amount of rays which exist in the ultra-violet, and that can only be told by a photometer of some description.

The next thing I propose to show you is with regard to drop shutters. I could talk to you for a whole evening on drop shutters, and even I should not have finished, for there is a great deal in the philosophy of a drop shutter of which people have not dreamed. I am sure if I were to enter into the philosophy of the thing, I should carry you beyond any endurable limits of time. I therefore propose to show you one very easy plan of knowing what your drop shutter can do for you. We often hear said, "Oh, I exposed that plate with a drop shutter!" and if the exclaimer is asked what length of exposure that was, he will probable confess that he does not know, or will say anything from 1-5th to 1-50th of a second. Now that is a very untidy way of photographing. It is decidedly misleading to say 1-5th of a second when it may be 1-20th. I will show you a way in which you can tell whether it is 1-20th or 1-5th of a second of exposure you may have given with a drop shutter. I have here a monster lens, with which, had I time, I was going to show you some tricks. It is not very valuable; I think it cost 6s. In front of this gigantic lens I have a gigantic drop shutter, and attached to the sides of that drop shutter there is a tuning-fork which cost 1s. I claim no monopoly. You take a common iron clamp, and attach it to the side of the shutter. Then you blacken a piece of albumenised paper by the side, and make the tuning-fork vibrate. As the shutter drops, it traces its own vibrations, and tells you how many it has performed during the fall of the shutter. You know that an E turning-fork vibrates so many times per second, and by simple measurement you can tell at what speed your shutter is going at any part of its path. I dare say we shall be able to see that the tuning-fork leaves its mark on the smoked glass, which I have substituted for the albumenised paper above described. Here is another trace (fig. 10) made when gravity was aided by an elastic band. [The shutter fell, and the diagram was shown on the screen.]

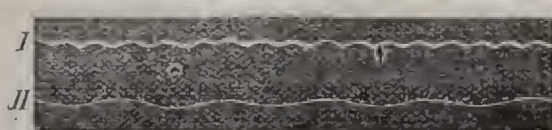


Fig. 10.

I find my time is more than up; but before I close I should like to show you one or two curiosities, as regards the scientific application of photography, and these are some composite photographs which were kindly lent to me by Mr. Galton, showing you what aid photography can give to anthropology. Here is a typical family composite portrait, composed of a mother and two daughters, all three faces being blended together. We thus get a likeness of the female branch of the family; then we have the father and mother, two sisters, and two brothers, giving the typical family group. Here we have another image, which is a typical group of Engineer officers, and I am glad to see that they are so good looking. Here is one more, which is a typical group of Sappers. I wish I had more time to go into the subject.

I cannot touch on printing processes at this late period of the evening, and therefore I must ask your permission to close. I feel that what I had done has been very imperfect, but I have done it to the best of my ability, so far as time would permit. I may have done things I ought not to have done, but I have certainly left undone a great many things which I ought to have done, but I hope for all my shortcomings you will excuse me. That this course of lectures has caused a certain amount of interest is evinced by the continued large audiences I have seen before me, and I hope some abler lecturer, at some future time, will be able to complete what I feel I have only commenced to do, viz., give a *resumé* of recent advances in photography.

Notes.

The establishment of a National Portrait Gallery of photographs is no nearer consummation, apparently, than when it was first mooted. The only way in which a commencement might be made, we think, would be for an amateur to begin the collection, which might afterwards be made semi-public property, or disposed of. We say an amateur for two reasons; first, because he is more likely to get others to part with copies of valuable portraits; and secondly, because an expense must be incurred for which no immediate return would be forthcoming.

That no time should be lost in commencing the work must be evident to all. Every day that passes makes the task of collection more difficult. Portraits that were easily obtainable twenty years ago are now rare, and in another twenty will be scarcely obtainable. It is not that the negatives perish, but that their original owners die out, or part with the plates to those who take no interest in the matter, and know not the value of them. Thus, there is probably a camera portrait of the Iron Duke extant, for he lived ten years after the discovery of Daguerre; but where it is to be found is another matter. Of Daguerre himself there were but two photographs in this country until we published the portrait in our Year-Book for 1881. Coming even to more recent times, to the portraits of such men as the Prince Consort, Thackeray, Macaulay, &c., good portraits of these are now-a-days not readily obtainable.

As an instance of photographic relics being lost sight of, we may mention the heliograph of Kew Church, produced by Nicephore Niepce when in this country in 1827. This, with other equally valuable pictures, was traced to the possession of the late Mr. Bauer, a former secretary of the Royal Society, and further to that gentleman's son-in-law. Subsequently they seem to have been regarded as worthless, and, mixed with lumber, passed into the limbo of the unknown. A few Niepcetypes are still in existence, but these, the first authentic photographs produced in this country, whose value is priceless, have been lost, simply because, instead of going into a collection, they passed into careless hands.

Captain Shaw, C.B., the chief of the London Fire Brigade, has a photographic portrait gallery at headquarters. It contains the portraits of all members of the Brigade who have distinguished themselves for bravery, and thus constitutes a pictorial roll of honour. The collection has, however, its melancholy side, for many of the brave fellows pourtrayed have lost their lives in the act that secured their admission to the gallery.

The desirability of taking a series of photographs after every fire was again forcibly illustrated in the case of the conflagration which nearly destroyed the Philharmonic Theatre on Wednesday morning; and it is tolerably certain that arrangements for the systematic use of photography by the Salvage Corps will be made before long.

Seeing is not always believing, and here is an example. When Mr. William England was in the United States, in 1857 and 1858 (for Mr. England makes pictures in every land except England itself), he happened to be at Niagara just when the redoubted Blondin made his trip across the Falls. The feat was made much of at the time, and has been made much of since; and Mr. England conceived the happy idea of taking a series of pictures showing Blondin on the rope, over the foaming water, to forward to England. This he did, posting off the packet of wonderful pictures to the *Illustrated London News.*

As Blondin's feat was the sensation of the day, Mr. England was rather anxious to see what use the journal made of his sketches: but, on searching, he could find no evidence of their having been used at all. So, naturally enough, on his return he called at the office to enquire if his photographs had been received. Yes, they had come to hand, he was told, with a smile. "Then why were they not used?" he rejoined. "Because," was the still smiling reply, "we knew they were only a joke." And to this day, indeed, the fact of Blondin having crossed the Niagara Falls on a rope is regarded as a myth by many people in this country. Certainly, the whole matter is not of very great moment; but when the *News* had the proof in hand, it is a pity it was not published. But in those days there was no *Graphic.*

Speaking of Mr. England's American photographs, it is well worth noting that he was the first to produce a series of views of that charming district hallowed by the romance of Washington Irving. The green-shored Hudson river and the craggy Kaatskills, world-famous as the home of Rip Van Winkle, where passed "the legend of Sleepy Hollow," and where Hendrick Hudson and his old-Dutch associates still live and move in spirit, carrying on in phantom-life their old sailor-smuggler adventures among the silvery crags and green forest land that overlook the winding river—these scenes were depicted with all Mr. England's art and skill during his stay in the New World.

Dr. F. Stolze appears to be quite at one with us as to the cause of halation, and he recommends backing with an aurine collodion.

One part of a saturated solution of aurine in absolute alcohol is mixed with three parts of plain collodion, and the addition of one per cent of castor oil is recommended.

Glycerine added to water constitutes a liquid that freezes with difficulty; in fact, if half as much glycerine as water is present, the mixture may be exposed to a temperature of 10° F. for a long time without being congealed by the cold. This fact is worth remembering, for it may be usefully applied in many ways, not the least important being in the charging of batteries with liquid in the winter time. By using glycerine, a non-freeable battery is at once secured in this country, a boon to all who propose to employ battery power for electric lighting.

Printing ink, and often printed matter, has frequently a bad odour because of the linseed oil varnish. Dr. Brackenbusch, of Berlin, proposes to overcome this disadvantage by using a solution of rosin in paraffin oil instead of linseed. He dissolves 45 parts of fine rosin in 25 parts of paraffin oil, heating the latter to 176° Fahr. to effect the solution. Fifteen parts of lampblack are subsequently mixed in, and the ink is made.

English authors who do not desire their books pirated in America should abstain from heavy type and smooth white paper. There is no difficulty about copying good print bodily by the sheet with the photo-etching process. The book is unstitched, the sheets stretched on a drawing board, and then a good black and white photograph is taken; an impression in fatty ink is transferred to a zinc plate, and this is then etched. The result is a block ready for the printing press; and the best of the process is, that if there are any engravings along with the letter-press, these are obviously copied at the same time.

The following results as to the penetration of coloured lights through darkness, which were obtained at Genoa some time back, are not without interest. White light, as might have been anticipated, could be observed the farthest. The penetrating power of red light came next in order, then green, and then blue. Green, before it actually fades from sight, appears white at a distance.

"They had made several dynamo machines, which had proved very good." Such is official report as to progress made during three months by one of the Electric Light Companies having a large capital. It is probable that many of the lighting companies may come to an end even before they have done this little.

It was in the Crimea that the first military application of photography was made, when, among other things, some very fine pictures of the Malakoff and the Redan were secured. These pictures, showing the nature of the earthwork defences thrown up by the Russians, how with huge baskets filled with earth our enemy was able to keep out the allied artillery fire, are still in existence, and mark a most important era in the history of ordnance. The photograph of the Redan—taken immediately after its evacuation by the Russians—exhibits traces everywhere of the terrible conflict, the floor of the battery being covered with dismounted guns, torn gabions, and shattered earth-works.

But the Redan picture has a story attached to it, too, which photographers will appreciate. Captain Lord, who was then serving in the Artillery in the Crimea, tells us that, like many other officers, he hastened into the Redan as soon as they learnt it had been abandoned by the enemy. Everything about the battery was naturally regarded with suspicion, for hidden mines were rife in the Crimea just then, and presently, in shadow of one of the angles, was found a machine that caused considerable distrust. It had evidently been left behind by the Russians, and might explode at any moment, so the officers forthwith called for assistance to help in its removal. So great was the scare, indeed, that when the photographer re-appeared with his collodion plate—he had left the apparatus and darkcloth after focussing—he had some difficulty in persuading the officers present that he was not a Russian spy, and that the unknown machine was nothing more than a photographic camera.

There are still people to be found who have but a vague idea of photographic portraiture. Here is a story we heard the other day. "I want you to take a portrait of our Sarah," was the request preferred on market-day by a country-woman, at a little studio on the confines of Wales. "Good, when can she come?" was the reply. "Oh, she can't come here, she is much too ill!" Then, when can I take over the camera to see her?" asked the photographer. "Take over the camera? Don't I tell you she is very ill, and she can't see nobody? But I can give you a description of her, quite as much as you'll want to make a portrait from."

If that photographer has many such customers, we advise him to follow the example of the heathen Chinee who took a studio at a sea-side resort in the Flowery Land, and whose stock-in-trade simply consisted of a collection of negatives of his pig-tailed brethren. When a customer came into the studio and wanted a portrait, he used to look over the stock of negatives for the same kind of face, with a pig-tail of the requisite length, and then print off as many portraits as the applicant asked for.

TWELVE ELEMENTARY LESSONS IN PHOTOGRAPHIC CHEMISTRY.

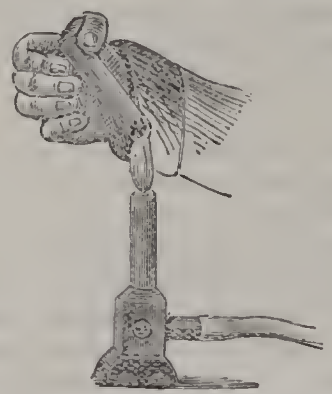
No. VI.—Qualitative Analysis of Photographic Chemicals.

It may, perhaps, be asked by some, "What is the use of knowing how to analyse chemicals?—why not leave it to the analytical chemist?" This question we can answer in a very few words, for, in the first place, the photographic student will always take more interest in his work if he knows the chemical properties of the substances with which he works; and secondly, everyone knows how provoking it is to find, when searching for a chemical, that the label has come off the bottle, and it is doubtful what its contents may be; while, if only the photographer knows the rudiments of qualitative analysis, he will determine by a few experiments with the test-tube the value of the substance under consideration.

It must be remembered that the following description is only intended for the separation of chemicals that are likely to be met with in the photographic laboratory, and consequently the description and manipulation are much shorter and simpler than that necessary for the analysis of all chemicals apart from any photographic use.

About twenty grains of the substance should be placed in a test-tube half filled with distilled water, and heat applied till the whole is dissolved (see fig.). The solution thus prepared is called the *original solution.* Pour about two drams of the solution into another test-tube, and add a few drops of hydrochloric acid. A white precipitate indicates the presence of *lead* or *silver*; add ammonia to the precipitate. If it dissolves, *silver* is present; but if unchanged, the substance is a compound of *lead.*

If no precipitate is formed with the hydrochloric acid, add to the *same* solution sulphuretted hydrogen water; a black precipitate indicates the presence of *copper*, *mercury*, or *gold.* To a fresh part of the original solution add ammonia. A yellow flocculent precipitate indicates *gold*,



greenish blue dissolving in excess of ammonia to a cobalt blue solution proves the presence of *copper*, white dissolving in excess to a colourless liquid indicates *mercury.*

If no precipitate is formed with sulphuretted hydrogen, add to the original solution about a dram of ammonium chloride and a few drops of ammonia and sulphide of ammonium. A black precipitate indicates *iron*, white shows the presence of *aluminium*, and yellow indicates *cadmium.*

If no precipitate is produced in the previous instance, add to a fresh part of the original solution ammonium chloride, ammonia, and ammonium carbonate. A white precipitate indicate *calcium.*

If there is no reaction, add to the *same* solution sodium phosphate; a white precipitate forming slowly when stirred proves the presence of *magnesium.*

If no precipitate is produced, even on stirring, add to the original solution potash, and warm gently; the odour of ammonia proves the presence of a compound of *ammonium.*

If no odour is produced, place a few drops of a *strong* solution of the original substance in a watch-glass with one or two drops of hydrochloric acid and platinic chloride; stir with a glass rod. A yellow precipitate formed in lines on the surface of the watch-glass indicates *potassium.* Heat a little of the substance on a platinum wire in the flame of of a spirit lamp or a Bunsen burner; a lilac-tinted flame confirms the presence of *potassium.*

If there is no reaction in either of the preceding experiments, repeat the watch-glass test, substituting potash and potassium antimoniate for the hydrochloric and platinic chloride. A white precipitate formed in lines proves the presence of *sodium.*

Having found the metal* or base, the next experiment is to determine what the acid is. Warm about ten grains of the substance with strong sulphuric acid in a test-tube.

Effervescence with inodorous gas indicates the presence of *carbonic acid*; confirm the experiment by passing the gas into lime-water (see Lesson II.).

Effervescence with pungent fumes, which form white clouds when brought near the stopper of the ammonia bottle, shows the presence of *hydrochloric acid.*

Yellow fumes which explode, when heated strongly, indicate *chloric acid.*

Brown fumes indicate *hydrobromic acid*, but slight brown fumes, which increase when metallic copper is placed in the liquid, indicate *nitric acid.*

Violet fumes prove the presence of *hydriodic acid.*

Yellow fumes of chlorine, which bleach moist litmus paper, indicate *hypochlorous acid* (the substance is probably chloride of lime).

* Of course, in the case of gallic, pyrogallic, and citric acids, no metal is present.

Effervescence, with odour of burning sulphur, indicates *sulphurous acid.*

Odour of burning sulphur and yellow precipitate indicates *hyposulphurous acid.*

Effervescence with inflammable gas which burns with a blue flame indicates the probable presence of *oxalic acid.*

Gradual blackening, with evolution of inflammable gas, proves the probable presence of *citric acid.*

Odour of vinegar indicates *acetic acid.*

To confirm some of the preceding tests, dissolve about twenty grains of the substance in water, to a small part of the solution add barium nitrate. A white precipitate, insoluble in nitric acid, indicates *sulphuric acid*; yellow, soluble in nitric acid, indicates *chromic acid.*

To another part of the solution add silver nitrate. A white precipitate, insoluble in nitric acid, indicates *hydrochloric acid*; yellow, insoluble in ammonia, proves the presence of *hydriodic acid*; cream-coloured, slightly soluble in ammonia, indicates *hydrobromic acid.*

A white precipitate, insoluble in cold nitric acid, but soluble on boiling, indicates *hydrocyanic acid.*

A white precipitate, which blackens on standing, indicates *hyposulphurous acid.*

To a small part of the solution add sulphate of iron, and then gradually pour down the sides of the tube strong sulphuric acid. A brown ring at the junction of the two liquids indicates *nitric acid*; a light blue precipitate with sulphate of iron indicates *ferrocyanic acid*; a dark blue precipitate proves the presence of *ferricyanic acid.*

To another part of the original solution add acetic acid, acetate of ammonia, and calcium chloride. A white precipitate, soluble in hydrochloric acid, indicates *oxalic acid.*

To a fresh part of the solution add potash, and shake. A red colour indicates the presence of *gallic acid*; a brown colour, *pyrogallic acid.*

The student should first take known photographic chemicals, and go through the above series of tests, in which way he will accustom himself to the various reactions; after finishing that task he should get a friend to supply him with unknown chemicals, and in that way test his knowledge of analysis. Suppose, for instance, the student is given potassium chloride, after going through a series of experiments according to the above description, he obtains a precipitate with platinic chloride, which proves to him that the compound contains potassium; he next tests for the acid, and finds the substance produces pungent fumes when heated with sulphuric acid, and that the solution forms a white precipitate with silver nitrate, insoluble in nitric acid, which indicates that the compound also contains hydrochloric acid: the substance is therefore potassium chloride.

After having tested the substance, the student is advised to read the description of it in the preceding lessons on "Photographic Chemicals," so as to confirm his results by performing any extra tests that may be described therein.

Review.

LIGHT: A Course of Experimental Optics, chiefly with the Lantern. By Lewis Wright. (*Macmillan and Co.*)

A HANDBOOK of the optical lantern, in which this instrument is rather put forward as a means of systematic scientific demonstration than as a means of exhibiting pictures, has long been wanted, and by publishing this work Mr. Wright has supplied an obvious requirement.

The opening chapter treats of the lantern itself, the various means of illumination which may be advantageously employed, and the various accessories required for ordinary scientific demonstration. Although the author remarks that a good Argand burner will serve for nearly all the experiments, provided that the demonstrations are carried out in a small apartment, he evidently thinks that the superior advantages of the lime light amply counterbalance the moderate amount of labour and expense involved by its use. The working instructions given by Mr. Lewis Wright for the management of the light are concise and practical, the precautions necessary to avoid accidents being clearly pointed out, while care is taken to indicate those details of adjustment on which the production of a maximum of light depends.

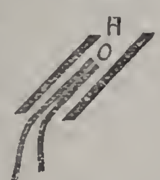
As regards preparation of oxygen, the author says :—

One must be sure that the pipe from the retort is disconnected from the first wash-bottle before the retort is taken off the fire or gas (otherwise water may be sucked back and cause an explosion), and to be sure no organic substances are in the mixture.

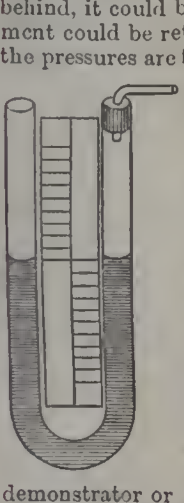
The safety tube will do the rest, and the india-rubber tops on the wash-bottles are additional safety-valves against a sudden rush of gas. The chlorate should be spread abroad on a sheet of cartridge paper to see if any small bits of straw, stick, or other matter have got in; and a small portion of the black oxide should be mixed with chlorate, and heated in a test-tube. Practically the only danger here is, lest a portion of soot or charcoal might be mixed with the sample; and if this is found pure, it is as well to lay in sufficient manganese from the same lot to last the winter.

The mixed jet is evidently regarded as best adapted for general use, as

No accident can occur if the pressure from each gas is fairly equal, and *no pressure is then altered* while the jet is alight. There is no practical danger in *adding* weight on a double pressure-board permanently. With the blow-through form, 28lbs. on the bag at first will be enough, gradually increased to 56lbs.; and many lose light as well as waste gas by commencing with too much; but the mixed jet gives the best results with high pressure. Unfortunately, however, the pressure does not remain uniform, but diminishes as the bags empty; the result of which is that a fresh adjustment of the taps is necessary every now and then. A valued correspondent found by experiment that a pressure equal to nine inches with full bags and taps closed, gradually diminished to little more than four inches as the gases exhausted; also that it was very difficult to get the same pressure with both gases, whatever arrangement was adopted. He therefore introduced between each bag and the lantern a simple gas regulator,* and then found that, provided there was only *sufficient* pressure behind, it could be kept uniformly steady, and the same adjustment could be retained throughout. In using these regulators, the pressures are first tested, as usual, by U-tubes (see fig.)



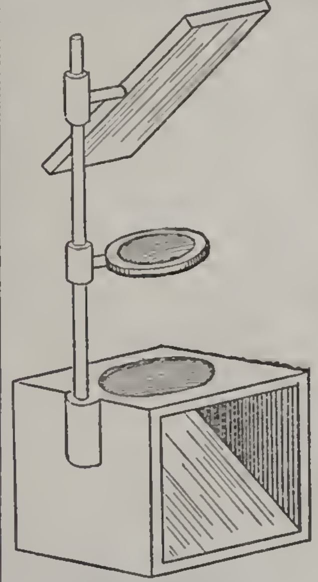
The tube is open at one end, while the gas to be tested is led to the other by a vulcanized stopper and small L-pipe.



Soft limes are often recommended for blow-through jets, but those known to opticians as "Excelsiors" are far the best; give at least equal, if not greater, brilliancy, with a smaller radiant spot; and with a "blow-through" require hardly any turning. With the mixed jet the lime should be turned a little, the same way, *with every experiment*. Finally, the best result will depend on the supply of each gas being carefully and deliberately adjusted; and the greatest advantage of the regulators referred to is, that when this has once been effected, it can be retained with certainty throughout the experiments, leaving the demonstrator or his assistant free (beyond turning the taps on and off as required) to give attention to other things.

In many cases, as when horizontal objects are to be represented, it is absolutely necessary to provide a vertical attachment, a very simple and convenient form being described.

A cubical wooden box is open on one of the perpendicular sides, and has a circular aperture cut in the top nearly extending to the edges of the square. The size of the box and of this aperture depend on the size of field to be projected; for magnetic curves or wave-ripples, a circle of less than five or six inches diameter is of little service. Opposite the open part, on strips of wood at each side, a piece of good plate looking-glass is supported at an angle of 45°, so as to throw the horizontal beam from the lantern up perpendicularly through the circular aperture. Owing to the larger size of this (the horizontal field), a *diverging* beam will generally be required, from any ordinary lantern, to cover it; and hence there *should* be a large plano-convex lens (costing about 15s. for one six inches in diameter) fixed to the under side of the aperture, so as to re-converge the rays on the focusing lens. Fair effects can, however, be procured without this with a good lime-light, in spite of what is then wasted. In any case, all but the condensers are removed from the lantern, and these are so adjusted, and the box so placed in front, that the field is just covered and no more. To one side of the box is fixed a stout perpendicular brass rod or tube, the same gauge as the pillar-stands already described, and furnished with two sockets. The lower socket bears a focusing lens, either plain or achromatic, and the upper socket the plane reflector, which reflects the image to the screen.



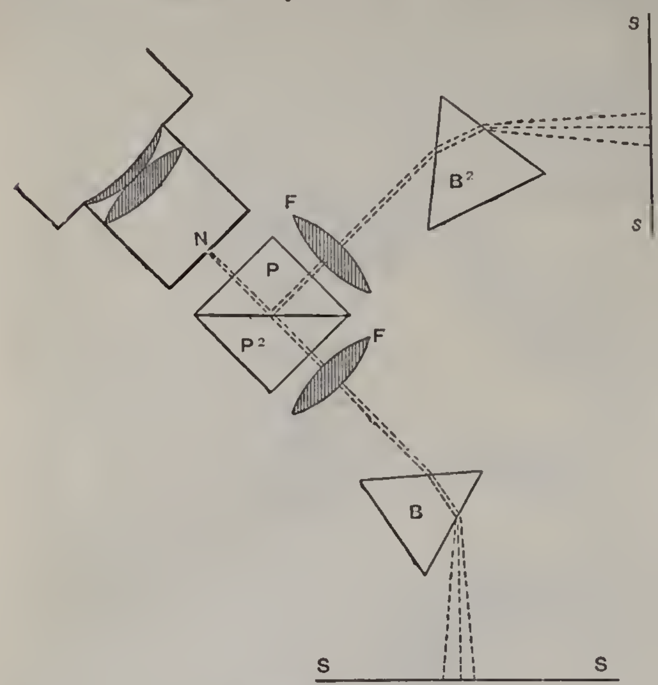
Vertical Attachment.

A selection of easily-performed experiments serves to demonstrate the laws of reflection and refraction, together with the production of real and virtual images; the pupils being thus placed in a position to understand any ordinary optical instrument which may be put before them. As an example of the thorough way in which Mr. Wright treats his subject, we may quote the description of an experiment to prove Newton's fundamental position of the special refrangibility of each colour.

It depends on the facts already noticed, that the angle of total reflection must vary with the index of refraction; the violet rays being totally reflected (because more refracted) at an angle which would allow the red rays to leave the denser medium. Newton therefore arranged an experiment (see fig.), except that he employed the parallel rays of the sun instead of those from the lime-light lantern. A perpendicular slit (N) is placed in the optical stage with the objective removed, or on the nozzle of the lantern if an adjustable slit is at command (see fig., which shows all the arrangements in plan). As close to the slit as convenient, on a table-stand, simply "stood up" on their ends, are two similar right-angled glass reflecting prisms (P and P2), with their reflecting sides together, kept together by an elastic band passed round near each end; they must not, however, quite touch, and may, if necessary, be kept apart by a narrow slip of paper at each end between them. In the direct path of the rays from the slit is a focussing lens (F), and beyond that, on another table-stand, is placed a bisulphide prism-bottle (B) in the usual position for throwing a spectrum on the screen S S. In the path of the rays totally reflected from the film of air between P and P2 is another focussing lens (F), and beyond that, on a third table-stand, a second bisulphide prism-bottle (B2), which throws its spectrum on the screen *s s*, adjusted at right angles to the other screen. All being thus arranged in the general, the double prisms, P and P2, can be turned round their common perpendicular axis from right to left in the figure, till nearly all the rays from the slit pass through both, and the prism B throws a spectrum on the screen S S as usual. Except for a little loss by reflection and absorption, all is just as if P and P2 were not there, the *refraction* of one being exactly neutralised by the other, and the rays passing as if through one square bar of glass. Let now the double prism be very

* Any efficient regulator ought to answer for this purpose; but the small and handy form used by my correspondent, and since by myself, with most satisfactory results, is manufactured by Messrs. Parkinson and Co., Cottage Lane, City Road. They cost 3s. to 6s. each.

carefully and slowly turned round in the direction of the hands of a watch. At one certain point of revolution, just when the film of air meets the rays from the slit at the critical angle



Newton's Experiment.

for violet, the violet *leaves the spectrum* on the screen S S, and being totally reflected, appears on the screen *s s*.* Continuing very slowly to turn the double prism, all the colours in succession leave the spectrum on S S to appear simultaneously on the screen *s s*, so that if we letter the screens with the conventional names, at the point when one screen has only left on it the colours Y O R, the other screen presents the missing colours, *v i b g*, which are "totally reflected."†

The course of demonstrations includes the principal phenomena of spectral analysis, phosphorescence, diffraction, polarisation, and all the ordinary phenomena of light as described in the usual text-books. No less than 190 woodcuts occur in the text, and there are in addition several coloured plates illustrative of the chromatic phenomena of light; while a copious index adds to the value of the book.

To the student, and more especially to the science teacher, Mr. Wright's work cannot fail to possess the greatest value, and we heartily congratulate Mr. Wright on the satisfactory manner in which he has struck out a new path in scientific literature.

THE VARIOUS MODIFICATIONS OF BROMIDE OF SILVER IN EMULSIONS.

BY DR. H. W. VOGEL.

Numerous investigations have been made in order to discover the relatively high sensitiveness of gelatine plates as compared with collodio-bromide plates, and these and other researches have brought to light the existence of several modifications of silver bromide.

The white silver bromide of Monckhoven appears, if we may judge from subsequent investigations, to change into the green modification by boiling, prolonged digestion, or treatment with ammonia; and at the same time its sensitiveness becomes exalted sometimes so much as fifteen-fold.

It will be remembered that in the year 1874, Stass studied the properties of the green silver bromide, and he recognised its high degree of sensitiveness, mention being made of the circumstance that an exposure of two minutes to the blue flame of a Bunsen burner served to blacken the bromide. This sensitive bromide he characterised as granular, as distinguished from the flocculent and pulverulent varieties; but how far these latter modifications are identical with the so-called white form is at present uncertain. There is no denying that I have been inclined to the view that the silver bromide of collodion emulsion and that of unripened gelatine emulsion are identical, as both are either white, or only possess a faint tint of yellow, and each of these modifications is unmistakably wanting as regards sensitiveness. There are, however, circumstances which have long been known which tend to contradict this view, as, for example, the fact that the sensitiveness of collodion emulsion cannot be exalted by warming or boiling; and although ammonia somewhat raises the sensitiveness, this increase is far less than in the case of gelatine. In addition to this I have made experiments which conclusively prove that the supposed identical silver bromides behave very differently in relation to the spectral light, the maximum of action for the collodion corresponding to the line G in the indigo; while in the case of the gelatine the maximum was found to be in the blue between G and F, but rather nearer to the former line—in fact, at a point corresponding to a wave length of 450.

It should be mentioned that the varying transparency of the atmosphere for the various spectral rays served to shift the position of the maximum to a certain extent; but the difference is always unmistakable when both bromides are simultaneously exposed; and the general reliability of my conclusions was further established by making considerable variations in the preparation of the emulsion.

Another point requires consideration. It is well known that the absorption of coloured light by a given material depends very materially on the solvent used, and the sensitiveness naturally depends on the absorption. I therefore attempted to separate the silver bromide from collodion emulsion and incorporate it with gelatine, but this experiment did not give a satisfactory result; still the converse experiment proved practicable, and it was found that collodion emulsion thus prepared with the bromide separated from gelatine, behaved exactly like the original gelatine emulsion when exposed to the solar spectrum. It is therefore evident that the difference between the point of maximum sensitiveness of the collodion emulsion and the unripened gelatine emulsion does not depend on the medium used, and it follows that a determinate difference exists between them. In fact, they are not identical, the former being indigo-sensitive, and the latter blue-sensitive.

It should be noted that the blue-sensitive silver bromide does not incorporate itself satisfactorily with collodion, and rapidly subsides, so as to render such a blue-sensitive collodion emulsion of but little practical value. The case is, however, quite different when the collodion contains gelatine, it being, as I have already pointed out, practicable to obtain a gelatino-collodion emulsion when a mixture of glacial acetic acid and alcohol is used as a solvent. Such a mixed medium can be readily obtained by mixing ordinary collodion and a solution of gelatine in glacial acetic acid. In a compound medium of this character the blue-sensitive silver bromide is maintained in a perfect state of subdivision, and such an emulsion is known in commerce as "Dr. Vogel's Emulsion."

The behaviour of the collodion gelatine emulsion in question towards the spectrum corresponds generally with the unripe gelatine emulsion, but the position of the maximum of action is a little nearer the line F, and corresponds to a wave length of 460, and it is, therefore, even more characteristically blue-sensitive.

If collodion emulsion is prepared in the usual way, and a solution of gelatine in glacial acetic acid is added, the resulting preparation is quite different from that obtained

* The effect is less visible on this screen, enough light being always reflected from the air surface to give a little spectrum. But it can be seen that the violet is strengthened.

† Only the sun, or the small radiant point of the electric light, will give the phenomena *perfectly* in these details. A large gas-burner will not answer for the experiment at all. A "mixed" jet will perform it fairly if the condenser will throw nearly parrallel rays. The "blow-through" form gives too large a radiant for a good parallel beam; but even with that, it is at least easily shown, by taking both prism-*bottles* away, and leaving the rest of the arrangement, that at a particular angle the direct image of the slit is reddish, and the reflected one bluish.

by first preparing a gelatine emulsion, and dissolving this in glacial acetic acid, the solution being next mixed with collodion. In the latter case, a blue-sensitive preparation results; while in the former instance the result is an indigo-sensitive emulsion, although the media are identical.

The green silver bromide of the ripened gelatine emulsion is ordinarily regarded as being distinct from the white bromide of the unripened emulsion, and the view taken by Stas would appear to lend support to this notion. Notwithstanding this, the fact that both are acted on to the maximum by the same spectral rays (wave length 450) appears to strongly indicate the identity of these bodies; but at the same time it must be admitted that the sensitiveness for all rays, and more especially for the ultra-violet, the indigo, and those of low refrangibility, is notably increased when the bromide becomes converted into the green modification. The green bromide must then be regarded as identical with the white, both being blue-sensitive; but I prefer to call the green bromide *high blue-sensitive*, and it appears to me that the greater sensitiveness of the green bromide is in reality due to the different state of aggregation of the molecule. As an illustration of a similar case in the domain of inorganic chemistry, it is merely necessary to call attention to the fact that many coloured metallic oxides—as that of chromium—vary extremely in colour according to their state of aggregation. The intensity of colour in such cases depends principally on the power of reflection for certain coloured rays, and the power of absorption for others. Doubtless something of the same kind holds good with the blue-sensitive bromides of silver.

The above considerations would lead us to believe that the blue-sensitive bromide of silver may be regarded as generally resulting when formed in the presence of gelatine, and the violet sensitive as being formed in the presence of collodion.

I had also previously stated that a minimum quantity of gelatine sufficed (I took 12 grammes of ammonium bromide, ½ of gelatine, and 100 of water) to form blue sensitive bromide of silver.

It afterwards appeared to me probable that the same modification would take place by the entire omission of gelatine, especially as Stas obtained his highly sensitive modification of bromide of silver by precipitation from aqueous solutions without gelatine.

My conjecture has been proved and established. Bromide of silver may be precipitated from aqueous solution of nitrate of silver, excess of silver being present, or from ammonium bromide, in the presence of excess of alkaline bromide, and both deposits, after washing with distilled water until every trace of soluble salt is removed, may be shaken up according to Abney's method in a warm solution of gelatine. Uniform emulsions resulted, and some plates were coated. The rest was allowed to stand in water at the temperature of 70° R. for an hour, in order that any increasing sensitiveness might be observed.

The plates were first tested by the action of the solar spectrum, and afterwards by trials on plaster models, backed up with black cloth.

The results are as follows:—1st. That the precipitated bromides of silver were each specially sensitive to the blue rays, the maximum point being about 450. That prepared with excess of bromide was almost free from fog, but the other emulsion was notably foggy. 2nd. The bromide of silver obtained from solutions containing silver in excess, after being digested for one hour, became more fogged, without increased sensitiveness; while the other bromide of silver became almost twice as sensitive by digestion. I here remark that Szekely, by allowing bromide of silver obtained by Abney's method with excess of silver to digest for a while, could not observe any increase in sensitiveness. I therefore believe that the formation of intensely blue-sensitive bromide of silver by heating only occurs with bromide of silver precipitated in the presence of an excess of alkaline bromide.

Abney, on page 70 of his book, says that the presence of great excess of bromide occasions greater sensitiveness. Eder is of the contrary opinion. Wilson, according to Abney's book, page 117, declares that the less bromide the longer it must be boiled. Were both present in equal proportions the conversion to the highly sensitive state would not take place, even by long boiling. In proof of this statement I made a gelatine emulsion with excess of bromide at 30° R., boiled one half for a quarter of an-hour, washed, and coated some plates. The other half was washed first, then boiled an equal length of time, and plates were prepared. The result was, that the emulsion not having free bromide, which was boiled after washing, was much more sensitive (nearly double) than the other. The Abney-Wilson theory, therefore, does not seem correct. Further, the emulsion not containing free bromide was quite free from fog, and on that account to be recommended. Although it is possible to obtain a silver bromide which is specially sensitive to the blue rays by precipitation from pure water, this proceeding is not to be recommended. The deposit without the presence of gelatine is too coarse for it to be fit for photographic purposes.

Stas certainly obtained highly sensitive bromide of silver in the finest state of division without using gelatine, but only after boiling for days, and using very weak solutions. Gelatine allows the bromide of silver, even in concentrated solutions, to deposit in the necessary state of fineness.

After these results, it was interesting to experiment on the bromide of silver precipitated from alcoholic solutions. The violet sensitive bromide formed in the presence of pyroxyline I have already considered; and the conjecture that the same modification may be arrived at without it is legitimate after the preceding.

Three grammes of ammonium bromide were dissolved in 100 c.c. of warm alcohol, and to this was added 5 grammes silver nitrate, first dissolved in 1 c.c. of water, and then mixed with 10 c.c. of alcohol. There is in this case a slight excess of bromide. The precipitate presents exactly the same appearance as that obtained under similar circumstances from an aqueous solution. It was next thoroughly washed in alcohol, then a portion was extracted with water, and shaken up with a solution of gelatine.

Here a distinct difference from the bromide deposited from the water is apparent. While this last was easily blended with the gelatine, and made a smooth emulsion, it was impossible to cause the bromide from the alcoholic solution to unite with the gelatine, either by shaking or warming for a long time. On the contrary, it mixed very readily with collodion, while the other precipitate did so with difficulty. With solutions of gelatine and pyroxyline in glacial acetic acid the same differences were observable. The preparation from alcohol would not unite with it, while that from water did so readily.

The alcoholic precipitate, when incorporated with collodion, did not produce as fine an emulsion as that obtained by the production of bromide of silver in collodion. The preparation was coarse, and only slightly sensitive. It was only after repeated trials with long exposure that it was found to be violet-sensitive, and that the maximum lay about G. Consequently, while it is proved that the precipitate from alcohol alone consists of violet sensitive bromide of silver, as a practical way, precipitation from collodion proves itself the better, as the bromide of silver is obtained in a finely divided state, which is necessary in the formation of a homogeneous picture, and to the attainment of the sensitiveness necessary for collodion emulsion.

Putting the results of these researches together, we have the following:—

1. Precipitation from aqueous solutions (either by excess of silver or bromine) gives blue-sensitive bromide of silver. Precipitation from alcoholic solution violet-sensitive.

2. The blue sensitive bromide of silver unites with diffi-

culty with collodion, and easily with gelatine; the violet sensitive acts in a contrary manner.

3. The presence of colloid substances (gelatine in aqueous solutions, collodion in alcoholic) practically effect only the fine division of the bromide of silver, without changing the spectral action.

4. The deposited bromide of silver resulting from excess of bromide in aqueous solutions becomes more sensitive by boiling, that prepared with excess of silver does not. Excess of bromide is unnecessary in adding to its sensitiveness. A great excess protracts it.

5. The various modifications of bromide of silver indicated by Stas, all obtained from aqueous solutions, namely, flakey, pulverulent, and granular bromide of silver, I believe to be varieties of the blue sensitive bromide of silver. I would rather distinguish them as different aggregations of the same body.*

* Stas has not experimented on precipitates with alcoholic solutions.

Correspondence.

DIRTY OPAL GLASS.

Sir,—In your last week's report of the meeting of the London and Provincial Photographic Association, I am made to appear in the ridiculous position of exhibiting as an object of interest an opal picture which was "not faded," but "much discoloured, as though with dirt."

If the definition of to fade, to become less vivid, be accepted, a picture the white parts of which darken is as much faded as one the dark parts of which become light. The fact that the surface of opal glass, especially when ground, is liable to change from white to a dirty brown is well-known; so much so that I have been informed by glass merchants that they will not keep it ground in stock, but grind it as required, as they have found it to become unsaleable from discolouration in a short time. This being the case, it is manifestly improper to use the material as a basis for expensive finished pictures issued as permanent, without some protection from the deterioration which it is liable to undergo.

My object, in addition to giving this caution, was to raise an enquiry as to what is the component of the glass which causes such a disastrous result, in order that, when known, the manufacturers may, if possible, be induced to prepare the material of a more permanent character.—I am, yours obediently, W. E. Debenham.

[When exposed to the action of dirt, all ground glass readily becomes dirty, and it is difficult to clean. This fact is pretty generally known.—Ed. P. N.]

PHOTOGRAPHY AND TRICYCLES.

Sir,—I read with interest your paragraph on "Photography and Tricycles." It has often struck me that amateurs taking advantage of all the scientific improvements in dry plates and apparatus do not utilize the tricycle more than they do in their rambles for artistic tit-bits. Journeys of forty, fifty, and even seventy miles are done in a day on good machines, and not by professional cyclists either, but by fair and square amateurs.

The best tricycle I have yet seen most suitable for the photographer, both for speed and hill climbing, is one made by a firm of engineers at Egham Hill, Surrey; I believe the name is Blenheim and Sons. I do not know the name of the machine, but there are peculiarities about it which are wonderful in their action, and though built extremely compact, leaves plenty of room for "packing traps," &c.

Fancy an amateur photographer getting on a tricycle in London in the morning, and in the afternoon quietly exposing his dry plates in some of the beautiful lanes and bye-ways in parts of Wilts and Oxfordshire! Or professionals even, like those your correspondent met in Guildford, running ten miles out, doing their business, and returning feeling not much the worse for twenty miles roadstering. It is really a triumph of mechanical science when we see such things accomplished, and they are now very frequently, and will be more so by-and-bye, when people get to understand the qualities of a thoroughly good machine. There is little doubt the firm to whom I refer would gladly supply particulars of their machines if applied to, and to amateurs or professionals who think of going in for photo-tricycling I would certainly recommend to have a look, if nothing more, at this machine.—Yours faithfully,

G. Emberson, Jun.

FERROUS OXALATE V. PYROGALLOL.

Sir,—Mr. Wilkinson says he is aware that some people cannot see the slightest merit in English work, simply because it is English; whilst they think that all foreign work is good, because it is foreign. I fear Mr. Wilkinson lays himself open to a similar charge of trusting to pyrogallol because it is pyrogallol. I read his article of August 4th with some surprise, but had not time to reply to it then. As far as my experience goes, I should say there is very little to choose between the two modes of development. I know some English photographers of good repute who, after long courses of experiment, have put aside pyrogallol altogether, and now only use iron.

I have seen work by Continental and American photographers, which, for brilliancy, could not be surpassed, and which in every respect was as fine as any English work I have seen. This foreign work was produced from negatives developed with ferrous oxalate. Mr. Wilkinson considers that with the ferrous developer a long exposure is necessary. With a properly prepared developing solution I have not found this to be the case—in fact, in some instantaneous work I did last winter, I found I got better results from the ferrous than from the pyrogallol developer. As to length of development, I find there is nothing to choose, the average time for both in my hands being three and a-half minutes, though I have often found that with the ferrous developer two minutes gave rather too much density. I am also at variance with Mr. Wilkinson in his opinion that it helps a poor plate. A good plate can, I believe, be equally well developed with pyrogallol or with ferrous oxalate, if the operator is equally familiar with the working of both methods; a bad plate may make an apparently better negative when developed with iron, but it will give just as poor a print as the pyrogallol-developed plate. In the one case the negative will print a little better than it looks, and in the other (the iron developer) it will print worse.

We should remember that the ferrous oxalate developer is very cleanly in use, that the smell of ammonia is avoided, that there is no pyrogallic poisoning or eruptions of the skin to be feared in using it, and that the negatives as a rule look better and print much more rapidly than negatives developed with pyrogallol.

I must leave it to some higher authority to decide which is the better developer, but I certainly do not agree with Mr. Wilkinson in thinking that with a really first-class plate it is not possible, under any circumstances, to get as good a negative with ferrous oxalate as with pyrogallol. I do not think the experiments given in his article are extended enough to draw a safe deduction from, and I regret to think that some beginner may have been discouraged or misled by his very positive assertions, which are not borne out by my experience.—Yours faithfully, John Doe.

Proceedings of Societies.

London and Provincial Photographic Association.

At the meeting of the Association on the 31st inst., Mr. W. E. Debenham occupied the chair.

Mr. A. L. Henderson exhibited a gelatine negative which was taken with a small hole, the diameter of which Mr. Haddon had, by means of the micrometer, ascertained to be $\frac{1}{70}$ inch. The negative was exposed for seven seconds in the open air, and seemed much under-exposed and much red-fogged; but a collodion transparency from it was full of detail. Some curiosity was excited as to the *modus operandi* by which this result was obtained from such a poor negative, and he (Mr. Henderson) stated that he had copied the negative while wet by reflected light, and he was of opinion that if he had used caustic potash instead of ammonia in developing, he would have got more printable detail and less green fog. Two other negatives taken by Mr. Henderson without the aid of a lens (exposure twenty seconds), at Southampton, were shown, and also a lens picture of the same subject (the statue of the Prince Consort), the latter being but very little sharper than the others.

The Chairman said that having occasion to write to Dr. Eder, he had mentioned to him that he (Dr. Eder) had been elected an hon. member of the Association, and that gentleman had in his reply said he felt honoured by his election, and would in consequence be stimulated to further efforts in photographic science. The Chairman also stated that he had cleared the discoloured opal picture which he exhibited at the last meeting, by applying to the parts not covered with colour, strong hydrochloric acid, afterwards softening the edge of the vignette with colour.

In answer to Mr. Henderson, Mr. Cowan said he preferred clear varnish for protecting opal pictures.

In the course of a discussion which took place on emulsions, Mr. Henderson said he found it an advantage to add a small quantity of bromide (1 grain to the ounce) to the washed emulsion.

It was suggested that this would slow the plate, and Mr. J. Barker said he had published about five years ago the results of some experiments, and in which he stated "the addition of soluble bromide to the finished emulsion did not slow the exposure provided the plate was developed immediately after exposure, but that if kept for some time before developing, a longer exposure was necessitated, and that by long keeping a plate in which soluble bromide was present, the image became gradually obliterated." He was also of opinion that the relative degree of sensitiveness of gelatine and collodion plates was greatly exaggerated, and that in a good light the quickest gelatine plates were not more than five times quicker than collodion.

The Chairman thought that if Mr. Barker were correct, and that the presence of soluble bromide hardly had the effect he attributed to it, it would prove a valuable addition, as it would obviate whatever slight inevitable action of light the plates had received in preparation; and as the development need never be deferred when working in the studio, the slow obliterating action would not take place.

Talk in the Studio.

British Association Grants.—Among these, the following may be noted:—£20 to Professor Odling, for photographing the ultra-violet spark spectra; £10 to General Pitt-Rivers, for photographs of the races and crosses in the British Isles; £5 to Sir F. J. Bramwell, for Patent Legislation

Royal Cornwall Polytechnic Society.—We subjoin a list of the awards in the photographic department, and shall next week give a full report of the exhibition:—*Professional Photography*—H. M. King, 1st silver medal; G. H. Dew, 2nd silver; W. D. Sanderson, T. Hillingworth, F. M. Sutcliffe, and F. Argall, 1st bronze; E. Day and Son, and E. Gael, 2nd bronze; A. G. Tod, highly commended. *Amateur*—H. Stevens, 2nd silver; A. Pringle, 1st bronze; S. P. Jackson and H. Manfield, 2nd bronze. On the 12th inst., Mr. W. Brooks is to lecture on "The Rise and Progress of Photography."

Continental Rambles with a Camera.—Mr. D. Ireland, jun. forwards us a charming selection of views, and writes:—"I send you a few lines to let you know how much we enjoyed your two papers on Norway. They were especially interesting to us, as we had gone over the same ground as you, with a few slight variations. We had a smaller camera than usual this year, but got very poor results, thanks to the dealers, who, on our asking them what sort of plates to take, assured us that the instantaneous were the very thing for landscape. Had we then known as much about dry plates as we do now, we would not of course have taken them; but, relying on the manufacturers, and thinking they ought to know, we took the instantaneous, with only a dozen of ordinary. Of course, on developing, the instantaneous turned out very poor; indeed, we discovered afterwards, that the batch had been a faulty one. However, I send a few prints by the book post, hoping they will be recognisable. One of them is Fleischer's Hotel, which we found a first-class, even luxurious habitation, and famed as being one of the best in Norway."

The Production of Bank Notes by Photo-Reduction.—The Bank of France is about to strike off six million hundred-franc notes from a plate engraved by M. Robert, after a drawing by M. Baudry, the painter. The original drawing was about 4 feet long by 22 in. deep, and was photographed on a reduced scale to the size of a bank note. Robert was engaged engraving it for several weeks in the strictest seclusion, in an inner chamber of the Bank.—*The Artist.*

Flameless Combustion.—In reference to the leader on this subject which appeared in our issue of the 25th August, Mr. Fletcher writes, calling in question the existence of anything approximating to flame even around the heated body, and says:—"There is most certainly nothing, no flame and no heat at the mouth of the burner; no flame anywhere, and not a trace of heat or sign of combustion, except in contact with the hot surface. The only sign of combustion is the heat evolved by the surfaces, the gas and air being combined by contact with the hot surfaces. Further than this, thick black smoke and flame are both destroyed by passing the heated surfaces, provided air is present in sufficient quantity. If air is deficient, black smoke is converted into carbonic oxide." In the case of our own experiments, Mr. Fletcher's conditions, as described in his letter, were not completely realised; there was certainly no heat or combustion at the mouth of the burner, but round about it and in the immediate proximity of the heated body there was something which possessed a vague outline, and, as already stated, appeared to us to partake somewhat of the nature of flame. In order to verify this, a spectroscope was so adjusted as to clear the heated body, and sodium chloride was dusted around, when the sodium lines immediately became visible. There is, of course, a possibility that the experiment may be carried a stage farther than we took it; but we are inclined to think not.

Commercial Alcohol and its Purification.—Oxidation methods are subject to the disadvantage of giving rise to objectionable products, such as aldehyde, acetic acid, and acetic ether; but the reduction method of Naudin and Schneider, in which the copper-zinc couple (pieces of zinc partially covered with finely-divided copper) is used, appears to answer well, and electrolysis by means of a separate electric generator has also been proposed. Pictet has recently adopted distillation under a very low pressure, and the vapour is fractionally condensed at a temperature as low as —25°, or even— 50°. A considerable saving appears to be effected by this proceeding. Eismann's method of using ozone is under trial, and it is said that the results are likely to be better than was at first anticipated. The method proposed by Cayeneuve and Cotton for detecting methylic alcohol by testing freshly distilled fractions with potassium permanganate appears to be considerably influenced by certain oily impurities which are ordinarily present.

Influence of one Metal on the Surface of another Metal placed at a Short Distance. By H. Pellet (*Compt. Rend.*, 94, 1247—1249).—If two metallic surfaces are placed parallel to one another at a distance of a few millimeters or tenths of a millimeter, the properties of the superficial layer of each surface undergo a slight alteration, due to the proximity of the other metal, and depending on the nature of the latter. This change is produced slowly, and at first increases with the time, but afterwards tends to a limit. It is not permanent, for, if the influencing metal is removed, the metal influenced gradually assumes its original condition. The amount of change was measured by comparing the difference of potential between a gilded brass surface and that of the particular metal before and after the latter had been subjected to the influence of a second metal. Of the metals used, lead and iron produced the greatest effect, but the change was very distinct with copper, platinum, and gold. Zinc appears to cause no change in the surface of copper, gold, or zinc. The phenomenon is not purely electrical, but is of a material character. It is probably similar to the phenomenon of Moser's figures, and is possibly related to the fact that many metals have a slight but distinct odour. The influence of copper on zinc is perceptible, even when their surfaces are 10 mm. apart. It would appear as if the metals give off at the ordinary temperature a volatile substance which can be deposited on other bodies, producing chemical change. When the influencing body is removed, the volatile substance gradually leaves the influenced surface, which resumes its original condition.—*Journal of the Chemical Society.*

CRYSTALLIZED VEGETABLE ALBUMEN.—Ritthausen has communicated to the *Journal für Praktische Chemie* the results of his researches, and finds that the vegetable albumen from pumpkin seeds, &c., &c., always gave a higher percentage of carbon than in the case of albumen from hemp seed and castor-oil seed, but in no case were Grübler's numbers obtained, the latter finding 1·8 per cent. carbon and 0·2 per cent. hydrogen more than Ritthausen, whose analyses agree very well with those of Barbieri referring to amorphous albumen from pumpkin seeds.

To Correspondents.

All Communications connected with Advertisements and Business to be addressed to Messrs. PIPER & CARTER, "*Photographic News*" *Office, 5, Castle Street, Holborn, E.C. Advertisers are requested to make all Cheques payable to* Messrs. PIPER & CARTER, *and crossed* "*Union Bank, Photographic News Co. Account.*"

*** We cannot undertake to return rejected communications.

PERPLEXED AMATEUR.—1. Not if it is an ordinary view lens. 2. Probably not. 3. No, the length would remain precisely the same.

W. T. H.—We know nothing of the whereabouts of the gentleman in question.

C. HUME.—Thin light macintosh cloth.

D. A. (Cadix).—Soaking in a saturated solution of alum will answer the purpose.

R. O.—1. The deposition may be prevented by keeping the preparation very faintly acid by the occasional and cautious addition of a solution of oxalic acid. 2. Place them face downwards in the washing water, and move them about occasionally. 3. Pour it over your cuttings, and, when dry, burn altogether. 4 We are inclined to think that you either used crystallised calcium chloride, or, at any rate, an imperfectly dried sample. If this is the case, it is easy to understand the presence of excess of silver. With absolutely pure alcohol there is no blackening; but methylated spirit often contains impurities which cause a rapid reduction of the silver.

L.—Thanks for the suggestion. The deposit in question consists of metallic silver, and exists at the back of the film—that is to say, next the glass—and it can only be removed by stripping the film from its support; after which the loosely coherent silver may be dissolved away by means of metallic mercury.

HENRI GUICHARD.—We cannot say; but he is described in his advertisement as "*Professeur de Photographie.*"

W. H. P.—1. An excellent idea. 2. Friday, September 29th. If in packing cases, to care of Mr. J. Bourlet, 17, Nassau Street, Middlesex Hospital; or, if ready for hanging, at the Gallery, 5, Pall Mall East.

FEANER.—Washing in the ordinary sense is not sufficient, long soaking with several changes of water being necessary.

A. R. DRESSER.—The only way is to make use of a lens having double the focal length, but of course you will not then include so large an area of the surroundings.

AN OLD SUBSCRIBER.—You will find a list of them in the YEAR-BOOK, but this is now out of print. Perhaps you may pick up a stray copy at a stock dealer's, or you can call at our office to copy out what you require.

ED. DOBBS.—Thanks; it shall be done.

IVORY.—We cannot lay hands on the address at the moment, but will send it you by post.

ARIEL.—1. From 8 till 6. 2. Certainly not. 3. You had better commence with a systematic study of inorgannic chemistry.

BENTALL.—Level the plate, and cover it with as thick a layer of the solution as it will retain.

HABRON.—It consists of starch in a nearly pure state.

WATER.—1. It is difficult to say without examining a sample, but the fact of green vegetable growths appearing in the bottle certainly indicates the presence of a considerable proportion of organic matter. 2. Its solubility is increased to a remarkable extent when carbonic acid is present.

WESTMINSTER.—Such regulations are not law, and are almost invariably upset when brought before a superior court; still it is questionable whether it is worth your while to spend several hundred pounds over a matter which is of so little importance to you.

THE EVERY-DAY FORMULARY.

THE GELATINO-BROMIDE PROCESS.

Emulsion.—A—Nit. silver 100 grains, dist. water 2 oz. B—Bromide potassium 85 grains, Nelson's No. 1 gelatine 20 grains, dist. water 1½ oz., a one per cent. mixture of hydrochloric acid and water 50 minims. C—Iodide potassium 8 grains, dist. water ½ oz. D—Hard gelatine 120 grains, water several oz. When the gelatine is thoroughly soaked, let all possible water be poured off D. A and B are now heated to about 120° Fahr., after which B is gradually added to A with constant agitation; C is then added. Heat in water bath for half an hour, and stir in D. After washing add ¾ oz. alcohol.

Pyro. Developer.—No. 1—Strong liq. ammonia 1⅜ oz., bromide potassium 240 grains, water 80 oz. No. 2—Pyro. 30 grains, water 10 oz. In case of an ordinary exposure mix equal vol.

Iron Developer.—Potassium oxalate sol. (1 and 4) 80 parts, ferrous sulphate sol. (1 and 4) 20 parts, dist. water 20 parts. To each 4 oz. of the mixed developer add from 5 to 30 drops ten per cent. sol. potassium bromide, and 30 drops sol. sodium hyposulphite (1 and 200).

Substratum or Preliminary Preparation.—Soluble silicate of soda 1 part, white of egg 5 parts. water 60 parts. Beat to froth and filter.

Fixing.—Sat. sol. of sod. hypo. 1 pint, sat. sol. of alum 2 pints, mixed.

Cowell's Clearing Solution.—Alum 2 parts, citric acid 1 part, water 10 parts. Edwards makes this sherry coloured with perchloride iron.

Eder's Method of Intensification.—The negative is whitened by soaking in sat. sol. of mercuric chloride, and after thorough rinsing immersed in potass. cyan. 10 parts, potass. iod. 5 parts, mercuric chloride 5 parts, water 2,000 parts. As film becomes dark brown, the actinic opacity is increased; but prolonged action causes brown tint to become lighter, until at last the negative is no denser than at first.

Fol's Backing Sheets.—A chromographic paste is prepared with gelatine 1 part, water 2 parts, glycerine 1 part, and a very small addition of Indian ink. Strong paper or shirting is coated, and the sheets are laid, face downward, on waxed glass to set. Press to back of glass plate.

THE WET COLLODION PROCESS.

The Nitrate Bath.—Water 14 oz., nit. silver 1 oz., nitric acid 1 drop. Before using coat a small plate, and immerse it for 20 minutes.

Cleaning Preparation for New Plates.—Alcohol 4 oz., Jeweller's rouge ¼-oz., liquid ammonia ½-oz.

Film-removing Pickle for Old Plates.—Water 1 pint, sulphuric acid 4 fluid oz., bichromate potassium 4 oz.

Substratum.—Whites of 2 eggs well beaten, 6 pints of water, and 1 dr. liq. ammon.

Negative Collodion for Iron Development.—Alcohol 1 pint, pyroxyline of suitable quality 250 grains, shake well and add ether 2 pints. *Iodize this by mixing with* one-third of its volume of alcohol ½ pint, iod. ammon. 80 grains, iod. cadm. 80 grains, brom. ammon. 40 grains.

Normal Iron Developer.—Water 10 oz., proto-sulphate iron ½ oz., glacial acetic acid ½ oz., alcohol ¾ oz. The amount of proto-sulphate iron may be diminished to ¼ oz. when full contrasts are desired, or increased to 1 oz. when contrasts are unduly marked. With new bath quantity of alcohol may be reduced to ¼ oz.; but when bath is old more is wanted.

Intensifying Solution.—Water 6 oz., citric acid 75 grains, pyro. 30 grains. When used, add a few drops of the silver bath to each ounce.

Lead Intensification.—After neg. washing, immerse in dist. water 100 parts, red pruss. potash 6 parts, and nit. lead 4 parts. When it is yellowish white wash and immerse in liquid sulphide ammon. 1 part, water 4 parts.

Fixing Solution.—1. Potass. cyanide 200 grains, water 10 oz. 2. Sat. sol. of sod. hypo.

Varnish.—Shellac 2 oz., sandarac 2 oz., Canada balsam 1 dr., oil of lavender 1 oz., alcohol 16 oz.

PRINTING PROCESSES.

Albumen Mixture for Paper.—White of egg 18 oz., 500 grs. ammon. chlor. in 2 oz. of water. Beat to a froth, stand, and filter.

Sensitizing Solution.—Nit. silver 50 grs., water 1 oz., sod. carb. ½ gr.

Acetate Toning Bath.—Chlor. gold 1 gr., acet. soda 20 grs., water 8 oz.

Lime do.—Chl. gold 1 gr., whiting 30 grs., boiling water 8 oz., sat. sol. chl. lime 1 drop. Filter cold.

Bicarbonate do.—Chl. gold 1 gr., bicarb. soda 3 grs., water 8 oz.

Fixing Bath.—Sodium hypo. 4 oz., water 1 pint, liq. ammon. 30 drops.

Reducer for Deep Prints.—Cyan. potass. 5 grs., liq. ammon. 5 drops, water 1 pint.

Encaustic Paste.—Best white wax 1 oz., oil of turpentine 5 oz.

Sensitizing Bath for Carbon Tissue.—Bichromate potash 1¼ oz., water 30 oz., ammonia 1 dr., methylated spirit 4 oz.

Enamel Collodion.—Tough pyroxyline 120 grs., methylated alcohol 10 oz., ether 10 oz., castor oil 20 drops.

Mountant.—1. Fresh solution of best white gum. 2. Fresh starch.

Collotypic Substratum.—Soluble glass 3 parts, white of egg 7 parts, water 10 parts.

Collotypic Sensitive Coating.—Bichromate potash ½ oz., gelatine 2½ oz., water 22 oz.

Collotypic Etching Fluid.—Glycerine 150 parts, ammonia 50 parts, saltpetre 5 parts, water 25 parts.

Printing on Silk.—Remove all dressing from the fabric by boiling in water containing a little potash, dry, and albumenize with ammonium chloride 2 grammes, water 250 cubic cents., and the white of 2 eggs, all being well beaten together. A 70-grain silver bath is used, and the remaining operations are as for paper.

Cyanotype Printing.—Water 1 oz., red prussiate of potash (ferricyanide) 1 dr., ammonio citrate of iron 1 dr. Prepare and preserve in the dark. Float the paper and dry. Fixation by mere soaking in water.

VARIOUS.

Luckardt's Retouching Varnish.—Alcohol 300 parts, sandarac 50 parts. camphor 5 parts, castor oil 10 parts, Venice turpentine 5 parts.

Matt Varnish.—Sandarac 18 parts, mastic 4 parts, ether 200 parts, benzole 80 to 100 parts.

FERROTYPES.

Collodion.—Ammonium iodide 35 grains, cadmium iodide 25 grains, cadmium bromide 20 grains, pyroxyline 70 grains, alcohol 5 oz., ether 5 oz.

Bath.—Silver nitrate 1 oz., water 10 oz., nitric acid 1 drop.

Developer.—Ferrous sulphate 1 oz., glac. acetic acid 1 oz., water 16 oz.

Fixing and Varnish.—Same as wet collodion process.

collodion process.

THE PHOTOGRAPHIC NEWS.

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CONTENTS.

TRUTH AND PHOTOGRAPHY.

There is a popular notion that a photograph affords conclusive and indisputable evidence as regards matters of fact, and there can be very little doubt that photography not only has done, but will continue to do, good service as a witness.

An illustration of the value of photographic records in connection with toxicological work is afforded by the paper of Mr. Jennings which is published in our present issue. Photography in this case gives us some kind of a permanent record of the appearances presented by sublimates consisting of one or two thousandths of a grain of arsenic, qualities far too small to be estimated by the ordinary methods of chemical analyses. In reference to the value of photographic evidence, Governor Porter, of Indiana, said, on a recent occasion:—

I have myself been a witness to some things exceedingly interesting in photography, in the course of legal investigations. In trials for forgery, important assistance has been rendered by it in showing erasures that the most skilful experts have been unable to detect in examining the papers copied. I recall that when I was first Comptroller to the Treasury, a young man came from Texas and paid a visit to my office to see if his father, who was dead, had become the security on a public bond. The family had persuaded themselves that he had not, and that his name on the instrument was forged. He asked me if he could not take the instrument from Washington to Texas, in order that it might undergo the inspection of those who were familiar with the handwriting of his father. I told him that it was impossible to allow any public paper to be taken off the official files, but that I would give him a photographic copy, and I thought from this they would be able to say whether the signature was forged or genuine. He took the photographic copy home, and in a few days he wrote to me that the family had examined the copy, and had no doubt that the signature was genuine. The Government was saved a lawsuit, and the family much expense, by a controversy being thus quietly settled.

Then again as affording valuable aid in relation to ethnological researches, we may mention that the anthropometric committee of the British Association reports as follows:—

The photographic portraits already collected have been handed over to the new committee, and will assist materially in determining the values of crosses in different parts of the country. Some, obtained under exceptionally favourable circumstances, and especially seventeen portraits of Shetland Islanders, well illustrating the Scandinavian element in the population, and presented by Dr. Muirhead, may be safely termed typical.

Not unfrequently is photographic evidence brought into courts of law, either with a view to deceive, or at any rate to give an exaggerated view of the case.

"I have lost my case all through one of you miserable photographers," said a lawyer to a friend of ours. "Serve you right," said our friend; "why did you not get another photographer to take pictures on your side?" The lawyer evidently profited by the lesson, for a few weeks afterwards he came into our friend's studio, and explained the necessity of having a series of pictures ready before the opening of court next morning. The nature of the work was explained, the widest of wide-angle lenses were sent for, windows were hastily knocked out, roofs were invaded, and pictures were taken which made a recently built wall look so far off that the jury could not possibly regard it as any obstruction to light reaching certain windows, which were also shown in the picture. Had the other side been ready with photographs taken by an objective of long focus the result would probably have been different.

Photographs illustrative of the remarkable powers of hair-restorers, fat-reducers, and other nostrums, may be occasionally seen, and no doubt influence the public in favour of the preparation in question; but a clever use of photography as an exponent of untruth was recently made at a fair in Paris, where the public were invited to look on the photographic portrait of a three-headed lady, and, moreover, to enter the booth and see the living original. The method by which the illusion was produced will be of interest to those of our readers who may wish to produce certain remarkable effects in combination photography, and we illustrate the matter by an engraving taken from *La Nature*.

An alcove on the stage is draped interiorly with black, and provided with a plain plate glass reflector placed at such an angle as to reflect any objects placed on an inclined bench, which is itself screened from public view by a high partition. Two of the models are draped in black, and so placed that the reflected image shows no trace excepting the heads. A good light thrown on them, and the abundant use of face powder, render it difficult to believe that one is not looking on a veritable three-headed lady, and a basket of flowers serves to break the line which might lead to a discovery of the trick. By employing sunlight it would be easy to produce a remarkable combination picture in the same manner. The trick depends on the fact that feeble radiations are entirely lost on striking the somewhat imperfect face of the plate glass.

THE CONVENTION OF AMERICAN PHOTOGRAPHERS.

THE third annual assembly, which has recently terminated, may be looked on as a partial success, although its value as compared with the efforts made as regards organisation, is a point open to question. In the present day subject matter of real value is, as a rule, placed before the public with considerable promptitude, and there is but a small probability of important papers being reserved for conventions or other similar gatherings. Proceedings under these circumstances tend, therefore, to take a conversational turn, and among other matters it is interesting to note how Mr. J. Traill Taylor refers to an evening spent in the company of Mr. H. P. Robinson. Mr. Taylor said :—

There is no one present who will not be interested in knowing the sentiments of that master of photographic art, H. P. Robinson, of England, respecting the value of extra sensitive gelatine plates to the artist. Having spent an evening within the past few weeks in Mr. Robinson's company, on the occasion of a recent visit to England, the Chairman of the Committee on Progress is enabled to reproduce in colloquial form the off-hand utterances of this able artist and art writer. Premising that your reporter had in course of conversation alluded to the fact of the paucity of those professional portraitists in New York City who made use of the gelatine process, Mr. Robinson said : "I am surprised to hear this, for here in England collodion is now seldom used, and that only for copying. Apart from the convenience of having your plates always ready, and the quickness of exposure, I consider that dry plates give artistic qualities that were seldom or never met with in the wet process. I do not know how to describe it except by the word 'quality' as used by painters. Then, if you can rely on your plate-maker, you have no faults in your plates—no pinholes, no comets, no streaks in the direction of the dip, and the other devilments that drove the wet-plater mad while he ought to be keeping himself cool so as to do the best with all the artistic gifts with which nature had endowed him. While you are posing your group for a gelatine plate," continued Mr. Robinson, "you need not fear that if you keep your plate waiting another minute it will be spoilt. Then you can do things it would be useless trying with the wet process. Few of these groups I now show you [and here it is of vital importance to observe that the speaker was so fortunate as (by the courtesy of Mr. Robinson) to secure copies of the pictures alluded to, and to have them here for exhibition] could have been possible in the old days ; but," observed our friend, "I say the *old* days by inadvertence ; I forgot that collodion was still used in America ; it seems to me to belong to the past ages. Then for convenience of work. I gave up outdoor photography eight or ten years ago because I was not equal to the physical exertion, but now I have taken to it again with large plates, and it is a delight to me. During my last holiday—photography is no longer hard work, but part of a holiday—of a fortnight, the wind and rain came on every day with great regularity, but there were two days on which I could get out with some hopes of success, and during these two days I exposed fifty-two 15 by 12 plates, all containing figures and all containing a subject—that is, some story is told. This would have been prodigious with collodion, but with dry plates it was only a sort of gentle exercise. But then, as you know, I think out my subjects before I make my pictures. I do not trust to accidents or the inspiration of the moment. Beside the fifty-two outdoor pictures, I exposed sixteen interiors, making sixty-eight in all." In reply to a question concerning the development of his negatives, Mr. Robinson said :—"I never develop away from home. I sometimes exposed two plates on a very good subject. Otherwise I trust to the negatives coming right, and am seldom disappointed. And the delight of developing at home! I never label my plates as I expose them, and as, perhaps, I ought to do, but mix them up recklessly ; so I never know what is coming. Perhaps it is one of your best subjects, or it might be one you were doubtful about, that comes out better than you expected. The 'Merry Tale' was done on a very windy morning. I posed the group, and said I would only throw away one plate on it as a sort of record for another time, and it turned out one of the best."

The foregoing is the gist of a conversation with Mr. Robinson just after he had returned from a fortnight's holiday, during which he took a number of pictures in the absolute sense of the word, not inferior in the slightest degree, however superior in many points they may be, to those by which his name has become known all over the world. It is not considered out of place to have quoted at such length the sentiments and expressions of this gentleman, seeing that, owing to his position as an artist and art teacher, they are so intimately entwined with photographic progress in a certain and all-important direction, not to speak of the fact of illustrations, never previously exhibited in public, being accessible to every one present.

By unanimous request the fine pictures by Mr. H. P. Robinson, which received so much attention on the first day, were placed in the exhibition room, where they were examined at leisure with a degree of interest that would have gratified the artist had he been present.

Mr. Carvalho's scheme of a Universal or International Photographer's Association was brought under consideration, but it did not seem to meet with the active support which might have been expected.

Several papers bearing on the gelatino-bromide process were read, but not one of them possess sufficient interest to be worth reproduction in our columns. A large number of every-day matters of photographic practice were discussed at considerable length.

PHOTOGRAPHY IN AND OUT OF THE STUDIO.

GLAZING PHOTOGRAPHIC STUDIOS—A PHOTO-ELECTRIC BATTERY—PHOTOGRAPHY AND TRICYCLES—THE USE OF BALLOONS IN WAR.

Glazing Photographic Studios.—At the last exhibition of "Domestic Labour Saving Appliances" at the Agricultural Exhibition were shown specimens of glazing for conservatories and photographic studios which were of interest to the photographer, and especially to those photographers who contemplate building studios. By using the old form of glazing with putty, the photographer has to contend with a life-long trouble. A perfectly water-tight studio roof is, when putty is employed, an impossibility, and the annual expense of re-painting, to say nothing of damaged apparatus, carpet, oil-cloth, and accessories, amounts to something enormous in a few years' time. The sections of roof glazed without putty, shown at the Agricultural Hall by various makers, indicate that this annoyance and expense are by no means necessary, nor does it appear that the cost of the new methods is very much greater. The three systems which particularly attracted our attention were those of Messrs. Tracey and Sons, of Ilford, Mr. B. Warhurst, of 33, Highgate Road, and Mr. S. Deards, of Harlow. The method of the first-named consists in the employment of a metallic tubular sash-bar. The edges of the glass are inserted in metal tubes, which thus act as gutters to conduct any moisture which may find its way in. Messrs. Tracey claim for their system that the most inexperienced person can glaze a conservatory, hot-house, &c , in a few hours without the assistance of a glazier ; while the squares can be taken out and replaced by any labourer without the risk of damaging the house or breaking the glass. Mr. Warhurst also uses metal bars, but on a different principle from that employed by Messrs. Tracey. In this plan gutters are entirely discarded, and by the adoption of strong lead connections the metal is pressed sufficiently close to the glass to prevent the oozing of any moisture. There is also no overlapping of glass, and consequently no accumulation of dirt between the panes. There is this advantage also with the use of lead bars, that curved roofs can be constructed as easily as flat ones. Mr. Deards uses a metal arrangement, which, placed on a wooden sash-bar, clips the glass tight, and prevents any moisture finding its way in. Of these three methods, that of Mr. Warhurst seemed the most suitable for photographic studios, on account of its lightness and freedom from obstructions. Whether it is sufficiently strong to be used for a large surface is another matter. Studios are, however, no longer the wildernesses of glass which they once were, and for all ordinary purposes the lead sash-bar should serve. There are certainly advantages in the endurance of lead and the non-necessity of paint, which recommend its use. It is singular that no horticultural manufacturer has tried the plan of making glass roofs water-tight by means of strips of vulcanized india-rubber. Last year we described in the News a cheap and effective method which, in the hands of a friend, had answered admirably.

A Photo-Electric Battery.—A series of experiments has led a French chemist (M. Saur) to the construction of an electric battery which gives a current only when exposed to light. The battery, which is described in *l'Ingenieur*, consists of a square glass vessel, with a solution of 15 parts of marine salt and 7 of sulphate of copper in 100 of water. This has an electrode of sulphide of silver. An inner porous vessel with mercury has an electrode of platinum. The electrodes are connected with a galvanometer, and the battery is placed in a box with light excluded. Closure of the circuit displaces the needle, the sulphide of silver being the negative. When the needle is at rest, exposure of the battery to solar light causes further deflection, the extreme sensitiveness of the battery being shown by the fact that the passage of a cloud causes a variation. The effect of the battery is due to the mercury being attacked by the bichloride of copper formed by the mixture of marine salt and sulphate of copper. The protochloride of copper formed reduces the silver sulphide; but this reduction requires the intervention of solar light, which produces the photo-electric current. We do not know whether this photo-electric battery has been tried as a recorder of sunshine, but if it is as sensitive as represented, it should be of some value in this direction.

Photography and Tricycles.—In view of the number of machines now in the market, it would be well if some photographer who has had practical acquaintance with tricycling would publish some details of his experience. We are inclined to think that a machine made for speed is not necessarily the best to carry baggage. For instance, a good pace can be got out of a tricycle with small wheels speeded up but at the expense of muscle and endurance. It is doubtful, too, whether a front steerer, which most authorities say is the best for hill climbing, would not be found rather awkward when loaded. The Premier, an admirable machine in most respects, requires one almost to stand on the treadles when going up a hill that is at all steep; if not, it tips backwards, and the addition of a weight would, we fancy, increase the tendency. The unexpected lifting of the front wheel from the ground, though not productive of absolute danger, is somewhat trying to the nerves. Whatever machine he selected, the most important factor is to have efficient break power. The sensation of being shot off through the machine turning over when going down hill is not at all a pleasant one—as we can testify from experience; and if to grazed elbows and barked shins be added smashed negatives and a shattered camera, you will be doubly urged to use strong language against both the tricycle and its maker for the want of means to regulate the speed properly. It is an error to suppose tricycles cannot turn over. They can and do, but invariably through inexperience or carelessness on the part of the rider, and in nine cases out of ten by reason of inefficient brakes.

The Use of Balloons in War.—The objection to the use of balloons in war time always has been the possibility of the enemy firing at and disabling them to the certain death of the unfortunate occupant. Mr. A. Cooper Key writes to a daily paper suggesting a plan by which this risk could be obviated. He proposes that a small captive balloon, from which four cameras fixed to a square frame are suspended, should ascend to a given height—say half or three-quarters of a mile; the four lenses, previously focussed, must be towards the earth, and closed with instantaneous shutters, capable of being moved by galvanic battery, the wires from which could be carried by the rope which tethers the balloon, and the frame in which cameras are fixed should have facing plates at an angle of 45 deg., and be prominently painted in different coloured symbols which could be clearly read off from the field of observation. The officer in charge should be provided with a field glass, mariner's compass, and a sheet of paper with symbols painted to correspond with those on the camera frame, so as to note the position of balloon the instant contact is made by means of the battery. Thus, when the balloon is brought to earth, the exact situation in which the photograph was taken can be ascertained.

By-the-Bye.

CONTINENTAL RAMBLES WITH THE CAMERA.

The Pyrenees.

There are two reasons why the tourist and the tourist-photographer are rarely found in the Pyrenees. The district is somewhat more distant than other playgrounds of Europe, and there is a wide-spread belief—certainly founded on fact—that the Pyrenean spas and spots of interest on the confines of France and Spain are expensive places. We are not going to deny this, but, despite the remoteness of the country and its costliness, we may state at the outset that we ourselves spent a month in the district, travelling, indeed, as far as Vittoria, to get a peep at Spain into the bargain, at a total cost of less than twenty pounds. That the journey cost us some fatigue as well—for third-class trains are very slow, both in France and in Spain—we readily admit; but, then, who would not undergo some little hardship to see the mighty forest-clad ranges, the snowy Vignemale and Maladetta, let alone the picturesque natives in their "berret" caps, broad red sashes, and white stockings, and the coquettish black-eyed maidens to be found on the borders of Don Quixote's country?

The way lies through Paris and Bordeaux, and at the latter town you may purchase a railway ticket, that makes the tour of much of the Pyrenean district, at seventy-five francs first class, and fifty, second class; but this ticket, naturally, only takes you into central spots, and, to get among the mountains, you must rely upon your legs, or hire a trap. The roads of the Pyrenees, we may here state, are very perfect of their kind—smooth and well paved; they pass through the most charming scenery of cliff and woodland, at times constituting a terrace-like promenade in face of a delightful out-look. Our journey was made on foot, with the knapsack, and so little is this mode of travelling understood, that, as often as not, you are taken for a pedlar. On one occasion, in the Val d'Ossau, we had thrown off the pack in front of a little auberge, the better to enjoy some red wine we had ordered. The landlady, after watching for some time, and mistaking our leisure for a hesitation to exhibit what we had in the knapsack, called out, by way of encouragement, "Eh, bien; qu'est que vous avez à vendre?"

One of the best starting points to visit the Pyrenees is Pau, journeying thence by diligence to Oléron at the foot of the valley of the Aspe, or Val d'Asaspe, as it is sometimes called. Oléron is a quaint town, where the camera may at once be brought into requisition, for it is one of those old-fashioned remote places where progress does not travel so fast as in big cities. Oléron, in fact, is a very good example of a Pyrenean town, and its streets and public buildings will make many an interesting picture. You may get into Spain by following the sequestered valley to its head, but the international traffic is not enough to wake up sleepy Oléron ; indeed, the road terminates at Urdos, and afterwards it is only a craggy ill-kept mule-path that leads over the border. A few miles beyond Oléron all traces of town-life vanish, and soon after the village of Asaspe is passed the lavish beauties of the valley become apparent. On both sides of the way are dense hedges of box, and upon the slopes on either side, which become more precipitous as we advance, are green fields in which the hay-makers are busy at work. It is not, however, till we cross the Gave, or stream, at the Pont d'Escot, that the most romantic part is reached, the mountains suddenly closing in upon you. In some places there is scarcely space for the road and the bright green torrent that runs beside it, so narrow is the defile, and the eye rests enchanted with the picturesque gorge that stretches many miles in front. The steep hill-sides present one vast expanse of soft green verdure, of various shades and tints, lawn-like meadows and cultivated fields being separated by hedges of leafy foliage. Not a barren spot, or a grey rock or boulder, is visible on the mountain side to mar the soft and peaceful aspect of the scene, which might be called with truth the Emerald Valley.

Presently the defile widens again, and we reach the busy little village of Sarance, the violet bloom of sunset making the cottages bright and splendrous with colour. It is a pretty sight of an evening to see the peasants hereabouts fetching water from a neighbouring rivulet, and carrying it away on their heads in tall wooden vessels, broader at the bottom somewhat than at the top, to allow of their being easily balanced. In most places it falls to the lot of the women to perform the office of water-carrier, but here it is the men of the household who do the duty. They set down their vessels, so white and clean as to be a marvel of scrubbing, at a spot where the little stream runs bright and clear over the pebbles, and proceed to bale the water into their tubs by means of bright copper ladles. The ladles are polished and rubbed till they shine like burnished gold, and the pure cold water is altogether treated with the most laudable care, to prevent contamination. At first we are under the impression that a party of water-carrying peasants, whom we meet, are on their way from the dairy with the milk-white utensils deftly poised upon their heads, and accordingly stop one of the men to beg a drink ; and great is our disappointment to be offered, instead of a sup of new milk, nothing but cold water, although we cannot resist the tempation of taking a sip from the golden ladle held out by the friendly hand.

The Pyrenees has not been photographed, like other mountainous districts, and even in the collection we have seen, no picture of the beautiful Val d'Aspe is included. The Pont d'Escot is one of the best points the photographer can select for a picture, and a second view may be secured above Sarance. Bédous, the next village, is rather dirty, and situated in the sole of the valley, where this is not so picturesque. But Bédous is a convenient halting place for the night, whence the rival valley, the Val d'Ossau, can be reached. It is a five hours' walk to reach the top of the col that separates the valleys, and the spa of the Eaux Chaudes is two hours further. Crossing the grassy peak, a charming glimpse of snow and forest scenery is before you, while on your lofty path, when other vegetation has ceased, may be gathered the red Alp rose, London pride, and the bright blue shepherd's looking-glass. The solitary Spanish shepherd and his dog we meet upon these lonely highlands deserve a few words to themselves, and a photographer nowadays, provided with gelatine plates, should not miss the chance of securing a photograph of the original aspect they present. He will have plenty of opportunities, for the type is to be met with throughout the Pyrenees. His swarthy figure seems covered with a sole garment, a big brown blanket with openings for the arms, quite a classic toga ; and instead of crook, he carries a long pole, at the end of which is a small spade or trowel, wherewith to dig up a bit of turf or earth to throw at an erring sheep. He precedes his flock, which is followed by a white dog, something like a Newfoundlander, but of more formidable proportions.

The hotels hereabouts—for we wish to make our paper as practical as we can—vary much in their prices and accommodation. In some parts the inns are homely and very reasonable, as in the case of the Val d'Aspe and that portion of the country between the valley and the Biscay coast ; in others, where fashionable spas exist, as at Eaux Bonnes and Eaux Chaudes, Cauterets, Luz, &c., the hotel charges are high, sometimes extortionate, but the accommodation is always of good character. Accordingly a pedestrian's expenses may vary from four to fourteen francs a day, if he travels continually across country without staying long in one place or another, and he can never estimate his day's expenses until he sees his night's quarters.

Eaux Chaudes—it takes its name from the warm springs here—makes a capital picture. It is not a village or even a hamlet, but a narrow defile or cleft in the rock in which a few houses are apparently firmly wedged. The mountain walls of the valley rise precipitately to a couple of thousand feet, and are not a hundred and fifty yards apart. The only difficulty in taking a photograph is how to display the full height of these cliffs ; as a matter of course, the lens must be raised above the centre of the camera, and if there is a swing-back, this must be adjusted with care.

Eaux Chaudes is a capital head-quarters for the tourist who wants to visit the wild scenery and magnificent torrents at the head of the valley, and a two days' excursion will take you to the primitive baths of Penticosa, situated up at the snow line in Spanish territory.

Eaux Bonnes, another spa, is close to Eaux Chaudes. This is a very fashionable place, and is filled with the élite of Paris in the season. There are fine gardens and pleasant promenades, together with easy mountain excursions in the neighbourhood. In fact, here you play at being at Switzerland ; the Parisian is not much of a mountaineer, but he likes to have his guide and his climbing suit, as if he were engaged on real hard work.

The guides, too, are a pretence. They know little of the district, and nothing of glaciers and crevasses. But as to costume and appearance they are perfect. Attired as if for the performance of an opera comique, with gorgeous red jackets and spotless white stockings, they invite visitors to avail themselves of their services in the most gentlemanly manner. Unfortunately, they are only men of promise, so far as their qualifications are concerned, and are not fitted for honest labour, any more than the theatrical costumes in which they are clad. One may safely trust oneself therefore in their hands, for they rarely venture off the beaten tract, and if they do, and lose their way, they are very frank about the matter.

"I beg pardon, sir, but do you happen to know where we are?" one of these guides is reported to have said on one occasion to his employer.

"That I certainly do not ; I was never here before!"

"Nor I either!" was the guide's unhesitating reply.

Frenchmen, as a rule, prefer to make their "ascents" on horseback rather than on foot ; and the guides we have mentioned are in reality horse-jobbers, rather than, as they are wont to describe themselves on their cards, and over their dwellings, "Guide de 1ère classe," "Chasseur des Izzards et des Ours," &c. No doubt chamois and bear are still to be found in the Pyrenees, but these Eaux Bonnes guides would make sorry hunters.

Another day's walk takes you to the valley of Argellez, over a steep col, whence a most charming view, when you once begin to descend, is secured of the valley below you.

It is the Val d'Arun you are looking at, and the tiny church and cluster of white cottages at your feet is the village of Arruns. If you can get a good photograph of this, you will have secured one of the most smiling features of the Pyrenees.

You may fancy you have gone back a couple of centuries as you lie lazily upon the grassy slope in the warm sun, and, half dozing the while, watch the objects passing along the road above you. Here come a couple of Spaniards with sunburnt faces and ragged beards, dressed in red berrets and sashes, white-stockinged and cross-gartered. Each carries a thing like a leg of mutton suspended from his shoulders, which turns out, as they come nearer, to be a skin of wine. The shaggy, picturesque characters come to a standstill, as a matter of course, on seeing travellers, and, in return for a coin or two, pour out some of the liquor into a travelling-cup, the red wine flowing out in a thin stream as soon as a wooden peg has been removed. Then labourers with agricultural tools of the most primitive kind pass by on their way to the village, and following them comes a cart drawn by oxen, such a one as our Anglo-Saxon ancestors might have used. It is a low wooden frame supported on wheels, which are simply wooden discs a foot in diameter, and altogether of the rudest aspect.

There is good accommodation at Argellez, and here we stop the night before proceeding on our way to Luz and Gavarni. (*To be continued.*)

PHOTOGRAPHING ONE-THOUSANDTH OF A GRAIN OF ARSENIC.

BY I. H. JENNINGS.

A few months ago Mr. Henry Carr sent me some micro-slides on which were deposited sublimates of ·001 grain and ·002 grain of arsenic, which had been obtained from definite solutions of arsenic; and he asked me if I could photograph them in a satisfactory manner, as he wished to have photographs of the whole deposit as seen under a low power, and also of a portion magnified 200 diameters. As I had been engaged in working with high powers upon diatoms for some time, and had obtained some very fair photographs of these difficult subjects, I had no hesitation in trying the crystals of arsenic. At first sight they appeared rather unpromising subjects for photography. In the centre of each slide was a misty-looking circular deposit of arsenious acid, about a quarter of an inch in diameter, looking like a film of moisture, and presenting to the eye no appearance of crystals. Under a two-inch objective, which took in most of the circle, one could discern tiny crystals, which were best seen by oblique light, but which were not defined properly by such a low power. I saw that I should have some difficulty in obtaining a satisfactory photograph of the whole area, for the nature of the object was such as to test the definition of the lens to the utmost, as well as its flatness of field. Added to this, a strong light at once "drowned" the transparent crystals; yet, without a strong light, it is almost impossible to work microscopic photography. Yellow or artificial light, which I always use, is so non-actinic, that, when transmitted too obliquely, or much modified, a thin washed-out negative alone is obtained. So I concluded that a rapid exposure with a strong illumination would be necessary to give the best results; and experiment proved this to be the case.

Under 250 to 400 diameters the crystals came out well; their forms, regular octahedrons, were clearly defined; and no unusual difficulty should be experienced in photographing them with a $\frac{1}{5}$-inch or $\frac{1}{8}$-inch objective. Viewed either by oblique, transmitted, or by reflected light, the crystals formed beautiful objects.

When I had made a complete examination of the slides, it occurred to me how useful, in certain cases, photography might be in quantitative analysis. The microscope has frequently done good service to the analyst; by its aid in discerning minute crystallized forms and chemical reactions invisible to the unaided eye, important facts have been revealed or confirmed; in qualitative analysis, the microscope has been invaluable, and the aid of the draughtsman has often been called in to give a record of permanence to certain results gained by its use—a record too often marred and nullified either by the inventive imagination or the lack of brains on the part of the limner. If photography could be successfully applied to record the results of a qualitative analysis, a step would be gained. But quantitative analysis is a different affair; no one at first sight would think the thing practicable.

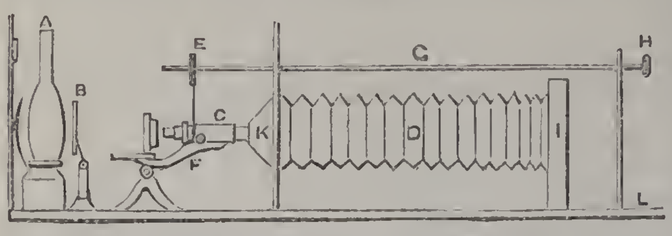
The results of my operations proved the truth of my conclusions. The slides which Mr. Carr had sent me were about twelve in number. On some were deposits of ·001 grain of arsenic, and on others ·002 grain. Under 250 diameters the difference between the two kinds of deposit was clearly marked. Taking up slides at random, and placing them on the stage of the microscope, after a little practice, one could not mistake the ·001 grain deposits for the ·002 grain deposits. On the ·002 grain slides the crystals were either much larger than the crystals on the ·001 slides, and more numerous, or, if the deposit of ·002 grain were a fine one, the crystals were crowded together thickly in the $\frac{3}{8}$-inch circle, presenting a strongly marked contrast to any of the ·001 grain deposits, in which the crystals were but sparsely distributed.

Now, in the photographs obtained, this difference is as clearly marked on the micro slides—perhaps more so. The photographs of the whole area of deposit, although neither attractive nor striking to the eye—being merely minute points, more or less thick, in a white circle—I consider of value for comparison; but those of a part of the deposit, as seen under a power of 300 to 400 diameters would probably be most useful. In these, the crystalline form of the arsenic crystals is clearly shown, while the amount of the deposit, whether ·001 grain, or ·002 grain, cannot be mistaken. Experience in photographing a number of these slides has shown me that no matter what portion of any deposit on any slide may be photographed, it is an easy matter to state at once whether the photograph be taken from a ·001 grain or ·002 grain deposit of arsenic. The forms of the crystals prove the deposit to be arsenic, while their number or size shows the quantity in a most unmistakable manner.

Doubtless, photographs taken from standard slides, such as these, would be of immense use to chemists and others in estimating the amount of arsenic obtained from an analysis. There are many chemists who rarely have to perform an analysis of any sort, and such would find themselves considerably aided by having recourse to reliable photographs, if they were required to pronounce an opinion on the quantity of arsenic contained in a wall-paper or fabric; while experienced analysts would often find it of use to call in the aid of photography to make a permanent record of an analysis, and in a mode that cannot be called in question—a mode in which imagination and the erring pencil have no part.

How far chemists may be disposed to use photography as a regular tool is a matter that time will decide; but there can be no doubt of the advantage to be gained from it. Suppose, for instance, that a chemist is called upon to prove that a poison (say arsenic) has been found to exist where it ought not; it would be inconvenient, to say the least, in most cases, to demonstrate the fact with microscope and slides, nor can everyone see and understand what the instrument reveals. But what difficulty would there be with photographs? They would be easily procured and easily carried about. Magnified 200 to 400 diameters, the forms of the crystals, and their quantity, could easily be seen and understood by anyone. The difference between a proper and improper quantity of arsenic in a dye could be pointed out to the most untechnical mind, and the photographs would most decidedly form evidence far weightier than any given by mere word of mouth.

To those unacquainted with the methods pursued in photographing minute objects, I may say that the microscope takes the place of the ordinary photographic lens; it is fitted to the front of a camera, and the image of the



A, lamp with reflector; B, bull's-eye condenser; C, microscope; D, camera; E, focussing wheel, attached to fine adjustment, F; G, focussing rod; H, milled-head, moving focussing rod, G; I, holder for dark slide; K, velvet hood to exclude light; L, base-board of camera.

object is thrown on the ground glass, this image being focussed by some motion of the microscope body. Motion of the camera is used only for the purpose of enlarging or diminishing the image.

I shall now describe the modes I employ usually in practising photo-micrography.

1. As to apparatus. Opinion is divided as to whether the eye-piece of the microscope should be used or not in photography. From my own experience, as well as that of several fellow-workers, I have come to the conclusion that while stronger illumination is gained without the eye-piece, the definition is not one whit better, while one has all the inconvenience which working with a long camera entails. My own practice, therefore, is to use the eye-piece with all lenses up to $\frac{1}{5}$ inch, and to omit it only with the higher powers, simply on account of the loss of light caused by its use, and the consequent long exposure required. Nevertheless, two of the best photographs that I have obtained with a $\frac{1}{16}$ inch objective were done with the eye-piece in place.

During the past winter, as I was engaged in photographing a number of diatoms, mostly new species, many of which were very small and finely marked, I constructed a special camera for working with high powers, which I have found very useful in all kinds of photo-micrographic work. A bellows body extending from about seven inches when closed, to about six feet when open, was made. The camera front is pierced with an aperture for the eyepiece of the microscope, and is fitted with a black hood for the more perfect exclusion of stray light rays. As the focussing is not performed by moving the camera, no rackwork was required, for it is only necessary to draw out the bellows by hand to any given distance to gain the desired enlargement; while the focussing, which is a delicate matter with high powers, is effected as follows. Along the top of the bellows body runs a brass rod, the extremity next the microscope carries a small wheel, and this is connected with the fine adjustment of the microscope by a narrow tape band; by first getting an approximate focus by means of the coarse adjustment, the final exact focus is easily obtained by gently turning the brass rod.

There has been much talk about the difficulty occasioned by the non-coincidence of the visual and actinic foci of microscopic objectives; but of this matter, practically, I know nothing. I have taken a good many hundred negatives of various subjects, using objectives chiefly by Swift, but also lenses by Ross, Zeiss, and Seibert, varying from five inches to $\frac{1}{16}$ inch focus, and I have never found it necessary to make any allowance. All I do is to obtain as sharp a visual focus as I possibly can; the results prove that the sharpness of outline and delicacy of detail in the best photographs produced in this way cannot be excelled. All the lenses that I use are of the most recent make, and slightly under-corrected, which would explain why no allowance for actinic focus is requisite. A lens that requires this allowance to be made must be a nuisance.

2. *Illumination.*—The illumination I generally prefer is that given by a broad-wick paraffin lamp (it matters not whether single, double, or triple); but I generally prefer a broad-wick duplex for all powers from five inches to $\frac{2}{3}$ inch. For $\frac{1}{12}$ inch and $\frac{1}{16}$ inch objectives, a good magic lantern will give the best results. Paraffin, unfortunately, varies much in light-giving powers, and bad samples are often dangerously explosive in a heated lamp; but, poor as it may be at times, it is far better than the uncertain flickering sunlight that we are usually favoured with. For low powers, I desire nothing better than a good paraffin lamp. When photographing the crystals of arsenic, I found I had too much light from my duplex, which fairly drowned the tiny crystals. Fortunately, I numbered amongst my apparatus an aperture shutter, which had very kindly been presented to me by its inventor, Mr. G. E. Davis. As this little piece of apparatus has been figured in the Photographic News, I need not now describe it; but I may mention, in passing, that some months ago I suggested to the inventor the adaptation of the aperture shutter to photographic lenses, in lieu of at least rotating diaphragms; but Mr. Davis did not agree with me that it would present any advantage over the diaphragms now in use. The object which Mr. Davis wished to attain by the use of his shutter was to give increased penetration to wide-angle objectives. This it does in a marvellous manner; and although I used it at first in photography chiefly as a light modifier, I found with the arsenic crystals, which severely tested the flatness of field of the objective, that I could only get the whole field in proper focus by using a suitable contraction of the aperture shutter. Some of the crystals would vary in size so considerably that, while I had the apex of a large crystal in good focus with a low angle $\frac{1}{5}$ inch, the smaller crystals in the field were completely blurred. Now, although the shutter is not supposed to be required with low-angle lenses, I found it invaluable in more cases than one.

For focussing, I find a fine ground-glass screen the best for all the lower powers; while for $\frac{1}{12}$ inch and $\frac{1}{16}$ inch objectives I always focus on plain glass, and examine the image with a Ramsden eye-piece. By this means there is no difficulty in obtaining an absolutely sharp focus.

3. *Exposures.*—This is one of the most uncertain and difficult matters in photo-micrography. Landscape photographers know how much judgment is required at times to estimate the correct exposure for varying light and subject; but in microscopic photography the difficulty is far greater. Only constant practice, using the *same* lenses, can make one expert in judging the time necessary for any given subject. With a five-inch, three-inch, or two-inch lens, and a moderately transparent subject, one or two seconds may be sufficient; while with the same powers, and a dark or thick rock-section as subject, half-an-hour may not be too much. Generally, I judge the exposure principally by the appearance of the image on the screen, and find I am usually correct with all the lower powers; but each lens must be carefully tested before it is brought into use for good work. High powers, owing chiefly to their small aperture, require much longer exposures than lenses of low power. Thus, with the camera extended four or five feet, as much as forty minutes may be necessary for a $\frac{1}{16}$ inch objective; but this inconvenient length may be much curtailed by a proper concentration of the light. Frequently I use magnesium ribbon, which is of great use with the higher powers, or where photographing very opaque objects, and find it almost as rapid as daylight. It gives splendidly dense negatives, but it is rather difficult to concentrate the light upon the exact point required. As I have not a lamp for the ribbon, I burn it in a holder, protruding about half-an-inch of ribbon at a time, and igniting it by a small spirit lamp. As each length is consumed, a fresh portion is thrust through, until sufficient flashes are given. Using a $\frac{1}{16}$ inch objective, and having a diatom as subject, I find from six to nine flashes sufficient.

With the arsenic crystals, one or two flashes were enough, using a $\frac{1}{5}$ inch lens; but all my best negatives were taken with the duplex lamp, *broad* side of flame towards the slide, and giving one minute or one minute and a-half.

The actual *modus operandi* followed with the arsenic crystals was as follows:—The slide of arsenic is placed on the stage of the microscope, and the crystals are brought into good focus; the stage is then moved about until a spot is found on the deposit, showing an average distribution of crystals, when the slide is clamped firmly, and the microscope is brought to a horizontal position. It is then fitted to the camera, and the velvet hood is fastened round the eye-piece by an elastic band. After this, the light of the lamp may be concentrated by means of a bull's-eye lens upon the slide; but I find it best to do this before attaching the microscope to the camera, as then the proper direction of the light can be more easily attained. This done, the camera front can be drawn forward and attached to the microscope, when the screen will be found to be fully illuminated.

I never use an achromatic condenser, even for high powers. It is advantageous to place before the lamp a large square of cardboard, preferably blackened, with a hole cut through the centre for the light to pass through. If some precaution of this nature be not taken, the heat from the lamp causes the expansion of the metal of the microscope, which will throw the objects out of focus. It is always best, when setting up the apparatus, to light the lamp, and leave the whole undisturbed for half-an-hour, to allow for expansion; in this way spoiling of plates from this cause can be avoided. It is an instructive experiment to focus an object with a high power correctly on the screen, and watch the image gradually grow dim through the expansion of the metal parts of the apparatus.

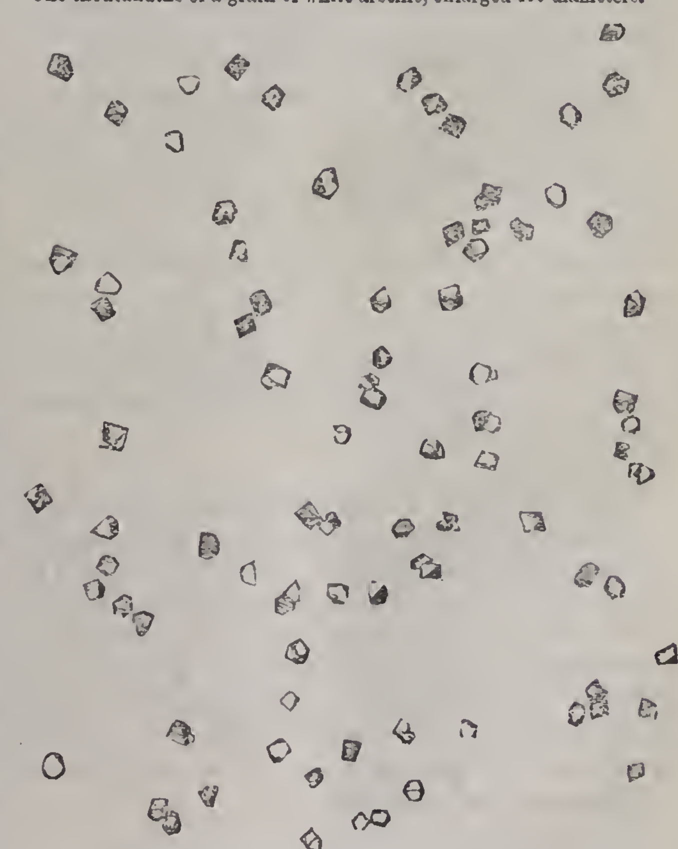
When sufficient time has been allowed for the apparatus to get warm, the coarse adjustment of the microscope, if within reach, is moved, so as to bring the object in focus; if it be too far from the hand, this must be done by the fine adjustment rod running along the top of the camera. If further enlargement be required, the camera is drawn out until the desired magnification is attained, when the slide must again be focussed on the screen. Then the light must be shut out, either by a screen in front of the lamp, or by a card fitting in front of the objective, or stage, as may suit best. The dark slide carrying the dry plate is then introduced into the camera, and the shutter drawn out. After waiting a few moments to allow all vibration to cease, the card is withdrawn from before the lamp, and the time of exposure marked. If several plates are to be exposed successively, the lamp must not be turned down between each exposure, or the alternate expansion and contraction of the apparatus will ruin good definition. When sufficient exposure is given, the light is again shut out, and the plate taken away to the developing room.

Now as to development. Photo-micrographic negatives require somewhat different treatment from ordinary negatives. As a rule, the image is a long time in making its appearance, no matter what developer is used, and comes out looking very much like an under-exposed plate. Patience and skill are often required to make a printable negative, especially if the operator have—as he should have—a wholesome horror of intensification. Ferrous oxalate is not well adapted for microscopic photography. The best developer, most decidedly, is Mr. Berkeley's sulpho-pyrogallol, if care be taken that the sodium sulphite is really neutral; or, if not, to make it so. Prolonged development being the rule in this work, the value of the sulphite developer cannot be over-estimated. Properly made, this developer does not slow the development, but allows all detail to be gradually brought out, without giving undue density.

I have used many makes of dry plates, and have got good results with all but one. Soft gelatine will not do for photo-micrography. It never gives the delicacy of detail that can be got from a good hard film, and prolonged development frequently brings on frilling. Latterly I have used the plates of Messrs. Mayfield, of this town, and find them all that can be desired for good qualities in microscopic work.

The woodcuts are taken from my photographs of ·001

One thousandths of a grain of white arsenic, enlarged 400 diameters.



Two thousandths of a grain of white arsenic, enlarged 400 diameters.

grain and ·002 grain deposits of arsenic. Each one gives about $\frac{1}{10}$ of the whole deposit, or roughly, the $\frac{1}{10000}$ or $\frac{2}{10000}$ of a grain. Much smaller quantities could easily be photographed by using higher powers.

Notes.

The late Mr. Fitz-Gibbon, the editor of the *St. Louis Practical Photographer*, was, it seems, born in London.

We have to acknowledge the receipt of the medal awarded to us last year by the Vienna Photographic Society for our Year-Book of Photography. It is a novelty in exhibitions to have a section for photographic publications, but one about which we are far from complaining.

Coblence has been chosen as the meeting-place next year for the German Photographic Association; and since it is situated on the Rhine, and easily got-at-able from England, it is not improbable that British photographers may give their presence to the gathering, which annually grows in importance.

Major Waterhouse has been busy at his photo-lithographic establishment at Calcutta producing maps for the Indian Contingent, now in Egypt. An army cannot move now-a-days without good maps and plans, and it has been the aim of the Indian Government to supply every British officer with a copy. Hence the services of Major Waterhouse's establishment has been largely drawn upon. "We have been hard at work making maps of Egypt," he writes us. "Easy work making maps now-a-days with the camera; but you must first catch your map, and maps of Egypt are scarce. However, we had some foreign maps, provided in anticipation of an emergency, and with English and French charts of Alexandria, Suez, and Suez Canal, we have managed very well." It is likely, indeed, that our army at this moment knows more about Egypt than do the Egyptians themselves, thanks to photo-lithography.

This week we bring our "Continental Rambles with a Camera" to an end with a short description of the Pyrenees. Next year we propose to describe some of the best-known European passes—the Stelvio, the Simplon, the Splügen, the Maloja, &c.—which present many interesting subjects to the tourist photographer.

Books illustrated by photography hang fire; one reason for this we discovered the other day, when we happened to be in Taunton, in Somersetshire. In the coffee-room of the hotel—next door, by the way, to Messrs. Chaffin's studio—was the *Illustrated Guide for Tourists*, and, as a tourist, we naturally turned to it for information. It told you where to purchase a hat at Brighton, and informed you on the subject of tradesmen in Warwick; but about Somerset and Devon it contained not a syllable. But it was illustrated by photography, and this is how.

In the Contents it told of four pictures; as a fact, we found but three—three dull, pigmy Woodburytypes. The first was Warwick Castle, the pigments of which had "run;" in a word, it was a spoilt print that ought never to have been issued, the lines being all swollen and unsharp. The second picture was that of a huge soot-beaten building of brick—"Washington Works, Sheffield"; the bleak, inhospitable walls, with not a soul near them, exhibited the most depressing, forsaken, wet-Sunday look it has ever been our lot to look upon. And yet it was considered an appropriate sketch for an *Illustrated Guide for Tourists!* The last picture, the best of a bad lot, was Shakepeare's birthplace; but here the quaint, old-fashioned house was much marred by the presence in the foreground of two young gentlemen dressed in modern town-cut suits. No wonder books illustrated by photography are not eagerly sought for.

Intending competitors at the Edinburgh Photographic Society's International Exhibition should remember that pictures, carriage paid, must reach Mr. J. M. Turnbull, 19, St. David Street, Edinburgh, by the 30th September. The conditions, which were published in our columns on the 10th of March, may be had on application to the secretary.

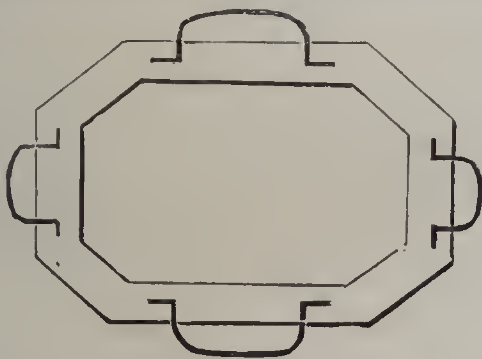
A photograph of a *Navicula Lyra*, taken with a $\frac{1}{16}$ immersion Siebert, and enlarged to the extent of 900 diameters, is a remarkable specimen of microscopic work sent to us by Mr. Jennings, of Nottingham, and the precaution which must be exercised in connection with the kind of work is well illustrated by the circumstance that if any considerable variation takes place in the size of flame used as a source of light, the definition of the resulting picture suffers, owing to the expansion or contraction of the brass work of the microscope. The above-mentioned gentleman says:—"It is an instructive experiment to focus an object with a high power correctly on the screen, and watch the image grow gradually dim through the expansion of the metal parts of the apparatus." All our readers should study Mr. Jennings' paper, as it embodies many points of interest to the general photographer.

The *Novelty*, the new theatre we have heard so much of lately, that is to have a photographic studio next the foyer, where portraits may be taken during the *entr'acte*, is to be opened next month. The photography will be done by the electric light, and the idea is that ladies and gentlemen attending the theatre will embrace the opportunity of being depicted in evening dress. Certainly few portraits are taken now-a-days in this costume.

The power of photography to confer popularity is very well understood. Some knowing ones in Constantinople have flooded the market with portraits of Arabi in order to create a diversion in favour of the rebel minister; but the step has not prospered very well, it seems, for, according to the *Daily News*, the Turkish police have seized and confiscated a great number of the photographs on sale in the shops. At the time of the downfall of President Macmahon, when the star of the late Prince Imperial was believed to be in the ascendant, some hundreds of thousands of the latter's portrait were sent into France to increase his popularity.

It is, perhaps, hardly in the power of any one firm of photographers in this country to render a man or woman popular by exhibiting portraits, in the same way as any lady whom Millais chooses to paint is said to become famous; but there is little doubt that if we had in Great Britain a syndicate of photographers, and such syndicate were to be of one mind about making a personage popular, this could well be done were the step worth while. As it is, we repeat, photography is already a power that politicians, patriots, play-actors, professional beauties, and others well understand.

Mr. Cowan's simple plate-holder is not so well known as it should be. While many photographers have been employing it for weeks past, others have never heard of it. It not only permits you to keep your fingers out of the developer—a matter of some moment to all who employ a pyrogallic solution—but it allows one to raise the negative out of the bath with ease, avoiding the sucking action of the developer which is so annoying. Here is a sketch of it.



Any tinman will make the apparatus for you. It should be constructed the size of your plate. The handles are of tinned iron wire, simply soldered on, and the cost of an eighth-inch holder would probably be a shilling. Tinned iron wire is used to prevent rust. The plate to be developed is placed upon the holder, and this is then put into the bath. After using, the holder should be rinsed in water and placed to drain.

One cannot dwell too much upon the importance of having the bromide solution convenient to hand in order to check development. The best plan we know is to have the solution in a corked bottle, a small wedge-shaped cut being made in the cork to allow the exit of the liquid. The cut should be so made that two or three drops only fall when the bottle is tilted, but when shaken with a jerk, a little stream is expelled. In a word, the bromide bottle cannot be better regulated than the well-known vinegar castor of the oyster-room.

Another hint for the dark-room is worth setting down. A ruby window alone cannot, as everybody knows, be relied upon in developing gelatine plates; but with a blind in front of stout yellow tammy, there is little fear of fog. Supposing you have the yellow fabric, you may fit up a most practical curtain of this sort for sixpence, by purchasing one of the American spring blinds, which, with roller complete, may be bought for this sum. The best of the American blind is that it is easily adjusted to any height, and requires only one hand.

"During this excursion I have exposed no less than three-quarters of a hundredweight of plates," writes a friend. The hundredweight is a unit of photographic work not quite calculated to comfort those who are just beginning to congratulate themselves on being released from the heavy burdens of wet plate operations afield.

Patent Intelligence.

Applications for Letters Patent.

4256. William Henry Reynell Toye, of Philadelphia, in the United States of America, and at present of 68, Fleet Street, in the city of London, for an invention of "Improvements in ornamenting or decorating glass, metals, and other materials or fabrics, and in means and apparatus to be employed therein."—Dated 7th September, 1882.

Grants of Provisional Protection.

3889. Edmund Edwards, of the firm of Edwards and Co., Patent Agents and Engineers, of 40, Southampton Buildings, Chancery Lane, in the county of Middlesex, for an invention of "Improvements in photographic cameras."—A communication to him from abroad by Paul Rouaix, of Paris, in the republic of France.—Dated 15th August, 1882.

Patents Sealed.

2403. Philip Middleton Justice, of 14, Southampton Buildings, in the county of Middlesex, Patent Agent, for an invention of "Improvements in frames employed for printing photographs, especially adapted for direct photography or 'blue printing.'"—A communication to him from abroad by George Stockton Street, of the town of Moncton, in the province of New Brunswick, in the dominion of Canada.—Dated 22nd May, 1882.

Patents Void through Non-payment of Duties.

3050. Henry Loewenberg, of Charlottenburg, near Berlin, in the empire of Germany, but at present of 20, Southampton Buildings, Chancery Lane, in the county of Middlesex, for an invention of "Improvements in apparatus for coating fabrics with gelatinous compounds for the production of imitation leather, fabrics, wood, and other embossed or figured surfaces."—Dated 31st August, 1875.

JUBILEE MEETING OF THE ROYAL CORNWALL POLYTECHNIC SOCIETY.

[from a correspondent.]

For the town of Falmouth, September 5th was a red-letter day, owing to the 50th Annual Exhibition of The Royal Cornwall Polytechnic Society. The doors opened at noon, and the President's opening address was given at one o'clock p.m., by the Rev. Canon Rogers, M.A. (President). The hall was well filled with members and visitors, and there was scarcely standing room in any part, the platform being occupied by gentlemen of eminence in science and art. Among those present at the opening were Sir John St. Aubyn, Bart., M.P.; Lady Elizabeth St. Aubyn; C. C. Ross, M.P.; Rev. Sir Vyell Vyvyan, Bart.; Colonel Tremayne; Mr. A. Pendarves Vivian, M.P.; Mr. Wm. St. Aubyn, M.P.; Rev. H. A. Molesworth St. Aubyn; Admiral Borlase; General Aylmer; Professor Couch Adams, F.R.S.; W. Grylls Adams, F.R.S.; R. Taylor, F.G.S.; T. S. Bolitho, Esq.; Dr. Jago, F.R.S.; R. N. Worth, F.G.S.; W. Brooks; G. M. Whipple, B.Sc., F.M.S.; J. Laughrin, F.L.S.; E. Kitto (the Secretary), and a host of others too numerous to mention.

The galleries, as usual, were devoted to the oil and water-colour paintings, the body of the hall to works of art, &c., and the large committee room to the exhibition of photographs. The President commenced by saying that he congratulated the Society on the continued energy displayed by the various sub-committees which had been formed for the Jubilee Exhibition, and the way they had fulfilled their duty. So far as he knew, they had stuck to their work, into which they had thrown their whole hearts. In consequence of that he had to congratulate the committee on the success which had attended their efforts, the result of which was now to be seen in an exhibition which they might safely say was surpassed in no former year in general excellence and in the number and general quality of the exhibits. He further congratulated them on having a gathering which, as far as he could see, resembled some of the old gatherings of former years, when the country came forward to support the Society with one heart.

The President then referred to the various departments of the exhibition. In the art department especially—the photographic—there was no particularly new process, but he believed the display was second to none out of London, through the instrumentality of one of their members (Mr. W. Brooks), who had worked hard for the Society on many occasions, and this year the display was the largest the Society had ever had. He must not pass over this department without mentioning one or two of the exhibits—viz., the exhibits of Mr. King of the private apartments of Her Majesty the Queen, being a series of transparencies which were perfect gems of photographic art. Then, again, there were some of the finest specimens of floral photography, by Mr. H. Stevens, which were very fine and artistically arranged. There was also a curious as well as an interesting photograph taken from the car of a balloon of the earth at an altitude of 2,000 feet, and he was told that it was the only successful one that had ever been taken—this was by Mr. C. V. Shadbolt—and some careful instantaneous studies by Mr. S. P. Jackson, the eminent water-colour artist.

In the loan collection were some very interesting exhibits of examples of the early processes of photography. There was an interesting collection of early Daguerreotypes, and an album of calotype prints and negatives—in it was one by Fox Talbot himself. There were also two specimens by Dr. Huggins, F.R.S., of stellar spectrum photography, which he had kindly lent; and he would finish his remarks by mentioning a series of early collodion negatives, taken by the inventor, Mr. Scott Archer. These were of very great interest from an historical point of view; but when Mr. Brooks gave his lecture, "The Rise and Progress of Photography," he would fully explain and enter into all the exhibits, as he knew more about them than he did. I must not omit to mention the presence of a certain lady who was on the platform, Miss A. M. Fox, the founder of the Society. On the mention of her name rounds of applause were given.

After the address several appropriate speeches were made by several gentlemen, when most of the company adjourned to the Royal Hotel, where about one hundred or more sat down to a capital luncheon. After the usual loyal toasts, the health of the founder of the Society was proposed, which, after being responded to, was succeeded by ringing cheers.

Thus ended the opening ceremony of the Jubilee of the Royal Cornwall Polytechnic Society of 1882.

ROYAL CORNWALL POLYTECHNIC JUBILEE EXHIBITION, 1882.

JUDGES' REPORT.

Section 1.—Professional Photography.

THE judges have great pleasure in being able to congratulate the Society on the unprecedented success of this year's display in this department. The number of exhibits far exceed those of previous years; and it has been with very great difficulty that the judges have been able to make the awards, as general excellence in all the exhibits is very marked. In previous years a great deal of inferior work used to form a large part of the display, with a few of great excellence, which contrasted greatly with the former. The days of want of judgment and slovenly manipulation happily seems to have passed, and, in many instances, the composition in productions of the higher branches of photography seems as good as, if not quite equal to, the work of well-known artists of the brush and pencil.

Mr. Julius A. Kay exhibits three frames of photographs (Nos. 840, 1, 2), two of portraits of examples of panel work, which possess great merit, and a small picture, "Waiting for my Lady," which show clean and careful manipulation. Mr. W. D. Sanderson sends some very fine examples of large size of interiors, and the chancel of Durham Cathedral (No. 850) has been awarded a first bronze medal, and it is one of the finest examples of interior work exhibited. Mr. Harris sends a frame of capital instantaneous work, similar to those exhibited by him some time ago. Messrs. John Chaffin and Sons are well represented by five exhibits, the best of which is "Sisterly Intercession," and would suggest that if Messrs. Chaffin and Sons would not have the same figures in their pictures year after year, they would possess more interest. A. G. Fox sends a pair of enlargements. Mr. F. York is well represented by a large series of magic lantern slides, which are very fine indeed, for which he has been awarded a first bronze medal. T. Hillingworth has also been awarded a first bronze medal for an enlargement—"Nurse and Children." Mr. G. H. Dew has a very fine series of pictures; No. 873—"The Old Mill, Guy's Cliff"—being the best, is awarded the second silver medal. It is very soft, delicate, and artistically treated. Mr. A. L. Henderson, of London, sends one frame of instantaneous views, taken at the Alexandra Palace, which are fairly good; also a frame of views of the course on the Derby Day, and a frame of his well-known enamels. Mr. F. M. Sutcliffe sends some splendid examples of instantaneous studies and effect subjects, No. 834 frame being the best, and has been awarded a first bronze medal. Mr. Lyddel Sawyer is represented by one enlargement on opal, "Supplication," which is very fine. Mr. J. Hubbard also sends one, evidently a composition picture—"A Mother's Love," a cottage interior, with the mother kneeling beside a cradle. The composition is well carried out artistically, but is a little too hard in the high-lights. Mr. E. Gale, of Falmouth, is awarded a second bronze medal for an enlargement, "Wesley Chapel," which is very successful. He also sends several well-selected views, notably one of Falmouth (panoramic) is the best, but being printed in platinum, is somewhat cold and unsuitable; if it had been printed in silver, it would have left but little to be desired. Mr. F. Thurston has a nice enlargement, "Frosted Trees," which is very effective. E. Denny and Co. send a few frames of small work, principally children, "Katie's First Ride" being the best. A series of twelve transparencies, by Mr. H. N. King, of interiors of Windsor Castle, are exceedingly fine, and are the most attractive in the Exhibition, and carrying off the first silver medal. Mr. J. P. Gibson sends some excellent examples, which are very soft and brilliant. A curious photograph is also exhibited by the same exhibitor—a flash of lightning. Mr. J. M. McLanachan has two frames of portraits, which are well treated. Mr. H. P. Robinson, of Tunbridge Wells, sends some half-a-dozen frames, and it is a general opinion that they are far below the average of this artist's work, and the tones are black, cold, and heavy. E. Day and Sons have been awarded a second bronze medal for a small vignette study, "Infant Meditation," which is very artistic, and they also send several other very creditable contributions. Mr. J. Milman Brown has several good landscapes, which show a marked improvement over his former work. Mr. F. Argall has also made great improvement since last year, and for his study portrait—"The

Skipper"—he receives a first bronze medal, and we hope to see in the future more of his work. Mr. Hendry is again represented by some very good productions.

Section 2.—Amateurs.

Mr. Henry Stevens sends several frames of the finest examples of floral photography ever seen of orchids, and too much cannot be said in praise of the delicate rendering of the pale tints of the bloom, the general arrangement of all the specimens sent being simple, graceful, and artistic; he has been awarded the second silver medal. Mr. F. S. Schwabe's exhibits of Egyptian views are very interesting; also an Autotype enlargement of an Atlantic swell. Our old contributor, Mr. J. M. Brownrigg, is this year well represented, and would have been awarded a medal had it not been that his having received an award last year precluded him from receiving one this year; there is a marked improvement in his productions this year to his former ones.

Mr. Andrew Pringle, we are pleased to see, is better represented than he was last time he exhibited. He sends a frame of Scottish scenery, for which he receives a first bronze medal.

Mr. S. P. Jackson sends four frames of artists' studies, which are very fine as rough sketches (sea pieces) which are well chosen, and has been awarded a second bronze medal. Mr. C. V. Shadbolt sends a very curious and interesting photograph taken from a balloon at an altitude of 2,000 feet above the earth. Mr. A. B. Thom sends a few examples of the animals in the Zoo. Mr. F. Beesley, Junr., sends some pretty little bits, which are soft, delicate, and brilliant. Mr. A. J. Grant is again represented by some of his well-known studies (Arctic subjects), and also some studies of horses, which might be improved in the printing.

Mr. M. Whiting sends some interesting small work. Mr. J. G. Horsey is again an exhibitor; his work is larger than last year. Some of his subjects are exceedingly good; but if he exposed a little more, his work would be improved, and we hope to see this suggestion carried out by him.

Photographic Appliances.

Messrs. W. Watson and Sons, of London, send a very clever instantaneous shutter by Addenbrooke, with clockwork arrangement for timing the exposure. The principle seems excellent, but the means for attaching to the lens is somewhat defective, as it has to be held by one hand while it is discharged by a trigger arrangement with the other; but as this is only a matter of detail it can be easily perfected. An instantaneous snap shutter, by the same firm, is also neat and clever; they also send two excellent cameras with several little improvements. S. P. Jackson's improved shutter is far more compact in form than it was in its last year's form, which is exhibited by Mr. J. G. Collins, of London. Mawdsley's tripod stand, by the same exhibitor, is a very clever arrangement, but the legs would be difficult to slide in damp weather; at the same time it is a very great improvement on the old form of tripod. Mr. Henry Husband, of Bristol, has several exhibits, which are well worthy of notice—viz., an instantaneous shutter, improved stereoscope, portable camera, and a portable lantern for changing plates.

Photographic Loan Collection.

This department is greatly indebted to the contributors for the loan of various objects of interest. Mr. Howard Fox lends a good collection of early Daguerreotypes, which are very interesting. Mr. W. Brooks, of Reigate, sends several objects of interest—viz., photographs of the caves at Reigate, taken by artificial light some few years since, some early specimens of the morphia and collodio-bromide process, &c. The stellar spectrum negatives of Dr. Huggins, F.R.S, are very interesting. Mr. J. Nicholson's (of Reigate, Surrey) collection of early calotype prints are of very great interest; the album contains one picture by Fox Talbot himself. There are also some calotype negatives of interest.

The most important exhibition in this department is a series of positives and negatives by the collodion process, by Scott Archer himself, sent by Mr. T. Barnes, of London. The above will be fully entered into and fully explained by Mr. William Brooks in his lecture, "The Rise and Progress of Photography." Mr. W. E. Foxlee sends some curious examples of the continuating action of light in carbon printing, which will also be explained.

MR. JENNINGS' PHOTO-MICROGRAPHS OF ARSENIC CRYSTALS.

BY HENRY CARR.

The publication of Mr. Jennings' paper on photographing crystals of arsenic will naturally give rise to the question, What is the object in view?

Some four years ago my attention was particularly called to the injurious effect of arsenical wall-paper, and so important did the question appear that I was induced to seriously take the matter in hand, in order to see whether some prohibitory legislation might not be carried out in this country as on the Continent.

The course adopted was to send a circular to about forty of the leading medical men and chemists, requesting them to state their experience and to give their opinions. Replies were given with a cordiality which was surprising, when it is considered that the application came from a stranger. Some few who did not reply at first did so on a further application made by my friends, the late Dr. Alfred Taylor and Mr. Jabez Hogg. One medical man, a leading scientist, who put my first communication into the waste-paper basket, soon after was found to have re-papered his consulting-room with a paper highly arsenical. A serious attack of dysentery, brought on, as he was satisfied, by this arsenical paper, at once induced him to join in the crusade against these poisonous decorations.

The information thus obtained was embodied in my pamphlet, "Our Domestic Poisons," which attracted a certain amount of attention. Mr. Jabez Hogg took the question up, and communicated a paper to the Medical Society of London. This led to a committee of that Society being appointed, with Mr. Malcolm Morris, M.R.C.S., acting as hon. sec., and this committee again sent out a large number of circulars to medical men asking for information. Much was obtained, a singular fact being that a large proportion of the cases of injurious effects occurred in the families of medical men. The fact is, that the profession are not yet fully alive to the question; but when a case occurs at home, the facts are more forcibly brought under their notice.

It was desired to bring the arsenical question forward at the Society of Arts, and Mr. Malcolm Morris was requested to write a paper; but his engagements would not allow of his giving the requisite time. I therefore undertook it myself in a paper dealing with "Poisons in Domestic Fabrics in Relation to Trade and Art." This was read January 21st, 1880, and a committee of the Society of Arts was appointed to work in conjunction with the committee of the Medical Society of London. The committee of the Society of Arts has taken up more especially the question as to the amount of arsenic permissible as "accidental contamination too slight to be injurious," and the framing of a "standard test" for arsenic which shall discriminate between *injurious* and *non-injurious* quantities.

A common standard test is essential, otherwise chemists have no means of comparing their results, a complete quantitative analysis being out of the question. The determination of whether a material be arsenical or not, depends finally on the obtaining octahedral crystals from certain quantities of fabric; these crystals are obtained, deposited on a microscopic slide, and the quantity of arsenic is determined with sufficient accuracy by comparison with the crystals obtained from certain small known quantities of a definite solution of arsenic. Representation standards are thus obtained of ·001, ·002, ·003 grains of arsenic, the ·001 grain and the ·002 grain being given in the photographs which have been reproduced as wood-cuts in illustration of Mr. Jennings' paper. Photography enables us to exhibit the crystals from definite quantities, thus realising a permanent definite scale or gamut of arsenic by which any chemist may compare his results with the results obtained by others.

As the Society of Arts have not yet published their report, I am precluded from giving details, which otherwise might have been of interest.

One word on the medical view of the question if not out of place in the Photographic News. The ordinary symptoms are irritation of the mucus membrane, debility, headache, dry cough, &c., running on to serious or even fatal illness, in the case of the physician before alluded to, to most serious dysentery. Chronic poisoning by arsenic simulates many other diseases, but there generally are some marked differences—as, for instance, in one case, that of apparent bronchitis in a child. The paper and the dust of the room were both found to be arsenical; but the child recovered permanently on removal of the poisonous paper. There are great facilities for determining whether unfavourable symptoms arise from exposure to arsenical fabrics, recovery on removal, recurrence on return, and this repeatedly, with final cure on the arsenical paper being taken down. Physicists may with propriety enquire how it is that such minute quantities of arsenic breathed as dust —or, perhaps, as gas—produce effects on the system vastly more powerful than far larger quantities taken into the stomach.

STRIPPING THE NEGATIVE FILM.

It has often been a matter of surprise to us that the stripping of the negative film was not more commonly practised, especially when we consider how much more safe a valuable negative is in this condition, where neither changes of temperature are to be dreaded on the badly-annealed glass so often met with, nor a sudden loud crack on fastening down the printing-frame door tell us so plainly what had happened that we do not have to turn over the frame to see; nor a fall on to a stone-floor or any hard surface mean destruction to something over which we had toiled and triumphed. We repeat, that it has seemed somewhat strange that photographers should go on accumulating housefuls of negatives in a perishable form, when it is not only possible, but quite easy to do otherwise. This we say having particularly in mind the exigencies of the ordinary portrait business. But it is even more true for the landscape and business photographer, who would gladly preserve all that he makes, especially if has invested capital and time in travelling to secure certain subjects; and the immense advantage to this class of photographers of being able to transport negatives for unlimited distances without the risk of accident is too obvious for further mention.

The stripping of a film is by no means the difficult and dangerous thing that it may appear to be to those who have not given it a trial; and although the re-application of a stripped film to glass is a little more difficult, yet it also becomes very easy and certain after a few trials.

Let us give a few directions, then, how to proceed; and let us begin with the standard wet collodion film, presuming that it is desired to make a pellicle negative, and preserve it in this condition, and not to re-apply it to glass, full directions for which will be given further on.

No special attention need be given to the collodion, any good sample succeeding if properly managed.

The glass must be well cleaned; and here let us say that it will be well worth while to use a good quality of thin plate, for as each piece may be used over and over again, the expense will not be very great, and the ease with which such glass can be cleaned, and its fine regular surface, make it most desirable for this class of work. Let it be soaked over night in weak nitric acid, then well washed, and, after draining, wiped dry with a roll of Joseph paper, finishing off with a second roll moistened with alcohol. With a tough and contractile collodion it would be possible to proceed at once to making the negative, merely brushing off the surface with a good stiff duster; but it is safer and better either to polish the surface with powdered French chalk, or to apply a rubber substratum. The text-books contain numerous formulæ for preparing a solution of india-rubber, but it will be found that some care and attention become necessary if such a solution is to be used as a substratum—*i.e.*, to cover the whole surface of the glass previous to coating with collodion. The directions usually given are simply to cut up pure india-rubber* into small pieces, and dissolve it in benzine. In our hands this has proved quite unsuccessful; such a solution is easily prepared, and answers perfectly for edging dry plates, so as to prevent the lifting of the film at the corners; but if an attempt be made to coat the plate with it, it will run off in oily streaks, and, in short, it will be found impossible to get an even coating.

The best method of preparing an india-rubber solution for this purpose is to use rhigolene as the solvent; and if the gum should not dissolve freely, it may be moistened with chloroform and allowed to stand until swollen up before the rhigolene is added. Nothing more is required except filtration through paper, taking care to cover the funnel tightly with a flat glass plate, inasmuch as rhigolene is one of the most volatile fluids known; and it is to this property, in fact, that it owes its power of producing intense cold, being used by surgeons for local anæthesia in some of the lesser operations. The solution when prepared should be slightly opalescent and very thin; not more than a grain or two per ounce of india-rubber should be added, and any thickening of the solution by use made up for by dilution with rhigolene. The plates are to be coated with the solution just as if it was collodion, and set up in a rack to dry, which will be effected in a few seconds. Plates so coated should be used within forty-eight hours, for the rubber film becomes brittle and loses its elasticity if kept longer.

Another method of preparing the glass is, as we mentioned above, to treat it with powdered French chalk. This can be bought at the drug stores in the form of an impalpable powder, and may be very conveniently kept in a small tin pepper-box, or one of the boxwood dredgers used by glove-makers. After the glass has been cleaned in acid and wiped dry, a little of the powder is to be shaken over its surface, and well rubbed in with a ball of clean cotton. A chamois skin is now to be applied, and the surface of the glass thoroughly polished until free from streaks. The powder will have been all carried off apparently, but enough will remain both to fix the collodion film firmly during the operations of making the negative, and to render the stripping easy and certain.

No directions need be given here for making the negative, all the manipulations being conducted as usual.

The negative, after having been dried, is laid on a levelling stand, and a solution of gelatine poured over it to the depth of about an eighth of an inch, taking care to avoid bubbles. If they form, they must be carefully removed with a bit of paper, without scratching the film.

The gelatine solution is prepared as follows:—

Gelatine	4 ounces
Glycerine	4 drachms
Water	32 ounces

After dissolving, add two ounces of alcohol, stirring briskly, and strain through muslin.

The proportions here given form a good standard solution; but it must be borne in mind that the proportion of the gelatine to the water, and of the glycerine to the gelatine, should vary with extremes of temperature or dampness of climate; less glycerine, for instance, being required when the weather is damp, and more when it is very dry and cold, the function of the glycerine being to modify the extreme contractility of the gelatine.

After the gelatine has set, the plate is to be dried in a place free from dust, and then, laying it flat on a table, the point of a knife guided by a ruler is to be carried through the film to the glass, about a quarter of an inch from the edge all round. The film may now be started by lifting it at one corner with the point of the knife, and by a steady and even pull it will leave the glass in one sheet. A suitable book, with the leaves made of blotting-paper, should be provided as a receptacle for the pellicle negatives.

The advantage of using plate-glass for the negative will be

* *Philadelphia Photographer.*

* Known to the trade as "virgin gum."

plainly seen if the surface of the film that was in contact with the glass be now examined. It ought to be perfectly smooth, even, and highly polished. If an inferior quality of glass has been used, the film will be found to have taken the impression of every bubble, scratch, or other irregularity.

The operations just described are in every respect applicable to the washed collodion emulsion film, or, indeed, to any dry collodion process where no albumen substratum has been employed. We have succeeded in making a transfer even where the glass had been albumenized, but do not advise the attempt, for the risk of sticking and tearing of the film becomes much increased by the presence of the albumen.

Before taking up the subject of the stripping of the gelatino-bromide film, let us say a word about the double transfer of a collodion negative. This is so invaluable to the travelling photographer that we feel that it ought to be as widely known and practised as possible. The negative is here stripped off the glass by means of gelatinized paper, *i.e.*, paper floated on a solution of gelatine, about $\frac{1}{15}$, and dried. A sufficient number of sheets of paper are thus prepared and cut to the proper size before leaving home. After the negative has been made and is quite dry, it is laid in a deep vessel of clean water, film-side up, and one of the sheets of gelatine paper with the film down is immersed in the water and held there for a few seconds until it has become thoroughly saturated and free from any tendency to roll up or cockle. It is now carefully brought down towards the negative film until it just touches; then, by lifting the glass, it will adhere to the film of itself. After draining off the superfluous water, the glass is to be laid flat on a table, and a soft India-rubber squeegee passed over the paper a few times. The glass is now left in its level position for about half-an-hour, or until the gelatine has had time to take firm hold of the collodion film without the paper drying. By passing the point of a pen-knife under the edge of the paper it may be lifted, and will carry the film with it, a little neat manipulation sufficing to strip the entire paper and film together off the glass. After drying, it may be trimmed and put away between the leaves of a book, and so carried home.

The only points requiring attention in this apparently risky procedure are not to force the wet paper roughly down on the negative film with the fingers, and to allow the proper time to elapse before attempting the stripping. An exact rule, of course, cannot be given, but it will generally be found that the paper should be allowed to become nearly surface-dry before starting the edge with the knife point. If the paper comes away and leaves the film behind, a longer time must be allowed; while if the paper gets dry, the film will be certain to crack when it is lifted, unless a sheet of wet blotting-paper be laid over the glass for a few minutes to restore the necessary moisture.

When it is desired to re-apply the negative to glass, a solution of gelatine is to be prepared of the strength of one ounce to ten or twelve of water. Add to this four grains of chrome alum dissolved in half an ounce of water; stir thoroughly and filter through muslin. Prepare the requisite number of glasses by coating them with this after having well cleaned them. After the insoluble gelatine coating has become quite dry, the glass is to be laid surface uppermost in water, and the negative on its paper support immersed in the water and made to adhere to the glass just as described above. The manipulations are identical, and after getting the paper smoothed down with the squeegee, the plate is to be thoroughly dried over night. The following day dip it into a vessel of hot water, and after a few moments the paper support will float off and leave the film firmly attached to the gelatine coating below, which becomes quite insoluble in water by the addition of the chrome alum. The plate may now be rinsed off in warm water, and after drying, varnish as usual.

Care is to be taken not to allow the negative on the paper to roll up, nor to get creased nor folded: and when it is first dipped into the water to re-apply it to the glass, hold it out straight and do not allow the sudden wetting to make it unmanageable.

The gelatino-bromide film may be stripped in much the same manner that we have already detailed for the wet collodion plate. If the plates, however, be bought ready prepared, an arrangement with the manufacturer had better be made beforehand, so as to enable him to prepare the glass specially for this purpose befor ecoating. The best method of doing this is to give the glass a rubber substratum after cleaning, in the manner already described, and then to give it a coat of plain collodion and dry it. The gelatine emulsion is flowed on the collodionized surface just as usual, taking care not to injure nor scratch it if a rod or any hard substance be used as a spreader to assist the free flowing of the emulsion. No directions need be given for any further manipulations, the drying of the plate and making of the negative being done in the routine manner, and the coating with gelatine, drying, and stripping off, being the same as for the wet collodion film.

Let us conclude, however, by hinting to those who prepare their own plates, that the film must be "hardened" before the warm gelatine is poured on, either by the proper additions to the emulsion, or by an alum bath, before drying, and so avoid the mortification of seeing the negative film dissolve.

THE RISE AND PROGRESS OF PHOTOGRAPHY.

Mr. W. Brooks, of Reigate, delivered a highly interesting lecture in connection with the Falmouth Polytechnic jubilee on "The Rise and Progress of Photography." The beautiful and fascinating art science of photography, with its various ramifications, had, he said, sprung into existence since the establishment of the Royal Cornwall Polytechnic Society, and as that Society had done so much for the advancement of photography, he thought a few historical notes would not be out of place that evening. That was the only Society that had offered awards for meritorious productions annually for so long a time. He was not aware when the first awards were given to photography, but he knew it was nearly twenty years since his productions received an award of a medal, and he was very pleased to acknowledge the satisfaction it gave him, and he believed it was owing to that medal, and the encouragement it gave him, that he had been so successful in photography.

In giving the history of the art, Mr. Brooks commenced with Pettit, who in 1722 noticed that certain salts of ammonia crystallized more readily in the light than they did in darkness. The illustrious Scheele, about 1777, published to the world how light changed the colour of certain salts of silver. Senebier repeated Scheele's experiments, and stated that he found chloride of silver darkened in the violet ray in fifteen seconds to a shade, which required the action of the red ray twenty minutes. In 1801 Ritter proved the existence of rays a considerable distance beyond the visible spectrum, which had the property of speedily blackening chloride of silver. The lecturer next referred to the discoveries of Dr. Wollaston, of the celebrated Cornish luminary, Sir Humphry Davy, and of Wedgwood, who undoubtedly was the first person who made the attempt to use the sunbeam for delineating the objects it illuminated, and therefore he must be considered the father of the photographic art. In 1802 Wedgwood published a paper in the journal of the Royal Institution under the following title, "An account of a method of copying paintings upon glass, and of making profiles by the agency of light upon nitrate of silver; with observations by Sir Humphry Davy." In his remarks, Sir Humphry Davy said: "In following these processes I have found that the images of small objects, produced by means of the solar microscope, may be copied without difficulty on prepared paper;" and Wedgwood said: "Nothing but a method of preventing the unshaded parts of the delineations from being coloured by exposure to the day is wanting, to render this process as useful as it is elegant." Seebeck, in, and subsequently to, 1810, made some important additions to our knowledge of the influence of the solar radiations. From the time when the difficulty of fixing the photographs which they obtained stopped the progress of Davy and Wedgwood, no more discoveries appeared to have been made until 1814, when M. Niepce, of Chalons on the Soane, appeared to have first directed his attention to the production of pictures by light. His early attempts were not very successful, and after pursuing the subject alone for ten years he, from an accidental disclosure, became acquainted with M. Daguerre, who had been by various chemical processes for some time endeavouring to fix the images obtained with the camera-obscura. In December, 1829, a deed of co-partnership was executed between them for mutually investigating the subject. In 1827, Niepce presented a paper to the Royal Society of London on the subject; but as he kept his process a secret it could not, agreeably with one of their laws, be received by that body. This memoir was accompanied with several heliographs on metal and glass, some of which are still in the British Museum. The substance M. Niepce used for producing these pictures was bitumen. That might be said to be the first carbon process, and a permanent one.

Mr. Brroks then described the further researches of Niepce, Daguerre, and Fox Talbot, who, it appeared, discovered the process of preparing a sensitive paper, ignorant of what had been done on the Continent by either of the former two. In 1841 Talbot took out a patent for an improved process, which he called calotype, but which, in compliment to the inventor, was called the Talbotype process. The experiments of Sir John Herschel were next spoken of by Mr. Brooks, examples of whose process he had with him, and which were taken in 1846 by Mr. Nicholson, an amateur, now residing in Reigate. On the 8th February, 1839, Mr. T. B. Jordan brought the subject of photographic registration before that Society. Mr. Jordan, who was still living, and residing in Reigate, was one of the first secretaries of the Society. Not many weeks ago he was in conversation with Mr. Jordan on the subject. He should have liked to see him present, and he was also sure they would all have been pleased at such an event. Mr. Brooks next gave an outline of Daguerre's process, and then referred to what Mongo Ponton had done for the art, and also mentioned M. Niepce de Saint Victor's method of applying albumen to glass plates, and Mr. Scott Archer's invention of the collodion process, which was also claimed by Mr. Fry. From 1850, the art of photography began to progress, and, very strange to say, the formula that Archer gave had been but very little altered to the present day. Robert Hunt was the first to call attention to sulphate of iron as a developer. He believed Mr. Hunt had done more for photographic chemistry than anyone else. The lecturer, having given a description of the collodion and dry-plate processes and the tannin process—a very popular one produced by Major Russel—and also of the experiments of Mr. W. B. Bolton of Liverpool, spoke of Dr. Maddox, Mr. Burgess, and Mr. Kennett, the last-mentioned being the first to put the gelatine emulsion process, introduced by Dr. Maddox, into commercial form. This process bids fair to eclipse all other processes. Mr. Brooks concluded his entertaining lecture by dealing with the most recent advances in the art, referring principally to the extraordinary achievements of instantaneous photography.—*Western Morning News.*

Proceedings of Societies.

BOLTON PHOTOGRAPHIC SOCIETY.

THE annual meeting was held at New Brighton, on Saturday, August 26th. The weather, though unfavourable on leaving Bolton, cleared up shortly after the party reached their destination, where about fifty instantaneous views were taken on the sands. The members were afterwards entertained to tea at the Royal Hotel by Mr. R. Harwood, at the conclusion of which a vote of thanks was passed to that gentleman for his hospitality, and suitably acknowledged. After another rough passage to Liverpool, the party returned to Bolton by the 8 p.m. train.

LONDON AND PROVINCIAL PHOTOGRAPHIC ASSOCIATION.

A MEETING was held on Thursday, the 7th inst.

Mr. E. J. GOLDING (the Chairman) stated that he found he could prepare an emulsion that developed with pyrogallic the same rich colour as an ordinary plate when ferrous oxalate was used, and further that plates prepared by this formula permitted great latitude of exposure. He had over-exposed a plate three times, and developed a good printing negative. The following was the formula for ten ounces :—

Silver nitrate	240 grains
Potassium bromide	sufficient to convert silver
Ammonium chloride	10 ,,
Ammonium iodide	4 ,,

The chloride and bromide were first added to the gelatine, then the silver. The emulsion was prepared by the boiling method, and gave a plate much quicker than commercial plates. There was scarcely any perceptible difference in the colour of the negatives, one of which was prepared according to this formula, developed with pyrogallic and sulphite ; the other was an ordinary bromide emulsion developed with ferrous oxalate.

Mr. GARRET exhibited a camera of very light construction by Hare, which gave rise to a discussion on swing backs, in the course of which Mr. Debenham said that he considered it preferable to use a swing back than to employ a lens of a very wide angle, and a front that could be raised much higher than usual, and he demonstrated by diagrams on the black board that with a lens having a flat field the plane of definition with a camera having rising front and rigid back was identical with the surface of the plate, but that when the camera was tilted and a swing back used, the planes were only coincident along one line.

Mr. COWAN exhibited some further improvements he had made to his cutting-board.

Mr. DEBENHAM stated that if a dense gelatine negative was first immersed in a solution of chrome alum, 20 grains to ½ ounce of water, then into ozone bleach, the density would be very successfully reduced, and that negatives which could not otherwise be printed, could by this method be reduced to good printing density.

Mr. HENDERSON said he had immersed gelatine in chrome alum, then washed free from the alum, and dried ; he then placed 2 drams of the gelatine so treated in 10 ounces of water, and boiled for two and a-half hours in a digester, when it was scarcely at all dissolved ; he then prepared an emulsion using half of the special and half ordinary gelatine, and found that a plate so prepared could be developed with a solution at 95° F., using the usual strength pyrogallic developer. The picture flashed up, and he then reduced the pyrogallic to $\frac{1}{10}$ strength, and still it developed too rapidly. He fixed with cold solution quicker than a wet plate with cyanide. He thought that this might prove of great use to those working in hot climates ; he also mentioned that the picture could be locally reduced by rubbing with the finger in the same manner as if treated with ozone bleach.

Mr. COWAN said he had placed a developed plate in chrome alum for half an-hour, then flooded with water at 125°, and the film washed off.

Mr. HENDERSON exhibited a drop shutter by Banks, of Bolton ; it was constructed of metal, the shutter being released by a spring catch on the saw-cut plan. He also mentioned that he had taken a transparency by transmitted light from the hole negative shown by him at the last meeting, and could not detect much difference between it and that taken by reflected light.

Mr. Trueman Wood was elected a member of the Association.

MEETING OF PHOTOGRAPHERS IN MELBOURNE.

A MEETING of photographers was held at Gunsler's Cafe, in Collins Street, when all the prominent firms were represented, and Mr. Stubbs, from Messrs. Batchelder and Co., was unanimously voted to the chair. Mr. Stubbs briefly explained that the object of the meeting was to consider an article dealing with the Tariff Commission which appeared in *The Argus*, stating, among other things, that several photographers desired the heavy duties at present imposed on many of their materials to be reduced, but that "one enterprising manufacturer of photographic materials made application for a duty to be placed on dry plates." The speaker then called upon Mr. Lindt, who had first noticed the matter, to give his views on the subject.

Mr. LINDT said it was the opinion of all photographers in the colony that as yet no trustworthy and uniform result had been obtained in the manufacture of dry plates in Victoria, and in his own opinion there was just about as much likelihood that anyone here would succeed in the manufacture of hair-springs for watches or steel pen-nibs as in making the modern dry gelatino-bromide of silver plates. He gave many reasons in support of this contention, and asked if any one present knew who the enterprising manufacturer alluded to was.

Mr. BURMAN stated that Mr. Perry, who was present, had informed him that it was his intention to apply for a protective duty to be placed upon dry plates which he purposed to manufacture here.

An irregular discussion followed, in the course of which Mr. Perry admitted that he had applied for a protective duty on dry plates, and spoke in justification of the action. It was argued by the other gentlemen present that the profession would be entirely opposed to an arrangement that would have been dependent on a manufacture which they regarded as being only in the experimental stage. It was urged that photographers were already handicapped with heavy duties on nearly all articles used in their business, and they intended to try and have the duty on nitrate of silver taken off, as the manufacture of that article was at present a monopoly, much to the photographer's detriment ; as well as to ask for a reduction of the duties on several other articles now heavily taxed.

The meeting then appointed Messrs. C. W. Foster, J. W. Lindt, and C. Nettleton as a committee, to place themselves in communication with the Tariff Commission, and to draw up a petition stating the grievances of the profession, to be offered for signature to every photographer in Victoria, and to be forwarded to the commissioners. The meeting terminated with a vote of thanks to the chairman.

Report of the Photographic Section of the American Institute.

President H. J. Newton in the chair.

Mr. Hallenbeck spoke of the merits of various developers used in dry plate photography, and gave some interesting details of recent experiments in photographing various spectra. He stated one instance in which it was believed that a hitherto unobserved line had been brought out on a negative of the spectra of iron, by the following developer :—

Water	1 ounce
Ferrocyanide of potash	60 grains
Carbonate of soda	50 „
Bromide of ammonium	1 grain
Pyrogallic acid	4 grains

This developer gave a more satisfactory image with an exposure of two and a-half seconds than was obtained with five seconds' exposure when other developers were used.

Mr. Partridge said that by the use of a small quantity of absolutely chemically pure sulphite of soda in his developer, he had been able to considerably reduce the time of exposure in the camera.

The President stated that the yellow and green stains often seen on gelatine plates could be removed by using a solution of perchloride of iron—two drops in one ounce of water. He would caution those who used it that unless all traces of the developer were removed before flowing this solution of the perchloride of iron on the plate, the action would produce the well known Prussian blue tint. If properly used, however, the resulting tint would be a rich chocolate, so much admired by all photographic printers. He also stated that he had continued his experiments upon the production of gelatine plates without using the somewhat tedious process of washing the emulsion, and exhibited several negatives and positives on glass, in producing which such unwashed emulsion had been used. These, he believed, gave sufficient proof of the correctness of his theory that the washing was quite unnecessary. He stated that all the instantaneous views recently exhibited by him had been made on unwashed emulsion plates ; yet his limited experience with gelatine had been such that he always felt more confident of success in field work when using collodio-bromide plates. With the latter he felt sure of getting twelve good negatives on each dozen plates taken out.

Mr. Partridge had believed that the washing of gelatine emulsion was solely for the purpose of removing any uncombined silver or bromide, together with such other soluble matter as might prove objectionable if left in the film.

The President exhibited negatives by the collodio-chloride process, and a gelatine positive from such negative. The work was much admired by those present ; a negative thus reproduced had all the fine printing qualities of the original. In using the oxalate developer, he recommended adding the iron in the form of a dry powder, and then rendering the developer quite acid by citric acid. He believed that the ammonia-sulphate was preferable to the protosulphate of iron, but in using it one-third more was required, as the combining proportion of iron in the former was less than in the last named. Thirty grains of the ammonia-sulphate should be added to each ounce of the oxalate solution just before use, while twenty grains of protosulphate would be sufficient. In speaking of various methods for increasing the density of gelatine negatives, he said that even very thin negatives could be made to yield good prints by treatment with the following intensifier :—

Water	5 ounces
Hyposulphite of soda	$\frac{1}{2}$ ounce
Carbonate of soda	100 grains
Pyrogallic acid...	3 „
Aqua ammonia...	1 drop

In discussing some of the common errors in working gelatine plate negatives by amateurs, Mr. Hallenbeck stated that the most usual mistake made was the lack of sufficiently long development ; many plates which would yield good printing negatives were discarded by the impatient operator, merely because the image did not appear to become dense enough in a few minutes. He believed that many of the failures, even by professional photographers who had always used the more rapidly developed wet plates, might be charged to the same lack of patience.

Association of Operative Photographers of New York.

The minutes of last meeting were read, and, after modification, approved.

Mr. H. J. Newton. I am not prepared to take up a special subject, but am always loaded with many subjects pertaining to photography. My experiments may not be of any advantage to practical photographers of this Association, though it is a great satisfaction to know many things ; they may be useful at times. If you have any special subject, or select any branch of the business, I shall be very happy to answer any questions. I have prepared chemicals for different persons, but in my experience they never succeeded. No two persons with the same chemicals attain the same results ; why it should be so we do not know. In the action of light upon mineral salts we know the effect, but not the cause. Take some of the most simple articles ; for instance, cane sugar, or glucose. The constituents of the two are nearly alike ; still they are different—why, we don't know ; but the facts we do know ; the same conditions and circumstances produce the same result. I have brought some transparencies and negatives to show the Association. If you have a fine negative, and you break it, it is lost. Quite a number of years ago I got up a process for duplicating negatives and making transparencies. If you had the collodio-chloride emulsion you would not be liable to make a picture such as I show you. I could not call to mind the quantities, but it was published in the various journals.

Mr. Atwood. I had two negatives from Mr. Newton ; one was an original, the other a duplicate from it. The duplicate made as fine prints as the original.

Mr. Newton. Anyone working collodio-chloride knows that it tones very quickly. The present transparencies were toned with gold in hyposulphite ; any colour from wine to deep black may be made. My method is to coat the plate with collodio-chloride and dry with heat ; now warm the negative, and, while both are heated, place together. The heating prevents condensation of moisture. There is another way to duplicate negatives : expose this sensitive film for a particular time to the action of light, and it turns into chloride of silver ; what the relations of light and the minerals are, we are not permitted to know. If you have a sensitive film and expose it to gaslight you get a positive ; now expose to sunlight and you get a negative.

Mr. Buehler could not get the collodio-chloride emulsion to work ; he changed everything, but it would not work. Some time after he tried again, and worked with ease.

Mr. Newton. Some of the chemicals (corrosive sublimate), two atoms of chlorine and one of mercury, form a deadly poison ; now the same ingredients under different relations form a harmless compound.

Mr. Hallenbeck : You were once trying to turn a transparency into a negative, Mr. Newton ; did you succeed ?

Mr. Newton thought he did not. He had used plumbago for the dusting-in process. He said, I use precipitated chalk and lamp-black, and make a dark lead colour, more to the colour of a negative.

Mr. Buehler thought plumbago was not good to use, as it often went on in patches.

Mr. Hallenbeck. I would like to hear some of Mr. Newton's ideas on printing.

Mr. Newton had been experimenting a great many years. It used to be thought you could not make a print on a bath of less than 80 or 100 grains to the ounce. It was thought if it was less than 60 grains it would take off the albumen. If you have 25 grains of silver, 25 grains of nitrate of magnesium, and 25 grains of nitrate of ammonium—a solution made in this way makes fine prints. I always make my bath 40 grains of silver and 30 grains of ammonium. You can work this down to 25 grains. You must have your solution alkaline, at least two drops of ammonia to the ounce. There is always a tendency to become acid. Fume with half ammonia, half water, thirty minutes in winter ; in summer fifteen minutes. The gold I dissolve with four parts of hydrochloric acid to one of nitric acid ; when dissolved, add bicarbonate of soda till just neutral. Now your copper (speaking of coin gold) turns to nitrate of copper ; now add aqua-regia to make it acid. I add borax to make alkaline ; add two or three grains of salt, and use the same toning bath over all the time.

Mr. Atwood thought the copper was very good. Mr. Newton made some prints in a combination bath to imitate the celebrated Salomon prints, and was so successful that experts could not tell the difference. He was sure he used chromic acid in it. Mr. Newton experimented in fifty different ways with collodion. You have four grains of bromide, five grains of iodide ; now go on increasing your bromide, and you come to the same point. In emulsion you get different results from the way you mix them. Mr. Black, of Boston, used an exceedingly acid bath. He found that by adding two or three ounces of acid to his bath it made the action very sensitive.

Mr. Buehler had fog from acid.

Mr. Newton. You can remedy that by adding tincture of iodine to your collodion. I have had silver crystals exposed to light for three months. When he used it, it was neutral.

Mr. Coonley had tested one of Mr. Black's baths, and it was no more acid than what he used; did not think Mr. Black used so much acid as was thought.

Mr. Newton. When you make up a bath it should be neutral. The bath is supposed to become acid with use.

Mr. Coonley: In the West Indies a bath becomes neutral, and you have to add acid twice a week.

Mr. Buehler said, if his bath had an excess of acid the bath held organic matter in suspension, and the negatives came out thin.

Mr. Newton was never troubled with discolouration of bath; he always had it neutral, and set it in the sun.

Mr. Coonley: I have used nitric and acetic acid apart and together, but never saw any difference; he preferred nitric acid.

Mr. Newton: For many years acetic acid was used before nitric acid, but nitric acid is most used at present.

Mr. Coonley: It does not matter whether the bath is acid or alkaline, if your collodion harmonizes with it.

Mr. Newton. Acetic acid is not as reliable as nitric acid.

Mr. Schaidner: Which is the safest way to neutralize a silver bath—with ammonia or bicarbonate of soda?

Mr. Newton. Throw down your bath with bicarbonate of soda to form carbonate of silver, wash it out well, then redissolve, and your bath is pure.

Talk in the Studio.

The Late John H. Fitzgibbon.—Mr. J. Traill Taylor, in writing to us of the sudden decease of Mr. Fitzgibbon, the founder of the St. Louis *Practical Photographer*, writes:—"Fitzgibbon was exceedingly jolly up to the last. A stout, fat, heavy man, with no neck (to speak of), one would have unhesitatingly pronounced him a subject for apoplexy at first sight. He was a Londoner."

A Photographic Lawsuit.—An action was commenced last week, in which a Lieut. Loring is plaintiff, and Captain Kerr, of the Artists' Co-operative Society, defendant, touching a money dispute. After the examination of one witness, the case was adjourned until the 19th inst.

Fire Caused by the Sun's Rays.—Quite recently a shop in the Avenue de l'Opera was kindled by the heat of the solar radiation; but the phenomena became easy to understand when it was found that some kind of reflecting arrangement exposed on an opposite roof by a photographer served to partially concentrate the rays.

Photogrametry, or Surveying by Photography.—Our readers will be interested to hear that the practical value of Meydenbauer's photogrametric methods has been practically demonstrated by the ease, rapidity, and accuracy with which a set of plans—representing the actual condition of the Tower of the Halberstadt Cathedral—have been prepared. We shall give some details regarding this matter before long.

A Photographer as a Candidate for Matrimony.—The following is translated from the last number of the *Notizen*, and any of our fair readers who care to respond should write in German, as perhaps the advertiser does not understand English:—"A widower, 34 years of age, and having a boy who is now five years of age, possesses a business in a provincial town, and this business, which is partly photographic, brings in from 1,300 to 1,500 florins yearly. He wishes to make the acquaintance either of a young good-looking widow without children, or of a spinster. The lady must be the possessor of 2,000 florins. Serious applications should be sent to "Aufrichtigkeit 1,500," care of Herr A. Moll, Vienna.

Trapped by a Photograph.—On Saturday a labourer was charged at Woolwich with stealing clothing and jewellery. Samuel Gaskin, a groom, living at Albert Road, North Woolwich, said that the prisoner engaged a lodging at his house, and stayed there three days, representing that he was employed on the river. On the third night witness met him leaving the house, carrying a large bundle, and he then stated that he was going to his home at Stratford. Witness walked with him to the railway station, and then, suspecting something, hurried home, and found that a portmanteau had been broken open in the prisoner's bed-room, and property stolen to the value of £6 6s. In his room, however, he left his photograph, and, this being sent round the police stations, led to his identification and apprehension. Some articles of clothing which he left behind were also recognised as the proceeds of a robbery from a barge. Mr. Marsham committed him to Maidstone for trial.—*Daily Chronicle.*

To Correspondents.

All Communications connected with Advertisements and Business to be addressed to Messrs. Piper & Carter, "*Photographic News" Office, 5, Castle Street, Holborn, E.C. Advertisers are requested to make all Cheques payable to* Messrs. Piper & Carter, *and crossed "Union Bank, Photographic News Co. Account."*

⁂ We cannot undertake to return rejected communications.

Dirty Opal Glass.—Mr. Debenham writes to say that he is still of the opinion that opal glass is liable to special chemical discolouration, and we shall be glad to receive particulars of any experiments or observations tending to support this view.

E. Davey.—1. The non-ammoniacal emulsion, if not boiled or digested, gives bright brown tones a little inclining to red; but by digesting for twenty-four hours at 35° to 40° much darker images—in fact, almost violet—result. A short digestion, say about six hours, leads to the production of good dark brown. Try the gallic developer. You had better use a somewhat harder gelatine, such as Coignet's.

South-Easter.—Judging from your description, the premises are most desirable ones, and the south-easterly aspect will occasion you but little inconvenience if you provide screens of tissue paper. During the summer the tissue paper may be permanently fixed to the glass as regards a greater part. Ground-glass is very undesirable, as it holds dirt, and becomes very opaque to the actinic rays. 2. It is generally considered better to adopt a shade rather inclining towards darkness, and to use white reflectors as required. 3. Either No. 1 or No. 2 will answer your purpose admirably; but you had better have one extremely rapid lens for difficult work in bad light. Although work can now be done much more quickly than formerly, the public expect more, and are likely to be impatient of long sittings.

A. M. K.—They are, in ordinary cases, hand-work, and they are usually painted to order.

G.—Apply to Messrs. Van Voorst and Co., publishers, Paternoster Row.

C. P. Chapple.—See the Formulary in our last issue.

E. J. S.—1. On or before September 29th. 2. Send them to Mr. Bourlet, 17, Nassau Street, Middlesex Hospital.

J. Streatfield Cox.—Its insertion would be calculated to create an ill feeling between the parties concerned.

Novice.—"The A B C of Photography," by W. K. Burton, price 6d., published at our office.

F. Cowley.—2. The apparatus is a very convenient one for use in the field; but after you have had some amount of practical experience as regards exposing, you will prefer to work without anything of the kind. Directions are sent with it. 2. No; ordinary sensitive albumenised paper. 3. By the judicious use of a paper mask and cotton wool.

C. N. D.—The Balmain phosphorescent paint is sold wholesale by Iblee and Horne, of 31, Aldermanbury, E.C.

Pyro.—1. You have evidently been very successful, not only in the production of the photographs, but also as regards colouring and retouching. You ought not to have any difficulty in obtaining a situation as all-round assistant. 2. The terms vary extremely; say from 30s. to 50s.

Lex.—1. Use a thin hard paper, and roll it very carefully. 2. It is due to the presence of the sizing material, which is likely to be either starch or gelatine. 3. Thin with lithographic varnish; that sold as "middle varnish" will probably suit you best.

C. Thirlow.—Only when the water is hard, or, in other words, contains soluble compounds of lime or magnesia.

Nitrate.—1. It consists of sesquioxide of iron in a hydrated condition; but if you heat it to redness for half an hour or so, the water will be driven off, and the colour will deepen considerably. 2. Preferably not; but when the gelatine has become partially deteriorated by a prolonged heating, you will find the proposed modification desirable.

C. Murdock.—Direct enlargements on bromo-iodised paper can be easily made with the appliances you describe, but you will find it advantageous to replace the white paper reflector by a square of looking-glass.

THE PHOTOGRAPHIC NEWS.

Vol. XXVI. No. 1255.—September 22, 1882.

CONTENTS.

FERROUS OXALATE AND ALKALINE PYROGALLIC DEVELOPERS.

The discussion which has recently been going on in our columns on the subject of the properties, defects, and excellencies of the two rival dry plate developers will have been read with unusual interest, as the point involved is one of vital importance to photographers.

The discussion has died a natural death, the champions of each of the developers being probably of much the same mind as he was before it commenced, for there is no truer saying than that "a man convinced against his will is of the same opinion still."

That this should hold of subjects which are ordinarily ranked as matters of opinion is natural: but that it should be equally true of scientific subjects, which are, it might be supposed, capable of definite demonstration one way or another, is remarkable. In photographic questions it probably arises from the fact that the first conditions are far more numerous and variable than is supposed.

Probably no better example of this could be found than the discussion in question, where quite insufficient account seems to be taken of the vast differences which exist in plates, subjects, and methods of treatment. Each side, whilst stating emphatically the defective nature of one of the developers, proves that the other is capable of giving the highest results by pointing out where these same results are to be seen.

This being the case, namely, that it is at least possible to obtain by the use of either the ferrous oxalate developer, or the alkaline pyrogallic, the very highest results under favourable conditions, it may be well to glance at the circumstances which favour each developer, and should lead to its adoption.

The great advantage of the ferrous oxalate lies in its cleanliness and simplicity. The manipulations are devoid of all complexity, and the greater or less mess which results at every turning with pyrogallic is entirely avoided, the resulting negative being the chief item which escapes the various stains due to pyrogallol. The desirability of this cleanliness can scarcely be over-estimated, especially where work is carried on in a large scale; but, on the other hand, it must be recollected that the difference between the two developers is much less than it was before the introduction by Mr. Herbert Berkeley of sulphite of soda in the pyrogallic, for by this addition, not only is the negative in many cases rendered indistinguishable from any oxalate one, but the developing solution is rendered much less liable to stain the fingers, or whatever it may come in contact with.

The objections urged against oxalate are, that it registers a shorter scale of light gradations than pyrogallic, thus giving an unharmonious print, and also that it permits a less latitude of exposure. That there is truth in both these accusations, under certain circumstances, we are quite satisfied; but both the defects mentioned are greatly reduced by the discovery recently made by Captain Abney of the effect of the addition of a small quantity of hyposulphite of soda to the oxalate developer. By this addition the gradation of shades is greatly improved, the appearance of a print hard without brilliancy, or feeble without softness, being avoided. It is still probable, however, that subjects including a very great range of light are best rendered by the alkaline developer. We have been able to get with it a difference of density between each two of a greater number of the tints of the sensitometer than by oxalate, even when this latter had some hyposulphite mixed with it.

In affording latitude of exposure, the hyposulphite shows to a great advantage. It gives a means of accelerating, to a certain extent, in a manner somewhat analogous to that of ammonia with pyrogallic.

The method of using three or more baths, either flat or vertical, the first of which may contain concentrated oxalate developer with an addition of hyposulphite, whilst the last contains a dilute developer restrained with bromide, is now pretty well known, and affords much greater latitude than would be believed by those who have not given it a trial. There are three objections to the method. It is not suited for work on a small scale, or for developing an occasional negative. The time of development necessary to get density with the weak and restrained solution in the case of an over-exposed negative is excessive, and, if the hyposulphite be adopted merely as an accelerator, to be used in the event of under-exposure, the benefit of it in giving a soft yet brilliant negative is lost in the case of normal exposures. This last difficulty is overcome, however, by placing in the second dish a developer similar to that in the first—that is to say, containing hyposulphite, but somewhat weaker in ferrous oxalate. This will then be the developer which will come into play for cases of normal exposure.

There can be little doubt that, given a plate which has been exposed for an unknown length of time, the chances of getting a good negative from it would be far greater were the pyrogallic developer used than with the oxalate. On the other hand, in the case of an extensive business in portrait photography, where the exposures are pretty fairly uniform, and where a number of negatives may be developed one after the other, it is probable that about equally good final results—that is, finished pictures—would be turned out, whichever developer was used; whilst greater cleanliness would reign when oxalate was the agent than when pyrogallic was; and, moreover, the printing operations would be considerably easier, although the difference in rapidity of printing between negatives developed by oxalate and pyrogallic need not be nearly so great as it generally is if full advantage be taken of the properties of sulphite of soda and of alum and acid.

So far we have not considered the differences in plates which, apart from subject and treatment, render one or other developer most suitable. In the first place, there are a number of evils which arise only when pyrogallic is used, and which, therefore, constitute oxalate the best developer for such plates as exhibit them. These are chiefly fogs and stains of various kinds. On the other hand, there are plates which are not suited to oxalate development insomuch that density is not be got at all, or only after a very prolonged development. These are plates which have been too thinly coated, or in the manufacture of which a very repellent gelatine has been used. They are difficult to work, even with pyrogallic, the usual strength of developer being insufficient to give density. A limit to the strength of the iron developer is very soon reached, but the alkaline may be almost indifinitely increased, the ammonia being, of course, increased in a less ratio than the pyrogallic and bromide; otherwise fog will ensue.

Amongst the properties of pyrogallic which may be of use must not be forgotten that of "flashing out" an image. The proceeding is not, as a rule, a desirable one, but it may be performed with advantage at times.

To sum up, it is generally believed that the alkaline pyrogallic developer has, on the whole, the wider range of usefulness. It is specially suited for landscape or any work in which the exposures are uncertain, and for all operations on a small scale, whilst it has the farther advantage of cheapness.

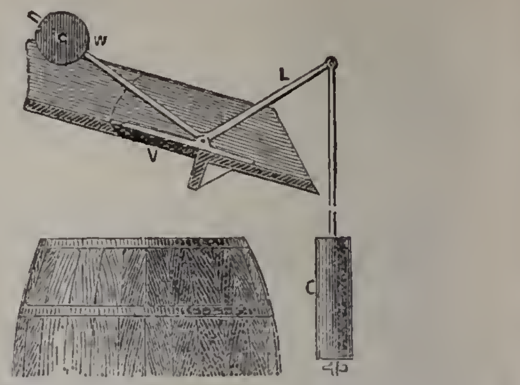
On the other hand, there is little to choose as far as results are concerned between the rivals for any work where the exposures are even fairly certain, and where it is possible to develop a number of negatives at one time, and here oxalate has the advantage of cleanliness.

PURE WATER FOR PHOTOGRAPHIC USE.

Our readers are well aware that water as found naturally is never absolutely free from dissolved impurities; and in ordinary cases it contains solid impurities derived both from the inorganic and organic kingdoms, together with gaseous substances; these latter being generally derived from the atmosphere.

By far the purest water which occurs in nature is rainwater, and if this be collected in a secluded district, and after the air has been well washed by previous rain, its purity is remarkable; the extraneous matter consisting of little else than a trace of carbonic acid and other gases dissolved from the air. In fact, such water is far purer than any distilled water to be obtained in commerce. The case is very different when the rain-water is collected in a town or densely-populated district, more especially if the water has been allowed to flow over dirty roofs. The black and foully-smelling liquid popularly known as soft water is so rich in carbonaceous and organic constituents as to be of very limited use to the photographer; but by taking the precaution of fitting up a simple automatic shunt for diverting the stream until the roofs have been thoroughly washed, it becomes possible to ensure a good supply of clean and serviceable soft water, even in London. Several forms of shunt have been devised, some of these being so complex as to offer every prospect of speedy disorganisation; but a simple and efficient apparatus is figured in the current number of *Engineering* by a correspondent who signs himself "Millwright," and as we have thoroughly proved the value of an apparatus which is practically identical, we reproduce the substance of his communication.

A gentleman of Newcastle, a retired banker, having tried various filters to purify the rain-water collected on the roof of his house, at length had the idea to allow no water to run into the cistern until the roof had been well washed. After first putting up a hand-worked valve, the arrangement as sketched below has been hit upon. Now Newcastle is a very smoky place, and yet my friend gets water as pure as gin, and almost absolutely free from any smack of soot.

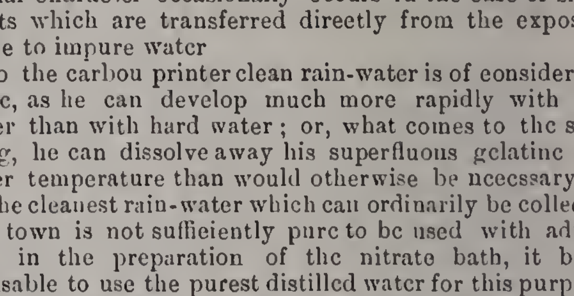


The sketch explains itself. The weight W and the angle of the lever L are such that when the valve V is once opened it goes full open. A small hole in the can C acts like a cataract, and brings matters to a normal state very soon after the rain ceases.

The proper action of the apparatus can only be insured by a careful adjustment of the weight W, the angle through which the valve opens, and the magnitude of the vessel C. It is an advantage to make the vessel C somewhat broader in proportion to its height than represented, and to provide it with a moveable strainer placed about half way down. This tends to protect the cataract hole, and any accumulation of leaves and dirt can be removed once in six months or so. Clean soft water is valuable to the photographer in very many cases. Iron developer (wet plate) free from chlorides will ordinarily remain effective on the plate much longer than when chlorides are present, and the pyrogallic solution for dry-plate work will keep good for a long time if made with soft water, while the lime which is present in hard water causes the pyrogallic acid to oxidise with considerable rapidity. Negatives that have been developed with oxalate developer often become covered with a very unsightly veil of calcium oxalate when rinsed with hard water, and something of a similar character occasionally occurs in the case of silver prints which are transferred directly from the exposure frame to impure water

To the carbon printer clean rain-water is of considerable value, as he can develop much more rapidly with soft water than with hard water; or, what comes to the same thing, he can dissolve away his superfluous gelatine at a lower temperature than would otherwise be necessary.

The cleanest rain-water which can ordinarily be collected in a town is not sufficiently pure to be used with advantage in the preparation of the nitrate bath, it being advisable to use the purest distilled water for this purpose; and in many cases it is well to carefully distil water for the bath in a glass apparatus of the kind figured below, which we take from the fourth edition of Captain Abney's "Instruction in Photography."



A. Thin glass flask serving as a retort. The tube T is fitted air-tight to the flask by a cork, C.

B. Receiver into which the tube T fits quite loosely.

D. Water vessel intended to keep the spiral of lamp wick, which is shown as surrounding T, in a moist condition.

This wick acts as a syphon, and water is gradually drawn over into the lower receptacle, E.

L. Spirit lamp, which may, in many cases, be advantageously replaced by a Bunsen burner.

A small metal still, provided with a tin condensing worm, is, however, a more generally servicable arrangement, and if ordinary precautions are taken to make sure that the worm tube is clean, the resulting distilled water will be nearly as pure as that distilled in glass vessels.

Such a still as that figured below can be heated conveniently over an ordinary kitchen fire, and should find a place among the appliances of every photographer.

Distilled water should always be used in the preparation of emulsion, as the impurities of ordinary water may often introduce disturbing conditions.

By-the-Bye.

CONTINENTAL RAMBLES WITH THE CAMERA.

The Pyrenees.*

Quitting the emerald vale of Azun, at the mouth of which Argellez stands—a sylvan paradise where the luxuriant foliage of Spanish chestnut trees, the grass-green leaves of the walnut, and the freshness of the verdure are "beyond compare," and all in lovely contrast to the frosted peaks and snow slopes that bar the end of the vale—we pass on to Pierrefitte. This little village—three miles from Argellez—is at the foot of the gorge of Pierrefitte, a magnificent mountain defile. The photographer will find plenty to do here, if he loves wild and rocky pictures. Grey cliffs rise precipitately several hundreds of feet above the torrent, which is little else but foam. On the wayside, too, are mighty boulders—picturesque masses of rock—which, if lighted from behind, make a magnificent feature in a landscape picture with their heavy shadows. The path is very steep for our destination. Cauterets is upward of three thousand feet above the sea, but well within a day's walk from Argellez.

Cauterets itself has little to attract, being rather cold and desolate; it is, however, a fashionable spa, its nasty lukewarm springs being considered very efficacious in disease. In the neighbourhood is the peerless Lac de Gaube, situated at the foot of the snowy Vignemale, and as the way thither leads by some magnificent cascades—masses of white foam tumbling out of mighty chasms in the depths of a black pine wood—the excursion is one which must be undertaken by every able-bodied visitor. You pass on your way the "Pont d' Espagne"—a few pine planks thrown over the torrent, and scarcely enough to make a picture in the camera—reaching the tiny mountain lake in about three hours from Cauterets. Of a greenish hue, its clear, still waters reflect upon their surface the towering Vignemale, whose sparkling glaciers rise from the further shore of the lake. We have never seen any photograph that has done justice to the Lac de Gaube; the pictures are too cold and hard, and have none of the warmth of sunlight about them, a quality very necessary to the full appreciation of the scene.

You may get over the snows of the Vignemale to Luz, but we prefer retracing our steps to Pierrefitte, which is a convenient spot to leave one's heavy baggage. Luz is quite a romantic spot. Of the two old castles you certainly must get a picture, for these were invested by Edward the Black Prince, during the prolonged wars in the reigns of the Edwards. The old church will also attract the photographer's attention, and he should include in his picture the little doorway, now bricked up, by which the crétins or cagots used to enter the divine edifice. Like the lepers of old, they were forbidden to mix with their fellow-creatures, and were permitted only to marry among themselves. At the present day, fortunately, whether these poor creatures are more properly cared for in hospitals, or whether the disease is gradually dying out before the progress of civilization, it is very rare indeed to meet with afflicted in the villages and hamlets, and, unlike in Switzerland and Savoy, cases of goitre or idiocy are rarely to be seen.

Opposite Luz, on the slope of a smoothly-turfed hill, and consisting of a street of tall white houses, stands St. Sauveur, one of the favourite and most cheerful spas of the Pyrenees. The prettiest view is obtained from the hill at the foot of the Pic de Bergons, whence the bright little place is seen, partly hidden among leafy foliage, its church of fine white stone being the most conspicuous object. An elegant iron bridge, spanning an abyss of upwards of two hundred feet, connects the spa with the valley of Gavarni.

The lawn-like meadows, the fresh green foliage, the dog-roses in the hedges, the stone church with its tapering steeple, the odour of new-mown hay, the cool atmosphere, all remind one somehow of Old England; while some of the thatched farmhouses about, with their straw-littered folds, help materially to heighten the illusion.

All this smiling country is soon left behind, and then you begin to climb the steep road to Barèges Barèges has a familiar sound to us, because of the fabric of that name which is made, not in the mountain town itself, but in the district. Barèges itself is reputed for its healing waters, which are said to cure old wounds, but it is such a woe-begone spot, and the way there is so difficult and steep—the road making its way through a bleak wilderness of stones and rocks—that, as M. Taine once remarked, an invalid must have lots of strength if he is to be cured.

Composed of tall, gaunt houses and wooden booths, the place has a temporary, half-built appearance, the wet and mountain fogs that never seem to desert the place making it still more dismal and depressing. Still the place is full of invalids, and especially with the crippled and diseased of the lower classes. Soldiers are also numerous, for the French Government has established a military hospital in the village.

From Barèges by the Tourmalet Pass to Bagnères de Bigorre is a day's walk, the photographer securing a picture of the Lac Bleu and the grand waterfalls at Grip on his way. Thence we cross the Hourquette d'Aspin—the farm buildings hereabouts make you think you are back again in Old England, they are so much like our Kentish homesteads—and reach Arreau, in the Val d'Aure. The outlook from the Hourquette d'Aspin is one of the finest and most extensive in the Pyrenees. In front, stretching from east to west, is a continuous chain of verdure-clad mountains, behind which rise others more lofty—some of a pure white, some merely tipped with snow, and others grey and craggy. The monarch of the Pyrenees, and highest mountain in Spain, the famous Maladetta, may be seen, and far beyond, at the blue line of the horizon, are the broad plains of Arragon. Down in the valley at our feet are tiny villages, with fields and streamlets on the same microscopic scale, the miniature town just under us—so near, apparently, as to be within stone's-throw—being Arreau, which is, however, still a dozen kilometres distant. A more beautiful picture can scarcely be imagined, combining as it does the snowy

* Continued from page 549.

scenery of the Alps with the luxuriant vegetatiou of a southern climate.

Quarters are to be found at Arreau, and then we march along the sequestered Vale d'Aure. At Cadéac, the first village, is a capital subject for the camera. It is an old church of the most original construction, and if you take your picture from the roadway, you show at once its chief features. For the church is literally built upou the highway; the road runs right through the building, the altar and pulpit being on one side of the thoroughfare, and rows of stone seats arranged in tiers on the other. A cart driven along the road during service would therefore find itself all at once in the middle of a devout congregation, driving up the aisle, or rather across the central pathway in front of the altar. Farmers coming to mass on a Sunday might remain in their vehicles during service, and have no need to dismount and to put up their horses at a neighbouring hostelry.

It is only the pedestrian who can penetrate this lovely valley beyoud the picturesque village of Tramesaigues, for here the roadway ceases, and there is no outlet except that over the Col de Cambiel into Gédre. This col, although not nine thousand feet in height, is an arduous climb, as the snow usually is very deep, but it may be attempted by any good walker accompanied by a guide from Arragnouet. It is a comb between two mighty peaks, and a couple of hours' tramp through soft snow is generally necessary to reach the summit, whence it is easy to reach Gédre in the Gavarni valley.

From Gédre, where the accommodation is good, although rather simple, we proceed to Gavarni and the Cirque, oue of the most wonderful spots in the whole of the Pyrenees. The famous French artist, Gavarni, took his name—for it was only a *nom de plume*, or rather *de crayon*—from this spot, where he lived many years. It is but a four mile walk to the village; but the Cirque is twice as far, so that it is well to sleep a night at Gavarni, where the inn, if not first-class, is very tolerable. The photographer must not fail to secure a photograph or two on the road, for there are pictures at every turn. Imagine the green sward of the valley as trim as a gentlemau's lawn, with graceful silver birch trees here aud there, and a backgrouud of dazzling snow peaks. The smooth road runs through this sunny Eden, but not in a straight line, for big masses of black rock, that have become detached from the bare mountain walls on either side, and have rolled headlong into the valley, lie about in glorious confusiou. In and out among these mighty obstacles your way leads to the valley, sometimes broad and spacious, and sometimes only a narrow rocky defile scarcely allowing room for the road and the torrent that runs beside it.

The Cirque of Gavarni is a mighty amphitheatre of rock and glacier, bringing the valley to a sudden end: it would be called a Corrie in Skye. A waterfall, said to be the highest in Europe, falls over the face of the cliff; but it is generally only a thread of water. The Cirque is a difficult subject to photograph; all the pictures we have seen give no idea of its height aud grandeur. They look like the representation of a big marble quarry more than anything else. So here is a problem for the tourist photographer which he may set about solving.

A steep climb from Gavarni will bring the hardy pedestrian to the snow-fields above the Cirque, and if he is a mountaineer, he may reach the Brêche de Roland, whence a path leads into Spain. But this is a difficult tour. For most tourists it is best to turn back to Gédre, and then visit the lower part of the Gavarni Valley between that village and Luz.

Coming homewards, it is well to pay a visit to Biarritz, a delightful watering place in the Bay of Biscay, and most picturesque with its shelving rocks, natural arches, and corralled bay. Thence the traiu may be conveniently taken into Spain—the frontier is but a dozen miles off—either to St. Sebastian, Saragossa, or Vittoria. A few days are sufficient to visit any of these interesting towns, to glean something of Spanish life, and to take a peep at the Pyrenees from the south.

PHOTO-LITHOGRAPHY AND PHOTO-ZINCOGRAPHY.

BY MAJOR J. WATERHOUSE, B.S.C.,

Assistant Surveyor-General of India.

CHAP. II.—APPARATUS AND GENERAL ARRANGEMENTS.

BEFORE proceeding to the consideration of the practical details of the various manipulations, it will be as well to describe the special photographic apparatus and appliances required for producing negatives suitable for photo-lithography, leaving the description of the process and material for transferring and printing to be considered afterwards, when treating of the manipulations connected with that branch of the subject.

Apparatus.—The essential points to be observed in regard to the apparatus for copying by photography are absolute rigidity and freedom from vibration, together with accurate parallelism between the plan board aud sensitive plate. Without rigidity it will be difficult to secure and retain squareness and freedom from distortion; vibration will destroy sharpness; want of parallelism will produce distortion; and though, in copying a subject within the compass of a single negative, a slight want of sharpness or squareness is of uo great consequence beyond its unsightliness and unworkmanlike appearance, it is otherwise with large maps and plans that must be taken in several sections to be joined up together afterwards. Unless each sectiou corresponds accurately with the other, distortions and discrepancies will arise which will make it impossible to produce a satisfactory result.

The camera must, therefore, be of the best construction, supported ou a firm, solidly-constructed stand. The plan-board must be fastened to a wall, or carried on a strong stand free from vibration. When possible, it is an advantage to have the copying-studio on the ground, there being always more or less vibration on an upper floor, especially in a town with vehicles constantly passing. By using the electric light, cellars and other underground rooms may be utilized for this purpose.

Camera.—The camera may be either of the rigid or bellows pattern; the latter has many conveniences, but a camera of this form must be thoroughly well made, so that the front and back parts may remain perfectly rigid and square. The size will, of course, depend on the work to be done; but, if required to be used for copying to scale, it must be of at least sufficient length to draw out to twice the equivalent focal length of the longest focus lens it is to be used with, and may be furnished with cone fronts to give this a further extension if necessary. A conical front has also the advantage, especially with large cameras, of diminishing the shadow thrown by the front of the camera. In making enlargements this is especially desirable.

The front and back of the camera should, in all cases, be quite firm when fixed, and be truly parallel. A swing back may, however, sometimes be convenient, and gives the power of correcting slight differences of parallelism between the plan-board and sensitive plate.

The lens should be accurately fitted, so that in its normal position its axis may correspond with the centre of the focussing-screen. Sliding fronts will, however, be useful for adjusting slight differences of position of the image of the plan on the focussing-screen.

It will be found convenient to have the focussing screen marked with one-inch squares round the centre; four inches or sixteen squares will be sufficient. Their use is, in conjunction with similar squares on the plan board, to test the squareness of the copy, and also to furnish an aid in setting the camera for reduction to any given scale

Lines passing through the centre of the focussing screen at right angles to one another, and marked off in inches, will also be found useful for measuring the size of the copy. Where much work of the same size, such as reductions of the sheets of a map, or a standard scale to any uniform smaller scale, has to be done, it is convenient to have one or more rectangles drawn on the ground glass to correspond exactly with the size the copy should be photographed. When the image of the subject exactly fills this rectangle, the adjustments of focus and parallelism will be correct.

It is a good plan to have a scale on the camera, by which it may be set to any desired focus at once.

The camera stand for copying should be constructed to run on rails fixed truly level in the ground, at right angles to the plan-board, in order to retain parallelism between

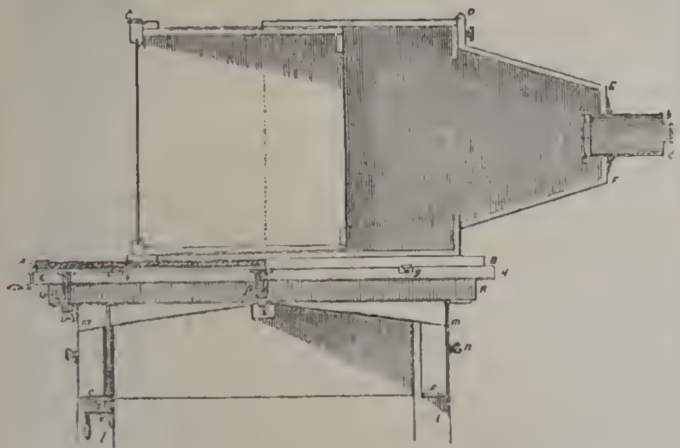


Fig. 1. Section and Elevation of Camera and Stand.
A B C D E F, the camera; G H Q R, top of stand; G H, upper board; Q R, lower board; a b c d, lens and mounting; g g, V-shaped runners working in V grooves; k, circular arc cut through the lower board; l, portion of legs of stand; m m, hinged plates; n n, screws for clamping plates; p, centre pin on which upper board works; r, screw passing through circular arc clamping upper to lower board; s s, endless screw for focussing; v, elevating screw for giving top of stand motion on axis x; x, axis of top of stand.

the camera and plan-board, and allow for easy adjustment to focus. It should be furnished with adjustments for moving the camera horizontally right or left, for turning it round on a central axis, and for tilting it up and down so as to make it perfectly level or give it a slight inclination so as to correct any want of verticality of the plan board or inclination of the floor. I know of no better pattern of camera stand for the purpose than that used at the Ordnance Survey Office, Southampton, of which a description was given in the News, vol. iii., p. 380; but as this description will not be available to many present readers of the News, a repetition of it may not be out of place.

The top of the stand (see fig.) consists of two separate portions; the lower, a strong board working on a transverse axis which rests on the frame of the stand, and is clamped at any required altitude by four screws, biting four hinged plates, which connect the top of the stand with the frame. The amount of motion is regulated by an elevating screw.

The upper board on which the camera is placed is connected with the lower one by a central pin, which passes through the top, and works in a socket in the lower board.

Through the latter an arc of a circle is cut, and a screw passing upwards through the arc, and fastened to the lower surface of the upper board, gives the means of clamping the top board in any portion of the azimuthal arc it describes on the central pin, its motion being of course limited by the length of the arc cut in the lower board.

V-shaped grooved plates of brass are let transversely into the top surface of the stand, and to the bottom of the camera are screwed similarly shaped brass runners, so that when the runners are fitted into the grooves, the camera lies symmetrically on the stand, and can be made to slide with an easy motion in a transverse direction, the motion being given by a small screw likewise let into the surface of the stand, and working in a small female screw-socket attached to the bottom of the camera. Each of the legs of

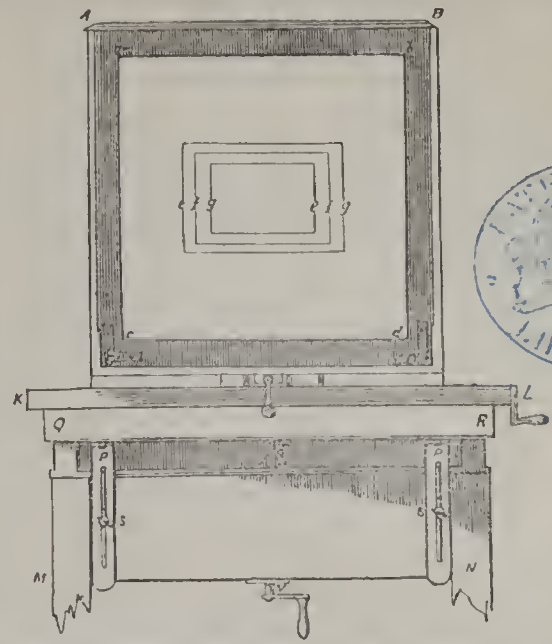


Fig. 2. Elevation of Back of Camera and Stand.
A B C D, movable slide, containing focussing glass; a b c d, ground-glass plate for focussing; e f g, rectangles ruled on ground glass to be made to coincide with margin line of plan according to nature of reduction, e 1-2500th to 6 inches, f 1-500th to 1-2500th, g 6 inch to 1 inch; K L M N, stand for camera; P P, plates to allow motion in altitude; s s, clamping screws for ditto; Q R, lower board; r, screw passing through circular arc clamping upper to lower board; V, screw for giving top of stand motion in altitude on axis.

the stand has a groove at the bottom to fit the convex surface of the rails on which it slides. I may mention that the above stand has been supplied to various offices by Mr. Dallmeyer.

Plan-Stand.—Very many forms of plan-stand are in use in different establishments devoted to photographic copying, and differ according to the work to be done. Nearly all of them are on the same principle as the ordinary vertical easel, and are fitted with adjustments for moving the plan-board vertically up and down and laterally right and left. In some forms the plan-board has a slight movement of rotation round a horizontal axis, so that if the plan is not quite straight on the board, its image may be made straight in the camera. If desired, the feet may be grooved or be fitted with runners for moving it easily on rails.

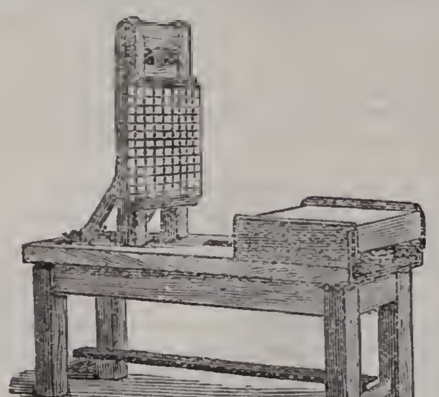
A convenient form of this kind of stand is one I had made up by Mr. Dallmeyer for the Surveyor-General's Office, Calcutta. It was specially constructed to enable maps drawn on a sheet of double elephant paper (40 by 27) to be copied in two sections. It consists of a rectangular iron frame about 5 feet long and 2½ feet wide, travelling in two vertical grooves cut in the side standards, its height being regulated by parallel rack work, with a detent to stop it at any required height. This frame has two horizontal parallel rods, about an inch thick, fixed in it, at about a foot apart, on which slides a glazed frame containing the original drawing. This frame is fixed on a pivot in the centre of two diagonal arms, the ends of which terminate in four arcs with circular slots cut in them, through which screws are attached to the frame, and serve to clamp it in any position. Between these arcs and the centre pivot are fixed tubular slides which run upon the parallel rods. These slides are attached to the back of the glazed frame, and support it on the rods. The plan board can thus be moved about half its length to the left or right, and may be raised or lowered about half its width, and thus any part of the plan can be readily brought in front of the lens.

Another very good form of stand of the same kind is used in the Deposit de la Guerre at Brussels, and is figured and described in Maes and Hannot's *Traite de Topographie et de Reproduction des Cartes.* Stands of this kind are very well adapted for subjects of moderate size, but in cases where work is varied, and plans and drawings of all sizes are received for reproduction or reduction, it is convenient to have a large vertical wooden screen, made of well seasoned wood, fixed permanently in a truly vertical position against a wall, and upon which plans of any reasonable size may be fixed.

When the work of a camera is confined to the constant reproduction of maps or drawings of the same size, I have found it convenient to make up a glazed frame on the same principle as the pr nting frames supplied by the Autotype Company for pigment printing, being fitted with a spring-back, which presses the plan closely and evenly against the glass. This frame is supported on a framework let into the wall, and allowing of a little vertical adjustment, so that the centre of the map frame may be on a level with the axis of the lens. Once fixed it requires no further adjustment. The map is held inside the frame by two thin brass clips, and the change is made at once. While making the change, the glass is supported by side props, and the frame is kept closed by hooks or spring catches.

For all ordinary small work it is most convenient to have camera stand and plan-board all combined in one piece of apparatus. This is usually made in the form of a table six or eight feet long, which can be moved about into any desired position, and on which the plan-board is fixed at one end, and the camera made to slide at right angles to it from the other, as shown in the annexed diagram of an apparatus of this kind made by Romain Talbot, of Berlin.

Sometimes it is convenient to have the plan-board fixed

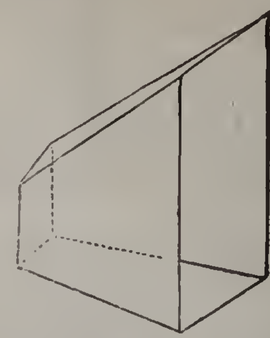


on a slider, so as to gain greater extension if necessary; and it is an improvement to have the top part of the apparatus working on a transverse axis, so that the camera and plan-board may be inclined to any desired angle in order to get the light of the sky falling direct on the plan. In some American studios this form of apparatus is suspended from the roof of the glass room, and can thus be very readily shifted into any position or light that may be desired.

For taking reversed negatives, the part carrying the camera should be moveable, and fitted transversely with sliders, so that its position on the stand can be changed. The plan-board should also have motion right and left to allow the drawing to be in front of the lens.

It is convenient to have the plan-board marked off in one-inch squares, which, as already noticed, with the lines and squares drawn on the focussing-screen, will be a great aid in ascertaining that the image is perfectly square and of the proper size, according to the scale of reproduction.

In order to prevent the *grain* of the paper showing up, Monckhoven recommends that the original should be placed within a square cone of white cardboard. The light reflected in all directions on to the white sides of the cone, and thence on to the original to be copied, will render the grain invisible.



Captain Abney recommends a similar arrangement, made of tissue paper stretched on laths.

When taking reversed negatives with a reversing mirror or prism, it is sometimes convenient and advisable to have an arrangement for laying the plan horizontally underneath the lens at any convenient distance from it. The grain of rough paper will be very much reduced by this mode of operating.

Lens.—In order to produce perfect copies, a lens must be used which will give a sharp clear image all over the field, and perfectly free from all distortion or curvature of the marginal lines of a rectangle. In practice, the most suitable forms have been found to be the triplets, rectilinears, and symmetricals of Dallmeyer and Ross; especially Dallmeyer's rapid rectilinear, and Ross' portable symmetrical, or a new lens specially made by the latter firm for copying. The aplanatics of Steinheil, and other lenses made on the principle of giving straight marginal lines, are also useful.

The lens should be worked well within its power, so as to use the most central rays with as large an opening as possible. The image should generally be focussed about midway between the centre and margin, with the full aperture, and then stopped down as may be necessary to secure perfect sharpness all over the plate; and for this a comparatively small stop will be required.

In order to prevent extraneous light entering the lens and fogging the lines, it is very desirable to put a long cone, an open box, telescopic sliding tube, or some similar protection in front of the lens—the opening should just admit the subject being seen.

For enlarging directly from a drawing or print, it is desirable to mount the lens so that the front part of it may point inwards towards the sensitive plate, and not outwards as usual. With lenses of symmetrical form, *i.e.*, those in which two exactly similar components are combined, this is unnecessary.

(*To be continued.*)

THE EXHIBITION OF 1882.

This annual event of importance to the photographic world will open with a *conversazione* to members and friends on the 7th of October.

The last day for reception of exhibits is rigorously fixed for Friday, the 29th of September. Till nine o'clock in the evening of that day the rooms in Pall Mall will be open for this purpose, and exhibits arriving after that hour will be "too late." This rule is established to enable the Hanging Committee to utilize their labour with the least delay and the greatest effect, to give time for the preparation of a correct catalogue, and opportunity for the judges to decide in comfort and at leisure on the merit of the show. It is a rule manifestly judicious, equitable to als exhibitors, and in the interest of the public and the Society.

There can be no doubt that the influence of the Exhibitions of the Photographic Society of Great Britain is favourable to the advance of photography as an art, and is commercially and socially useful to the profession. The best work of each season is gathered to a focus in an admirable gallery in Pall Mall, and year by year the interest shown by the public increases. Due prominence is given to new developments of the art, the public is made to appreciate its progress, and to utilize its advantages; while excellent work brings into prominence the names of leading professionals and amateurs. There is no work done by the Society more useful than the successful organisation of these Exhibitions, and many noted photographers whose names are yet absent from the list of members might gracefully recognize the good work by repairing that omission.

The award of medals is certainly an inducement to exhibitors abroad and at home to contribute. No one is indifferent to the recognition of merit in himself or in others. A medal is an outward and visible sign of distinction, gratifying to self-consciousness, and useful in business. The commercial instinct may innocently interpenetrate the artistic, when one's living is concerned; and photography is of more vital interest to the professional, than to the amateur.

Doubtless there is always some dissatisfaction when awards are announced, a dissatisfaction that may arise from interested, disinterested, or blended feelings; but it has never in the Photographic Society been deep or wide. The election of the jury is on a popular basis, and its composition includes each year the most trusted names. Some murmurs have been heard the last two years to the effect that portraiture has been neglected by the judges; that charming lucky bits of landscape caught on a dry plate have swept off the medals; while the higher-class portraiture, involving much greater skill and labour, has received no official recognition. The distinguished painters who have honoured the Photographic Society by joining the staff of judges have been supposed to wield an undue influence, to underrate technical difficulties, and to neglect the merits of portrait work.

On the other hand, competent observers who have closely watched the portraits exhibited of late years have thought the progress made so slight as to acquiesce complacently in the decisions which left this branch of the art without judicial recognition.

Two things may be said in support of this view: first, that during the evolutionary stages of the bromide gelatine emulsion process, when the wet plate was giving place to the dry, a noticeable degradation of quality was observable in studio work generally; and secondly, that it was both natural and desirable that the results of the new process, full of fresh powers and possibilities, should receive marked attention from the judges, and that the successful workers should receive the distinction of a medal. These awards are certainly justified by the event, for in every branch of photography the new process is superseding the old.

Nevertheless, the social and commercial importance of portraiture is so paramount, and its artistic progress so desirable, that its just claims are not likely to be neglected by the leading Photographic Society; it is, indeed, settled that portraiture will certainly receive prizes this year if the work rises to the level of desert. The bromide emulsion process offers its advantages equally for portrait and for landscape work. Varieties of graceful pose, charms of expression, and life-like spontaniety of subjects, can be rendered with a fidelity to nature impossible with prolonged exposures. Studio work has been less bold than that in the field; but how much more difficult! Given a spot well chosen, light and conditions favourable, a landscape will yield all of its beauty to the camera that photography is able to seize. But to seek in a humble way to approach in portraiture the masters of painting, to follow such guides as Reynolds, Gainsborough, Millais, is a task demanding superior skill and ability.

Consider for a moment the difficulties with which the photographer has to contend; the brief time allotted to him, time quite insufficient to enable him to give anything like artistic study to his subject; consider the intractable nature of the means at his disposal, the lens taking actually what it sees, neither more nor less. No one knows better than a photographer how common-place-looking most people are when the character and expression is not stimulated into life and activity. How often do people wish to be taken as they are, in their natural way; and, as a rule, how awkward and ugly they look when the photographer gratifies their whim! And yet, in the short space of ten minutes or so, a photographer is expected to make an artistic picture and a good likeness, to seize salient excellency of feature, attitude, and expression, to modify and hide whatever is commonplace, to harmonize figure and background, and to have light and shade duly and favourably proportioned to the subject. All this, when done well—and it is done well by very many able, educated, and talented professional photographers all over the kingdom—demands a feeling for art, a social tact, an insight into character, and a rapid decision that enter very largely into the true artistic element, and deserves more recognition from artists than has hitherto been accorded.

It is expected that the forthcoming Exhibition will show marked progress in portrait studies, and great improvement in the general excellence of dry-plate work.—*Autotype Notes.*

THE BLUE PROCESS OF COPYING TRACINGS.

As we have had several inquiries recently in regard to the best method of copying tracings by what is known as the "blue printing process," we will give a brief description of the method employed by us; we do not say it is the best, but it certainly is as simple as any other, and has always given us perfect satisfaction.

The materials required are as follows:

1st. A board a little larger than the tracing to be copied. The drawing-board on which the drawing and tracing are made can always be used.

2nd. Two or three thicknesses of flannel or other soft white cloth, which is to be smoothly tacked to the above board to form a good smooth surface, on which to lay the sensitized paper and tracing while printing.

3rd. A plate of common double-thick window glass of good quality, slightly larger than the tracing which it is wished to copy. The function of the glass is to keep tracing and sensitized paper closely and smoothly pressed together while printing.

4th. The chemicals for sensitizing the paper. These consist simply of equal parts, by weight, of citrate of iron and ammonia, and red prussiate of potash. These can be obtained at any drug store. The price should not be over 8 or 10 cents per ounce for each.

5th. A stone or yellow glass bottle to keep the solution of the above chemicals in. If there is but little copying to do, an ordinary glass bottle will do, and the solution made fresh whenever it it wanted for immediate use.

6th. A shallow earthen dish in which to place the solution when using it. A common dinner-plate is as good as anything for this purpose.

7th. A brush, a soft paste-brush about four inches wide, is the best thing we know of.

8th. Plenty of cold water in which to wash the copies after they have been exposed to the sunlight. The outlet of an ordinary sink may be closed, by placing a piece of paper over it with a weight on top to keep the paper down, and the sink filled with water, if the sink is large enough to lay the copy in. If it is not, it would be better to make a water-tight box about five or six inches deep, and six inches wider and longer than the drawing to be copied.

9th. A good quality of white book paper.

Dissolve the chemicals in cold water in the following proportions: 1 ounce of citrate of iron and ammonia, 1 ounce of red prussiate of potash, 8 ounces of water. They may all be put into a bottle together and shaken up. Ten minutes will suffice to dissolve them.

Lay a sheet of the paper to be sensitized on a smooth table or board; pour a little of the solution into the earthen dish or plate, and apply a good even coating of it to the paper with the brush; then tack the paper to a board by two adjacent corners, and set it in a dark place to dry; one hour is sufficient for the drying; then place it, sensitized side up, on the board on which you have smoothly tacked the white flannel cloth; lay your tracing which you wish to copy on top of it; on top of all lay the glass plate, being careful that paper and tracing are both smooth and in perfect contact with each other, and lay the whole thing out in the sunlight. Between eleven and two o'clock in the summer time, on a clear day, from six to ten minutes will be sufficiently long to expose it; at other seasons a longer time will be required. If your location does not admit of direct sunlight, the printing may be done in the shade, or even on a cloudy day; but from one to two hours and a-half will be required for exposure. A little experience will soon enable any one to judge of the proper time for exposure on different days. After exposure, place your print in the sink or trough of water before mentioned, and wash thoroughly, letting it soak from three to five minutes. Upon immersion in the water, the drawing, hardly visible before, will appear in clear white lines on a dark blue ground. After washing, tack up against the wall, or other convenient place, by the corners to dry. This finishes the operation, which is very simple throughout.—*The Locomotive.*

Notes.

Next Friday, the 29th, is the *last day* for sending in pictures for the Annual Exhibition of Pall Mall.

The Honorary President of the Vienna Society, Herr Anton Martin, is dead. He was the first Austrian to practise the Daguerreotype process, and the first to make experiment with the Petzval-Voigtländer lens. Herr Martin was also the first to issue a photographic manual in the German language.

"The A B C of Dry Plate Photography," by W. K. Burton, C.E., which recently appeared in these columns, is shortly to be published in French by M. Gauthier-Villars, of Paris.

Writes a correspondent: "I develop with ferrous oxalate, and I always find my second plate (I work duplicates, to be sure of my result) is more successful than my first. The reason is, that I employ the same developer for the second plate, which comes out more slowly and evenly, and is consequently under better control. To tell the truth, I hardly like using a fresh and vigorous developer."

Mr. Durrant's yacht pictures are well known, for there are few photographers so successful in depicting the delicate rigging and snowy sheets of those trim craft as he is. We were privileged the other day, at Torquay, to examine a whole collection of these clever pictures at Mr. Durrant's little studio; and the various shapes and forms of the beautiful vessels, as they spread their "white wings" to the breeze, or drooped their tired pinions at the journey's end, reminded you of huge and graceful sea-birds, and for the moment you almost forgot they were but structures of wood and canvas.

Following the footsteps of their sailor-uncle, the Royal midshipmen seem to take particular interest in all things photographic. They have a large collection of pictures of the places visited during their recent voyage round the world. The Duke of Edinburgh, it will be remembered, became an expert photographer on his early voyages, thanks to the tuition of Mr. Frederick York, who accompanied His Royal Highness during his cruise in the *Euryalus.* The pictures, by-the-bye, produced jointly by the Duke of Edinburgh and Mr. York were never published, having been produced, indeed, for the Queen's private album—a great pity, we think, for they would add one more to the many interesting series of "slides" which Mr. York has given to the public.

In these advanced days, when it is not uncommon to hear the names of princes taken in vain, it is something to know that our royal family do not forget old companions. Mr. Francis Bedford, who accompanied the Prince of Wales to the Holy Land twenty years ago, is always sure of a friendly greeting when they meet, and same may be said of the Duke of Edinburgh, who still chats pleasantly with Mr. York of the times when the former was a midshipman, and the latter a member of the ward-room mess on board the *Euryalus.*

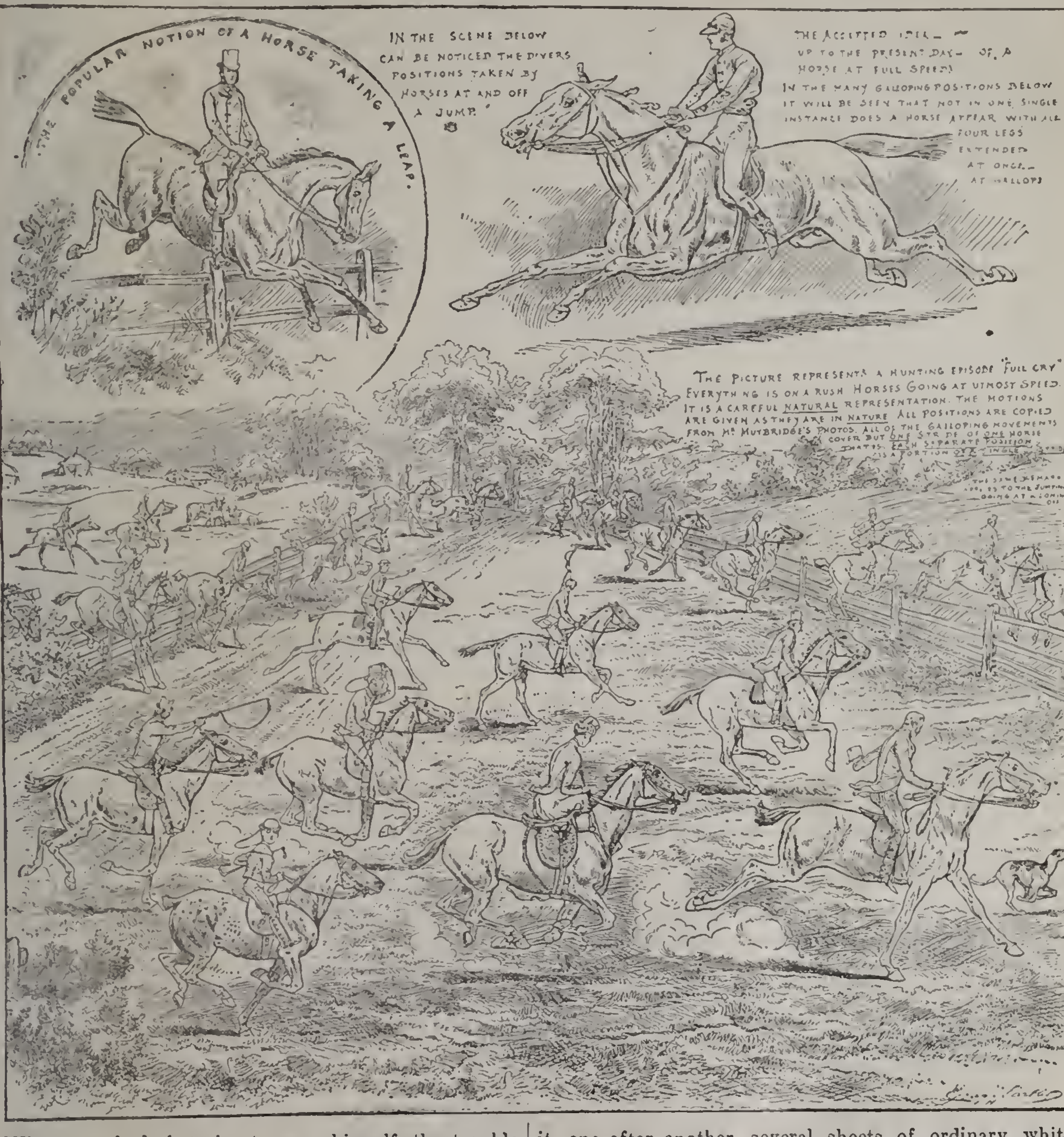
Messrs. Liesegang and Co., of Düsseldorf, have sent us the *Ateliers von Europa*, being the German edition of our "Studios of Europe." The German publishers have conceived the happy idea of issuing, by way of supplement to the book, a portfolio containing specimen pictures emanating from the principal studios described. The price of the portfolio is twenty marks (shillings), and no doubt Messrs. Liesegang would forward it to any of our readers in this country on receipt of a postal order to that amount.

We have already called attention to the singular perverseness of nations in declining to adopt a thermometer scale suggested by one of themselves, and we notice that a contemporary last week returns to the subject in proof that no man is a prophet in his own country. Thus, while we in England adopt the system of Fahrenheit, who was a German, the Great Fatherland on their part use the Réaumur scale, Réaumur being a Frenchman. The French, again, use the scale of a Swede, Celsius, or the Centigrade, as it is now generally called; while to complete the chain, the Swedes themselves adopt the thermometer scale of Leslie, a native of Great Britain.

We gave the other day the prices of cartes and cabinet portraits in the first-class studios of Europe; here are the prices charged for the next larger size, the panel or promenade. In Paris 120 francs per dozen (£4 16s.) is the highest charge we have met with, while in England £6 6s. is quoted by several studios, or at any rate £3 3s. for the half-dozen. In Germany the average charge in high-class houses is about fifty shillings; while in Austria, and also in Hungary, it is but forty-five shillings. In the above instance, therefore, England leads the way; but, on the whole, it may be said that Paris and London prices are about on a par, while those of Vienna and Berlin are a trifle lower.

It is only the other day that we mentioned Blondin in these columns in connection with photography; now the *Mittheilungen* gives us something more to say about him. Blondin has become a photographer—a high-art photographer, indeed, for he takes pictures on a rope stretched at a height of seventy feet from the ground. On the 27th of last month, at the "Neue Welt," in Berlin, he went through the whole operation of photographing upon the tight-rope; he put up his camera-stand, fixed his camera, and actually focussed in the approved manner with his head underneath the dark-cloth. Imagine this, balanced at a height of seventy feet, and in the teeth of a stiff breeze. Then he introduced the dark slide, held up his hand as a signal for the spectators to remain quiet, and coolly exposed. What Blondin's success was in these conditions is not recorded.

We take from the *American Queen* an illustration which will be of considerable interest to our readers. It represents the ideal and the real of the horse in the hunting field. It is needless to say that the horse-pictures are taken from Mr. Muybridge's instantaneous photographs; and it would have been well, indeed, if his riders had also been copied. These, however, have been supplied by the American artist.



When everybody is trying to save himself the trouble of sensitizing paper every day, it may be well to remind our readers of the old-fashioned but very effective plan of preserving it by means of carbonate of soda blotting-paper. Sensitized albumen paper will keep good a week—nay, even a fortnight in cold weather—by taking the precaution to roll it between carbonate of soda pads, and the ordinary operations of toning and fixing need not be modified.

The best plan is to make a strong solution of bicarbonate of soda—a saturated solution, if you will—and immerse in it, one after another, several sheets of ordinary white blotting-paper. The blotting-paper, when wet, is so tender that it cannot be lifted without much risk, and therefore it is well to lay sheet after sheet in the solution, until a dozen or a score are immersed one above the other. The sheets are then taken out *en bloc*, squeegeed, and, when tolerably dry, separated and most perfectly desiccated. Sensitized albumen paper packed sandwich-wise in these soda sheets will be preserved from brownness.

Another use for this bicarbonate of soda paper arises in winter time, when a slow-printing negative remains in the frame for two or three days together. If you put a sheet of the soda paper in the printing-frame next the sensitized paper, the latter neither becomes yellow nor discoloured. The soda paper, we may add, will keep indefinitely.

Although Mr. Robinson, of Tunbridge Wells, employs nothing but gelatine plates for his studies, he still finds room for a dipping bath in his laboratory; the reason is that he prefers wet plates for taking sky pictures, lack of sensitiveness in this case being in most circumstances a considerable advantage.

Tracings of designs, especially if made upon cloth, are not easily copied with the camera, even when made with Indian ink. In these circumstances, the *Moniteur Industriel* recommends the addition of raw sienna to the Indian ink, as this colour unites very intimately, besides intercepting the greatest amount of light.

Black mounts with bevelled gold edges have hitherto been generally employed for portraiture, but they are still more pleasing when small landscapes, say of cabinet size, are mounted on them. The prints should be cut so as to leave a quarter of an inch margin of black all round, and then, if the gold bevel is broad, the effect is that of a bijou picture tastefully framed. The mounting in this fashion is especially suitable for small landscapes exposed for sale, for a most finished look is thus imparted to the little productions. We recommend those of our readers who have not seen the effect of a cabinet landscape mounted in this way to make trial of the plan.

The *Pall Mall Gazette* is exercised in mind on the subject of the word "scientist," which it pronounces to be very objectionable. Instead, our contemporary proposes that scientific men should be called "scientiates" for short, in the same way as we have licentiates and potentates. We suspect that in this everyday world, the more simple word will always be preferred; telegraphême was said to be more correct than telegram, and yet it never had a chance; while to quote a more recent instance, the Zulu battlefield where we suffered disaster having in the first instance been misprinted Isandula, was ever after called by that convenient name, in preference to the unpronounceable Isandhlwana.

On the principle of setting a thief to catch a thief, the authorities of the Bank of France, so the *Archiv* tells us, have taken advantage of photography in producing their bank notes to prevent photographic forgeries. The famous painter Baudry has been pressed into the service to design the new note, and this he has done on a monster scale The original bank note is, indeed, no less than thirteen feet long and four feet broad. In this condition it has been handed over to the photographer, who having reduced it, with all its fine detail, to the ordinary dimensions of a bank note, the design has been etched on metal. By securing the aid of photography in this way, the Bank of France hopes to suffer immunity from evil-doers in future.

Patent Intelligence.

Notice to Proceed.

2277. Herbert John Haddan, of Kensington, Middlesex, for an invention of "A new or improved process for producing pictures on glass, stone, metal, and other materials."—A communication to him from abroad by Edouard Godard, of Paris, France.—Dated 15th May, 1882.

Specification issued during the Week.

565. A. Cowan.—"Packing photographic glass plates automatically." Price 2d.

A rectangular box has in the lid an opening half an inch larger each way than the size of the plates to be packed, and on each side of this opening are placed sliding pieces having their top edges bevelled off at an angle of 45°. These pieces are made to close over the opening in box by springs, and when in their normal position are about one quarter of an inch nearer together than the width of the plate to be packed. Above these sliding pieces is placed a strip of paper which is held in position by a hinged frame with frictional rollers to regulate the paper, and having also on each side a hinged plunger which drives the plate through the opening. Inside the box below the opening is a rising platform kept in position by a spring. In use, the plate to be packed is placed in the hinged frame, and the side plungers made to push it past the sliding pieces, which, directly it has passed them, close together and make a corrugation in the paper all along each edge; on removing the plungers the lower platform rises and flattens the bent edge of the paper ready to receive another plate. *Provisional protection only.*

Specifications may be obtained by addressing an order, with the price and postage, to Mr. H. Reader Lack, Office of the Commissioners of Patents, London.

Patent Void through Non-payment of Duties.

3541. Frank Wirth, of the firm of Wirth and Company, Patent Solicitors, at Frankfort-on-the-Main, in the empire of Germany, for an invention of "Improvements in apparatus for holding photographs and showing the same."—A communication from Friedrich Wilhelm Schwarz, manufacturer, a person resident at Offenbach-on-the-Main, in the empire of Germany.—Dated 3rd September, 1879.

TWELVE ELEMENTARY LESSONS IN PHOTOGRAPHIC CHEMISTRY.

No. VII.—Preparation of Pyrogallic Acid, Gallic Acid, and Hydrokinone.

There are several methods of preparing gallic acid, but the one which is simplest to carry out on the small scale is by heating an infusion of gall-nuts with a dilute solution of sulphuric acid. Take about a quarter of a pound of powdered gall-nuts, place it in a pint beaker, and pour about half a pint of boiling water into it and allow the mixture to stand for an hour. Place over a large funnel a piece of calico about a foot square, and turn the contents of the beaker into the calico, but of course allowing the liquid which passes through the funnel to drop into a suitable vessel. When all has drained through, the calico is held by the corners, and thoroughly squeegeed in order to press out the adherent liquid; this is then mixed with the liquid which drained through, and the whole is filtered through bibulous paper. Now pour the filtered solution into a pint flask, with half an ounce of dilute sulphuric acid (1 : 4), and boil over a sand-bath for a quarter of an hour; then let the solution cool down, when beautiful needle-like crystals of gallic acid will separate out. The gallic acid thus prepared is somewhat impure, so to purify it, the crystals, after draining, are placed in a flask with about five ounces of water, and boiled till all is dissolved; the solution is filtered, while still hot, through bibulous paper, and the filtered liquid will deposit, on cooling, gallic acid which is moderately pure; the crystals are finally dried by pressing between two or three thicknesses of bibulous paper.

In preparing pyrogallic acid, one has the choice of several methods, viz., heating gallic acid alone, heating a mixture of gallic acid and powdered pumice-stone in an atmosphere of carbonic acid, and heating a solution of gallic acid in glycerine. The method which is most conveniently worked by the photographer is that of heating a solution of gallic acid in glycerine, but we give details of the other processes, so that the student may experiment with them.

In order to prepare pyrogallic acid by the first-named process, about half an ounce of gallic acid is placed in a large porcelain crucible, a piece of thin cardboard perforated with several small holes is tied over the top of the vessel, and a cone of stout paper is placed over it. The crucible is placed in a sand-bath heated by a Bunsen burner fitted with a rose. The temperature should be kept at about 180° C. or 185° C. for some hours, when the gallic will gradually decompose into carbonic dioxide, various secondary products and pyrogallic acid, the latter compound condensing in the paper cone. The great objection to this process is, that there is a great difficulty in maintaining the right temperature, for should it exceed 185° C., the gallic acid is converted into meta-gallic acid and water; consequently, the above process does not yield more than twenty per cent. of the original weight of the gallic acid.

The second method is a modification of the preceding process, and was proposed by Liebig. About half an ounce of gallic acid is mixed with one ounce of coarsely-powdered pumice, and placed in a six-ounce tubulated glass retort; the latter is placed on a sand-bath heated with a Bunsen burner to the same temperature as is necessary in the first method. In the tubulure of the retort is fitted a perforated cork, and a tube connected with a carbonic acid apparatus (the sulphuretted hydrogen generator containing lumps of white marble and hydrochloric acid will answer very well). The pyrogallic will gradually form on the inside of the neck of the retort, and can be easily removed by a glass rod. If the latter process be carried out correctly, about thirty per cent. of the original weight of gallic acid is formed. The reason why a greater yield is produced than in the former method is that the carbonic dioxide carries away the pyrogallic acid as soon as it is formed, and consequently prevents it being decomposed to a certain extent by a rise of temperature.

The next method is that of heating an aqueous solution of gallic in a sealed vessel to about 200° C.; after about half an hour the solution is boiled with animal charcoal, filtered, and evaporated to dryness, the residue being afterwards distilled under diminished pressure. In this process almost the theoretical yield is produced; but the process is not easily worked on the small scale, as a special apparatus is required for heating the solution of gallic acid and for distilling the impure pyrogallic acid under pressure. The process of heating a solution of gallic acid in glycerine has lately been suggested by Professor Thorpe, and is certainly the simplest and most economical method for working on the small scale. Place in a four-ounce hard glass flask 300 grains of gallic acid and two ounces of Price's glycerine; fit in the neck of the flask a cork perforated with two holes, one being left open for the escape of gas, and through the other place a thermometer capable of registering 200° C. or 400° F., the bulb of which must dip into the liquid. Now heat the flask on a sand-bath to about 190° C. or 200° C. (400° F.), till the evolution of carbonic dioxide stops, which operation generally takes about an hour. The solution can now be preserved in a stoppered bottle for months without any apparent change. Each ounce of the liquid will contain about 100 grains of pyrogallic acid, but Professor Thorpe prefers to pour the solution into 66 ounces of water, and in that way he obtains a solution which contains rather more than three grains to the ounce; the pyrogallic acid in so dilute a solution will not keep more than a month.

Hydroquinone or hydrokinone, which substance has lately been proposed as a developing agent, may be prepared by distilling an extract of the cinchona bark or the coffee-berry with a mixture of sulphuric acid and manganic dioxide, and finally reducing the quinone thus obtained by dissolving it in water containing sulphurous acid, and evaporating the solution. A simpler and more economical process, which has been suggested by Nietzki, is that of oxidizing aniline by means of potassium bichromate and sulphuric acid.

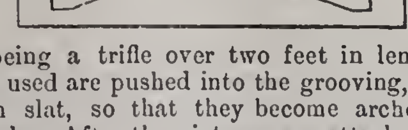
For preparing it on a small scale, pour into a quart flask a pint and a half of water, and then gradually add five fluid ounces of sulphuric acid and allow to stand till quite cool. When ready, place the flask in a basin of water with a few lumps of ice floating in it, and pour an ounce of aniline into the dilute acid; then very slowly add powdered potassium bichromate till the dark green precipitate first formed is dissolved. From two to three ounces of the salt is required. When the operation is finished, place about ten ounces of methylated ether in a Winchester quart stoppered bottle, and then pour the contents of the flask into the bottle, replace the stopper, and briskly shake the vessel for ten or fifteen minutes, and allow to stand. When the two liquids have separated, draw the top ethereal solution off into an evaporating-basin by means of a syphon, and place the dish in the open air (if possible in the sun) for two or three hours, when the ether will evaporate, leaving crystals of quinone. While the evaporation of the ether is proceeding, a solution of sulphurous acid in water should be made. An apparatus must be fitted up similar to the sulphuretted hydrogen generator, the bottle being replaced by a four-ounce flask; into the latter vessel about an ounce and a half of copper turnings is placed, together with a fluid ounce of strong sulphuric acid, and the cork replaced, the delivery tube being conducted into a vessel containing six ounces of distilled water. The flask is gently heated on a sand-bath, when in a short time action commences, and will continue for about twenty minutes. When the operation has finished, the delivery tube should be withdrawn from the water before taking the lamp away, otherwise the water will run up the tube into the flask, and cause an explosion.

When the greater part of the ether has evaporated, pour into the dish the six ounces of the aqueous solution of sulphurous acid made in the previous experiment, and place the evaporating basin on a saucepan of boiling water, continuing the boiling till all the water has evaporated, leaving a crystalline mass of hydrokinone.

A SIMPLE APPLIANCE FOR USE IN MOUNTING CARTE PICTURES.

BY C. KEUCHEL.*

It is my opinion that the convenient and easily constructed apparatus about to be described will prove of real practical utility to the photographic printer. The tendency of recently mounted pictures to curl inwards on drying causes considerable inconvenience in several ways, but more especially during burnishing or rolling; and in order to overcome this, I construct grooved wooden slats or strips of moulding having a section as shown in the diagram



each slat being a trifle over two feet in length. The cards to be used are pushed into the grooving, six end to end in each slat, so that they become arched with the face outwards. After the pictures are attached, the cards are once more slid into the grooves, and allowed to remain until nearly or quite dry. The set or curve thus given to the cards quite counterbalances the tendency of the print to distort the mount; but if the pictures are allowed to become quite dry in the grooves, it sometimes happens that a permanent curvature is given in a contrary direction to that usually taken.

* *Photographisches Archiv.*

ODD JOBS.

BY THE AUTHOR OF "LOOKING BACK."

No. 11.—THE PARVENU!

EVERY profession has its annoyances, no doubt. Lawyers have queer clients that expect them to buy justice in the face of a bare unvarnished truth; doctors have patients that want to be healthy and intemperate at the same time. Each, more or less, in his business routine, beholds the seamy side of humanity; but I fancy photographers see more petty meannesses and pitiable littlenesses than any other. The tailor is told of the high shoulder, and has to hide it; the shoemaker has to make large feet small, and knobby toes symmetrical; but what is that compared to the multitude of weaknesses displayed in all nakedness to the photographer in the studio? Every day almost, we pass one or other of the seven cardinal sins through our hands. We are not told of them as the tailor and shoemaker is; experience or intuition points us out the cloven foot. No one can mistake the noodle, full of empty pride; the common—not to say ugly—looking girl so puffed with vanity; the penurious purse-drawn face of avarice; the filthy breath and blotched face of the drunkard; the bloated cheeks and sensual lips of the glutton, or the bitter withering look of old maid envy as she looks upon the budding charms of sweet seventeen. Occasionally we meet with flaming anger; but, in my experience, that sin displays its proportions to more advantage in the dark room than in the studio.

In this paper you will only find a sample of a class that tries the patience of operators until they find themselves hovering on the verge of raving lunacy. When one of this class drops into the studio, quote Shakespere's "Patience on a monument," &c., and think of Job. A good plan is to have a few engravings from the Book of Job handy, so as to refresh your memory with that exemplary man's sufferings.

The yahoo, as usual when he deemed something nice in store for me, was on the broad grin when he informed me that F. Midas, Esq., who drove the four-in-hand creams, and had run away with Methusalah Smith's wife, and got turned out of the assembly rooms, and kicked out of the club, was coming to be "nicked off (Yahoo's vernacular) in various poses and divers garbs."

F. Midas, Esq., was a fair, good-looking little man with a jaunty, impudent, over-bearing air about him; he gave one the idea that he was for ever trying to impress the public that he was a "good man and tall"—six feet at least—the only party deceived with the fraud being himself. When F. Midas, Esq., entered the studio, I politely bade him good morning; but, instead of answering, he fixed up his eye-glass, and, with the utmost coolness, impertinently scanned me slowly from head to heel. I daresay he wondered at the assurance of a photographer daring to address even a good morning to his greatness.

"A—ah! What country du yu come from?" he asked. The stare would have been enough to raise some people's dander, and, backed up with a question given in the same tone as if he were asking into the antecedents of a footman, I'm sure you will not blame me when I lied and coolly answered, "Africa."

Up went the eye-glass again, while the yahoo spluttered and knocked about the bottles in the dark-room in a very suggestive manner. "Jove!" quoth F. Midas, Esq., "that accounts for your curly hair!" I could hear the yahoo going into fits in the dark-room at the deduction of F. Midas, Esq.

"I want cabinets taken in this coat," explained my sitter, the coat in question being a brown silk velvet; "but I must have it open so as to show this chain." And he displayed an enormous gold albert, made of long square solid links, and the side of each link studded with a diamond. "Never saw anything like that before—eh?" he continued, as he fondled at the heavy links." This is my own design—pretty, ain't it? The diamonds alone cost me £7,000. What do ye think o' that? No wonder if I want it to come out well—eh! Ha, Ha! You should see the ladies how they look at it! Why, the Prince has nothink equal to't! By-the-bye, I'm told you photographed the Prince. Now, honestly, don't yu think him a very common, podgy sort of a chap?"

With such vain, vulgar twaddle did F. Midas, Esq., with an income of £60,000 per annum, pass the intervals of posing and arranging the lighting. Of course, the posing was the great trouble. "I want something gentlemanly. I don't care whether I sit or stand, but I must have it gentlemanly." I first tried a three-quarter figure, sitting at a reading-desk with some books. "Demmit! I shan't have that! Looks like a schoolmaster." I then took away the books, and as he stuck his legs in form as if they were made of wood, I got him to cross them. "Oh, oh, this won't work! every demmed tailor sits cross-legged! How will this do?" And, bringing up one foot over one knee, he flung himself back in his chair, taking care to put aside his coat, so as to display his chain. He had several suits with him, and as all my suggestions as to posing were met with such expressions as—"Oh, that's frightful common! Awfully stagey! Quite vulgar; suit a tradesman!" I was really put to my wits' end to please him. I have a dislike to scenic backgrounds, especially interiors. There was one in the studio—a complicated affair, with a half-open window, a distant view, a curtain, and some elaborate wainscoting that was my particular abomination. F. Midas, Esq., while looking over some specimens, dropped upon one of it, and immediately went into ecstacies over it. It was so like a picture in itself, nothing stiff or formal, and everything came out so distinct. Believe me, the only picture that he really liked and praised was the one taken with that hideous interior.

I had a whole day about with him, and, to help make the thing worse, he was the veriest fidget I ever saw: three seconds' exposure with the head-rest, and he would move as if he were doing it on purpose, and, when charged with it, swear you some good round oaths, that he was—"Demmit! steady as a rock! Demmit!" Independently of this, I succeeded in making some very good pictures of him, the best being a large head (that he never ordered from) and the three-quarter in velvet. I was agreeably surprised at the rich effect produced by the velvet on the gelatine: it far surpassed anything I could obtain with collodion. An enlargement made from it retained the shimmer so well that one would fancy it quite easy to lay hold of the folds.

The last *gentlemanly* action of F. Midas, Esq., prior to leaving the studio, was to offer me a shilling for being so attentive. I was asked in the evening by the guv'nor what I had done that F. Midas, Esq., set me down as a "demmed proud sort of a fellow."

While he was leaving orders in the reception room about his portmanteau and dressing case, the yahoo had impaled the guv'nor's little boy in a corner, and evidently had been teaching him a lesson. During a pause in the talk the yahoo exclaimed:

"What did Joe Jolliffe's ducks say, Tommy?"

"Quack! Quack! Quack!" answered Tommy.

Everyone laughed with the solitary exception of F. Midas, Esq., and he looked angrily and suspiciously at the smiling and placid face of the yahoo, while his face flushed most painfully. The yahoo knew the secret of F. Midas, Esq.'s wealth. The elder Midas was originally a bird catcher, but lately had discovered that quackery paid better. Thus, the elder Midas, with a wonderful pill that cured all the ills that flesh is heir to, made a fortune, and only failed in his last undertaking—*videlicit*, to make his son a gentleman.

THE DEVELOPMENT OF GELATINE PLATES.

There is no doubt but that certain makes of plates develop better with pyrogallic developer than with ferrous oxalate; and it is equally a fact that certain other makes develop quite as well, if not better, with ferrous oxalate than with pyrogallic. This is not only true of plates made by different makers, but even of plates made by the same maker, and is probably due to an alteration of texture in the gelatine, produced by some slight variation of the treatment during the process of manufacture.

It is therefore impossible to say that one mode of development is superior to the other, and that is practically admitted when the instructions sent out with the plates include both modes. In the ferrous oxalate development there is a clearness and brilliancy, and an appearance, which remind one strongly of a fine collodion negative, and if the absence of yellow stain is considered advisable in plates developed by ferrous oxalate, this stain is conspicuously absent.

It has been urged against ferrous oxalate that it does not permit of any coaxing of the negative as the pyrogallic development is supposed to do. This is a mistake; the normal condition of ferrous oxalate is about the same as that of pyrogallic with its full dose of ammonia; if the exposure has been too long, or it is wished to proceed very cautiously in the development, the addition of bromide will retard and control the action of the ferrous oxalate just as it does the pyrogallic.

As a practical matter, if one ounce of a one-grain solution of bromide of potassium solution be added to each five ounces of ferrous oxalate developer, it will be at once apparent that it puts the development of the picture quite under the control of the operator. It is true that it is impossible to force up the picture with ammonia, as it is attempted to be done with the pyrogallic mode of development, but is this ever of any value? Does it not simply intensify the yellow veil over the picture, without in the least helping to bring out the desired detail?

In employing the ferrous oxalate developer, it should always be used as strong as possible. It is best to have saturated solutions, and with the aid of a couple of good large jugs this condition can readily be secured. It may be urged that the saturation point depends upon temperature, and that more is taken up at one time than another. That is very true; but in any case the solutions balance each other, are as strong as they can be made, and in the winter, care should be taken to keep them in a room or in some place where the temperature does not fall very low.

The following is an easy and simple mode of making saturated solutions, the important point being to always have a quantity of the undissolved salts in the bags. Procure two large common jugs; over the tops put two pieces of common coarse muslin, or strainer, so that they bag into the jug; now put a quantity of neutral potassium oxalate into the one, and a quantity of protosulphate of iron into the other; fill the jugs up with warm water, leave them to get quite cold, and the two are ready for use. Keep the jugs filled up with water, and take care to have always some undissolved crystals left in the bags. Before commencing to develop, mix a sufficient quantity for the day's work, in the proportion of one part of the iron solution, stirred into four parts of the oxalate.—*Autotype Notes.*

LIGHT AND COLOUR.

BY ALFRED DANIELL, M.A., BS.C.

Light is a form of wave-motion in the all-pervading ether; and it scarcely needs, nor does space allow, a lengthened discussion of the varieties of converging proofs which aid one another in forcing us to this conclusion. If we throw a couple of stones on the surface of water, we find a couple of systems of rings produced, which at their points of crossing present the appearance of engine-turning. Where the crest of one coincides with the crest of the other, there is double upheaval; where the trough of one coincides with the trough of the other, there is double depression. Where, however, the crest of one coincides with the trough of the other, what do we find? Neutralization of effects—no effect, no motion; for the instant a state of rest. This is exactly what happens when two beams of light coming, or appearing to come from two points exceedingly near to one another, are allowed to shine upon the same spot. The phenomena of interference of light are phenomena in which light added to light produces darkness in some places, and extra brightness in others—darkness when the same spot is affected by waves which are in opposite places, and increased brilliancy when the waves are in accord with one another. This is a matter capable of easy explanation when the phenomena of light are considered as due to wave-motion; but under the old corpuscular material theory of light it was very difficult to explain, as, indeed, it was to understand or believe the explanation offered.

The phenomena of colour are again due to waves of different lengths. Each colour and shade of colour, provided that it is in the spectrum, is due to a special wave-length. The waves of light which produce in our eyes the impression of deep red have a length of about the 37,640th part of an inch; and since the ripples of 192,000 miles of space break upon the eye in a second, we learn that during each second we spend in contemplating the planet Mars, or any red star, the prodigious number of 458,000,000,000,000 break upon the eye; and if the red object we look at be terrestrial, it must be in a state of continued vibration, which enables it during each second to start this enormous number of waves travelling through the ether and striking the eye. The other extreme in colour is produced by certain violet rays, which have a wave-length of the 60,000th part of an inch, and of which more than 700,000,000,000,000 strike the eye during every second. But there are still more rapid vibrations, propagated by the ether, to which our eyes are not sensitive, but to which our photographic plates do respond; and there are vibrations, slower than those of the extreme red, to which our eyes are not specially sensitive, but which our skin and general bodily organisms perceive as heat rays. The slower waves are thus the cause of radiant heat, the more rapid ones cause the sensation of light, and the most rapid produce the chemical effects upon which photography depends. Yet there is no broad line of demarcation between these departments of energy-bearing waves. The red rays are felt to be warm by the hand, and seen by the eye to be red; the violet rays are seen by the eye to be violet, and are also found to be active in relation to photographic plates. What lies beyond these we do not know. There is no probable reason, in the nature of things, for such a limitation of vibrations in the ether to one or two octaves; but whether there be or be not any radiations through space which are slower or more rapid than those with which we are acquainted as heat waves, light-waves, or actinic waves, it remains that we do not know anything about them, for we have no senses which perceive them, and we have as yet discovered no instrumental means for their detection. Yet we suspect their existence. Many of the vibrations of luminous bodies are connected with one another in the same way as the harmonies of a low musical note are related; and thus we may, without any material call upon our imagination, suppose ourselves to be in relation to the vibrations of light in much the same position as we can easily suppose a grasshopper to be on listening to the boom of a church organ. The grasshopper can hear sounds which are beyond our hearing, sounds high and keen edged, sounds like those which he himself makes; but it is probable that we in our turn can hear low tones which the grasshopper cannot hear, and that on listening to a full-chorded combination of sounds, the insect would be deaf to the lower notes, and would hear simply a crowd of harmonics, which would seem at first to bear no relation to one another. In the same way, we can suppose ourselves to be blind and devoid of sensation in respect of those long fundamental waves in the ether, of which these light rays and heat rays are some of the harmonies. Too much stress must not be laid on this, however, because our knowledge (though growing) is not yet very great in this regard; and there is not much evidence that there is any material loss of recognizable or perceptible energy in the shape of unrecognizable or imperceptible radiations.

Colour in the theory of light resembles pitch in the theory of sound. Both depend upon the length of wave which strikes upon the appropriate organ of sense after travelling through the appropriate medium. Yet, though they depend upon the length of wave, the length of wave does not explain the sensations of colour or pitch. The theory of light and that of sound are both, in the most rigid sense, sciences of calculation, of applied mathematics, mechanical sciences. They have nothing to do with the emotional effect of the harmony of colours or of sound; or with the relation between beauty of colour or of sound, and the admiration which this calls forth from a sensitive mind. They have to deal with vibrations alone, and a transversal vibration in the ether, having a wave-length of the 51,110th of an inch, and falling on the retina of the eye, may or may not rouse the enthusiasm of the mind which is behind the eye that perceives the blue of heaven; but physical science, concerning itself with the vibration as such, and as such only, stops short where physiology and psychology take up the burden of discovery and of explanation.

White light, such as that which comes to us from the sun, is composed of almost all the vibrations within the limits of visibility, simultaneously travelling through space, and simultaneously striking our eyes. When a ray of bright white light strikes the eye, we have no sense of any special colour in the mixture, and this is the sensation of white light; the mixed sensation of all colours, of which none preponderates, is the sensation of uncoloured or white light. If an orchestra sounded forth every imaginable note within the compass of our hearing, the blinding flare would not produce in our ears the effect of any particular pitch; the result would simply be an indescribable Wagneresque ocean of pitchless sound. So it is, and as wonderful, but that we are more accustomed to it, every time we behold white light; and our object when we endeavour to procure what we call pure white light is to procure light which is due to all possible vibrations, of which no one preponderates over the other so as to impress the aggregate result with its own coloured individuality.—*Journal of Gas Lighting.*

THEORY AND PRACTICE.

Theory and practice, says the *Chemiker Zeitung*, will involuntarily strike the ear of some of our readers like shrill discord.

"All theory, dear friend, is hoary," perhaps one will say, while the theorist, wrapping his toga proudly about him, will draw aside from the practician with a sympathetic smile and express his ideas. The contradiction herein expressed has become so customary that one rarely meets with any other conception than this, which is decidedly false. For this reason we may be permitted to state in a few words what is the real relation between theory and practice.

We do not see in it any contradiction, any "master and servants," or "head and hand;" nay, we look on them as two perfectly equal factors, through the harmonious co-operation of which the acquisitions of science are first made to serve mankind. If we admire the learned who live only for science, pondering on the highest problems for their own sake alone, unconcerned as to whether their thoughts can find any practical use, we do not honour less the man who is quick to see which thoughts of that savant promises a rich return if carried into practice, and then with an iron energy carries it out, and impresses upon it its best form.

And where is there any discovery which owes its origin to the mind of a theorist, that has not found its first complete application in the efforts of a diligent practician?

We have seen a whole series of discoveries, which seemed originally to have merely a scientific value, but they soon celebrated unexpected practical triumphs; we have seen how flourishing industries have been built on small and unseemly experiments made only for scientific purposes in the laboratory of the investigator, not only without regard to their practical utility, but very frequently without any suspicion of it. About two decades ago Bunsen and Kirchhoff astonished the world by their discovery of spectrum analysis, but at that time no one imagined that it would so soon find an eminently practical and genial use in the manufacture of Bessemer steel.

The insignificant observation that the legs of a frog hanging on a copper wire would jerk whenever they touched the iron, was the foundation of the electric telegraph, and there is scarcely another domain in which practical men have attained such brilliant results as in electricity.

Marggraf's ever memorable isolation of the "sweet salt" in the beet was the corner stone of one of the most flourishing industries of Germany, which to-day supports very many chemists and technical men who are continually striving to advance the higher development of this branch of industry.

What a wide step from Ziuin's conversion of nitro compounds into amides to the present state of the coal tar colour industry!

We could give an enormous number of examples of how small theoretical beginnings have risen to important practical results. But these few may suffice to show how everything of importance which has been accomplished in our profession owes its results to the circumstance that theory and practice have mutually supplied each other's deficiencies.—*Scientific American.*

Correspondence.

PHOTOGRAPHIC SOCIETY EXHIBITION.

Dear Sir,—Permit me to remind intending exhibitors that packing cases can be despatched any day, addressed to Mr. Bourlet, 17, Nassau Street, Middlesex Hospital; but the very latest sent must reach London on Friday morning, September 29th; also that the *only* day for receiving exhibits (sent by hand) at the Gallery, 5a, Pall Mall East, will be Friday next, September 29th, up to nine o'clock in the evening, after which time no picture will be received (by order of the Council). Any information respecting the exhibition can be obtained from—Yours, &c.,

57, Queen's Road Peckham, S.E. Edwin Cocking.

USE OF BALLOONS IN WAR.

Sir,—We have noticed in your last week's issue a paragraph on "The Use of Balloons in War," suggesting that for photographic purposes no person should require to ascend in the balloon, but that the camera being fixed in position, and fitted with a shutter capable of being discharged by electricity, the exposure might be made from below through a wire.

It may be interesting to your readers to know that the Royal Engineers were, by the War Office, provided with such an apparatus.

We, a short time since, made for Captain Abney one of our Addenbrooke's shutters fitted with an electrical discharge to expose by a wire at a distance from the apparatus; this having been seen, we were requested to supply a similar one for the use of the proposed balloon expedition, which we therefore did. The Addenbrooke shutter was particularly well adapted for the requirements, as by its construction any definite exposure required can be exactly given.

We might also mention that we presume the above was for occasional use, and that ordinarily the balloon would have occupants, as for the same order was supplied, together with other apparatus, three of our new snap shutters to be discharged by hand only; but in places of danger, the ability to get accurate record of the proceedings of the foe, without risk to life, would of course be of great service.—We are, dear sir, your obedient servants,

W. Watson & Sons.

[We did not suggest employing balloons without occupants, but described Mr. Cooper Key's suggestion. The originator of the plan is, as our readers know very well, Mr. Woodbury, who has taken out a patent in connection with it.—Ed. P.N.]

Proceedings of Societies.

London and Provincial Photographic Association.

At the meeting of this Association held on Thursday, the 14th inst., Mr. A. Haddon occupied the chair.

The Chairman stated that he had measured the aperture of the hole with which the pictures of the statue of the Prince Consort, exhibited by Mr. Henderson at a previous meeting, were taken, and he found it was $\frac{1}{150}$ inch.

Mr. Debenham said this would represent No. 2,300 on the uniform system.

Mr. W. K. Burton passed round some 12 by 10 negatives, in which both sky and foreground were fully exposed; this result was obtained by shading the lens with a cabinet mount, the foreground receiving five seconds, and the sky three seconds exposure.

Mr. Collins said that Mr. England used a somewhat similar arrangement inside the camera.

Referring to the plates exhibited by the Chairman of the previous meeting, Mr. Debenham said he had prepared plates with an emulsion containing chloride, and did not find any perceptible change in colour.

Mr. Burton thought the colour of the plate depended more on the gelatine than the salts.

Mr. J. Traill Taylor was elected an hon. member of the Association.

Sheffield Photographic Society.

The ordinary meeting was held at Freemasons' Hall, on Sept. 5th, Dr. Thos. H. Morton presiding. The minutes were read and approved. It being near the close of the financial year, Messrs. Yeomans and Davy were appointed auditors.

The Society's excursions, owing to unfavourable weather, have not been very successful, but the members are making amends for it by work on their summer holiday tours. Several good prints were shown by Messrs. Taylor (hon. sec.), Seaman, Fonon, Amley, and others. The instantaneous views by Mr. Taylor, taken at Morecambe Beech, were much commended.

Mr. Dakin exhibited a useful combination of pocket-knife and glaziers' diamond.

In reference to the subject of mounting photographs, Mr. Taylor thought that fading was sometimes due to the presence of soda salts, and questioned the utility of cheap mounts.

It was decided to have the usual supper at the Annual Meeting on Tuesday, Oct. 3rd, members of the Society and friends being cordially invited.

Talk in the Studio.

Photographic Society of Great Britain.—The next Technical Meeting of this Society will be held at the Gallery, 5a, Pall Mall East, on Tuesday next, September 26th, at 8 p.m.

Royal Cornwall Polytechnic "Art Union."—Among the successful numbers drawn this year are the names of Mr. W. Brooks, Reigate, £5; and Mr. E. Gael, Falmouth, £1, the amounts to be selected in pictures exhibited in the exhibition by professional artists.

Developing and Fixing Dry Plates.—"I find it very convenient," says a correspondent, "to lay a piece of thin string or thread in the developing dish under the plate, extending a few inches each way beyond it. This enables me to lift the plate out of the solution without putting my fingers in, and prevents the adhesion of the plate to the dish by suction. I should have thought this expedient so obvious as to suggest itself to every worker, were it not that the various more or less elaborate contrivances described from time to time in the News for lifting the plate seem to show that there are many to whom it has never occurred that 12 inches of thread would be just as efficacious, without raising the plate sufficiently to require more solution for covering it." Some of our readers will find this, which is one of the earliest devices of the kind, to be more convenient than the rather elaborate arrangements recently proposed.

The Arctic Yacht "Kara."—Our readers will be glad to learn of the safety of this little craft, in which Mr. W. J. A. Grant accompanied Sir Henry Booth to the Arctic regions. According to the following telegram, the little ship has safely got back to Norway:—"The Arctic Sloop *Kara*, Hammerfest, Sept. 16.—Met the ice on August 12, in lat. 75 deg. 45 min. north, long. 58 deg. east. On the 13th anchored at Berg Island. Driven by ice into Lystina Bay. On the 16th lost anchor, cable, and boat. Driven ashore on Tern Island, so called by Markham. Lightened ship, and got off on Sept. 2 uninjured. Up to this time beset by ice. On the 3rd got free and sailed southward. Met snow and very bad weather." Sir H. G. Booth left England this spring in his sloop *Kara*, with the object of following up his researches in Nova Zembla, and of co-operating with Sir A. Young as far as possible in the search for and relief of the missing crew of the *Eira*. The *Kara* was in Matochkin Straits when Sir Allen and the *Hope* rescued the *Eira* crew. The *Hope* returned to England with the long-lost explorers, and Sir Henry Gore Booth and Mr. Grant remained on the coast of Nova Zembla. The *Kara* has shared in the usual risks attending Arctic navigation, and has narrowly escaped the fate of the Austrian exploration ship *Tegetthoff*, which was beset in the same locality, and which had eventually to be abandoned by her crew.

The Late Dr. Pusey.—Mr. Samuel A. Walker has photographed, from an original drawing in his own possession, the portrait of Dr. Pusey, sketched from life, eight or nine years ago. The venerable churchman would never consent to sit for a photographic picture. As a contrast to this, we may mention that Queen Emma, of the Sandwich Islands, is possessed by a mania for being photographed in different costumes and attitudes. At Montano's, the grand photographers of Honolulu, she is seen in no less than twenty-five different photographs, and no two of them in the same dress.

Balloon Photography.—The Academy of Aërostation will try on September 22nd the system of aërial panoramic photography, for which they have received a subvention from the city of Paris. This scientific experiment, which, it is expected, will bear interesting results, will take place on the occasion of the *fete* of the "Defence National" round the Lion of Belfort, at a very little distance from the Observatory.—*Nature.*

Separation of Silver from Alloys.—The silver-holding alloy of metals are dissolved in the least possible quantity of crude nitric acid. The solution is mixed with a strong excess of ammonia, and filtered into a high cylinder, provided with a stopper. A bright strip of copper, long enough to project beyond the liquid, is next introduced, which quickly causes separation of pure metallic silver. The reduction is completed in a short time, and the reduced silver is washed, first with some ammoniacal and then with distilled water. The more ammoniacal and concentrated the solution was, the more rapid is the reduction. The strip of copper should not be too thin, as it is considerably attacked, and any little particles which might separate from a thin sheet would contaminate the silver. The operation is so simple that it seems preferable to all others for such operations as the preparation of nitrate of silver from old coins, &c. Any accompanying gold remains behind during the treatment of the metal or alloy with nitric acid, chloride of silver (produced by the impurities [HCl] in the nitric acid) is taken up by the ammoniacal solution, like the copper, and is also reduced to the metallic state; and whatever other metal was not left behind, oxidized by the nitric acid, is separated as hydrate (as lead, bismuth) on treating with ammonia. Any arsenate which may have passed into the ammoniacal solution is not decomposed by the copper.—Mr. Solthien, in *Arch. d. Pharm.*

The Photographic Money Dispute.—At Clerkenwell, on Tuesday, Captain Herbert Kerr, late of the 17th Regiment of Foot, of 22, Bushey Place, Clarendon Road, Hampstead, appeared before Mr. Hosack to answer the sworn information and complaint of Lieutenant Arthur Henry Loringe, R.N., for having, on the 20 April last, obtained from him the sum of £2,070. Mr. Besley, barrister, appeared for the prosecution, and Mr. Grain, barrister, for the defence. The plaintiff stated that he had been induced to embark the sum specified, in the Photographic Artists' Co-operative Association, on the presentation of certain statements of account, showing that the Association was in a satisfactory condition. He had taken up the appointment of Assistant Manager, and since then found that the affairs of the Association were not so flourishing as he believed them to be. After detailing his evidence as to the payment of money to Captain Kerr, &c., Mr. Hosack said he should have to remand the case at this point. As far as he understood it, the case for the complainant was that if he had known the real state of the accounts between the defendant and the Company, he should not have parted with his money. Mr. Grain said he was anxious that the case should be taken at the earliest possible opportunity, as it would collapse as soon as he had asked the prosecutor one question. The fact was that the prosecutor did not know or did not remember what was the effect of the affidavit which he had sworn in the Court of Chancery. The case was then adjourned.

Photographic and Political Meetings.—It appears, according to a statement in a daily contemporary, that one of the meetings of Zulus alleged by Sir Henry Bulwer to have been held for political purposes was in reality for no other purpose than that of being photographed. The Bishop of Natal, alluding to this meeting, asserted that a photographer from Maritzburg had arranged to take the likenesses of the principal members of the deputation at Bishopstowe on the Wednesday, but the weather being very inclement, the Princes sent a messenger to excuse themselves from coming. So much for the first "meeting." Sir H. Bulwer, however, stated that on the Thursday there was a second meeting of Zulus at Bishopstowe, but the Bishop explained that this report—to which the attention of the Secretary of State was gravely called—was simply based on the fact that the Princes, having disappointed the photographer on the Wednesday, returned on the following day to keep their engagement with him.

To Correspondents.

*** We cannot undertake to return rejected communications.

H. E. P.—1. The black powder is metallic gold, and after it has been deposited the bath has no longer any toning properties. Add the chloride of gold just before you use the solution. 2. As the varnish is too soft, reduce the proportion of castor oil and Venice turpentine.

Bertani Oreste.—Use the usual India-rubber solution or paste; we have bought it in tins at Hancock's Rubber Works in the Goswell Road.

Perplexed.—This takes place as the iron oxidises, and depends on the fact that a highly oxygenated oxide requires more acid to neutralize it than a lower oxide.

Printer.—The formula is one of those curious burlesques which, after circulating through family magazines and provincial newspapers, are occasionally quoted in technical or semi-technical journals. Although it is impossible to make up the solution according to the directions, as these will bear no definite interpretation; you may succeed in utterly ruining your burnishing rollers.

W. E. Davis.—Write to the Secretary of the City and Guilds Institute, Gresham College, London, E.C., asking for a syllabus of the Photographic Course.

William V. Morris.—Both are first-class, and far ahead of most continental makers.

Richard Nicholson.—You probably allude to Mr. Ashman's article on "Coloured Photographs on Glass." It appeared in our issue of August 11.

E. S. K. (Amsterdam).—Mr. G. F. Williams, who is an authority on glass, gives us the following particulars:—"Stained red is nothing more nor less than what it is called. It is distinct from 'flashed' red (or, as it is called, flashed ruby), inasmuch as it is made by taking ordinary sheet glass made with *kelp*, and covering this with a layer of 'stain' containing silver as a principal ingredient. This is fired, and gives a *rich yellow*, intense according to the richness in silver, and the conditions of the glass, and the temperature of the fire. The glass is then cleaned off, and another coating is put on and fired in again, which has the effect of doubling the intensity of the colour; this being said to soak in. Two thicknesses of yellow will give a deep orange, and so a third firing will deepen into *red*. I send you a small sample of stained red; you will see it is very much brighter than 'ruby,' and the facility with which you can abrade the stained side will show you that the colour is extremely thin. Sometimes the plain glass is flashed with a thin skin of 'kelp' metal, which is very soft, and readily absorbs stain at a low temperature. In such cases the flash can be detected, as it is greener than the body of the glass, due doubtless to iron in the kelp salts. Stained red is very dear, four or six times the price of ruby, and is only made perfectly in England by one firm, Messrs. Chance Bros. and Co., whereas flashed ruby is made from copper. Stained red is made by silver, at the same time there are secret formulæ in existence for making red stain, the components of which are doubtless well known to the firm named. Red stain can be bought ready made from Hancock and Co., Worcester." Let us know your exact address, and we will post you the small sample which Mr. Williams sent us.

A. R.—Dissolve it in dilute nitric acid, and nitrate of silver will be formed; carbonic acid being evolved. If you employ excess of the carbonate, the resulting nitrate will be neutral, or nearly so.

N. I.—The process given in the Everyday Formulary can be carried out on calico, silk, or linen. There is no patent covering the method as we give it.

South Devon.—See Mr. Ashman's paper, as referred to in answer to "Richard Nicholson."

Alexandria.—Only a small salary would be expected at first, with a provision for an increase when facility in the work might be attained.

S. Bowley.—1. It will boil at a much lower temperature when the pressure is lowered. 2. Yes, if the pressure is not considerably reduced. 3. Add a small proportion of Epsom salts to the water—say a salt spoonful to each quart. 4. They consist of nearly pure silica. 5. Give at least three times the exposure.

PHOTOGRAPHS REGISTERED.

Mr. J. W. Walmsley (Liverpool)—Photo. of Rev. J. Reacher. Photo. from Painting entitled "The First Prisoner."

Mr. Palmer (Harrow Road)—Photo. of Steamer in the North Sea.

Mr. F. Downer (Watford)—Two Photos. of two Girls of Watford Free School. Two Photos. of two Boys of ditto.

Mr. W. F. Anckorn (Arbroath, N.B.)—Photo. of Mr. G. Deakin.

Messrs. Adams & Stilliard (Southampton)—Two Photos. each of Prof. Leone Levi; Thos. Hawkesby, Esq., C.E.; Richard A. Proctor, Esq. Six Photos. of Mr. C. W. Siemens. One Photo. each of Capt. Abney and Capt. Bedford Pim.

THE EVERY-DAY FORMULARY.

The Gelatino-Bromide Process.

Emulsion.—A—Nit. silver 100 grains, dist. water 2 oz. B—Bromide potassium 85 grains, Nelson's No. 1 gelatine 20 grains, dist. water 1½ oz., a one per cent. mixture of hydrochloric acid and water 50 minims. C—Iodide potassium 8 grains, dist. water ½ oz. D—Hard gelatine 120 grains, water several oz. When the gelatine is thoroughly soaked, let all possible water be poured off D. A and B are now heated to about 120° Fahr., after which B is gradually added to A with constant agitation; C is then added. Heat in water bath for half an hour, and stir in D. After washing add ¾ oz. alcohol.

Pyro. Developer.—No. 1—Strong liq. ammonia 1¾ oz., bromide potassium 240 grains, water 80 oz. No. 2—Pyro. 30 grains, water 10 oz. In case of an ordinary exposure mix equal vol.

Iron Developer.—Potassium oxalate sol. (1 and 4) 80 parts, ferrous sulphate sol. (1 and 4) 20 parts, dist. water 20 parts. To each 4 oz. of the mixed developer add from 5 to 30 drops ten per cent. sol. potassium bromide, and 30 drops sol. sodium hyposulphite (1 and 200).

Substratum or Preliminary Preparation.—Soluble silicate of soda 1 part, white of egg 5 parts, water 60 parts. Beat to froth and filter.

Fixing.—Sat. sol. of sod. hypo. 1 pint, sat. sol. of alum 2 pints, mixed.

Cowell's Clearing Solution.—Alum 2 parts, citric acid 1 part, water 10 parts. Edwards makes this sherry coloured with perchloride iron.

Eder's Method of Intensification.—The negative is whitened by soaking in sat. sol. of mercuric chloride, and after thorough rinsing immersed in potass. cyan. 10 parts, potass. iod. 5 parts, mercuric chloride 5 parts, water 2,000 parts. As film becomes dark brown, the actinic opacity is increased; but prolonged action causes brown tint to become lighter, until at last the negative is no denser than at first.

Fol's Backing Sheets.—A chromographic paste is prepared with gelatine 1 part, water 2 parts, glycerine 1 part, and a very small addition of Indian ink. Strong paper or shirting is coated, and the sheets are laid, face downward, on waxed glass to set. Press to back of glass plate.

The Wet Collodion Process.

The Nitrate Bath.—Water 14 oz., nit. silver 1 oz., nitric acid 1 drop. Before using coat a small plate, and immerse it for 20 minutes.

Cleaning Preparation for New Plates.—Alcohol 4 oz., Jeweller's rouge ¼-oz., liquid ammonia ½-oz.

Film-removing Pickle for Old Plates.—Water 1 pint, sulphuric acid 4 fluid oz., bichromate potassium 4 oz.

Substratum.—Whites of 2 eggs well beaten, 6 pints of water, and 1 dr. liq. ammon.

Negative Collodion for Iron Development.—Alcohol 1 pint, pyroxyline of suitable quality 250 grains, shake well and add ether 2 pints. *Iodize this by mixing with* one-third of its volume of alcohol ½ pint, iod. ammon. 80 grains, iod. cadm. 80 grains, brom. ammon. 40 grains.

Normal Iron Developer.—Water 10 oz., proto-sulphate iron ½ oz., glacial acetic acid ½ oz., alcohol ¾ oz. The amount of proto-sulphate iron may be diminished to ¼ oz. when full contrasts are desired, or increased to 1 oz. when contrasts are unduly marked. With new bath quantity of alcohol may be reduced to ¼ oz.; but when bath is old more is wanted.

Intensifying Solution.—Water 6 oz., citric acid 75 grains, pyro. 30 grains. When used, add a few drops of the silver bath to each ounce.

Lead Intensification.—After neg. washing, immerse in dist. water 100 parts, red pruss. potash 6 parts, and nit. lead 4 parts. When it is yellowish white wash and immerse in liquid sulphide ammon. 1 part, water 4 parts.

Fixing Solution.—1. Potass. cyanide 200 grains, water 10 oz. 2. Sat. sol. of sod. hypo.

Varnish.—Shellac 2 oz., sandarac 2 oz., Canada balsam 1 dr., oil of lavender 1 oz., alcohol 16 oz.

Printing Processes.

Albumen Mixture for Paper.—White of egg 18 oz., 500 grs. ammon. chlor. in 2 oz. of water. Beat to a froth, stand, and filter.

Sensitizing Solution.—Nit. silver 50 grs., water 1 oz., sod. carb. ½ gr.

Acetate Toning Bath.—Chlor. gold 1 gr., acet. soda 20 grs., water 8 oz.

Lime do.—Chl. gold 1 gr., whiting 30 grs., boiling water 8 oz., sat. sol. chl. lime 1 drop. Filter cold.

Bicarbonate do.—Chl. gold 1 gr., bicarb. soda 3 grs., water 8 oz.

Fixing Bath.—Sodium hypo. 4 oz., water 1 pint, liq. ammon. 30 drops.

Reducer for Deep Prints.—Cyan. potass. 5 grs., liq. ammon. 5 drops, water 1 pint.

Encaustic Paste.—Best white wax 1 oz., oil of turpentine 5 oz.

Sensitizing Bath for Carbon Tissue.—Bichromate potash 1¼ oz., water 30 oz., ammonia 1 dr., methylated spirit 4 oz.

Enamel Collodion.—Tough pyroxyline 120 grs., methylated alcohol 10 oz., ether 10 oz., castor oil 20 drops.

Mountant.—1. Fresh solution of best white gum. 2. Fresh starch.

Collotypic Substratum.—Soluble glass 3 parts, white of egg 7 parts, water 10 parts.

Collotypic Sensitive Coating.—Bichromate potash ½ oz., gelatine 2½ oz., water 22 oz.

Collotypic Etching Fluid.—Glycerine 150 parts, ammonia 50 parts, saltpetre 5 parts, water 25 parts.

Printing on Silk.—Remove all dressing from the fabric by boiling in water containing a little potash, dry, and albumenize with ammonium chloride 2 grammes, water 250 cubic cents., and the white of 2 eggs, all being well beaten together. A 70-grain silver bath is used, and the remaining operations are as for paper.

Cyanotype Printing.—Water 1 oz., red prussiate of potash (ferricyanide) 1 dr., ammonio citrate of iron 1 dr. Prepare and preserve in the dark. Float the paper and dry. Fixation by mere soaking in water.

Various.

Luckardt's Retouching Varnish.—Alcohol 300 parts, sandarac 50 parts, camphor 5 parts, castor oil 10 parts, Venice turpentine 5 parts.

Matt Varnish.—Sandarac 18 parts, mastic 4 parts, ether 200 parts, benzole 80 to 100 parts.

Ferrotypes.

Collodion.—Ammonium iodide 35 grains, cadmium iodide 25 grains, cadmium bromide 20 grains, pyroxyline 70 grains, alcohol 5 oz., ether 5 oz.

Bath.—Silver nitrate 1 oz., water 10 oz., nitric acid 1 drop.

Developer.—Ferrous sulphate 1 oz., glac. acetic acid 1 oz., water 16 oz.

Fixing and Varnish.—Same as wet collodion process.
collodion process.

THE PHOTOGRAPHIC NEWS.

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CONTENTS.

VIGNETTES AND VIGNETTING.

The vignette style, although more generally adopted for head and shoulder portraits, may be employed with advantage in many other instances; as, for example, in the case of small landscapes and seascapes, and occasionally for three-quarter and full-length portraits.

It is not a rare thing to enter a reception-room and to find the general work excellent, good examples of all the usual styles of picture being shown, vignettes alone excepted. This doubtless arises in many cases from the circumstance of vignetted pictures being occasionally required from a negative altogether unsuited for this style of work; and it is seldom that results of the highest merit can be obtained unless the original was specially taken with a view to the production of vignette pictures. We shall not be wrong if we say that the London photographers who can be depended on to produce artistic vignettes might be counted up on the fingers of one hand.

A very general fault is the use of a background which is too dark, the result of this being generally noticeable either as a black halo around the head, or in the loss of all outline by attempts to cut this off close to the figure.

When the subject is a lady clothed in light garments, a uniformly tinted background of a faint cream colour may generally be used with advantage; but even in such a case it is often desirable that the lower part of the background should be a shade darker than the top. When the sitter is dressed in a material of more sombre hue, this condition of things becomes almost essential, as otherwise the requisite gradation of shades around the dress cannot be satisfactorily obtained without occasioning considerable difficulty in shading off the surroundings of the head.

An excellent background for general use, when vignettes are required, is a large square one graduated uniformly from a nearly pure white to a faint tint corresponding approximately to the colour of ordinary brown bread. This, when arranged so that the light tint is on one side of the sitter, and the dark tint on the other, can be so shifted as to give a light or dark tint as required; but in most cases it will be advisable to so tilt it over as to bring the lighter portion either towards the top, or towards the diagonal of the general field. In order to employ such a background to full advantage, it will be necessary to provide a slot or groove in the floor, so that the background can be partially lowered when required; but as this is not always practicable, it will frequently be necessary for the portraitist to provide several smaller graduated backgrounds. Such points as the adjustment of the shades of the background to the special requirements of each sitter can only be learned by careful observation and study, and much can be gathered regarding this matter by a careful observation of the works of good portrait painters, more especially those of the Flemish school.

Before passing from the production of the negative to the operations incident to printing, we may refer to a process of making a vignetted negative which was practised with success by one of the earliest portraitists. A series of white paper screens were provided, each having an oval hole cut in it, and these were so placed between the lens and the sitter as to produce the required gradation. The screens were generally much nearer to the lens than to the sitter, this being essential for obtaining the required gradation of tints, and by overlapping the oval masks any required shape could readily be obtained. Our friend used to urge in favour of this system that he could carry out his ideal of a vignette more thoroughly by this method than by any other, and he was sure of having all his prints uniformly graduated.

In actual practice most are contented with the less perfect, but much easier method, of graduating by a mask placed in front of the printing frame, this mask being generally attached to the outer glass of the frame by strips of gummed paper. When one is pressed for time, an ordinary vignetting glass, such as can be purchased from any stock dealer, may be useful as a basis of operations, the final adaptations to the requirements of the picture being made by pulling out cotton-wool into extremely light flocks, and attaching these by gum where required. Another method is to sandwich a quantity of cotton-wool between two perforated cardboards, and then to pull out the wool with a point until the required graduation and shape are produced. As cotton-wool is very liable to be deranged in discharging and re-charging the frames, many prefer to use paper screens, these being best built up out of a series of thin tissue paper masks, cut as shown in fig. 1.

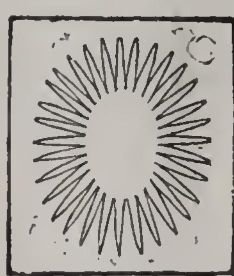


Fig. 1.

These sheets are next piled on each other so as to produce the requisite number of steps and the required shape, the whole now resembling the arrangement shown in figs. 2 and 3. The distance between the vignetting-screen and the glass of the printing-frame often requires some adjustment, this either being effected by distance pieces of cork, or other similar arrangement. It is often an advantage to place the frames on a large square board, suspended scale-pan fashion, from an ordinary roasting-jack. Direct sunlight should be avoided in ordinary cases.

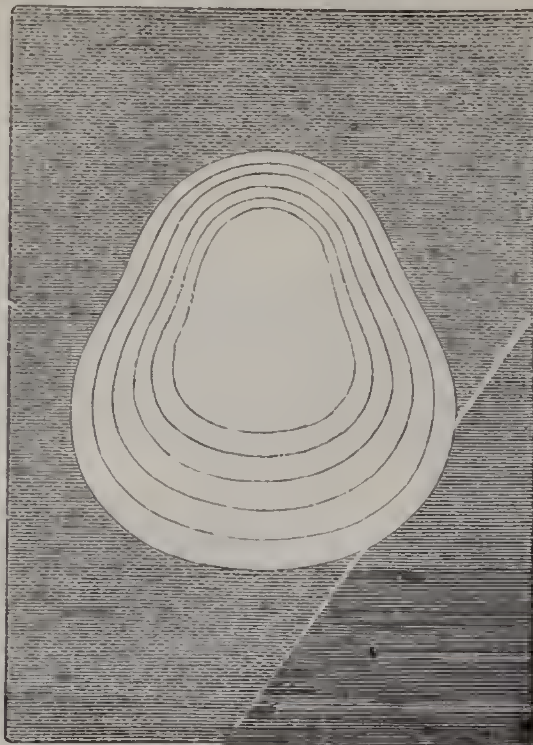


Fig. 2.

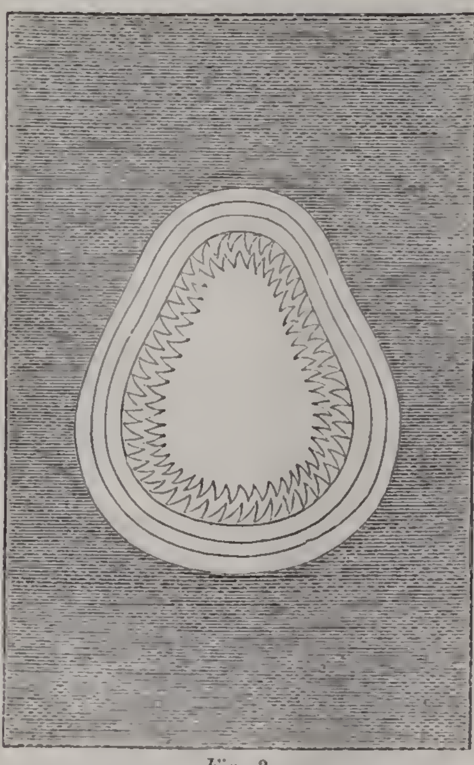


Fig. 3.

More difficulty is experienced in producing good vignettes in carbon than in silver, as the feebler radiations appear to possess less effect on tissue than on the usual sensitive silver paper; and many very successful carbon printers merely use a rough hole cut in a piece of cardboard, this being fixed at a distance of from half-an-inch to two inches from the glass of the printing-frame. In such a case, constant attention must be given to the frame, as frequent changes of position are required.

The carbon printer may, however, work successfully with an ordinary compound mask made of tissue paper, but the graduation must be less rapid as regards the central steps. Let the following diagram (fig. 4) represent a

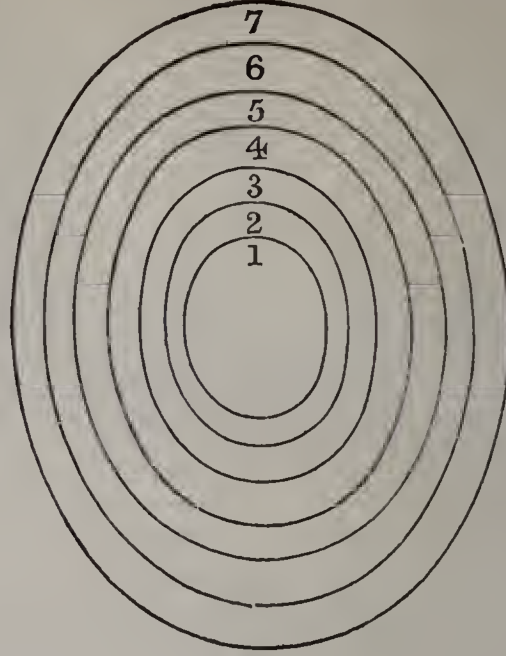


Fig. 4.

vignetting mask, and if it is intended for silver the steps 2, 3, 4, 5, 6, and 7 may all be equal; but for carbon printing the steps 2, 3, and 4 should be much more transparent, this being compensated for by the more rapidly advancing opacity of 5, 6, and 7.

The old-fashioned method of striking an oval by using two pins and a piece of string, as represented by fig. 5, holds its ground. The pencil is moved round at the

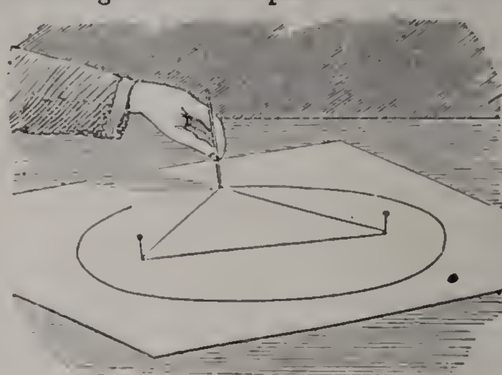


Fig. 5.

extreme limit which the length of the string permits.

THE CONDITIONS OF CHEMICAL ACTION IN PHOTOGRAPHY.

BY J. VINCENT ELSDEN, B.SC., F.C.S.

The photographer who has the advantage of even a little chemical knowledge cannot but feel the superiority of an ability to understand chemical reactions over a blind rule-of-thumb method of working. Not only is he in a better position to investigate the causes of his failures, but he can also, in many cases, so improve his results that the highest pitch of excellence is within his easy reach.

But in photographic chemistry, as in other branches of science, a little knowledge is sometimes, if not a dangerous thing, at least misleading; for those chemical reactions which are the most delicate are also usually the most dependent upon circumstances, and varying conditions will often produce the most unexpected results. This is especially the case with those reactions which enter most prominently into the chemistry of photography. The extreme care and the minute attention to detail which are necessary for success, alike point to the deranging influence of external circumstances, and to the multiplicity of the causes which combine to defeat the best efforts of the photographer.

In examining the chief of those causes which modify chemical action and their influence in photography, it will perhaps be best to refer them to the following heads—viz., *cohesion*, *pressure*, *mass*, *motion*, *catalysis*, and *temperature*. Cohesion, it is well known, is of immense importance in many ways. The state of minute subdivision into which silver bromide must be reduced in an emulsion is a most important element in the successful working of the gelatino-bromide process. The coarse, granular condition of the silver salt, which makes some gelatine plates so gritty to the touch, is always antagonistic both to delicacy of detail and to extreme sensitiveness, and doubtless some kinds of spots may be traced to the aggregation of minute particles of bromide into compact insensitive masses.

But if different degrees of cohesion have an important influence on chemical reactions, even so apparently slight a cause as *pressure* is not without a considerable effect in changing the photographic condition of many substances. Thus, if any metallic substance be placed upon a piece of clean mirror glass, and heat be gently applied, on cooling and removing the substance it will be found that by breathing upon the glass an image is developed. An analogous result has been shown to be produced in gelatine films by pressure, and doubtless many of the streaks and other unaccountable markings which sometimes appear during development may be due to an alteration in the molecular condition of the gelatine by accidental pressure, such as might easily be applied while changing plates in darkness.

But far more striking variations are produced in photography by the influence of *mass*. From earliest times it has been known that very different results are often obtained according to the amount of material present. The quality of collodion made in small quantities is known to be far inferior to that made on a larger scale, and it is not improbable that a similar fact may apply to the manufacture of gelatine emulsions. It would be interesting to know by actual experiment what difference there is in the sensibility and excellence of gelatine emulsions made in both small and large quantities. There can be but little doubt but that the coarseness of the precipitate of silver salt is to a very large extent influenced by the degree of concentration of the solutions of the soluble haloids employed. Many emulsion formulæ seem to aim at dissolving both silver and haloid salts in a minimum quantity of water, and also in cooking an extremely concentrated emulsion with an exceedingly small quantity of gelatine. A very simple experiment will illustrate the influence of strength of solutions upon the characters of precipitates. If silver nitrate be mixed with an equal or larger quantity of soluble chloride, it will remain for a long time milky; but if excess of the nitrate is used, on shaking, the whole of the silver chloride collects into dense flocks, and leaves the liquid clear. If, then, the condition of the silver, when first precipitated in an emulsion, is as important as seems to be indicated by the numerous devices which have been invented for its introduction, of no less importance must be the degree of concentration of the solutions which are employed. This influence of mass, however, is perceived not only in emulsion making, but also in the equally important process of development. Perhaps in no case is so little care taken in photography as in adjusting the quantities in pyrogallic development. Even where the relative proportions of ammonia and bromide are carefully taken, the quantity of pyrogallic used, the amount of water added, the quantity of developer employed, are so often regulated by mere guess work, that we are convinced that the effects of mass and of rapidity of development upon the character of a negative are not by any means universally appreciated.

The influence of *motion* is seen in many chemical and physical reactions. Water may be cooled down far below freezing point so long as it remains perfectly still, but solidifies immediately when agitated. Many well-defined chemical reactions refuse entirely to manifest themselves without violent agitation or constant stirring. A good example is seen in the formation of the bi-tartrate of potash, or of the double chloride of potassium and platinum. Similarly in photography, agitation is often beneficial during certain processes, such as the introduction of the silver into an emulsion.

A very great deal might be said upon those numerous and scarcely-understood phenomena, which are included under the term *catalysis*. Catalysis may be defined as a determination of chemical action by the mere presence of another substance which does not of itself undergo any perceptible change. Thus chlorine, when in the presence of ignited charcoal, can decompose silica; but neither alone can effect this decomposition. Gaseous ammonia is only partially decomposed when passed through a hot porcelain tube; still less when a platinum tube is used, and not at all in a glass tube; but the presence of finely-divided copper or iron in the porcelain tube renders its decomposition easy at a low temperature. Similarly, every photographer remembers the attempt, not long ago, to ascribe certain defects in gelatine emulsions to the use of glazed porcelain vessels in which the cooking was done. Few also have not had experience of the influence of dust particles, which not only prevent development immediately beneath them, but exert a sort of repellent action on the developer for some distance around them. These and many other obscure chemical and physical actions, which may be classed under the head of catalysis, render it a matter of no small astonishment that photography should have reached such a high state of perfection in the face of the multitudinous circumstances, known and unknown, controllable and uncontrollable, which at every step beset the photographer, and combine to produce the most perplexing and unlooked-for results.

So much may be said upon the influence of *temperature* on chemical affinity, that its treatment must of necessity form the subject of a future article.

THE TRIESTE ART EXHIBITION.

A correspondent who has recently visited the Exhibition writes:—

The exhibition at Trieste is well worth visiting, more perhaps by reason of its beautiful site on the shore of the blue Mediterranean, than the intrinsic value of the collection. Most of the Austrian photographers have preferred *not* to exhibit; they are probably tired of exhibitions.

The exhibition, nevertheless, contains much to interest the photographer, and one point observable is, that the gelatino-bromide process is making its way, if rather slowly, into the Austrian provinces. The most important exhibitors in portraiture are Messrs. Benque et Cie, of Trieste, who have a branch house in Paris. Benque produces most of his work on Monckhoven plates, and he employs the oxalate developer. Some very beautiful enlargements of Benque are also to be seen.

The Pesth photographers make a brave show. Koller—whose atelier you described in "The Studios of Europe"—as also Kloesz, have a fine collection of portraits, Koller, moreover, attracting considerable attention by his pictures of Hungarian life. Ellinger, of Pesth, sends a collection of oil paintings and crayon sketches upon canvas, the groundwork of which is photography.

One of the most attractive exhibits is that of Konkoly. Konkoly is a Hungarian nobleman, who spends much of his time and money in astronomical research. In a word, he is a man of fortune, like your Dr. Huggins in England, who spares nothing to advance the science of astronomy. He has built his own observatory, furnished it with the best of apparatus, and is now occupied in applying photography to recording the wonders of the heavens. His beautiful star pictures, as also his photograph of the eclipse taken at O'Gyalla, shows that he is a most successful photo-astronomer.

Just, of Vienna, exhibits a collection of albumenized pictures, and also a beautiful assortment of platinotype prints, which he has produced by the method of Captain Pizzighelli and Herr Hübl. Knoll, of Bozen, is distinguished for his interesting studies of heads; Burato, of Zara, shows some infant photographs, as does also Ortolani, of Trieste.

At first the exhibition was not very largely patronised. For one reason, there was a good deal of bad feeling shown by the Italians, and at the opening, it may be remembered, some miscreant threw bombs among the crowd, and several people were killed. The exhibition, I should mention, was to celebrate the 500th anniversary of the union of Trieste with Austria, and hence some Italian partisans have felt aggrieved. Since, however, the Emperor of Austria visited the exhibition on the 16th of this month, it has become popular, and visitors have been abundant. Indeed, any one travelling to Trieste, or to neighbouring Venice, will find it well worth his while paying a visit to the art exhibition.

PHOTOGRAPHY IN AND OUT OF THE STUDIO.

Instantaneous Photographs of London—Spiritualistic Photographs — Awarding Medals — Pictorial Notoriety.

Instantaneous Photographs of London.—Looking over a number of photographs of London the other day, we could not help thinking that the great city has not been done justice to. The majority of the pictures are cold and colourless in the extreme. They have been secured in the early morning when there is no traffic, and, apart from the flatness which somehow generally marks photographs taken in a light of feeble actinic power, the deserted and desolate aspects of the streets give them a most woebegone appearance. There are, it is true, a few specimens of instantaneous work, but it is by no means of the highest kind. Nothing that has been done in the present day at all approaches the instantaneous views of Mr. Valentine Blanchard taken some twenty years ago. Wet collodion was of course employed, yet for graphic representations of street life in London as it really is, these views could not easily be surpassed. It is a mistake to suppose that any time of the day will do for photographing streets and street architecture. The shadows falling on one side or the other will make all the difference between an artistic and an inartistic effect. We believe it will be found that each street looks its best at one particular time of the day, and it is the business of the photographer who wishes for the best result to find out this particular time. The ground, in fact, wants carefully going over two or three times before the picture is taken; and, if this is done, it will be found that the trouble has been well bestowed. With gelatine plates the enormous labour of twenty years ago has disappeared, and the time has come when a series of really good instantaneous pictures should be produced. At present nothing of the kind exists. The public appreciate something which is really artistic; witness, for instance, the enormous sale of a series of charming little etchings, illustrating the Thames below and above bridge. Most of the photographs of London are neither artistic nor truthful; that is, they do not show the streets or the buildings as we are accustomed to see them.

Spiritualistic Photographs.—The exposure of an unhappy medium at Peterborough recalls to one's memory the excitment which the "spiritualistic" photographs caused some years ago. We can remember two photographers whose names we need not mention, but who are well known, interesting themselves greatly in the subject. One, if we did not misjudge him, was always hovering between the extremes of scepticism and belief; the other was a most ardent supporter of the spiritualistic theory, though he was rather shy in talking about it. What have become of all these "spiritualistic" photographs, and do those who were so enthusiastic over their production believe still that it is possible to take the portrait of immaterial beings? With the ultra-sensitive gelatine plates something more definite than the shadowy outlines of former years, which might have been intended for persons in white robes, but which generally looked like "fog," ought to result. But spiritualism is now at a very low ebb, and perhaps the spirits, disgusted at the little interest taken in their table rappings and concertina fantasias, have also deserted photographic studios.

Awarding Medals.—A professional photographer, we take it, has a perfect right to make use of any medal he may gain as a means of advertising his superior skill, though it may be doubted whether this is exactly the object intended by those who confer the award. Some years ago an odd incident happened to a gentleman who was the chief actor in the scene, and who happened to be one of the judges in the selection of the competitors for certain prize medals, which must certainly have led him to this train of thought. Immediately after the awards being decided, the gentleman in question started on a tour abroad. It so chanced that he went to a town in which a photographer resided who had competed in the exhibition where the visitor had been a judge. The photographer had gained a medal, but was not aware of his good fortune until the tourist called upon him and acquainted him with the fact. The recipient of the prize was, of course, overjoyed, and anxiously pressed the visitor to come again the following day, when he would have a number of specimens ready for his inspection, and delicately hinting that he should like to present him with a *souvenir*. Our friend accordingly paid the studio a second visit, and, sure enough, there was a grand display of photographs, and exceedingly good photographs too. Wandering about was an unconcerned-looking young man who occasionally made a note in a memorandum-book, but the visitor took him to be an assistant, and, engrossed in examining the specimens, forgot his very existence. The photographer, who was all smiles and graces, made himself agreeable to his guest, who, nothing suspecting, talked freely about the merits of the photographer's work, what the other judges had said about it, and so on. The interview over, the photographer bowed the visitor out, but had apparently forgotten all about the *souvenir*, for he never referred to it, and away went our friend, if not disappointed, at least surprised. But his surprise changed to astonishment when the next morning he opened the local paper, and discovered the entire conversation he had had with the photographer reported verbatim, together with some glowing remarks of the editor on the honours which had been showered on "our fellow townsman," who had not only carried off a medal in London, but had also received a visit from one of the judges, who had come over on purpose to congratulate him. The unconcerned looking young man was of course the reporter, whom the artist photographer had taken the precaution to invite, and for this purpose had asked his visitor to come a second time. The gentleman who was thus entrapped has not the implicit faith in medals he once had. We hope, however, that this story, which is perfectly true, will not deter the Council of the Photographic Society from offering these awards, as very few photographers are to be found who would make *this* use of them.

Pictorial Notoriety.—The *Globe* has been discoursing learnedly on "Pictorial Notoriety," and has expressed inability to understand why it is persons are so anxious to have their photographs exposed in shop windows for sale, remarking that "there are really so few who can show portraits to be proud of, that few, it might be supposed, would care to go to the trouble and expense of having them distributed about for scrutiny and criticism." It further observes that very often it is a monetary inducement that leads to this publicity, but that "it is impossible to suppose this is always the case, and there can, it is to be feared, be little doubt that hosts of photographs issued every week, and numberless printed portraits in cheap serials, are merely the manifestations of a silly vanity and a paltry desire for cheap notoriety." It is odd how the *Globe* has in these remarks entirely missed the point. The reason of the exhibition and sale of portraits is a very simple matter. It is entirely based on the law of supply and demand. The public are anxious to see persons of whom they have heard much, and in whom they are interested, and are willing to pay for their portraits. The photographer and the photographic dealer do their best to supply the demand. In very many cases the person whose portrait is exhibited is indifferent on the subject, and consents simply to get rid of a pertinacious petitioner. All the vanity in the world will not get publicity for an uninteresting nobody. As for the pictures of the young ladies whose names are so ostentatiously displayed together with their features, we may presume that they have their admirers, although they may be unknown to the general public. At all events, the majority have the excuse of a pretty face, which is certainly a reasonable justification for publicity.

At Home.

M. GERUZET IN THE RUE DE L'ECUYER, BRUSSELS.*

M. Géruzet enjoys a distinction of which he may well be proud. Of all portraitists on the Continent of Europe, he is the only one who prints his work in carbon, and in carbon alone. "I made a vow, two years ago, to produce only permanent portraits," says M. Géruzet to us, "and I have since kept to it. If a better process than the carbon is brought forward, I shall be quite ready to adopt it, for printing in pigments is not unattended with difficulty; meanwhile I take the best process I can that will give me durable work."

All the prints, then, we see around us—from tiny carte to life-size pictures—are printed in permanent pigments. "What of their quality?" it will be asked. Our reply is that M. Géruzet, five years ago, was in the first rank of portraitists in the Belgian capital, and in that position he is still as firm as ever. It may be that in small work the impressions are less bright and pretty, occasionally, than might be produced from highly-albumenized paper of roseate hue, as M. Géruzet himself readily admits; but, among the many prints we critically examined at the studio, there were none that were anything but satisfactory, while, in many cases, it would have puzzled an expert to say whether silver or pigment constituted the impression.

We shall say but little of M. Géruzet's studio, into which we were first invited, for the simple reason that we desire to do justice to the carbon operations in progress at the establishment. Suffice it to say that M. Géruzet employs now only the gelatino-bromide process. He purchases the dried pellicle always, and dissolves it for use as required; and he uses none other than oxalate development. For carbon printing he thinks, indeed, that oxalate development is imperative; but a daily experience of eighteen months has proved to him its superiority over the pyrogallic developer in many ways. In this respect, by-the-bye, M. Géruzet does not differ from his brethren in Brussels and in Paris, for, at the chief ateliers in the French capital—Benque, Van Bosch, Lejeune, Walery, Nadar—the oxalate developer is also in favour. It is so difficult to judge the printing density of a pyrogallic negative, and, since the whole success of a carbon print depends upon this, it is naturally a matter of the first importance. "Non, non," says M. Géruzet, emphatically, "pas de pyro."

The sensitizing of the tissue is conducted in the cool domain of the cellar. The solution of bichromate varies from 3 to 5 per cent. in strength, the tissue, as it comes from the bath, being gently squeegeed on a glass plate to remove the superfluous liquid. It is contact with the bichromate solution that is one of the most vexatious drawbacks of the carbon process, for one cannot but admit it is injurious to health. To take care that the skin is touched by the solution as seldom as possible is one of the standing precautions; but it is not so easy for a principal to get his assistants to carry out even regulations provided for their benefit. The temperature at Brussels in the summer, and also in spring, is often so warm that the sensitizing of the tissue cannot be carried on uninterruptedly in an ordinary room, for gelatine runs when the thermometer points to 90° F. or thereabouts. At the same time, after thoroughly draining and squeegeeing, the tissue is found to set so quickly, that within ten minutes or a quarter-of-an-hour of its being sensitized it can be carried into one of the upper rooms to dry. Heat is now a matter of little consequence, so long as there is a good current of air; and M. Géruzet allows the drying to go on as quickly as possible. Keeping the tissue for twenty-four hours after sensitizing, instead of being hurtful, is, in some conditions of the tissue, a positive advantage. But this question is a matter in which experience is the only guide.

We now proceed to the printing-shed on the roof, and here a singular sight presents itself. There are probably five hundred small negatives printing, and yet not a single printing-frame. The printing is conducted in the open, but in the shade. "Many talk of the comparative rapidity of carbon printing," says M. Géruzet; "but, practically speaking, owing to the care necessary in the operation, the work does not go on more quickly than the production of good silver prints."

We have said that no printing-frames are used. Each carte or cabinet is simply made fast to an under glass by means of two or three American clips. A piece of pigment tissue is put under the negative; this is backed up by half-a-dozen pieces of red blotting-paper to act as a pad, and the whole clamped between the two glasses. It is the simplest arrangement conceivable. Since it is never necessary to look at an impression in course of printing, the whole *raison d'etre* of a complicated pressure-frame disappears, the negatives can be closely packed in rows on the printing-board, and, when printed, the process of changing the tissue of a hundred negatives or so is but the work of a few minutes.

Every negative has gummed round it a paper margin or mask, so that an unexposed border of tissue is round every print. The negatives are examined by the printer before the printing commences, and he estimates their density; they are then put in closely-serried rows upon the printing-board, according to the density they present. Thus one row will remain exposed to light until the photometer—Marion's photometer is employed—records five degrees, another row until six is recorded, and so on. M. Géruzet, by means of the oxalate developer, can now control the density of his negatives so well that they all range between five and eight degrees.

We will now follow a batch of exposed pieces of tissue to the developing room. This is a sombre apartment with plenty of water, warm and cold, laid on. The development of the prints takes place on sheets of opal glass measuring about 12 by 10 inches. The surface of the opal is polished, and this first receives a preliminary coating of white wax, which is simply rubbed on and off again; afterwards thin normal collodion is poured on, and the plate put into cold water until the greasiness of the surface has disappeared. Here in a shallow bath of cold water are

* From Pritchard's "Studios of Europe."

half-a-dozen such prepared plates ready at hand for development.

Six or eight small pieces of the printed tissue are now thrown into cold water,* and, when thoroughly soaked, say in two minutes, they are pressed, of course face downwards, upon a wet opal plate. A little while elapses, to permit the tissue to become firmly adherent to the glass, and then immersion in warm water follows. The temperature of this water, as most of our readers know, must depend to some extent on the tissue, whether it is fresh or stale, but 90° to 95° F. is the usual warmth. All the pieces of tissue are supposed to have received the same amount of printing, and should, therefore, develop simultaneously, but this does not happen in practice. It becomes necessary to hasten the washing of the more tardy images, and this is done by using ammonia. A coffee-pot-looking utensil stands close at hand containing warm water to which a little ammonia has been added. and this mixture is carefully poured over the surface of those prints from which the superfluous pigment refuses to wash away. In this way the development is at once accelerated, and the manipulation of half-a-dozen impressions can be proceeded with at the same time.

The white opal surface, of course, permits one to judge of the success of the print on development, and we need scarcely say that this part of the process is the most difficult and crucial of all. Besides skill and experience, the carbon printer must have an inexhaustible amount of patience. "If you will only wait, you will get what you want," is a proverb that the carbon worker must have closely at heart, for it may happen that he has to develop half-a-dozen impressions before securing that pitch of perfection he desires. Fifty per cent. of failures M. Géruzet would probably take as a low estimate; in any case, however frequent failure may arise, he pushes on until success at last attends his efforts.

The application of gelatined paper to the developed prints when dry, and stripping the latter from the glass surface, are matters of less moment. M. Géruzet employs fresh paste for mounting; but with carbon prints, obviously, this operation plays a far less important rôle than when silver impressions are under consideration.

We have only referred to the printing of small work, for it is in this that so many photographers have failed. M. Géruzet succeeds where others do not, for the simple reason that he has a larger stock of patience, and has the courage to condemn all but first-class work. As we have said, among the vast collection of prints we saw, there was not one picture that was unsatisfactory; but this was due to the fact that he destroys all mediocre pictures. In saying this, we do not desire to underrate M. Géruzet's experience, skill, and keen judgment on points connected with carbon printing, but we are sure that these would never have led him to success unless he had possessed much courage and patience into the bargain.

The "By-the-Bye" next week will be "About Rapid Exposures"; the following "At Home" will be "Mr. Frederick York at Bridgwater."

THE CHEMISTRY OF PHOTOGRAPHY.

BY DR. GARRISON, OF CHICAGO.†

I probably have the honour of being the only amateur present, and am probably the only person present who has practised photography for three or four years without ever making a cent by it. On the contrary, I have invested several hundred dollars in this unprofitable work. Nevertheless, it has given me a great deal of pleasure, and that is all the use I have for money—to buy pleasure; and I think that I have procured as much of it in this way as in any other direction in which I could have turned my energies. I feel somewhat acquainted with you here from these signs just before me. I happened to be born in this old State of Indiana, was educated in the State of Ohio, began to practise medicine in the State of Iowa, and finally drifted to Illinois, where I now hold forth. These signs stand before me in the order in which I have progressed, going on, like the good old Methodist, from one degree of grace to another. I have now nearly got to the state of perfection, I believe.

Now, I hardly know what it is expected that I shall say. Your President intimated to me last evening that the subject of chemistry is one not generally understood by the craft, and that it is a subject of which they wish to know more. Now, I consider that a very difficult subject, although a very profitable one. I may, perhaps, if I attempt to elucidate anything of this kind, fall into the common course, and partially fail, as do most scientific gentlemen, because of abstruseness and abstraction. They pitch their notes entirely above the capacity of their audiences, and then wonder that their utterances are so little appreciated.

You know, as to sound, according to the laws and theories of acoustics, it is believed that there are many sounds that we cannot hear. It is believed that insects make many sounds audible to each other, but inaudible to us. I know scientific men often have good ideas, but when they attempt to put them before an audience they present them invested in a technical nomenclature above the comprehension of their audience. Now, I make this explanation preparatory to saying some things in very common language.

Perhaps, if I ask a question or two, the matter will come up to you in a more interesting form. Many of you wish to make oxalate of potash for your ferrous oxalate developer, and you at once ask the question, how much oxalic acid should I use to a given quantity of carbonate of potash? Or, if you have a certain quantity of oxalic acid, how much carbonate of potash shall be used? Now, how many of you can figure that out? Suppose that you have two ounces of oxalic acid, how much carbonate of potash shall you purchase or weigh out to neutralize that? The common way would be to add little by little until you have got enough; but you are almost sure to get in too much, and then, if you have no reserve of oxalic acid, you are in a fix. You have made your solution alkaline, and cannot correct it. There is a way to determine these questions chemically. Let me put an example before you. You are going to make dry plates by the new process, and you have a certain quantity of nitrate of silver. Take a case that occurred in my own practice. I was going to make some dry plates the other day, and weighed out my entire stock of silver, and found the amount to be one that would astonish you by its smallness—only 464 grains; that is all I could scrape up. Now, how much bromide of ammonium would that require? This was not a quantity—464 grains—that could be found in any formula, but I was able by a very simple calculation, which I think I can explain so that you can make it, to determine how much bromide of ammonium to use, or, if bromide of potassium was preferred, how much of that salt would be necessary.

In order to get this matter before you properly, I must call your attention to the old and hackneyed question of atoms for just a minute or two. We know that all matter of every kind is composed of atoms. These are extremely small bodies, as you have probably heard before. How small they are no one can tell you, but they are, as all agree, extremely small. Now, they have another quality which I want you to bear well in mind. Whether these atoms are of the same diameter or not, no one can tell you! but it is absolutely certain that they are not of the same weight. They are not of the same weight any more than the different individuals before me are of the same weight. You all have your special weights, each one of you. That weight is somewhat characteristic of you. It may increase a little, as it has in my case, in the course of time, from a good conscience and plenty of food, and a little beer occasionally. Your weight may also increase or diminish; not so with the atoms, however. They always retain the same weight. Each atom has its special weight. Now, we cannot weigh one of them, because we cannot even see them, but we can take masses of them and let them act upon other masses, and considering them in that way find, after many trials, how they compare with each other.

Now, for instance, we find the hydrogen atom has the least weight of any. We do not know how heavy it is. It is the lightest of all, at all events, and we therefore take that as a

* With very fine work, it is well to coat the printed tissue also with collodion, prior to its immersion in cold water for development.

† Read before the Annual Convention of the Photographers' Association of America.

starting point, and compare all the rest with it, and we call it 1. Now, you say, one what? Well, one anything you please.

If you have enough of them you have one grain; if you have enough hydrogen atoms you will have one pound—or, of course, you can have a ton of them. No matter what the actual weight is, you may consider the hydrogen atom alone, and you can say the weight is 1. Now, you compare the other atoms with it, and you will find that they have different weights. The atom of potassium, for instance, is 39 times as heavy. The atom of sodium is 23 times as heavy; iodine, 127 times as heavy; silver, 108 times as heavy; bismuth, 210 times as heavy—210 times as heavy as that little atom of hydrogen! You will find this table of atomic weights in the rear part of most of the works on photography—at least, you will find it in all of the works on chemistry. It is a part, though, like the preface, that a great many never read. You don't need to read it, but you have it there for reference. That is the way with most knowledge; it is available and valuable when we know where to lay our hands on it when we want it, and know how to use it when we find it. Now, looking at this table, what does it all mean? Suppose that I unite together one atom of hydrogen and one atom, we will say, of chlorine. I may state that the atom of chlorine is $35\frac{1}{2}$. Upon uniting these atoms together they make what we call a molecule, which is simply a compound of two or more atoms. I think you can all remember that, so when I use the word molecule you will know just what I mean. I mean the combination of two or more atoms—not a mixture, but a compound of two or more atoms in which the atoms have united chemically. Now, suppose that we unite hydrogen with chlorine, what will be the weight of the molecule? The hydrogen atom is 1, and the chlorine is $35\frac{1}{2}$. I expect that you are all mathematicians enough to solve this problem. We add these together, and the result is $36\frac{1}{2}$. That is the molecular weight of hydrochloric acid. Let us take another example. We will say that we wish to find the molecular weight of bromide of silver. Let us represent it by symbols—we have those outlandish symbols that were invented originally to keep folks from understanding the science. Now that we have got them we have to make the best of them that we can. We have Ag representing silver. The old Latin name was argentum. Then we have Br for bromine. Now, what are the weights severally of these atoms? The weight of the bromine atom is 80; the weight of the atom of silver is 108. Now, it does not require much of a mathematician to add them together. We see the result to be 188, and that is the molecular weight of bromide of silver. I think that you could calculate the molecular weight of anything in that way. But let us take a more difficult example. Let us take the nitrate of silver, of which the following is the formula expressed in symbols:

Ag (silver)	108
N (nitrogen)	14
O_3 (oxygen, 3 atoms)	48
	170

We will add these up. It is just as simple as before: 108 for the silver; then the nitrogen, and as the nitrogen atom is fourteen times as heavy as the hydrogen atom, you put down its weight, 14; and lastly, the oxygen atom is sixteen times as heavy as the hydrogen—in other words, 17 is its actomic weight, and, as we have three of it, we must multiply the 16 by 3, of which the result is 48; then, adding these together, we get 170 as the molecular weight of the nitrate of silver.

Now, again, let us find the molecular weight of bromide of ammonium. These are the two substances we are going to use, and we want to know how they will balance, so that each molecule will be decomposed, and there will be no excess on either side. Let us, therefore, examine the bromine of ammonium critically. You will see, by referring to your works on chemistry, that this is the formula for bromide of ammonium: NH_4Br. Let us consider the weight of this molecule: Nitrogen 14, hydrogen 4 (because there are four atoms present), and bromine 80, the total being 98, which is the molecular weight. Now, that means just this, that 98 grains of bromide of ammonium are exactly equivalent to 170 grains of nitrate of silver; and, if you put those two compounds together in this proportion, they will exactly decompose each other—double decomposition will take place, so that there will not be a single atom left on either side.

What occurs when we have put the bromide of ammonium and the nitrate of silver together? You know what occurs in the dance. You change partners. That is all that happens here. There is a change of partners, the ammonium evinces an affinity for the acid radical with the silver, and the bromine and silver unite—a "cross over," as they used to call it. Now, that is a case of decomposition, and it is about as difficult as any example that you may expect to encounter. You will see that there is just enough of each element. Now, the question is, after this is accomplished, what have we formed? Well, in the first place, the silver and the bromine have united together. How much bromide of silver has been formed? That is a question you usually do not wish to determine in the practice of making dry plates. But suppose that you do care. Just think a moment! We have 108 of silver and 80 of bromine, which, added together, give 188, which is the amount of bromide of silver formed. Now, then, what else has been formed? Well, nitrate of ammonia. You see that we could plainly tell how much has been formed if we wished to stop and do it; and now I think that any of you could tell that just as well as I can.

We found that 170 is the molecular weight of nitrate of silver. That is the weight of all the different atoms, and we found that the molecular weight of the bromide of ammonium is 98; very well, now these are the quantities that act upon each other without any excess being left upon either side. Now this serves as a ratio or a proportion by which we can determine in what quantities to add these agents to each other in order to effect complete double decomposition. 170 of silver are to 98 bromide of ammonium as any given quantity of silver is to the quantity of bromide of ammonium to be used. Well, let us try an example. We will take the example here: 170 (of silver) is to 98 (that is the bromide of ammonium) as the amount of silver which I have, 464 grains, is to the quantity of bromide of ammonium which I must use. I have made the calculation and find that 267 grains are necessary. I know, then, just the amount to add to make these gelatine plates, but, as you know, if you have tried it, you must use some excess of the bromide of ammonium. I used a very small excess, much less than the books said was necessary, and yet obtained good plates. Now we will leave that and come back to the oxalate of potash.

In the first place, we have the oxalic acid. Let us see if we can write the formula for that. It is a rather hard formula. I may get something wrong. You had better watch me. Here it is: $H_2C_2O_42H_2O$. Now let us find the molecular weight. Two of hydrogen is 2, 2 of carbon (1 of carbon is 12, 2 would be 24), 4 of oxygen (4 times 16 are 64), and now we add to this water, and we must always take that into account, because it weighs—it has a definite weight on our balance. We buy it when we buy the oxalic acid. You cannot get rid of it, and when you buy a good many salts you buy more water than anything else—a good deal more sometimes. Carbonate of sodium has 10, alum 24 equivalents of water of crystallization. They weigh very heavily. Let us try 1 equivalent of water and see what it weighs. One equivalent of water is 2 of hydrogen and 1 of oxygen = 16, that would be 18 altogether. Here we have two of them, this big figure 2 [pointing to 2 in the formula] shows that whatever follows it is taken twice. So we have twice 18, which is 36. Now perhaps I have confused you in this. Perhaps I had better do it in another way, by which we may arrive at the same result. I told you that whatever follows the figure is to be taken as many times as the figure indicates; if 2, it is taken twice; if 3, three times; if 10, ten times. Here are 2 of hydrogen; if you take those 2 twice, that will be 4, and we will set that down 4, then we have it. There is 1 of oxygen, that will be 16 by itself, but you take it twice, which will be 32, so that you see that we get the same result whichever way we calculate. Now we are prepared, having added up this combination, to find out what the whole of it weighs—here we have it, 126. Now, that is the molecular weight of oxalic acid—that is the weight of the formula, if you please. It is just like the firm of Brown, Thompson, and Smith, each one has his own special weight. One weighs, say, 100 pounds, another 150 pounds, and another 200 pounds; you add these weights together and you get the firm's weight, which is analogous to molecular weight, the latter being the joint weight of a firm of atoms of different kinds, the former of men. Very well, having now illustrated that, let us turn to carbonate of potash. To understand carbonate of potash, we will have to write out its formula. K is the heiroglyphic that stands for potash. It used to be called kalium; we have retained the K, but dropped the balance of the name. Two of potash, 1 of carbon, and 3 of oxygen (K_2CO_3). Now, let us add these weights up, and see what the amount will be. Twice 39 for the potash, 12 for the carbon, and three times 16 for the oxygen will be, altogether, 138.

Now, then, the facts brought before you simply lead to this conclusion, that for every 126 parts of oxalic acid you must use 138 parts of carbonate of potash, or the reverse.

You must remember that carbonate of potash is not absolutely pure, and it sometimes happens that oxalic acid is not absolutely pure, so with ordinary articles you do not arrive at such absolute precision as you may arrive at theoretically, but practically you are near enough right. Now, you might inquire, how can these facts be utilized? We do not wish to weigh out 126 grains of oxalic acid and 138 grains of carbonate of potash each time, but we take that as a ratio, and say as 126 of oxalic acid is to 138 of carbonate of potash, so is the amount of oxalic acid which I propose to use to the amount of carbonate of potash which I must use with it. If we have three members of a proportion, we can get the fourth; so we can turn this problem backward and forward, and work everything out that we wish, and in that way.

Notes.

The Sheffield Photographic Society loses its President for a while; Dr. Thomas Morton proceeds to India this week.

The *conversazione*, open to members and their friends, with which the Exhibition of the Photographic Society will be inaugurated, takes place to-morrow week at 8 p.m.; it will be held, as usual, at 5A, Pall Mall East.

The Photographic Exhibition will be open to the public daily, from Monday, the 9th October, until Thursday, the 16th November, and on Mondays, Wednesdays, and Saturdays in the evening.

"It just reminds one of the queer attitudes in which pedestrians appear in ordinary instantaneous pictures," said a friend, on looking at the illustration after Muybridge, which we issued last week.

Mr. E. Leader Williams, C.E., the president of the Manchester Photographic Society, is the author of a scheme to make Manchester into a seaport, by cutting a canal navigable to ocean-going vessels. There is every probability of Mr. Williams' proposal being adopted by Cottonopolis.

Dr. Eder suggests, as a method of measuring the length of exposure in the case of certain shutters, to get an assistant to make circles in the air with lighted magnesium wire. After a little practice he would have little difficulty in describing a circle in the space of a second, and then the portion of circle shown by the image would demonstrate the period of exposure. As burning magnesium is easily extinguished, a glass shade of some sort would be necessary. Another plan we would suggest, as possibly more accurate, would be to fasten the burning magnesium to a long pendulum, and then expose. The rate of the pendulum could be measured by a scale, and the length of the image on the plate would demonstrate the rapidity of the shutter.

Everybody has been buying a pocket spectroscope lately to examine the "rain-band," and see if it is going to rain; and some of our observatories have been making arrangements to have the spectrum photographed daily, so that the state of the "rain-band" from day to day may be recorded. Suddenly, we are told to place no reliance upon the "band" as a forecast of weather. Mr. Abercromby and the Duke of Argyll both say that after much watching, the "rain-band" is not to be relied upon, although the latter admits that Professor Piazzi Smyth, who brought the subject forward, "has certainly made a good shot" in his prognostications about the weather.

Here is a brief explanation of what the "rain-band" is If we look through a spectroscope directed to any portion of the sky we see a spectrum-tinted riband, crossed with thin black lines. One of the strongest of these, situate in the orange, is technically known as the D line. When the instrument is directed to a pure blue sky this line is thin and faint, but in certain conditions of cloud or sky the red side of the line has a dark shadow, as if it had been shaded down with a bit of rough black chalk. This shading is the "rain-band" of Professor P. Smyth, who maintains that the relative darkness of this band is a measure of the nearness or quantity of rain.

Mr. York's little room for changing the paper of his printing frames deserves to be described, it is so simple. It is a little erection in a corner of the printing yard, measuring, perhaps, nine feet each way, and lighted in front by a large window having a tammy blind. An assistant sits herein as in a pay-place, and through a large pigeon-hole on the shadow side of the building receives and gives out printing frames. In fact, the little room reminds you of an office where you take tickets; while the paper is kept well screened from the light, it is still very handy for use, for the printers have but to stretch forth their hands to thrust the frames through the pigeon-hole.

There has been an early fall of snow in Switzerland—rather a heavy one, too—and Dr. Tyndall, who happens to be there just now, has deemed it his duty to write about it and about himself to the *Times*. We should like to reprint the whole of his beautiful letter, for the Tyndallian style is never commonplace. Dr. Tyndall does not say the storm abated, but "the flakes dwindled to flocculi;" and instead of vulgarly putting it that they melted a pot full of snow to get water, he tells us that firewood was "expended in rendering its own heat latent in the indispensable fluid." All this is very gratifying, and when Dr. Tyndall, *à propos* of our Egyptian success, winds up with, "Thank God, we are a people yet," we feel constrained to add on our part, that, despite the snowstorm, "Thank God, too, we have our Tyndall yet!"

The *Times* is acquiring quite a reputation for being behindhand with its news. Photographing from a train in motion is a feat it has just heard of, and probably next year we shall be told the operation can be performed on board a steamer as well. Our contemporary also speaks of a shutter moving so rapidly that "only 1-100th of a second" exposure is given by it. Apparently the *Times* is incapable of conceiving anything faster than itself just now.

An interesting experiment in signalling by sunshine has been made by our army in Egypt. Colonel Keyser ascended one of the Pyramids near Cairo, and setting up a heliographic mirror, reflected a ray of sunshine all the way to Alexandria, a distance of some 120 miles. The signals, appearing like pin-points of brightness, were distinctly readable on the coast, and took the form of a message from Sir Garnet Wolseley to the Khedive.

"How do you print a cracked negative?" asks a correspondent. We reply that there are two very good ways: one is to put the printing frame at the bottom of a narrow box some two feet deep, with blackened sides, a sheet of light tissue paper being dropped upon the face of the frame; the other, which is quite as efficient, is to place the printing frame on a board suspended from a roasting-jack, which is kept going during the process of printing. There should be no trace of the crack upon the paper print if the plans are properly carried out.

"Don't you think that there is as much pride in refusing to sit for your portrait as in consenting?" asked Dassier of Montesquieu; and this query we would beg all to bear in mind who hesitate on the subject. The man who loudly vaunts he has never been photographed is really more vain than he who has been depicted in the camera a score of times. We hold that the Queen, who so frequently allows herself to be pourtrayed, is far more modest withal, and far more considerate, than the Empress of Germany, who will not allow such a liberty to be taken. Her Majesty's subjects are gratified in the possession of her portrait, while photographers and shopkeepers derive no small pecuniary benefit from the circumstance. It is difficult, indeed, to assign any other reason than pride, nine times out of ten, to a refusal to sit for one's portrait.

A guinea a dozen—or rather a guinea for ten cartes-de-visite—is the highest price charged in any photographic establishment in London at this moment, or indeed anywhere. But it is not so long since that two guineas was the price, while one firm, we remember—that of Messrs. Williams and Mayland, of Regent Street—were wont to charge £1 11s. 6d. for half-a-dozen cartes. This, however, was in the palmy days when cartes-de-visite were a novelty, and when unmounted copies of the same were usually charged half-a-crown a-piece at West End studios.

The *Graphic* not so long ago organised a gallery of beauties, to which some of our best painters contributed; each picture was supposed to represent the particular painter's idea of beauty, both in respect to model and treatment. It seems to us that in any competition in photographic portraiture, the same principle might well be adopted; that is to say, the palm given for the most charming type of beauty, both in respect to model and treatment. As everyone knows, the most beautiful may be marred by photography, just as by tasteful lighting and posing, a plain face may be rendered pleasing. In a "type of beauty" competition, the photographer would be able to distinguish himself by the choice of his model and by his art in displaying her to the best advantage.

"Impersonal" studies, such as these, would no longer be called portraits, and here we repeat our opinion that the sooner medals for portraiture, as portraiture, are discontinued, the better. Unless the individuals whose portraits are exhibited are known to the jurors, how can these tell if the portrait is good or the reverse? You can judge of the lighting, the posing, and skill in manipulation, but that is all; you cannot say if it is a speaking likeness, or whether the expression is foreign to the individual or not. "By Jove! what a good portrait that is of Brown—you know Brown, of course"—suddenly exclaims one of the jury, coming upon the picture of a man he knows; and the chances are that the photographer of Brown will get the medal, not because the portrait he sends is so much better than all the rest, but because it happens to be a good picture of a model who is known.

Frederick Woehler—certainly the most celebrated of our recent chemists—died on Saturday last at the age of eighty-two. For nearly fifty years he was Professor of Chemistry at the University of Gottingen, and his name is connected with some of the most brilliant discoveries of the century. He it was who first produced the beautiful metal aluminium, and another element—boron—he likewise isolated. But, perhaps, his most important investigation was that in which he was able to connect organic with inorganic chemistry. Before his researches it was supposed that organic substances could only be evolved from the animal and vegetable kingdom; but Woehler showed—as in the production of urea, for instance—that so-called organic matter could be prepared from inorganic substances. The result of this investigation was to Woehler so startling, and so opposed to preconceived notions on the subject, that for a long time he hesitated to make it known, and did not, indeed, do so until three years after he had completed it.

Patent Intelligence.

Grant of Provisional Protection.

4071. William Christopher Haigh, of the city of Manchester, Artist, for an invention of "Improvements in apparatus for printing."—Dated 25th August, 1882.

German Patents Granted.

19,395. J. W. Muchall, of Berlin, for "An instrument for multiplying, enlarging, or reducing drawings."—Dated 24th January, 1882. Class 42.

19,499. C. Frank, of Leipzig, for "An instrument for measuring and recording profiles of bodies."—Dated 7th March, 1882. Class 42.

Specifications issued during the Week.

775. R. T. Wall—"Improvements in photography." Price 4d.
The improvements consist in making a new sensitizing solution from white pepper and its analogues macerated with and in

ether, turpentine, alcohol, naphtha, chloroform, or spirit of tar and such like; or by essential and volatile oils; acetic, carbolic, or other acids; or with diluted mastic, crystal copal, sandrac, photographic spirit, or other varnishes; a ready way being to take one pound weight of freshly-ground white pepper and macerate it in one to two pints of ether or alcohol for some days, then press the tincture through one or more filtering media. Also, in using, a little mastic varnish or oil of turpentine is added to the resultant solution if ether is used, a little spirit varnish is used when alcohol is used, and the resultant solution is spread on the surface to be sensitized and exposed in the usual way; and in the use of powdered pigments, cold or warm, brushed or dusted over the surface for the purpose of developing the image. The improvements also consist in the manufacture of transparent sheets of collodion and collodion emulsions, and elastic media for printing on uneven or other surfaces. For making a clear transparent sheet of collodion, a thick preparation of collodion is made, consisting of acetic acid or formic acid, gun-cotton, and castor oil. Canada balsam may be used also. This composition is poured upon waxed glass edged with strips of paper by means of glue so as to form a dish; being placed in a box, the lid is closed, and then left a day or two to dry. On this layer a film of prepared gelatine emulsion or rapid collodion emulsion is poured, and the negative or transparent picture taken thereon suitably varnished and protected, when the whole may be stripped from the glass together. A thick ordinary collodion and a little of castor oil added may be used instead of the above, but the result will be a light yellow colour. The sensitive gelatine emulsion sold in the market may be used. If my extra rapid collodion emulsion is used, the above collodion sheet must contain gelatine, or gum, or india-rubber coating before the application of the emulsion. The following description will show how this emulsion is prepared. The collodion is thus made:—

Ammonia bromide	27 grains
Distilled water as little as possible.	

When dissolved, add 2 or 3 drops of gelatined hydro-bromic acid.

Alcohol...	$2\frac{1}{2}$ ounces
Pyroxyline	32 grains
Ether	$2\frac{1}{2}$ ounces.

The emulsion with silver is formed by adding 120 grains of silver nitrate which has been dissolved in a little distilled water, and then $\frac{1}{2}$ ounce of alcohol. It is poured out into a dish of sufficient capacity in order for the solvent to evaporate, and in a day and night it is ready for further treatment. This consists in breaking up the mass into pieces with a piece of glass or a bone spoon, and covering it with water for some time, and pouring the whole into a calico bag which has previously been washed in carbonate of soda and then well rinsed and dried; the bag and its contents are put into an enamelled saucepan, or in a stone jar covered with gelatine solution, 20 grain No. 1 gelatine in one ounce of water, when the whole is boiled for thirty minutes, and then taken out and put into clean warm water, twisting and washing several times till all traces of acid are removed, which can be tested by litmus paper. When all water is wrung out, the emulsion is dried on a hot-water bath, or spread out in a warm room on blotting-paper; the result is mixed in $2\frac{1}{2}$ ounces of alcohol and $2\frac{1}{2}$ ounces ether. I also make a collodion emulsion as follows:—Bromide of ammonia, 27 grains; distilled water, as little as possible; and when dissolved add 2 or 3 drops of hydrobromic acid containing gelatine, and then blend; glacial acetic acid, 3 ounces; pyroxline, 32 or 35 grains. The emulsion with silver is formed by adding the silver nitrate solution prepared as before, but instead of evaporating I pour the whole into a large jar filled with clean water, and then pour it into a calico bag, and wring, and put it into gelatine solution and then boil for thirty minutes, dry as before, dissolve in 4 ounces of equal parts of ether and alcohol. I find it convenient to use a box for regulating the evaporation having both sides covered with several pieces of calico, holland, or linen, which must be soaked in alumized gelatine, whipped, and then dried; or fine perforated zinc sheet, fine horsehair, or fine wire gauze may be used. This box will keep down the too rapid evaporation, and prevent honeycombs or other irregular marking. To wax the glass plate I warm the glass and rub it with a piece of wax, and warm it again sufficiently to melt the wax, and immediately rub with a piece of flannel until a thin coating is left. I make also a preparation of an elastic medium for printing on uneven surfaces, of gelatine, sugar, glycerine, chrome alum, spirit, thymole or boricic acid, or any preservative agent. A glass plate is prepared by gluing a strip of paper around the edge of the plate so as to form it into a dish. I pour the mixture into this dish and leave it to set, and then place a negative tissue on it, and then place it on a dried pepper sensitized surface; print by light as usual; and for this purpose I find the following proportions useful:—

Water	4 ounces
Sugar	1 ounce
Gelatine	1 ,,
Glycerine	6 ounces
Thymole	some drops
Alcohol	$\frac{1}{2}$ ounce
Saturated chrome alum	some drops

Hand-drawings may be used for my process by using the collodion sheet, coated with matted varnish, then draw any picture on the matted sheet with soft lead pencil, charcoal, or chalk, and print on by my process as before; coloured prints may be used by it. I claim:—1. The sensitizing solution formed from white pepper and its analogues. The manufacture of elastic media for uneven surface printing. 3. Also the mode of treatment for regulating the evaporation and manufacture of transparent sheets of collodion.

820. T. VICKERS—"Improvements in photographic camera shutters." Price 2d.

My invention relates to means or apparatus whereby the light may be quickly or instantaneously excluded or shut out from cameras in photographic operations; such improvements may be employed in photographing generally, but are particularly applicable for the instantaneous processes. For the above purpose I employ a box or casing so constructed as to readily fit on to the outer end of the lens of the camera. Within the case or box is arranged the means for shutting out the light, and for this purpose I prefer employing two slides or shutters of sufficient size together to cover the opening in the lens. These shutters or slides are retained in front of the opening by elastic bands or springs; but for the purpose of photographing any object, they are pulled away from the front thereof, in opposite directions, by the operator, a cord being attached thereto for the purpose. After the required length of exposure, and when the operator lets go the cord, the shutters instantaneously close over the opening and entirely exclude the light. In some cases, one shutter only may be employed in this arrangement; the opening and closing operations are similar to the above described. The shutters in some cases may be of a flexible nature, and passed on to rollers. The shutters may be worked backwards and forwards by a cord, or by mechanical, electrical, or pneumatic means. (*Provisional protection only.*)

TWELVE ELEMENTARY LESSONS IN PHOTOGRAPHIC CHEMISTRY.

No. VIII.—PREPARATION OF SILVER NITRATE, GOLD AND PLATINUM CHLORIDE.

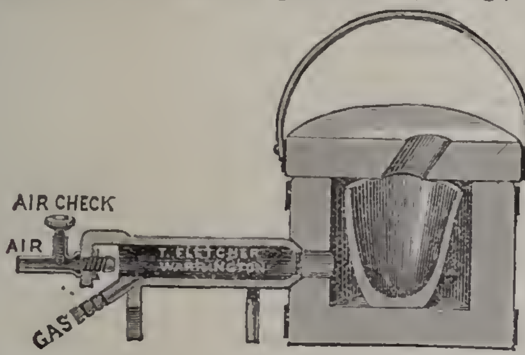
IN preparing silver nitrate, the first operation is to obtain pure silver. Of course different processes are used, according to whether the silver is in the form of an alloy or as a residue; but the precipitation as chloride is the method which is best adapted to the requirements of the photographer.

The impure silver, whether it be silver plate or precipitated from hyposulphite solutions, is placed in a beaker, and for every ounce of the metal pour into the vessel an ounce of strong nitric acid, and warm the mixture till all the metal is dissolved. If old-fashioned plate be treated with nitric acid, very often a slight residue of gold is left undissolved, the reason being that the separation of gold from silver was not so perfect in former days as at the present time.

When the solution of the metal is complete, the liquid is diluted with an equal volume of water, and common salt is added till no further precipitate is produced; rather more than half the weight of the original metal is generally required to ensure the perfect precipitation of the silver chloride. After allowing the mixture to stand for a few minutes till the precipitate has settled, the top liquid containing the impurities should be carefully decanted off, and the beaker refilled with water, the operation of washing by decantation being repeated. Having obtained the silver chloride, the next operation is to reduce it to the metallic state, which may be accomplished in several ways—viz., fusing the chloride with a mixture of potassium and sodium carbonate, reducing the precipitated chloride with metallic zinc suspended in a dilute acid, or by gently fusing the chloride, and placing a piece of pure zinc in the fused mass, and, when cool, pouring dilute acid over it.

These methods are equally successful in bringing about the desired result; but it depends entirely upon the apparatus which the student happens to have at his disposal. Thus, if he possesses a good furnace, we should advise him to work with the first-named process, while if not, he must content himself with using either of the other processes.

When working by the first-named process, a good blast furnace is required, either of the form known as the Sefström, fed with coke, or, where gas is attainable, a Fletcher's injector furnace is preferable (see fig). The



dried silver chloride, mixed with rather more than half its weight of an equal mixture of potassium and sodium carbonate, and about one-fourth its weight of borax, is put into a clay crucible, fitted with a loose lid, and placed in the furnace for about twenty minutes. The crucible should be examined from time to time during the operation, and after the mixture has been in a complete fusion for five or six minutes, the liquid must be poured into a dry tile and allowed to cool down. The button of silver is best separated from the slag by treating it with hot water, thus leaving pure metallic silver ready for conversion into the nitrate.

For reducing by zinc, the silver chloride should be placed in a beaker and covered with a ten per cent. solution of sulphuric acid, about an equal weight of chip zinc being mixed with the silver compound. In a very short time the white chloride of silver nearest to the zinc will be seen to turn to a grey substance consisting of spongy metallic silver; every few minutes the mixture should be stirred, so that a fresh quantity of the chloride may come in closer contact with the zinc, and after two or three hours the whole of the chloride will be reduced. All that is necessary in order to obtain pure silver is to wash the spongy metal by decantation with three or four changes of water. The disadvantage of the process is, that a small amount of the chloride is apt to escape reduction; but if the silver compound be melted first, it forms one compact mass, and consequently does not require stirring. The silver chloride, after being thoroughly dried, is placed in a porcelain crucible, and heat applied till the whole is melted; the lamp is then taken away, and a piece of zinc placed in the acid is poured into the crucible, and left for about half an hour till the grey mass has changed to brown spongy metallic silver. Any zinc remaining after the action is complete should be taken out, the acid liquor poured off, and the spongy silver thoroughly stirred up with water, to wash away the adhering impurities. Having obtained the pure silver, the remaining operation is very simple; the silver is placed in a beaker, and strong nitric acid poured into it, about three-quarters of a fluid ounce of the acid, sp. gr. 1·4, for every ounce of the metal is sufficient; the beaker is heated till the whole of the silver dissolves, the solution is then poured into an evaporating basin, and the excess of acid driven off by boiling, The operations of dissolving the metal and evaporating the acid solution should be conducted in the open air, as the acid fumes are very objectionable if inhaled. In order to recrystallize the salt, dissolve it in the smallest possible quantity of boiling water, and, on cooling, the solution will deposit beautiful crystals of pure silver nitrate. Of course the salt remaining in the mother liquor may be recovered by evaporation, and preserved as a less pure sample.

When preparing gold chloride from coins or jewellery, one meets with the same impurity as in making silver nitrate—viz., copper; thus it is necessary to purify the gold before converting it into a chloride. The gold is put into a beaker, and a mixture of three parts of hydrochloric and one of nitric acid (*aqua regia*) is poured into it, and heat applied till the metal is dissolved; the excess of acid is then expelled by evaporation. The impure gold chloride, when free from acid, is dissolved in *boiling* water, and a cold saturated solution of protosulphate of iron added till a dark precipitate of pure gold is no longer produced—about two ounces of the crystallised sulphate of liquid. When cold, a ten per cent. solution of sulphuric iron being sufficient to reduce one ounce of gold chloride. The precipitate of gold must be poured on a filter and washed by pouring boiling water constantly over it till the wash-water no longer produces a precipitate with a solution of barium chloride, proving that the gold is free from the excess of sulphate of iron. The gold is redissolved in *aqua regia*, and the solution evaporated to dryness, the latter part of the operation being carried on slowly on a sand-bath, to prevent spurting. The yellow crystalline chloride of gold thus prepared should be preserved in a well-stoppered bottle or in a sealed tube, as the salt is very deliquescent.

Perchloride of platinum, or platinic chloride, a substance sometimes used for toning, is prepared in a similar manner to chloride of gold, the same precaution to expelg the last traces of acid at a gentle heat being observed.

Bichloride of platinum, or platinous chloride, may be prepared by gently heating the platinic chloride; but if the temperature rises beyond a certain point, the platinous salt is reduced to the metallic state. The best method of reducing the plantinic chloride is to add a saturated solution of sulphurous acid (as described in the previous chapter) to an aqueous solution of the salt, when a yellow precipitate of platinous chloride is produced; this is washed and dried, and, if required for photographic purposes, must be converted into the double chloride of potassium and platinum, which is soluble in water.

To prepare this salt, mix twenty-seven parts of platinous chloride with eight parts of potassium chloride, dissolve in a small quantity of hot water, and evaporate to dryness; the residue being chloroplatinite of potassium, the substance used in the platinotype process.

PHOTO-LITHOGRAPHY AND PHOTO-ZINCOGRAPHY.

BY MAJOR J. WATERHOUSE, B.S.C.,

Assistant Surveyor-General of India.

Chap. II.—Apparatus and General Arrangements.*

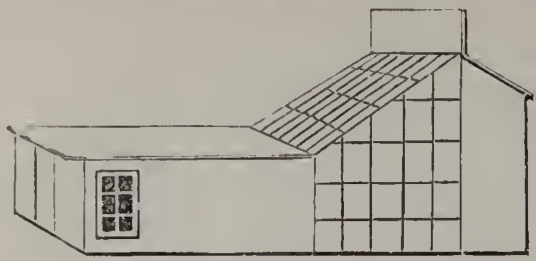
Studio.—In fine weather a good deal of copying work may conveniently be done out of doors, provided that all the apparatus connected with the camera and plan-board is firmly fixed and sheltered so as to be free from vibration, which would destroy the perfect sharpness of the image; but when work is constant and must be carried through regardless of weather, a glazed studio will be necessary.

As regards the best position of the studio for copying, it is difficult to know what to recommend, especially as so much depends on local circumstances of position, aspect, and climate.

Monckhoven recommends for reproductions a studio of what is called the "tunnel" form, having the glass roof to

* Continued from page 566.

the north, and I think there is no doubt that on the whole a steady, bright diffused light from the north coming through clear glass is to be preferred to sunshine filtered, as it must



be, through ground glass, which cuts off an enormous proportion of the light.

In my own case, having a certain amount of open ground towards the south of the office building, and none to the north, I built the glass house for the photographic branch of the Surveyor-General's Office, in Calcutta, on the ground level in something of the same kind of tunnel shape as Monckhoven's, but facing the south. The sloping glass roof and the side sashes under it are glazed with ground glass, so that a strong diffused light is thrown upon the plan-boards. In order to lessen vibration as much as possible, the plan-boards are fixed on a separate wall, quite isolated from the walls of the buildings; and each camera stands by itself on a block of masonry resting on a bed of sand, and is thus isolated from adjoining blocks, and from the walls and floor of the rest of the building. The house is roofed in over the cameras, and the dark-rooms are conveniently placed just behind the cameras, the dark-slides being passed in and out of the dark room through wooden boxes let into the wall.

This arrangement is found to answer very well for copying of maps, though sometimes, when the sun is high, the grain of the paper is apt to show too much, and it is possible that a similar arrangement facing the north might have been better.

For out-door work in places where there is little wind and dust, I have found it a good plan to have the camera and plan-board, both Southampton pattern, mounted on a firm traversing carriage about twenty feet long, running on trucks and working on a vertical pivot, so that as the day wears on, the position of the plan-board may be changed so as always to face the sun. This can also easily be done with the combined table-stand and plan-board described above.

It is of course much easier to make suitable arrangements for copying the small subjects generally required for book illutration than for large maps and plans, which require considerable space and large apparatus.

Lighting.—A strong diffused light coming in a horizontal direction at nearly the same angle and strength upon every point of the picture, so as to give an even light over the whole surface, is generally to be recommended for copying, as the grain and other unevenness of the paper is least shown by such a light. In a vertical or strong side light the rough points of the grain, creases and waves of the paper, throw shadows which interfere with other details, and render it difficult to get a clear ground of the transfers. Indian ink or sepia drawings and plans and engravings, or prints that have been stained and yellow with age, are better copied in sunlight or strong diffused light.

A good deal may be done to remedy defects of lighting, and shorten exposures in dull weather, by means of reflectors suitably placed below or at the sides of the subject. These reflectors may be made of clean white paper or of silvered glass. An ordinary looking-glass placed in the sun outside the studio is often useful to brighten up a piece of dark work.

Arrangement of the Plan and Focussing.—The subject to be copied must lie quite flat and free from ridges on the plan-board or other support. This is best attained when drawings are made specially for copying, and can be left strained on the drawing-board. Another effective way, especially if the original is creased or cockled, is to cover it with a sheet of glass rather larger than the negative, and in which holes have been drilled at the corners, through which drawing pins may be passed to fasten glass and paper to the board; or, better, if the subject is not too large, to put it into an ordinary printing-frame or the especial glazed frame before described, in which the paper will be sufficiently pressed to lie quite flat against the glass.

Engravings and prints, &c., which will not be injured by wetting, may be soaked in water for a few minutes, and laid face downwards, perfectly flat and evenly, on a glass plate, or strained on to it by gumming round the edges. In either of these cases, when using glass over the original, care must be taken to avoid any reflection from light objects directly in front of the plan-board, and which may be reflected back into the lens. The camera will require a black cover, and any light coming in from behind it must be cut off with a dark screen placed at the back, and large enough to cut off all reflections. These reflections can best be detected by looking at the subject with the eye in the position of the lens. The tunnel form of studio is advantageous for this kind of work, because everything at the back of the camera is in comparative darkness.

In the Military Geographical Institute at Vienna, the drawing to be copied is placed in an iron frame, the sides of which can be drawn out by means of screws, and thus the drawing can be stretched quite tight and smooth all over. A somewhat similar arrangement is used in the Military Topographical Institute at Florence.

We have already stated that in order to prevent distortion, the ground glass and the subject to be copied must be perfectly parallel, and it is necessary to have some ready means of ascertaining that they are so when focussing the camera. The squares and rectangles ruled on the plan-board and focussing-screen will generally be sufficient, and will also serve at the same time for adjusting the camera to scale. Thus, supposing it is desired to produce a copy half the scale of the original, the camera and plan-board must be first adjusted, so that the image of the centre of the board may coincide with the centre of the focussing-screen, which in a properly constructed camera will occupy the same position as the centre of the sensitive plate. The position of the camera must then be altered till the image of a square eight inches in the side on the plan-board exactly occupies the square of four inches in the side marked on the focussing-screen. Should any one of the lines forming the sides of the square on the plan-board be longer or shorter than the others, it will show that the two surfaces are not strictly parallel, and either the plan-board or camera must be slightly slewed round or tilted a little up or down, till both sets of lines correspond exactly. If the sides of the test-square on the plan-board are marked with a number, a simple inspection will at once show the nature of the adjustment required to bring any particular side of the square to its proper length. With properly constructed apparatus once put into true adjustment, there will be very little trouble in setting the camera for different subjects; but it is advisable to see at least once a day that the adjustments are true.

Captain Abney (*Instruction in Photography*, p. 96) recommends the following method:—On the centre of the board on which the drawing, &c., are to be fixed, a small mirror may be fixed temporarily, or may be let in flush and strictly parallel with the board, thus obviating the necessity of its removal for fixing up the drawing. The point corresponding to the centre of the lens should be accurately marked on the ground glass. On the lens itself an open cap should be fitted, furnished with two cross-threads intersecting on the prolongation of the axis of the lens. The image of these cross-threads will be reflected by the mirror, and should be focussed. The board should then be tilted or screwed round till the image of their intersection coincides with the point marked on the ground glass;

the board will now be parallel to the ground glass, and the drawing may be fixed on it and focussed as usual.

In Vogel's *Hand-book of Photography* another simple method is given, which consists in using a black board with a white stick fastened to it perpendicularly. This is fastened on the copying-board, the camera pointed towards it, and focussed. If the camera and plan-board are parallel, the stick should appear as a white circle on the ground glass.

Dark-Room Arrangements.—The arrangements in the negative dark-room will be much the same as usual, and require no special remark. When working large plates, a horizontal well-bath for the silver solution, on the system recommended by the Autotype Company, will be found most convenient. It is made to tilt up, so as to thoroughly drain the plate, the latter being protected from light meanwhile by a hinged cover.

Large troughs will be required for the bichloride of mercury solution. These may be made of good wood, well coated with black varnish, over which a layer of canvas or cotton-cloth is laid very evenly all over, and then coated again with two coats more of the varnish.

If hydrosulphate of ammonia is used for intensifying, care should be taken to perform this operation in an open place, if possible over a drain, so that the fumes may be carried off at once, and not allowed to get into the other work-rooms.

For the preparation of the photo-transfer prints two special dark-rooms will be required—one for preparing and drying the paper, and the other for inking and washing the transfers. For drying the transfer-paper a drying-box will be useful. It may be made of sheet iron, and furnished with apertures at the bottom and top, for allowing a current of heated air to pass through the box without admitting light. The sheets of paper are suspended from wooden slips resting on wooden supports at the sides of the box.

It will be convenient to have a range of shallow zinc troughs running along one side of the washing-room, under the windows, and to have hot and cold water laid on to each trough. *(To be continued.)*

Review.

Die Fortschritte der Photographie Seit dem Jahre 1879 (Photographic Progress since the year 1879). By Professor Dr. H. W. Vogel. (*Berlin: Robert Oppenheim.*)

Dr. Vogel has been good enough to forward us his new book on photographic progress since 1879, forming a kind of supplement to his well-known *Lehrbuch der Photographie.* The author has done well in confining himself to a description of photographic science for the past three years, for although his volume is a goodly one, comprising 176 closely-printed pages, the importance of the period is such that a record of it, to be complete, must necessarily be somewhat lengthy. And Dr. Vogel has given us a most complete history, as the reader at once discovers on opening the volume. Not only are the physics and chemistry of our art duly recognised, but Dr. Vogel has wisely commented upon all the important practical improvements a well, which have been so numerous during the past few years. He even adds a chapter especially for amateurs, which we make bold to assert will not be found the least attractive portion of the volume.

Dr. Vogel's work, complete and thorough as it invariably is, has always one other important and attractive feature. Whatever he writes is interesting, and this is a great point with nine readers out of ten. His present book is, moreover, capitally illustrated, not the least attractive among the illustrations being pictures and diagrams relative to the employment of electricity in the studio.

Of course the principal feature of the book is the history and description of the gelatine process, the manner of preparing the emulsion, and the different formulæ that have been suggested for development. Dr. Vogel has put this forward in a most clear and succinct manner, detailing the modifications and improvements that have been suggested up to the moment of going to press.

New apparatus—and there has been much novel apparatus in the form of shutters and dark-slides lately—are summarised, and, in many cases, pictorially described; while the new lenses that have recently come into favour on the Continent are shown and discussed. Finally, the new positive printing processes are carefully considered, not forgetting platinotype, to which several pages are devoted. Altogether, we may pronounce Dr. Vogel's new book a most valuable and interesting one, and one likely to attract many students, not only in the great Fatherland, but in this country and in America.

THE LIMITATIONS OF PHOTOGRAPHY.

BY J. E. BEEBE.*

Did you ever think, brother photographers, in the hurry and excitement of money making, that in this beautiful art of ours there are many things well worth thinking about that are of themselves quiet and restful? That the philosophy of the art-science contained within its range many problems that in no wise touched the vexed questions of prices, Sunday work, unwise competitions, troublesome customers and the like? If you have thought this matter over, it will be helpful to know that others are awake to the fact; and if you have not, it will not be unprofitable to reason awhile together and see if we cannot find food for thought outside of formulas and technicalities.

Have any of you ever read that splendid work by England's first art writer, Philip Gilbert Hammerton, called the "Graphic Arts?" If you have not, get it and study it. In this work he says of photography: "It is supposed by many, that since photography gives very minute details, and is in some sort the fixed reflection of nature in a mirror, any one who desires a true record can get it much better by making use of a photographic apparatus than by the careful study with a pencil. This is one of those cases in which a really well-founded opinion cannot possibly be a simple opinion easily transmitted to those who have not studied the subject.

"Photography does in some respects give more delicate truth than any draughtsman can, but from its incapacity for selection, there are many truths which it cannot state in drawing, and it often happens that even if the photograph could give them separately, it could not give them together.

"Again, notwithstanding all the really wonderful ingenuity which has been employed in making the photographic apparatus portable and convenient, it is still far from being so ready and handy as a pocket sketch-book. But there is one fatal objection to photography in comparison with drawing—an objection that far *outweighs* all others—and that is, *the necessity for an actual existing model.*

"You cannot photograph an intention, while you can draw an intention, even in the minutest details, as we constantly see by the drawings made by architects of buildings not yet in existence. This settles the question in favour of drawing, because all constructors require to be able to represent ideas and conceptions which have not yet become realities. Even in the representation of realities photography is less explicit than a good drawing by a person who thoroughly understands his business."

The photographer, then, is not to be compared with the painter, who generally attempts to render something of the mystery and effect of nature. This, then, is the idea of a careful thinker, a lover of all the arts and art-sciences, as to one of the limitations of photography; and I think I can safely say that in all the range of art literature you will find no truer, fairer statement than this. Photography is the helpful assistant, the patient fact collector for the higher arts of printing and illustration. Let her rest content with these honours, and waste no time in reaching for laurels that she can never attain.

Let us analyse a little further, and try and get a few more of the weak spots in our defences in sight before we go into the much easier strain of self-congratulation.

* *Photographic Times.*

Our lenses are eyes of brass and glass, but, unfortunately, they have not behind them a powerful brain. Our plates will accept one set of facts at a time, but no more. When the slide is pushed in, no beating heart or busy thoughts are placing the coming image among the stores of memory. Photography fails woefully when she attempts to depict any of the higher or holier emotions; so guard yourselves carefully, ye modern geniuses who attempt the copying of great paintings—or, worse yet, who attempt arrangements that touch the bounds of the tragic or soulful—for ridicule is your just reward.

Realise well the fact, my friends, that no matter how magnificent your chemical effects, no matter how perfect your workmanship, you are hedged and bounded in the range of subjects you can depict with your cameras; you are limited in the class of expressions you can attempt with safety; you, and subjects whose effect is dependent on colour, are without affinity; your chemicals can bear but a certain strain; your lenses cover but a limited space at one time; your professional life has its boundaries, and you waste your energies in attempting heights your wings were never made to reach. A skilful artilleryman will not use his ammunition in firing at an object beyond the range of his cannon, and a skilful workman will profit by his example. A thoughtful photographer will carefully study his resources, will dull his faculties in certain directions, will use his tools with cool judgment, will polish, refine, beautify his work within certain limits—will, to put it technically, not make 14 by 17 heads with a greater size tube. Many of my hearers must take to heart this lesson. Their art knowledge is limited, their studios are small, their opportunities for culture and training are of a meagre character. If they climb, it must be but slowly and painfully; they must pocket their pride, not fret their lives out over what they would like to do, but use every means to do perfectly what they have to do. See what a field opens before you, my dissatisfied friend. That you are dissatisfied is a sure sign of growth; that you are hungry for formulas, ravenous for information, anxious to meet this man and that man whose work you admire, points straight to the fact that you are improving, and will improve in your work; perhaps not, however, in your prices. A year ago I led my hobby before you, and I will once more ride him across the stage. Art study is not limited; culture will end only when you yourself desire it; a sturdy, honest desire to improve will take the form of studious perusal of art books, a subscription to art journals, of humble, loving study of the work of the master painters and photographers, of drawing, of an endeavour to understand composition, arrangement, light and shade. You forget that your study of chemicals and the management of your light and instruments is but the means by which the great end is to be obtained—namely, beautiful, artistic work. Now for one word of encouragement, and I am done. You may think, as I myself have done, of what benefit is all this, if the worst of all limitations continually surround us? What satisfaction in beautiful, artistic work, expensive studios, or loving devotion, if cabinets are to be made for two dollars a dozen? Let me give you the answer; it is the only one: the love of a true workman is for his work. This has helped many of us over the roughest places; and without it the journey of life would be well nigh intolerable. Courage, therefore. Life is short, art is long; love your work for its own sake, and the result will be satisfaction to your soul without limit.

Correspondence.

BALOON PHOTOGRAPHY FOR WAR PURPOSES.

DEAR SIR,—I am much obliged to you for having called attention to the fact of my being the original inventor of the system of photographing from a captive balloon by means of electricity, as notwithstanding the numerous press articles, together with a paper read at the Balloon Society, my endeavours, which cost me much time and money, seem, during the late war balloon furor, to have been entirely ignored. I patented the system in 1877, but as I found no signs of a likelihood of its being taken up, abandoned it at the three years' stage. I must do Mr. Cooper Key the credit to say that he had not heard of my endeavours prior to his writing the article in the *Daily Telegraph*.

In my original patent I describe a method of causing a band of tissue "à la Warnerke," worked by clockwork, to be detached by the electric current, thus exposing a fresh surface at each connection of the wires, but found this less practical than the simple cube holding four plates, and caused to make a quarter of a revolution at each contact. This was exhibited by me at the Crystal Palace during the late exhibition, and formed an illustration in the *Graphic*.

In conclusion, let me assure Captain Abney and the other gentleman who, I note, are said to be working in this direction, that nothing will give me greater pleasure than hearing of success attending their endeavours.—Yours truly, WALTER B. WOODBURY.

MR. HENDERSON'S COLD EMULSIFICATION PROCESS.

DEAR SIR,—It appears to me that Mr. Henderson's method of preparing gelatine emulsion as described in the NEWS a few weeks ago gives a key to the long-sought problem of uniformity. Although I am only a worker on a very small scale, I have proved its value, and have been much more successful in attaining the proper exposure of my plates than has ever been the case previously. I have found the sensitiveness to be somewhat exalted when the carbonate of ammonia is increased to 30 grains, and I, for one, would be glad to learn more about this process.

SAM. LAUDNER.

[We have received several letters of a similar character, and would be glad if Mr. Henderson would let us have an account of his more recent experiments.—ED. P. N.]

Talk in the Studio.

SOUTH LONDON PHOTOGRAPHIC SOCIETY.—The monthly meetings of the above Society will be resumed on Thursday evening next, October 5th, at eight o'clock, at the Rooms of the Society of Arts, Adelphi. Papers have been promised on "Notes from the Royal Cromwall Polytechnic Society's Exhibition," by Mr. W. Brooks; and "The Past Season," by Mr. E. Dunmore.

PORTRAITS OF SIR GARNET WOLSELEY AND THE ARCHBISHOP OF CANTERBURY.—Mr. Luks, of Bedford Street, is good enough to forward us portraits of the above, belonging to a "new series" of celebrities he is publishing.

THE A B C OF MODERN PHOTOGRAPHY.—The *Journal of the Society of Arts*, in noticing this work, says:—"This little book is a reprint of a series of articles in the PHOTOGRAPHIC NEWS, by Mr. Burton, whose paper read before the Society last Session will be remembered by those who take an interest in photography. The recent advances which photography has made have brought within its powers results which a few years ago were unattainable; and it is not one of the least remarkable points about the progress of the science, that it has rendered the production of these results comparatively easy. The would-be photographer can have the first and most difficult of his processes done for him. He can purchase his plates ready made, and if he will only attend carefully to the directions which accompany his purchase, he can hardly fail, even at a first attempt, to produce something more or less resembling a picture. An amateur, at the end of his first season, has even been known to boast that his first attempt was quite as good as any of his later efforts—and perhaps it was. This facility in picture-making is raising up a host of amateurs, who may be expected to be anxious to acquire a mastery of their art with the smallest expenditure of time and trouble. For these Mr. Burton writes. He assumes no previous knowledge. He begins at the beginning, giving minute and detailed instructions for every stage of the process, from the time when the plate is placed in the dark slide, to the completion of a print from the finished negative. The little book only deals with the gelatine process, but to the extent to which it goes it is complete, and so far as manipulation can be taught by written instructions it is taught. In spite of the simplicity of the processes to be carried out, the learner will, doubtless, soon discover that there is abundant scope for dexterity in manipulation as well as for judgment. That this is so is sufficiently evident from the different degrees of excellence to be observed in the productions of our best photographers, professional and amateur; and it will be found that while, thanks to the manufacturers of apparatus and gelatine plates, a certain low standard of excellence is rapidly attained, to pass beyond this level is far from easy. Were it not so, the only interest left for the photographer would be the arrangement and treatment of his subject, so that his pictures may really be pictures, and not mere transcripts of the scene towards which his camera happens to be pointed. Artistic merit will always be the quality most sought, but there is still room for many different degrees of technical excellence."

Technical Classes at Preston.—We notice that Mr. Parkinson, who obtained the Guilds' Special Silver Medal for proficiency in the technology of printing, is about to commence a class in Preston. The course will include lithography, plate-printing, and some of the photo-mechanical methods. Considering that photographers usually fail in phototypic work just where the skill of the practical printer is required, rather than on the photographic side, we shall not be surprised to hear of a large proportion of the Preston photographers joining Mr. Parkinson's class, especially as it is to be held in the evening.

The Photographic Money Dispute.—At the Clerkenwell Police Court, on Tuesday, Captain Herbert Kerr, late of the 17th Regiment of Foot, 22, Bushey Place, Clarendon Road, Hampstead, appeared on an adjourned summons to answer the complaint of Lieutenant Arthur Henry Loringe, R.N., of having, on the 20th April last, obtained from him by fraudulent pretences the sum of £2,074, with intent to defraud. Mr. Besley appeared for the prosecution, and Mr. Grain for the defence. The fraud complained of is alleged to have been committed by the defendant as Managing Director of the Photographic Artists' Co-operative Supply Association. The prosecutor, recalled, said that, in addition to the premises at 43, Charterhouse Square, the Association had offices in Carthusian Street connected by speaking tubes with the main premises. The book from which he had obtained the information as to the account between Captain Kerr and the Company was found by him amongst some old books at the offices in Carthusian Street. There was nothing in any of the current books to show that the Company owed Captain Kerr in 1881 more than £202 4s. 6d. He first saw this book when he was making out a balance-sheet for the half-year ending June, 1882. At that time the balance sheet for 1881 had not been completed. He had asked Captain Kerr at least three times when that balance-sheet would be ready. Cross-examined by Mr. Grain.—When he commenced active duties he took charge of the books in use. After the middle of May the books from which he had taken the figures showing the account between Captain Kerr and the Association was on a shelf in his office. He had applied for the winding-up of the Company in Chancery, and he then swore an affidavit. Mr. Grain (reading from the affidavit)—Is it true that you "inspected the books of the Association on several occasions before contracting for the purchase of any shares from H. Kerr?" Witness—Some of them; not all of them. It was true that he had the opportunity of inspecting the books before contracting for the purchase of the shares. His brother suggested that he should have a separate accountant to examine the books. He knew that at the time that the negotiations for the purchase of the shares were proceeding, Mr. Steel was solicitor to the Company. Captain Kerr told him that he had a large number of shares; that he had invested a large sum of money in the Company. The defendant did not say that he had worked up the business himself, and in effect was the Company. What Captain Kerr said was, that he had been engaged for some years in the manufacture of dry plates, and it had been suggested to him that he should start a co-operative company for the manufacture of photographic materials; that he had adopted this suggestion, and had invested largely in shares. Before the interview with Mr. Covell, he had seen a statement of accounts which Captain Kerr guaranteed as correct, and the defendant had promised that the balance-sheet for 1881 should soon be ready. Mr. Grain.—What do you say is the false pretence made by Captain Kerr which induced you to part with your money? Witness.—Captain Kerr gave me a statement of assets and liabilities, stating that he guaranteed it as correct. In this there was a sum of £201 4s. 6d., instead of £1,456, which was standing to Captain Kerr's credit at the time. Mr. Hosack.—Would you have parted with your money if you known that the Company owed Captain Kerr £1,456? Witness.—No. Mr. Grain.—Is that £201 4s. 6d. carried out at all? Witness.—No. It does not affect the totals carried out. Mr. Grain.—Is that the only false pretence you allege? Witness.—No; on the statement of liabilities there is an omission of a liability of the Company of £315, owing to Mr. Gerald Vanderlin. Continuing, he said that before he had anything to do with the Company they took large sums in cash every day. The sums during the first half of this year varied from £12 to £50 or £60 a day. The sales for the first half of this year amounted to £8,600. Last year the sales, according to the books, were £20,000; but after inspecting the books he had even reason to doubt that this was correct. He believed the prices had been raised this year. Witness was not satisfied with the receipts this year, as they showed a falling off as compared with last year. In July, he did not think the business was at all satisfactory, but he thought it was a business to put further money in, and he lent £500 to the Company. He had also lent £500 to the Company in June. That was probably after he had seen the difference in the receipts for May, 1882, as compared with those of the corresponding month of 1881. The second £500 was certainly lent after he had compared the figures. By the Magistrate.—It was before he knew that the Company owed Captain Kerr £1,456. Cross-examination continued.—Captain Kerr did not tell him at any time during the negotiations that he had never drawn the salary due to him. He had not searched the books to see whether he had drawn any salary. Captain Kerr had said that he had such faith in the undertaking that he intended to regularly invest a portion of his salary in the Company. After some further cross-examination the case was again adjourned.

The Photographic Artists' Co-operative Supply Association, Limited, in Chancery.—On Wednesday, a petition was filed by Mr. A. H. Irving for the winding-up of this Company, and for the appointment of a provisional liquidator. The Company objected to the validity of the petition on two grounds. The first was that the petitioner had not held his shares for six months, and that his debenture stock for £1,000 was not ripe for payment. Mr. Eddis, Q.C., for the petitioner, and Mr. W. Barber, Q.C., for the Company. His Lordship said that since the case was last before him he had looked into all the facts and gone over the whole of the affidavits, and for his own part he thought it would be much better that this Company was put out of its misery. It was clear that the two parties—the managing director and the assistant manager—had quarrelled, and hence these proceedings. These two parties held the largest number of shares, and the petitioner knew when he took his shares that the Company was being carried on at a loss. It would be much better that some agreement was come to between the parties. Mr. Eddis said that he had to suggest that a provisional liquidator should be appointed. Mr. W. Barber did not object to such an appointment. His Lordship appointed a provisional liquidator.

Photography from Trains.—Instantaneous photography, in its more familiar aspect, supposes motion of the objects photographed; but another form of it is that in which it is the camera, more especially, that has motion of translation, as in photographing from balloons or trains. The practicability of photographing landscapes from the window of a train running at a rate of even forty miles an hour has been recently proved by Dr. Caudéze, who uses what he calls a gyrograph for the purpose. The apparatus comprises a copper tube similar to that which carries the lenses in ordinary cameras, but the lenses are placed on opposite sides parallel to the axis. Within is a shutter similar to the box of a stopcock; it presents two quadrangular apertures, which, according to the position of the shutter, do or do not let pass the light-rays in making a quarter of a turn. This rotatory movement is obtained by means of a spring liberated from a catch. An exposure of only 1-100th of a second may be had. With a little practice wonderfully distinct views, it is said, can be obtained with the apparatus.—*The Times.*

The Progress of Electric Lighting.—The enormous difficulty of keeping an extensive system of electric lighting conductors in a proper state of insulation can only be appreciated by those who have had experience in working with currents of moderately high potential, and it is a question whether even an area of a square quarter of a mile can be efficiently covered by one generating station for any length of time. The recent attempt to light up a considerable area of New York from a single source led to curious results, horses being frightened by electric shocks traffic stopped, and something like a general consternation existing over the district. On cutting off the current the manifestations ceased, and peace was restored. It seems to us that incandescent lighting will show at its best when a terrace, small square, or similar group of houses, is alone supplied from the same dynamo room.

To Correspondents.

Specimens and Testimonials.—The grievance is an old one, and has often been adverted to in our columns. Although, of course, any honourable man will return specimens when stamps are enclosed for that purpose, correspondents forward their samples at their own risk, the publishers not holding themselves accountable from the simple fact of their consent to receive replies. In the case of testimonials, it is always advisable in the first instance to forward copies, producing the originals only at a personal interview if desired.

Registration.—You would have saved yourself much trouble had you simply signed your name *in full* on the registration form as desired, leaving the description to be filled in from the prints forwarded. What is wanted is the name and address of the photographer, the name of the person or thing photographed, and such a description of the photograph, briefly given, as will enable it to be identified.

Toner.—1. Do not be alarmed, as there is no danger. Such a catastrophe has never yet occurred; neither will it ever happen. 2. The whole matter was fully discussed in the News rather more than a year ago.

T. C. Johnson.—It is all very well for those who have plenty of time to waste; but business men will generally prefer to adopt the usual method.

Lex.—A short series of articles on the subject will appear in the Photographic News before long.

F. Cowley.—The bitumenous film left on drying the varnish tends to become insoluble by long exposure to light, and the best solvent you can employ is chloroform. As the next best, we should recommend benzole; but take care that you do not get light petroleum, or the so-called "benzolene," by mistake. It is probable that if you had devoted less time to elaborate studies as regards photometry, and a correspondingly longer period to careful observation in the field, your progress would have been more rapid. The appearance of the image on the focussing-screen will generally serve to enable a fair estimate to be made; but you must not forget that the actinic intensity of the light falls off very much towards the evening. As good a practical method as any is the following. Set aside a few sheets of albumenized paper as a store, and before going into the field sensitise a small slip on a standard solution of silver nitrate, say 40 grains to the ounce. The times required to produce a standard darkening on a small slip exposed in the direction of the landscape will have approximately the same relations among themselves as the exposures required for camera work. Let us suppose that when you first expose your paper it requires 30 seconds to darken it until it corresponds to a standard tint, and that a gelatine plate with a given lens and stop requires 1-17th of a second, it is obvious that with similar plates, lens, and stop the exposure in the camera should always be 1-510th (or, say, 1-500th) of that required to darken the paper to the arbitrary point selected. There are many circumstances which render this method somewhat incorrect, but you may find it practically useful, for all that. Still the fact remains that the most successful out-door workers do not practise photometry in the field. As regards the other matter, see our leader.

Laboratory Boy.—1. Your supposition that Mr. Verbum Sap. is a well-known authority on photographic matters is somewhat erroneous. Just study through a list of abbreviated Latin quotation, such as you will find in an ordinary dictionary, and you will find the real meaning of the mystic ending. 2. Your method is the correct one, and far preferable.

W. G.—Fasten up screens made of the thinnest and whitest tissue paper which you can obtain.

Lux.—Probably because of the white fumes of magnesia. You had better employ a very large number of paraffin lamps, and give a long exposure. If you possess the means of producing an electric light of sufficient power, you will be able to work with greater rapidity.

O. S.—1. Mr. A. L. Henderson, of King William Street, London Bridge, is undoubtedly one of the best enamel photographers in this country. We do not know the cost. 2. No doubt you can obtain it from the stock dealers. 3. Unless the reduction of weight is a matter of exceptional importance, it is better to use glass. 4. They must be cleaned occasionally, and for this purpose there is no alternative but to unscrew them. 5. Very nearly, but not quite. 6. Quite the reverse, as it enables the photographer to depict nature in its most interesting aspects.

W. E. Craig.—On page 487 of the present volume (issue of August 18th).

Perplexed.—1. Try the formula of Dr. Eder as given in the Year-Book. 2. Judging from the appearance, you have used too large a proportion of silver in relation to the chloride. Perhaps your chloride was not quite free from moisture.

W. B. Funnell.—1. You will find much more extended information in "The Studios" than we can possibly give you in this column. 2. No absolute preference can be expressed, as special circumstances must be considered.

THE EVERY-DAY FORMULARY.

The Gelatino-Bromide Process.

Emulsion.—A—Nit. silver 100 grains, dist. water 2 oz. B—Bromide potassium 85 grains, Nelson's No. 1 gelatine 20 grains, dist. water $1\frac{1}{2}$ oz., a one per cent. mixture of hydrochloric acid and water 50 minims. C—Iodide potassium 8 grains, dist. water $\frac{1}{2}$ oz. D—Hard gelatine 120 grains, water several oz. When the gelatine is thoroughly soaked, let all possible water be poured off D. A and B are now heated to about 120° Fahr., after which B is gradually added to A with constant agitation; C is then added. Heat in water bath for half an hour, and stir in D. After washing add $\frac{3}{4}$ oz. alcohol.

Pyro. Developer.—No. 1—Strong liq. ammonia $1\frac{3}{4}$ oz., bromide potassium 240 grains, water 80 oz. No. 2—Pyro. 30 grains, water 10 oz. In case of an ordinary exposure mix equal vol.

Iron Developer.—Potassium oxalate sol. (1 and 4) 80 parts, ferrous sulphate sol. (1 and 4) 20 parts, dist. water 20 parts. To each 4 oz. of the mixed developer add from 5 to 30 drops ten per cent. sol. potassium bromide, and 30 drops sol. sodium hyposulphite (1 and 200).

Substratum or Preliminary Preparation.—Soluble silicate of soda 1 part, white of egg 5 parts. water 60 parts. Beat to froth and filter.

Fixing.—Sat. sol. of sod. hypo. 1 pint, sat. sol. of alum 2 pints, mixed.

Cowell's Clearing Solution.—Alum 2 parts, citric acid 1 part, water 10 parts. Edwards makes this sherry coloured with perchloride iron.

Eder's Method of Intensification.—The negative is whitened by soaking in sat. sol. of mercuric chloride, and after thorough rinsing immersed in potass. cyan. 10 parts, potass. iod. 5 parts, mercuric chloride 5 parts, water 2,000 parts. As film becomes dark brown, the actinic opacity is increased; but prolonged action causes brown tint to become lighter, until at last the negative is no denser than at first.

Fol's Backing Sheets.—A chromographic paste is prepared with gelatine 1 part, water 2 parts, glycerine 1 part, and a very small addition of Indian ink. Strong paper or shirting is coated, and the sheets are laid, face downward, on waxed glass to set. Press to back of glass plate.

The Wet Collodion Process.

The Nitrate Bath.—Water 14 oz., nit. silver 1 oz., nitric acid 1 drop. Before using coat a small plate, and immerse it for 20 minutes.

Cleaning Preparation for New Plates.—Alcohol 4 oz., Jeweller's rouge $\frac{1}{4}$-oz., liquid ammonia $\frac{1}{2}$-oz.

Film-removing Pickle for Old Plates.—Water 1 pint, sulphuric acid 4 fluid oz., bichromate potassium 4 oz.

Substratum.—Whites of 2 eggs well beaten, 6 pints of water, and 1 dr. liq. ammon.

Negative Collodion for Iron Development.—Alcohol 1 pint, pyroxyline of suitable quality 250 grains, shake well and add ether 2 pints. *Iodize this by mixing with* one-third of its volume of alcohol $\frac{1}{2}$ pint, iod. ammon. 80 grains, iod. cadm. 80 grains, brom. ammon. 40 grains.

Normal Iron Developer.—Water 10 oz., proto-sulphate iron $\frac{1}{2}$ oz., glacial acetic acid $\frac{1}{2}$ oz., alcohol $\frac{3}{4}$ oz. The amount of proto-sulphate iron may be diminished to $\frac{1}{4}$ oz. when full contrasts are desired, or increased to 1 oz. when contrasts are unduly marked. With new bath quantity of alcohol may be reduced to $\frac{1}{4}$ oz.; but when bath is old more is wanted.

Intensifying Solution.—Water 6 oz., citric acid 75 grains, pyro. 30 grains. When used, add a few drops of the silver bath to each ounce.

Lead Intensification.—After neg. washing, immerse in dist. water 100 parts, red pruss. potash 6 parts, and nit. lead 4 parts. When it is yellowish white wash and immerse in liquid sulphide ammon. 1 part, water 4 parts.

Fixing Solution.—1. Potass. cyanide 200 grains, water 10 oz. 2. Sat. sol. of sod. hypo.

Varnish.—Shellac 2 oz., sandarac 2 oz., Canada balsam 1 dr., oil of lavender 1 oz., alcohol 16 oz

Painting Processes.

Albumen Mixture for Paper.—White of egg 18 oz., 500 grs. ammon. chlor. in 2 oz. of water. Beat to a froth, stand, and filter.

Sensitizing Solution.—Nit. silver 50 grs., water 1 oz., sod. carb. $\frac{1}{2}$ gr.

Acetate Toning Bath.—Chl. gold 1 gr., acet. soda 20 grs., water 8 oz.

Lime do.—Chl. gold 1 gr., whiting 30 grs., boiling water 8 oz., sat. sol. chl. lime 1 drop. Filter cold.

Bicarbonate do.—Chl. gold 1 gr., bicarb. soda 3 grs., water 8 oz.

Fixing Bath.—Sodium hypo. 4 oz., water 1 pint, liq. ammon. 30 drops.

Reducer for Deep Prints.—Cyan. potass. 5 grs., liq. ammon. 5 drops, water 1 pint.

Encaustic Paste.—Best white wax 1 oz., oil of turpentine 5 oz.

Sensitizing Bath for Carbon Tissue.—Bichromate potash $1\frac{1}{2}$ oz., water 30 oz., ammonia 1 dr., methylated spirit 4 oz.

Enamel Collodion.—Tough pyroxyline 120 grs., methylated alcohol 10 oz., ether 10 oz., castor oil 20 drops.

Mountant.—1. Fresh solution of best white gum. 2. Fresh starch.

Collotypic Substratum.—Soluble glass 3 parts, white of egg 7 parts, water 10 parts.

Collotypic Sensitive Coating.—Bichromate potash $\frac{1}{2}$ oz., gelatine $2\frac{1}{2}$ oz., water 22 oz.

Collotypic Etching Fluid.—Glycerine 150 parts, ammonia 50 parts, saltpetre 5 parts, water 25 parts.

Printing on Fabric.—Remove all dressing from fabric by boiling in water containing a little potash, dry, and albumenize with ammonium chloride 2 grammes, water 250 cubic cents., and the white of 2 eggs, all being well beaten together. A 70-grain silver bath is used, and the remaining operations are as for paper.

Cyanotype Printing.—Water 1 oz., red prussiate of potash (ferricyanide) 1 dr., ammonio citrate of iron 1 dr. Prepare and preserve in the dark. Float the paper and dry. Fixation by mere soaking in water.

Various.

Luckardt's Retouching Varnish.—Alcohol 300 parts, sandarac 50 parts, camphor 5 parts, castor oil 10 parts, Venice turpentine 5 parts.

Matt Varnish.—Sandarac 18 parts, mastic 4 parts, ether 200 parts, benzole 80 to 100 parts.

Encaustic Paste. Best white wax, in shreds, 1 oz., turpentine 5 oz.; dissolve in gentle heat, and apply cold with piece of flannel.

Ferrotypes.

Collodion.—Ammonium iodide 35 grains, cadmium iodide 25 grains, cadmium bromide 20 grains, pyroxyline 70 grains, alcohol 5 oz., ether 5 oz.

Bath.—Silver nitrate 1 oz., water 10 oz., nitric acid 1 drop.

Developer.—Ferrous sulphate 1 oz., glac. acetic acid 1 oz., water 16 oz.

Fixing and Varnish.—Same as wet collodion process.

THE PHOTOGRAPHIC NEWS.

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CONTENTS.

OBERNETTER'S NEW GELATINE EMULSION.

News comes to us from Germany of a further improvement in the preparation of gelatino-bromide emulsion. Herr Obernetter, of Munich, whose name is well known as a practical photographic chemist, and as the projector of more than one successful method of importance, has put forward a manifesto among his countrymen to the effect that he has succeeded in devising a more satisfactory and simple plan of preparing gelatine emulsion than that in general use. How far Herr Obernetter is justified in making his statement we know not, but shall content ourselves with placing before our readers all that has so far been communicated on the subject, adding that, in a letter just to hand from our friend Dr. Vogel, of Berlin, that gentleman informs us he has witnessed the process of emulsion making in the Obernetter laboratory—the preparation from first to last taking but six hours—and that he was much impressed by the simplicity and success of the operations.

Herr Oberuetter produces his emulsion in the form of a cake. All the details, he tells us, up to the coating of the plates, are undertaken in daylight, and the tedious operations of mixing and washing are in effect done away with. But the great advantage claimed is, that the proportion of gelatine to sensitive silver salt is only half that usually employed, and yet the salts remain perfectly in suspension. The reason given for this is, that the silver bromide is in a finer state of division than formerly; it is not precipitated in a liquid solution, but is formed in the set gelatine cake, and hence, we are told, the bromide of silver particles have no opportunity of balling together.

Herr Obernetter thus describes his process. "It is a general rule to mix the bromine salt with the gelatine, and then add the silver salt. I reverse the process. I maintain, as the result of many hundred experiments, that gelatine may be for days in contact with nitrate of silver solution without any trace of red fog showing itself, if only on the preparation of the emulsion, a short time before washing, there is an excess of soluble bromide salt present. On this account, in my process, I take the gelatine mixed with nitrate of silver and treat it with a bromine salt; but I do not have the gelatine mixture in solution; I effect the treatment with set gelatine.

"In ordinary daylight, I dissolve the gelatine and the nitrate of silver in water, filter the solution into a shallow vessel, and let it set. At an ordinary temperature, but taking meanwhile certain simple precautions, I can in a few hours obtain a hard gelatine cake, which contains as much as 200 per cent. of nitrate of silver. This cake is not so hard but that I can easily cut it to pieces with a bone spatula, the fragments being one to two centimetres broad, and of convenient length. These are put into a large glass, which is enclosed in a washing apparatus that can be effectively screened from light. Afterwards, I carry the gelatine fragments into the dark-room, and pour upon them a solution of a bromide salt, shut up the apparatus, and allow the whole to remain for a few hours.

"The solution of bromide penetrates the set gelatine, and produces in a most perfect and equal manner the finest bromide of silver, while the greater part of the nitrate salt remains in the mother liquor. In a short time the whole of the silver salt has undergone change, and then ordinary water is allowed to run through the washing apparatus, in order to free the gelatine fragments completely from any soluble salts. Finally, the wash water is permitted to run off, and the sensitive emulsion is at hand in the apparatus, without the least chance of any injurious light rays having penetrated to it. When required for use, the cake emulsion is dissolved, and plates coated therewith; or it may be kept for years by pouring over it a little alcohol."

Herr Obenetter, we may say, in conclusion, estimates the cost of his emulsion at about two marks, or shillings, per square metre of film.

No doubt the indications given above will scarcely suffice to produce the emulsion by anyone except, perhaps, a skilled chemist; more detailed information will be necessary, but still many of our readers will be glad to make experiment on the lines we have indicated. What measures Herr Obernetter will take to make his emulsion known in this country, we are not informed; but we see that photographers of the Great Fatherland may receive further instruction in the process on payment of a certain fee to Herr Obernetter, fixed, we believe, at one hundred marks. All, however, we are concerned with, at present, is to place before our readers what we have learnt respecting the manipulations involved in Herr Obernetter's new method of making sensitive emulsion, and this we have done to the best of our ability.

PHOTOGRAPHY AT THE PARIS EXHIBITION OF DECORATIVE ARTS.

The position of photography as an instrument of art culture appears to be more fully recognised in Paris than in London, a circumstance which may perhaps arise from the fact that a Frenchman judges in such matters rather from his own impression than from a consideration as to what view is likely to be taken by others. For this reason a gem of photographic art is less likely to be hastily passed over as "only a photograph" in Paris than in London.

Photography holds a very good position in the exhibition of decorative arts which was opened a few weeks ago in the Champs Elysées. The gallery upon which one sees the names Daguerre and Niepce emblazoned contains a principal portion of the photographic exhibits, but some objects of notable interest to the photographer are to be found in other parts of the building. The enlarged groups of children shown by Braatz, of Settin, are extremely good and rich in those intermediate grades of tone which are often lost in the case of enlargements, while the arrangement is also good from an artistic point of view. A characteristic collection of portraits from the Reutlinger studio, and comprising promenade, cabinet, and carte-de-visite work, may be taken as typical of the high class portraiture of the present time; and the effect of many of these pictures is much improved by the selection of suitable frames, solid bronze, and greenish-yellow satin, bordered with metal, producing an admirable contrast to the pictures in some instances. Perhaps those mounted with surroundings of dark brown-red satin are the most striking.

Among the Rhine views of Lévy, we were struck by the excellence of some of the old churches of Cologne, these being in most cases very difficult subjects, owing to the proximity of other buildings; the picture of the quaint and heavy-looking St. Gereon being especially worth notice. Lévy has also an interesting series of views of Portugal.

Photo-mechanical processes are so well represented as to make the collection well worthy of a visit from any person specially interested in this branch of photographic work; and the phototypic process, or so-called similiogravure of Messrs. C. P. Petit and Co., is well illustrated from beginning to end. The negative to be reproduced in block form is first somewhat enlarged, and from the reproduction a gelatine relief is made; this relief being next subjected to enormous pressure in contact with a grained paper, more or less resembling emery paper in its nature. The half-tones of the relief are thus broken up into a grain or stipple, and by photographing this relief, so as to reduce it to the original scale, a translation of the first negative into stipple or grain is produced. The further steps consist merely in exposing a zinc plate, coated with a thin film of bitumen, under the stipple negative; and after the unexposed or still soluble portions of the bitumen have been dissolved away by turpentine, the zinc plate is etched into relief. This appears to us to be one of the most promising methods of making photographic blocks for printing in the ordinary typographic press, and we are informed that in most cases the cost is not likely to exceed one-half of that of wood engraving. Photolyptic blocks are also shown by Michelet of Paris, Monchou, and others; zinc, copper, celluloid, brass, and steel being the materials most used. Woodburytype, collotype, and intaglio plate engraving are well illustrated in their various stages by several well-known firms; the collection of the old-established house of Lemercier and Co. being, however, one of the most interesting and complete.

Microscopic photography is not so extensively represented as one might expect from the extent to which it is practised in France; but the enlargements of diatoms shown by Ravet are so sharp and clear as to be remarkable; but they are certainly not such good examples of work as some which have been recently executed by Mr. Jennings, of Nottingham.

The extensive collection sent by Mr. Carlos Relvas, and his daughter, Miss Margaret Relvas, is a large photographic museum in itself, comprising collotypes, and several other photo-mechanical productions. Messrs. Braun and Co.'s well known carbon enlargements cannot fail to attract attention, owing to their notable size and general excellence; but besides these there are but few examples of carbon work on view.

Instantaneous photography is by no means well represented; but the excellence of the street and marine views contributed by Grassin, of Boulogne, compensates for this to some extent.

Ceramic photographs, both plain and coloured, are shown by Gougenheim and Forest, of Paris, and for delicacy of tone, combined with vigorous depth, these reproductions stand high.

By-the-Bye.

ABOUT RAPID EXPOSURES.

We are not about to describe some new form of shutter that accurately times an exposure to the millionth of a second, nor do we intend discussing the intricacies of mechanism of some of the more elaborate instruments now before photographers; our intention is simply to look at the matter from a practical photographer's point of view, and to discover what it is he generally wants to carry on his work. Whether his wants are met by any of the hundred and one shutters that have been described in these columns and elsewhere, is a matter that must be left to his decision alone.

One of the most important points in connection with rapid exposures is not unfrequently overlooked by the shutter designer. The exposure may be of the briefest, and the vibration reduced to a minimum, and yet the invention, when it comes to be handled practically, lacks perfection. For the advantages we have enumerated go for nothing if the exposure does not happen to take place at precisely the right moment. A shutter may act very rapidly and very accurately, giving an exposure of precisely one-hundredth or one-thousandth of a second, but if it does not act at the proper time, its very rapidity mars success. It is for this reason that most photographers still prefer to employ an ordinary apparatus—such as the drop shutter before the lens or behind it—in their work. It so rarely happens that an exposure of but a very small fraction of a second is called for; while, in nine cases out of ten, it is of the utmost importance that the exposure should be so under control that the photographer can effect it any instant he desires.

We have had experience in rapid exposures, but have never yet required to employ one less than one-tenth—or, say, one-twentieth—of a second. There are occasions, of course, when exposures of almost lightning celerity are absolutely essential—to wit, in such experiments as the clever French photo-astronomer, M. Janssen, is wont to conduct. When a direct view of the sun itself is to be taken, it stands to reason that the briefest of exposures is desirable, for a so-called *solarised* image is pretty sure to result. For this reason it is M. Janssen employs a rapidly revolving disc, which is said to open and close the lens in an interval estimated to be as small as $\frac{1}{2000}$ of a second, and even less. In this way M. Janssen was able to achieve the result which set the astronomical world talking two or three years ago; he obtained upon his plate, not merely a round white disc, such as we are wont to see in a sun photograph, but a disc that contained veritable half-tones all over its surface, showing oval grain-like markings, which changed their form in succeeding photographs, one taken rapidly after the other. In M. Janssen's work, it is not of so much importance to secure a picture at any precise instant—although he is quite capable of doing this with his *revolver*—as to secure rapid exposures, and obtain them quickly one after another. In ordinary photographic work, on the other hand, we hold that excessive rapidity of exposure is a matter of secondary importance, while the means to expose at the proper instant is most essential; while, if it were possible to obtain a *revolver* which was something more than a scientific instrument, so that the photographer at will could give three or four exposures, following rapidly one after the other for brief intervals, such a *revolver* would certainly be a most useful instrument.

We will give our experience of instantaneous work by quoting two instances. The first happened long before drop-shutters were christened, or gelatino-bromide thought of. It was in May, 1866, that we first gained experience in the taking of a torpedo explosion—or, rather, of the effect made upon the surface of water by the firing of a submarine charge. These photographs were taken by means of a stereoscopic camera fitted with a pair of No. 1B Dallmeyer's, and furnished with a simple flap-shutter. Doubts that had been entertained about a short-enough exposure were found quite uncalled for, and the upheaving of the water against the *America* hulk was shown crisp and sharp by an exposure that resulted from a simple turn of the wrist. Indeed, in the securing of torpedo photographs in which a body of water appears in the form of a cascade or fountain, rapidity of exposure is, as we have before said, a secondary consideration. The main point is not to expose too soon. It behoves one to wait patiently until the water is thrown to its full height, and as it remains suspended in the air—it is surprising what a long time this really is—to expose then, and not till then. To expose at the time of the explosion would be to get no picture at all. Standing on shore, we have felt through our feet the shock of concussion some time before the time proper for exposing. This, one might almost say, cannot be done too leisurely, for as the American Engineers have demonstrated by actual experiment, it takes sometimes no less than two and a-third seconds before the column of water reaches its full height.

In the case of a torpedo explosion, half a second's exposure may sometimes be given—certainly one quarter; but whether it is of the longest or briefest, this, we repeat, is not so important as the time at which the operation is performed. In landscape photography, the same thing holds good. It is but the other day that Mr. England pointed out how necessary it was to be able to expose at the right moment. "One can never tell," he said, "when the particular instant for exposing may arrive. It may be in five minutes, or five seconds. It all depends upon a puff of wind or a gleam of sunshine." Mr. England, we believe, employs nothing but a small drop-shutter behind his lens, and this, albeit we have a battery of shutters at our disposal, is the one that we, too, usually employ. We made use of it in the other instance we wish to bring forward, and although the problem we desired to solve is not likely to present itself in the every-day work of photographers at large, it contained conditions which, in these days of experiment, will require to be fulfilled again and again. The event we speak of was the destruction of a small building by dynamite—an explosive, as most of our readers know, much more sudden in its action than gunpowder. We desired to secure a picture, if possible, at the moment of explosion, and to do this naturally required a little forethought. In the first place, it was necessary to avoid the fall of brickbats and splinters likely to follow the catastrophe, a measure effected by erecting an iron mantelet, such as is employed by volunteers at the firing butts, in front of the building, at a distance of some forty or fifty yards. Two cameras were set up, their lenses valiantly peeping forth from the mantelet, and their shutters weighted with a few ounces of metal to render the fall rather quicker than usual. The flexible tube, or rather bulb, was, in each case, held by an observer in the mantelet, who could judge in safety ofthe time of exposure by looking at a mirror overhead, reflecting the building. In this case, if the exposure had been made at the time of depressing the electric key to fire the charge, the exposure would have been all too soon. A sharp vibration was felt, the building quivered, and then the four walls fell like a house of cards. The bulbs had been pressed intuitively at the first visible motion of the house, and some excitement naturally attended the development of the plates, all being anxious to know what phase of the explosion would be depicted. In the end, it was found that nothing the observers had remarked was photographed; the four walls that had been seen falling outwards were still erect in the picture; but a space of six feet intervened between them and the roof, showing clearly that the first phase of the explosion had been to send this into the air. It was a very good proof, if any were wanted, that dynamite does not explode downwards only, as some wiseacres will keep on insisting. A curious point in the photograph was the circumstance that both observers had exposed at precisely the same period of time, for in each picture was shown a huge splinter in mid-air, flying in the direction of the mantelet. M. Charpentier has told us that a human being can repeat a signal within thirteen-hundredths of a second, and these two negatives bear out that gentleman's statement, for both photographers exposed at the first visible movement, and were equally successful in securing the roof in mid-air and a flying splinter.

The sharpness of the shaken brickwork, as also the débris flying in all directions, proved very plainly that the exposure was a brief one; although we doubt if it were less than one-twentieth of a second. At any rate, it was quite short enough to capture the results of a dynamite explosion, and yet, we repeat, it was secured by a simple wooden shutter, the fall of which was merely accelerated by being weighted. The experiment only wanted one thing to make it perfect: if a revolver of some sort could have been used, capable of firing off a series of exposures quickly one after the other, it would have been possible to depict not only the first phase of the explosion, but every succeeding one, during the second or two of time that the operation lasted.

There are, no doubt, occasions when photographers desire to work more quickly than in the cases we have cited; but these are exceptional. As a rule, we think their rapid exposures do not include conditions more severe than those of our own experience, and for this reason we shall be surprised if the simplest apparatus for quickly uncapping and capping the lens is not, after all, preferred by practical men.

The "At Home" next week will be "Mr. Frederick York at Bridgwater;" the following "By-the-Bye" will be "A New Scientific Study by Photography."

ABSORPTION OF LIGHT BY THE ATMOSPHERE.*

M. Egoroff, who was deputed by Admiral Mouchez to carry on experiments at the Paris Observatory on the absorption of light by the terrestrial atmosphere, has communicated his latest results to the French Academy of Sciences. In previous experiments he had proved that the electric light when sent from Mont Valerieu to the observatory, lost many of its rays, as was evident from the absorption bands in the spectrum of the beam. The greater part of these rays had also been identified by him with corresponding rays in the solar spectrum. It still remained, however, to study the order of their disappearance in proportion as the layer of air decreased in thickness, and to find for that thickness the limit at which they all ceased to be visible. All the observations were made in company with M. Thollon, who placed his delicate apparatus at the disposal of M. Egoroff. The first series of experiments were made with the electric light sent from Mont Valerien, a distance of about six miles. Between D_1 and D_2 of the spectrum obtained, there were four plain absorption rays. To the left of D on the red side, the rays were exceedingly numerous and distinct; the group *a* being almost complete. The region C was also very rich in absorption rays, as was the region B. Lastly, A was easily distinguished by putting a cobalt blue glass before the eye-piece to absorb diffused light. A second series of experiments was made with a petroleum lamp and reflector stationed at Montsouris, about a mile distant. The spectrum in this case was quite luminous, but only extended in the red to beyond B. When a Drummond limelight was substituted for the petroleum B, *a* and A could be seen. Between B and *a* there were two feeble absorption rays, but *a* could hardly be distinguished, and in the regions D and C some traces of absorption rays were visible. When the Drummond lamp was placed in the Ecole Arago, 264 yards distant, the spectrum showed two absortion rays *a* and A, the

* *Engineering.*

former being very feeble. When a Drummond light was placed in the garden of the observatory, 90 yards distant, the absorption ray at A could be seen with difficulty, but all the rest had disappeared. To determine the elements of the atmosphere which produce absorption rays, a number of experiments on different gases such as nitrogen, oxygen, vapour of water, &c, are still required, and M. Egoroff intends to perform these. Experiments of the kind are desired not only by spectroscopists, but by electricians, as the electric light loses much of its power in passing through the atmosphere, especially if the air is moist. M. Janssen's experiments on the absorption of bodies made in 1866 at Villette would be very valuable, but they are not yet published.

PHOTO-LITHOGRAPHY AND PHOTO-ZINCOGRAPHY.

BY MAJOR J. WATERHOUSE, B.S.C.,
Assistant Surveyor-General of India.

Chapter III.—The Preparation of the Negative.

The production of a suitable negative is the most important part of the whole photo-lithographic process, because upon it depends the entire success of the after operations. With a good original drawing or print, in which the lines are strong, black, and well separated, and the paper clean and white, there is no great difficulty in securing a good negative, and all will work well towards obtaining a successful result; but with originals in which the lines are pale, very fine and close together, and the paper tinted or dirty and yellow from age, difficulties will arise which will require considerable skill to overcome. At the same time, a good deal may be done with the most unpromising originals by the exercise of a little care and trouble in retouching.

Putting aside the few cases in which photo-lithography may be used for reproducing subjects in half tones, and for which any good ordinary negative, direct or reversed, will answer, we may confine ourselves to the consideration of negatives of subjects in line or dot from pen and ink drawings, lithographs, and engravings.

The characteristics of a negative from such a subject, suitable for photo-lithography, are the following:—

1. Perfect sharpness of the lines in every part. This is secured by proper focussing, and by using a suitable lens well within its power.

2. Exact squareness and freedom from optical distortion, which would alter the proportions of the copy relatively to the original. To secure this a suitable lens of the rectilinear type must be used, and the apparatus must be carefully adjusted for parallelism, as described in the last chapter.

3. There must be the greatest possible contrast between the lines and the ground of the negative. As in the original the lines should be black, on an even clean white ground, so on the negative there should be perfectly clear glass on a black or opaque ground. The nearer these conditions are realised, the easier will be the work, and the better the result.

The process by which negatives for photo-lithographic work are generally obtained is the usual wet collodion process, modified and extended by an after-process of intensification, in order to secure the desired transparency of the lines with an intensely opaque ground.

Recently, however, in this as in other branches of photography, this old and useful process seems likely to be supplanted by gelatine bromide dry plates, which have many conveniences and advantages in their favour.

The manipulations and formulæ for copying by the wet collodion process do not differ very much from those in ordinary use as described in the text-books. It may, however, be useful to describe some modes of working, the utility of which has been proved in large government offices; and we shall assume that our readers are familiar with ordinary photographic manipulations.

Glass.—Any good photographic glass may be used, but for large sizes patent plate is to be recommended, as giving better contact, and being less liable to break in the printing frame. The surface is also better and more free from blemishes—a point of considerable importance in taking reversed negatives through the glass.

The glass should be cleaned in the usual way with a mixture of tripoli, ammonia, and spirit of wine, or any of the other mixtures recommended for this purpose.

The films may be removed from old glasses by boiling or soaking them in a solution of washing soda, quarter of a pound to a gallon of water, and if they are stained with mercury they may be steeped in a solution of iodine and iodide of potassium.

A very effective way of treating old glasses stained with mercury is to rub them over with Eder and Toth's lead intensifier, viz.:—

Nitrate of lead	4	parts
Ferridcyanide of potassium ...	6	,,
Distilled water	100	,,

This is allowed to remain on for some days, then rubbed off, and the glass cleaned as usual.

Solutions of bichromate of potash containing nitric, muriatic, or sulphuric acid are also very useful for cleaning old glass. A good formula is:—

Bichromate of potash	30	parts
Nitric acid	300	,,
Water	700	,,

Or,

Bichromate of potash	60	parts
Sulphuric acid	60	,,
Water	1,000	,,

It is very convenient to have a bottle of the nitric acid mixture handy for washing out bottles and dishes. It will clean off and remove very obstinate stains.

Before use, the glasses should be coated with a substratum of albumen, to prevent stripping or lifting of the film in the after-processes. If the glasses are old and stained, the solution of albumen may be tolerably thick (1 part of albumen to 4 of water).

Collodion.—The collodion should be of a kind yielding clear, intense negatives, and should not be too new. Sometimes a plain iodised collodion is recommended as giving more intensity and a harder image; but it will generally be better to use a collodion containing a small quantity of bromide. Captain Abney recommends the addition to an ordinary collodion of a grain or two of pyroxylin—or, better, papyroxyline—which has been washed in dilute ammonia, the alkaline solution favouring intensity, which is further increased by the addition of the pyroxyline.

The formula generally used in the Surveyor-General's Office, Calcutta, for large plates, is—

Plain Collodion.

Pyroxyline	60	parts
Ether	2,000	,,
Alcohol	1,000	,,

It is sometimes found necessary to increase the quantity of pyroxyline to seventy-two parts.

Iodiser.

Iodide of ammonium	20	parts
Iodide of cadmium	12	,,
Bromide of cadmium	8	,,
Iodine	0·3	,,
Alcohol	1,000	,,

In the Military Geographical Institute at Vienna, the following is used. It contains the usual iodides and some chlorides, but no bromide:—

Plain Co lodion.

Pyroxyline	15·6	parts
Ether	500	,,
Alcohol	400	,,

Iodiser.

Iodide of cadmium	7·8 parts
Iodide of ammonium	4·7 ,,
Chloride of calcium	1·6 ,,
Absolute alcohol	100 ,,

This is used with a strong nitrate bath at 10 per cent., acidified with nitric acid.

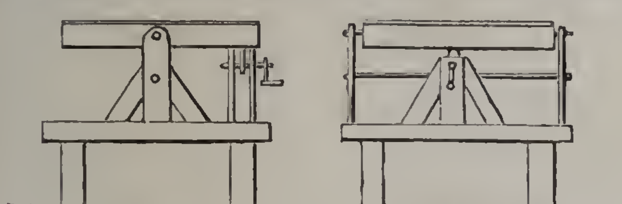
Senhor Rodriquez gives the following as used in the Photographic Section of the Geographical Department at Lisbon:—

Alcohol	500 parts
Ether	500 parts
Pyroxyline	11 ,,
Iodide of cadmium	6 ,,
Iodide of ammonium	5 ,,
Bromide ammonium	2 ,,

Nitrate Bath.—The nitrate bath is made up in the usual manner, at about thirty-five grains to the ounce of water, and should be rather more acid with nitric acid than is usual for portrait or landscape work. As noted before, for large plates, horizontal troughs will be found more convenient and economical than the usual vertical dipping-bath. They will be found useful for many other operations when using large plates, and may be made up of well-seasoned wood carefully put together to avoid leakages. The inside is varnished and covered with cotton-cloth or canvas, then varnished again with two coats of Bates' black strong shellac varnish, or the following composition recommended by Mr. W. K. Burton:—

Asphaltum	7 lbs.
Beeswax...	2 ,,
Linseed oil	1 pint

The trough containing the nitrate bath should be constructed with a well at one end for the reception of the silver solution when the bath is in an upright position for draining, &c. It should have a cover, which may be fastened to it with hinges, or be loose, and should be mounted on a wooden stand so that it may be raised up in a slanting position to allow the plates to drain, and may be given a slight rocking motion on an horizontal axis by the addition of some simple mechanism, such as an excentric turned by a handle and acting at one end of the trough, so that it rises and falls as the excentric is turned (see figs.)



Side View. Back View.

It is a good plan to have two baths working alternately, so as to keep them in good working order; the one out of use being sunned to drive off ether and alcohol and precipitate impurities.

Developer.—With bromo-iodised collodion an iron developer is generally used, but pyrogallic acid is sometimes substituted for it, especially with simply iodised collodion.

The following is the formula in general use in the Surveyor-General's Office, Calcutta:—

Protosulphate of iron	50 parts
Glacial acetic acid	33 ,,
Spirits of wine	40 ,,
Water	1,000 ,,

The addition of a little gelatine in the proportion of $\frac{1}{61}$th part per 1,000 has been found useful in giving intensity, and at the same time keeping the lines clear. The gelatine is kept dissolved in the acetic acid.

A very good developer for line work is—

Protosulphate of iron	1 ounce
Acetic acid	1 ,,
Spirits of wine	½ ,,
Water	1 pint

To 40 ounces of this are added 8 ounces of a solution of glycerine prepared by dissolving 2½ drachms of gelatine in 1 ounce of sulphuric acid—neutralising with ammonia—and then adding 7 drachms of acetic acid, 500 grains of protosulphate of iron, and sufficient water to make up 25 ounces.

At the Ordnance Survey Office, Southampton, the developer is—

Protosulphate of iron	1 ounce
Glacial acetic acid	6 drachms
Alcohol	6 ,,
Distilled water	20 ounces

In the Military Geographical Institute at Vienna the following is in ordinary use, but I do not like it quite so well as the above:—

Protosulphate of iron	210 parts
Sulphate of copper	105 ,,
Glacial acetic acid	210 ,,
Water	6,720 ,,

also—

1.—Solution of protosulphate of iron at 10 per cent.	350 ,,
Glacial acetic acid	70 ,,
2.—Nitrate of lead	21·9 ,,
Water	350 ,,

(1) and (2) are mixed, filtered, and diluted with 350 to 700 parts of water. It is weaker than the first formula, and requires a longer exposure, but is said to keep the fine lines very open and free from fog.

Captain Abney recommends rather a weak developer:—

Protosulphate of iron	5 grains
Glacial acetic acid	10 minims
Alcohol	*quant. suff.*
Water	1 ounce

In developing negatives of line work, the action of the developer should be arrested before any traces of deposit show themselves on the lines, and the negatives should also be slightly under-exposed.

Fixing.—As a rule, it is better to fix immediately after development, and before intensifying; but in copying large maps with long-focus lenses we have found it useful to wash the plate well after development, and then apply a 20-grain solution of nitrate of silver, followed by a second application of the iron developer, in order to give the requisite density for the after mercurial intensification.

For fixing, a solution of cyanide of potassium of 6 per cent. is generally used, and it is an economical plan to keep it in a vertical dipping-trough lined with lead.

Redevelopment.—The first development with iron will not, as a rule, give enough deposit of silver to obtain perfect opacity by the after-treatment with bichloride of mercury. It is necessary, therefore, to slightly intensify or redevelop with pyrogallic acid or iron, and this may be done either before fixing, as described above, or after. To make sure of the lines being clear, I prefer to do all intensification after fixing.

If the lines appear slightly clouded after fixing and washing, the *clearing* process recommended by Mr. Osborne may be used with advantage before proceeding to intensify. The plate is covered with a solution of—

Iodine	20 grains
Iodide of potassium	40 ,,
Water	20 ounces

This is allowed to act for about a minute, and then washed off. A very weak solution of cyanide of potassium is now applied, and should take off all deposit from the lines. If it does not do so, it will be better to reject the negative and take another.

The negative, being free from deposit in the lines, is again covered with the above solution, which is washed off almost immediately, and the plate exposed to daylight for a few moments. It is then intensified with the usual pyrogallic acid and silver or iron intensifier containing citric acid, but, as a rule, only a very slight increase of density is given. The plate is then well washed, and is ready for further treatment with bichloride of mercury, &c.

One of the simplest methods of obtaining the necessary density with suitable subjects, showing perfectly clear lines, is to allow the fixed and cleared negative to remain in Davanne's solution of iodine—

Iodine	1 part
Iodide of potassium	4 parts
Water	200 ,,

until the film becomes yellow throughout. It is then well washed, and re-developed in daylight with the ordinary pyrogallic and silver solutions restrained with citric acid. Any amount of density may thus be obtained, and the intensification may be stopped at any desired point.

As a rule, it is better, however, to re-develop slightly, and obtain the requisite opacity by changing the colour of the deposit rather than by increasing its thickness.

(*To be continued.*)

SOME EXPERIENCES WITH THE EMULSION PLATES NOT SO PLEASANT.

BY EDWARD L. WILSON.

I have said so much in favour of emulsion plates within the last year or two that I believe myself to be entitled now to find a little fault with them. But I do not wish the remarks which I make to be taken as referring to every kind of plate under all circumstances, or as in any way harsh. I am personally acquainted, I believe, with nearly all of our emulsion plate manufacturers. I do not think a set of men exist who are more devoted and earnest in the desire to produce faultless plates than they are. I believe they all want to do the very best possible, and are constantly striving to make more valuable plates. Therefore I relate a few of the experiences I have had lately, more to clear up in the minds of the photographers who are using them the doubts as to what are the causes of certain experiences which they have had as well as myself, than to suggest to dry plate manufacturers how they may improve; for I am sure they know as well as I do what the faults of their plates are, if any. I ought to say, too, that my experiments have been confined to only a few brands of the plates offered in the market, though they have been quite extensive. One of the first things I saw, which I did not like, upon developing the plates exposed from two to six months ago, was the irregular coating of the emulsion upon the plate. It is very evident that some of these had had a puddle of emulsion applied in the centre of the plate *à la* collodion, which had been allowed to spread itself toward the sides and ends, thus making the centre of the plate more thickly coated than the other parts. The consequence is a difference in intensity of the various parts of the plate; this would be apparent when developing. Two 5 by 8 plates, following each other, showed that they had once formed parts of an 8 by 10 plate which had been cut in the middle, leaving a sort of half disc of intensity in the middle of each plate, with a weakness of image at each end.

Moreover, a second experience, which was not pleasant, was found in the 5 by 8 plates, which seemed to have been coated separately, one end giving a much stronger and better image than the other. This is undoubtedly due to irregular coating. Doubtless carelessness in the same direction causes some plates to make no show of an image whatever.

But it is a different sort of carelessness which displays ruthless finger and thumb-marks through the latitude and the longitude of the film in various directions. I have either lost a number of excellent results from this cause, or had to resort to a great deal of labour to save them.

Another unpleasant thing is the manner in which some plate manufacturers pack their plates. The most of those which were used by me during my tour were packed in cases, and I cannot speak too loudly in praise of such a method. I have found since my return scarcely a single plate broken when packed in this way. But I used some plates that were packed with a frame of card-board or straw-board (I do not know which) between them, and they have caused me a great deal of trouble. Some chemical effect seems to have taken place which causes an insensitiveness around the whole border of the plate to the extent of from half to three-quarters of an inch, sometimes giving me on a 5 by 8 plate only 3½ inches of image the narrow way. This is a most unpardonable blunder, and should be remedied by any one who makes it. There is a machine made for packing plates by Mr. Cowan, which I found in use in England and France. It should be adopted everywhere, and would avoid all trouble in the direction I have just described.

I have been asked many times whether I have been troubled with fogging during the development of my plates. I have been blessed with a great deal of freedom from fogging, having had none of the "green" or "red" varieties which are described so graphically by many; but I have had fog, and sometimes it was very annoying. I find the addition of a few drops of citric acid to the developer disposes of the trouble altogether.

Another disagreeable effect which I noticed, was that plates which would develop rapidly and with good strength would be reduced in the hyposulphite solution considerably, rendering them almost useless unless intensified. This trouble was overcome by the addition of a little protosulphate of iron to the fixing solution. I have tried the use of alum in the hyposulphite bath for the hardening of the film and the prevention of frilling, and I cannot say that I altogether like it. It causes the solution to be milky, while it hardens the film, and leaves a deposit on the plates which must be brushed off, thus causing extra trouble. I prefer rather the use of the dipping bath of alum, and then the hyposulphite separately. There may be other experiences which will come up from time to time as I go on with my work, and, if so, I will mention them. Some results have been obtained thus far fully equal to those obtained with the wet method, and I consider part of my journey would have been impossible without emulsion plates, on account of the scarcity of water. I feel that, with all the drawbacks, emulsion plates are a great thing for the photographer of to-day; but we have a great deal to learn about them.—*Photographic Times.*

IMPROVEMENTS IN COLD EMULSIFICATION.

BY A. L. HENDERSON.*

Since I gave the formula for emulsification in the cold a few weeks since, some exceptions have been taken to it as being an expensive way of making emulsion, in consequence of the value of the alcohol used. I believe that anyone trying both methods—that is, washing and precipitating—and taking the number of plates coated into consideration, will find the advantage on the side of the alcoholic method. No matter how carefully you may wash emulsion, some of the bromide gets washed away, and, as a rule, you have greater bulk than you desire, necessitating thicker coating. Let us compare the price of each. The alcohol for ten ounces of emulsion will cost about eightpence, and with precipitated emulsion about two dozen more quarter-plates may be coated than with the same quantity of the washed. I do not advocate my method purely on commercial grounds, but on that of quality. Since I published the cold method I have made an improvement, namely, to utilise some of the waste products to make the next batch. If you recollect, I used one ounce of water to three of alcohol, then two ounces of water with the silver. This gives a compound containing three ounces of alcohol and three ounces of water; when I add the twelve ounces more alcohol to precipitate I have 80 per cent. of alcohol and 20 per cent. of water in the so-called waste product. Of course the solution contains sufficient gelatine for emulsification, as well as some of the soluble salts which help to act as restrainers. This solution must be allowed to cool, and be filtered before using again. If I take three ounces of this compound and add the bromide, then the silver, I save at least two ounces of alcohol; and, moreover, what is of much greater importance, is the fact that all the gelatine in this batch is soluble in alcohol, and consequently removed by the next precipitation. One thing I must mention, namely, that the bromide of potassium is not all soluble in this quantity of alcohol, &c., and it is as well to add half the solution of silver first, stirring all the time, and in a few seconds the water from the silver will go towards the solution of the bromide. In conclusion, I am glad to say that my last formula seems to have made some

* Read before the London and Provincial Photographic Association.

impression on our Continental brethren. I have received several communications on the subject, and have also been informed that one of the largest professional plate makers in this country has adopted the cold method. He has personally expressed his opinion that the rapidity obtained is due to the alcohol.

ILLUMINATION OF THE DEVELOPING ROOM.

BY W. HORSMAN KIRKBY.*

To many present my present remarks will be an oft-told tale. When gelatine plates first came into vogue they were found to fog in the light then used in the preparation and development of collodio-bromide, although this was much nearer the red end of the spectrum than was requisite for wet collodion. There was a general cry that not only must the light be more confined to red, but that little—in fact, almost none—of even that must be used; consequently there resulted a regular groping in the dark, and many a negative has been spoilt thereby. Ruby glass was generally employed, and that of the darkest; and even several thicknesses were used by many.

It is due to Captain Abney to state that, in connection with his investigations with the spectroscope, the use of ruby and orange combined was recommended, and this when properly selected is perfectly non-actinic; but still many photographers, unable to get out of the groove, were afraid to use much light with it. I have always held the opinion that, provided we could obtain a *perfectly* non-actinic light, we might use *any* quantity of it, and thus be enabled to see clearly what we are doing. I see that in a lately published book by Captain Abney he says that "if the quality of the light be correct, the quantity may be unlimited."

I am induced to make these remarks from reading the labels on a packet of extra-sensitive plates received from a well-known maker. One label recommended filtering the light through the "deepest ruby glass," and the other spoke of the importance of using a "very *subdued* red light." Now, to show the fallacy of this, I developed one of these extra-sensitive plates within a foot of my lantern, and fully exposed to it, without any trace of fog; and when I tell you that by the same light I could read the above-named labels at a distance of six feet from the lantern, and even see the seconds hand of my watch at sixteen feet distance, you will understand that I do not work in a very subdued light. My lantern is an ordinary square petroleum stable lantern, the air-holes being carefully shaded to prevent the exit of white light, and the flat glass sides are covered with (Thomas's) commercial ruby paper, which, I have no doubt, is stained with both ruby and orange dyes, either separately or combined.

HOW TO MIX THE DEVELOPER.

BY J. DIXON.†

I have been working dry plates for one year, and I have had no trouble. I never saw a dry plate before one year ago. In New York I saw them working—Mr. Scholten and others—three times, and actually developed some of Mr. Cramer's plates. I have been since then living myself in a small city where there are about five thousand people. Remember that I only saw him develop five or six different plates. I saw how they were worked. I went right home and commenced trying them; the first two or three were failures. I kept on, however, and kept at work at it. I picked up a receipt, and I saw it was good, and I was bound to do it. So I kept on. I first worked the oxalate for three months. I worked it until I understood it. I worked it at three different degrees of strength. Whenever I came upon a formula that was better than the one I was using, I adopted it, and at last I struck Edwards' receipt, and for the last six months I have been working that steadily, and I have no desire to change. You can use any strength you wish. It is always ready, and there is no spoiling of plates. I have tried the different grades of plates of different makers. I work altogether the Swan plate, made in England, with from one to three seconds' exposure, and from seven to twelve by electric light at night. I take these plates and I take this same developer, and I never make an exposure of more than one second. I can produce as fine results as I wish in my pictures. As I said before, I always use the Swan plate, made in England.

Now the developer is the pyrogallic. The first few times I mixed it up I used to take it out with a stick on paper, and put the paper into the stand or holder, and then put it into a smaller bottle, all of which took considerable time. (Mr. Dixon now proceeded to mix his developer.) Now here is the pyrogallic—there are six ounces of alcohol which you pour right in—one ounce of pyrogallic acid to six ounces of alcohol. Now there is a great deal of it; pour it in a stoppered bottle, then you put what you want to use in another bottle, put it away for half-an-hour until it is all dissolved—put very little in the bottle. That is what I call the pyrogallic and the alcohol. Here are two ounces of glycerine; one ounce we will put into that. I will tell you in a few minutes what they are put in there for; they are all for a purpose. If you should see it on paper, you would say it was "all bosh." There is one ounce of pyrogallic, six ounces of alcohol, one ounce of glycerine. The pyrogallic is put there for strength, the alcohol is put there to keep it better. I have got stuff enough here to last six months. You can mix it up better in water; let it stay twenty-four hours in warm water. The glycerine is put there for a restrainer, and also for its keeping qualities. Use good alcohol. Here I have sixty grains of bromide of ammonium; we will take six ounces of water, and it will keep just as well as with the alcohol. Now there are sixty grains of ammonium. Instead of adding six ounces of water, I put eight ounces in. Now we will put in one ounce of glycerine and one ounce of liquid ammonia. I want you all to understand this. In this bottle there are sixty grains of ammonium, six ounces of water, one ounce of glycerine, and one ounce of strong liquid ammonia (concentrated). Label that bottle "ammonia." Now, then, with the pyrogallic mixed up and the ammonia mixed up, there is enough to make over one hundred dollars' worth of work, and I think it cost me in this town one dollar and ten cents. Now we will take one ounce of either one of these, just one ounce of stock to fifteen ounces of water. Now take one ounce of ammmonia. When I say ammonia, I mean the mixture of bromide of ammonium, glycerine, and all—I mean the stock solution. Then I fill the second bottle up. Now supposing we have an over-exposed plate, I fill the second bottle up and develop it quickly, just as quickly as I can. Suppose we have here an over-exposed plate, what shall we do with it? We first take one ounce of the pyrogallic, and then put in one ounce of the ammonia. Now you have a two-ounce solution. Instead of laying the plate in there and letting the solution flow over it, I put several into the dish—otherwise you would get a nice crop of air-bubbles—the glycerine will give air-bubbles. Now you must take heed to my description. If you will take a bit of paper, and lay the plate under it all at once with one sweep, it will go right over in a wave. You will commence to see it come up. It will come up in one minute. If you go to work shaking it pouring it in, you will have water-bubbles, and you will not improve the plate.

Now, suppose that the plate is coming up nicely, in one minute it will appear fairly developed. Supposing it does not—suppose that it is coming up slowly—the developer works slowly—you will then use the pyrogallic. The pyrogallic gives strength, ammonia gives detail; the bromide of ammonium is put in there as a reducer or retarder, the same as citric acid in the iron developer; the pyrogallic is put in to build it up and give strength; the alcohol to keep it up; the glycerine to give body; the liquid ammonia is put in there for an object also. So you have your mixture. Supposing that the developer is working too slowly, and you want it to work quicker. You pour ammonia into your graduate, and pour it into the pyrogallic. Now you have more ammonia than pyrogallic. The ammonia will give more detail, and the pyrogallic will give more strength. I heard a gentleman say yesterday, while giving a receipt, "Suppose it is going too slowly, you then add so many grains more of the pyrogallic. If you add more of the pyrogallic, you want to bring in something. Ammonia will do. Suppose that it is acting too quickly, what will you do? Then you want to add more pyrogallic." This is the way you should work with your plates, by which way you can add more pyrogallic, or less, whichever way you want to, according to the kind of plate you are using.

* Read before the Liverpool Amateur Photographic Association.

† A communication to the Photographers' Association of America.

Notes.

The Photographic Exhibition at Pall Mall opens to-morrow, to members of the Society and their friends, at eight p.m.; to the public, on Monday, at ten a.m.

The Royal Victoria Music Hall, in the Waterloo Road, yclept "The Vic'," is to be the scene of a series of popular scientific lectures, undertaken after the plan of the Polytechnic demonstrations. The admission is to be one penny.

It will be noted that an important point in connection with the Obernetter emulsion process, which we describe in another column, is the absence of all boiling or cooking of the emulsion.

Events cast their shadows before, and we must not be surprised, therefore, to find many shadows of Mrs. Langtry being cast before her visit to America. Indeed, no less than 25,000 shadows, in the form of photographic portraits of Mrs. Langtry, have been ordered from one firm alone for the United States.

A well-known "model" to painters and photographers died last week. He was an old man, tall of stature, and with long, grey hair blowing over his face, to be usually met with in the Strand, and generally known as a vendor of evening papers, and by his never wearing a hat. One of Mr. Valentine Blanchard's finest studies, exhibited some years ago, at Pall Mall, was obtained with this "model," who has probably represented more "holy men" on canvas than any of his brethren.

A communication made last week to the Academy of Sciences shows how inadequate an observatory unprovided with photographic apparatus is to secure trustworthy records of astronomical phenomena. A beautiful comet has been discovered by MM. Thollon and Gouy at Nice, in the immediate neighbourhood of the sun. Apart from its brilliant head, there was nothing very noteworthy, except this salient fact: on examination through the spectroscope two lines were seen very close to D′ and D″ of sodium, but not perfectly agreeing with the Frauenhofer lines. If it is sodium, this is the first time the metal has been discovered in a comet. Unfortunately, the latter has disappeared, and as the lines have not been recorded in a photograph, the momentous question is still involved in doubt, and will be for some time to come a subject of many deliberations in astronomical circles.

A new use has been found for micro-photography. It is employed to demonstrate the structure of wood, a glance at the photograph serving to show whether the wood is strong or weak. At the Franklin Institute, on a recent occasion, a series of micro-photographs of timber were exhibited, and it was stated by Mr. Grimshaw that practical tests bore out the indications of the micro-photographs. Thus, in strong timber, the concentric rings were close in texture and of slight width, and the radial plates frequent, wide, long, and thick; while in the case of weak timber these characteristics were reversed.

Shortly before his death, Dr. Van Monckhoven resumed the photo-spectroscopic researches which had been put aside for some years, owing to the calls made on his time by the commercial preparation of gelatino-bromide; and only a fortnight since we received a memoir which had been presented by him to the French Academy of Sciences. In this memoir he sets at rest a dispute as to the cause of the broadening of hydrogen lines in the spectrum. Dr. Van Monckhoven secured several photographic observations of the spectrum of hydrogen under different pressures and at different temperatures, and these he submitted, in proof of his deductions, to the French Academy through M. Janssen.

We may thus briefly summarise the investigation. While many astronomers attribute the broadening of the hydrogen lines in certain spectra to the influence of pressure alone, others—among whom may be cited Cecchi—believe the phenomena to be caused jointly by pressure and change of temperature. Dr. Van Monckhoven secured photographs of the hydrogen lines under varying conditions, and the pictures were so conclusive as to lead him to state at the end of his memoir: "The broadening of the hydrogen lines is, therefore, absolutely independent of temperature, and solely due to pressure."

The out-door portraitist must be careful in future how he pushes his business, as the magistrates of Ramsgate have fined a member of the photographic fraternity 2s. 6d. for pertinaciously soliciting one of the holiday folk to have his portrait taken.

A fine of half-a-crown often covers a much more serious offence, and, considering that visitors to Ramsgate are seldom engaged in any serious or important work on the sands, we are inclined to think the prosecutor may have been the greater offender against society. If the photographer deserved a fine of 2s. 6d., what punishment would suffice for him who knocks at a door and brings you from the top of the house to explain that no water-cresses are required to-day? Still worse is the offence of the circular sender, who often occasions the loss of moments far more valuable than those spent in sunning oneself by the sea-side. Magistrates generally hit little boys hardest.

The Prince of Wales took considerable interest in Mr. Muybridge's instantaneous photographs, and, it may be remembered, occupied the chair on the occasion of that photographer's lecture at the Royal Institution. We have just now received a note from His Royal Highness' private Secretary, stating that the Prince has been much interested in our illustration of a fortnight since, in which the Muybridge results were for the first time applied to picture-making.

Mr. Mayall's studio in Bond Street may be added to the list of those lit up with the Swan electric lamp, only Mr. Mayall does not employ battery power for the purpose, as photographers have hitherto done. Having a ten-horse engine on the premises, and a powerful dynamo machine, which is used for taking portraits by the electric light, he has at his disposal a magnificent source of electricity, available for ordinary lighting purposes. Each window of the Bond Street establishment is fitted with six Swan lamps of twenty-five-candle power, there being thirty lamps in all, and these illuminate the pictures and show-cases in the most brilliant manner.

There are not many who would care to light up their windows on this grand scale, but if photographers only understood how comparatively inexpensive, and how easy of application, the incandescent lamp is, we feel sure that its use would be more general. A pair of five-candle Swan lamps should not cost more than from ninepence to a shilling per evening, and they suffice to light up a show-case in a most effective manner. No doubt this is dearer than gaslight, but then the novelty and attractive character of the light go for something. We shall next week explain the matter fully, and give such plain directions as will enable any intelligent being to fit up a battery and lamp without difficulty.

Here is a hint from the *Engineer* on the subject of making cheap and easy moulds for metal castings. If ten per cent. of alum is used in the water employed for mixing plaster of Paris, and a mould made from this, it is, our contemporary says, hard enough to resist molten metal.

The time is not far distant, we think, when the formation of a Photographers' Defence Association will be necessary to protect photographic copyright. Every day the hawking of pirated photographs, both portraits and landscapes, becomes more common, and every day do the pirates exhibit greater impudence. They know very well it is not worth the while of any single photographer to prosecute, and the consequence is they fearlessly exhibit in the open thoroughfares whole barrows full of pirated pictures. We have seen cabinet pictures by Downey, Van Bosch, Reutlinger, Mayall, &c., selling for twopence a-piece in the streets, and it is very certain that if the public can purchase pictures at this low rate, they will soon cease to buy from the authorized vendors at all.

Some time ago Messrs. W. and D. Downey did join hands with the Stereoscopic Company with a view to prosecuting the hawking of piracies, but the expense involved was so large that the firms in the end deemed it wiser to withdraw. But if photographers banded themselves together in the form of an Association or Syndicate to protect their commercial interests, there would be funds in plenty for such prosecutions, and piracies would soon become rare. Whether photographers have yet suffered sufficiently to bestir themselves we know not, but the creation of a Defence Association is only a matter of time.

We referred recently to the advantages which would accrue to the Insurance and Salvage offices if they adopted the plan of photographing the scene of a fire; the picture would be valuable not only as a record, but as an illustration of the amount of damage done, and possibly of the origin of the disaster. We can now furnish a paralle example which supports our view. The Home Office, as our readers may know, exercise control over all gunpowder works and manufactories of explosive compounds, and a periodical visit is made to these by the inspectors of explo sives. When an accident happens—and, thanks to the excellent supervision, these are now rare—the first thing the Government Inspector does, on arriving on the scene, is to order a photograph to be taken of the results of the catastrophe. Afterwards, when he comes to make his report upon the affair, the photograph serves as an excellent illustration.

Dorber: "Strange thing that photographers never can paint, isn't it?" *Foatow*: "I don't know; there's Doublet You know Doublet's fine photographs; well, he paints, and so does Aplanatic; I have seen them both at work with the brush." *Dorber*: "Oh, yes; I've no doubt they are tolerable, but they are not, of course, well-known exhibitors at the Academy. Look at some of our men who handle the camera. Take Bretcep, R.A., for instance; now, he is an excellent painter." *Foatow*: "Yes, but then he is a very bad photographer."

Patent Intelligence.

Applications for Letters Patent.

4605. John Henry Johnson, of 47, Lincoln's Inn Fields, in the county of Middlesex, Gentleman, for an invention of "Improvements in the manufacture of paper applicable especially for bank notes, share certificates, state documents, and the like."—A communication to him from abroad by Edward Musil, Manager of the Paper-making Company of Neusiedl, near Vienna, in the empire of Austria.—Dated 28th September, 1882.

4651. John Young McLellan, of Glasgow, in the county of Lanark, North Britain, Analytical Chemist, for an invention of "Improvements in artificial-light apparatus for photographing, and applicable otherwise."—Dated 30th September, 1882.

4671. Charles Picton Evans, of Birmingham, in the county of Warwick, Gentleman, for an invention of "Improvements in the art of photography."—Dated 2nd October, 1882.

Patents Sealed.

3232. Jean Frederic Plucker, Capitaine D'Artillerie, of Antwerp, in the kingdom of Belgium, for an invention of "An improved stand for photographic cameras."—Dated 7th July, 1882.

3329. William Patrick Bruce, of Kinleith Currie, Midlothian, for an invention of "A new process for the reproduction of designs applicable to the illustration of books and the like."—Dated 13th July, 1882.

Patent Void through Non-payment of Duties.

3818. Ralph Augustine Jones, of Brill, in the county of Bucks, Gentleman, for an invention of "A new or improved apparatus for applying pressure suitable for taking copies of letters or other documents and drawings, and for mounting photographs and drawings, or for similar purposes."—Dated 23rd September, 1882.

My said invention relates to a simple and effective hand apparatus for applying a rolling pressure when taking copies of letters or other documents, and drawings or designs, applicable also to the mounting of photographs and drawings, and for similar purposes, and consists of a frame or holder of any convenient construction, and of any suitable material, such, for example, as wood, *papier maché*, metal, porcelain, or glass, the said frame or holder carrying two or more rollers placed side by side, and working loose within such frame, which rollers rest upon the surface intended to receive the pressure, and project slightly beyond or below the under-side or surface of the said frame or holder. One or more handles or bearing surfaces are provided in or on the frame, or the frame itself and the handle or bearing surface may be formed in one for the purpose of receiving through the hand or hands of the operator the direct pressure required for the purpose, such pressure being imparted by the two or more lines of contact of the rollers acting in the same direction and upon the same plane at the same time. Having now described and particularly ascertained the nature of my said invention, and the manner in which the same is or may be used or carried into effect, I would observe, in conclusion, that what I consider to be novel and original, and therefore claim as the invention secured to me by the hereinbefore in part recited Letters Patent is,—First. The peculiar construction and arrangement of hand-pressure apparatus wherein a rolling pressure is applied along two or more parallel lines of rolling contact, acting simultaneously in the same direction and upon the same plane, substantially as and for the purposes hereinbefore described and illustrated by my drawings. Second. The application and use of the said hand-pressure apparatus to and for the taking of copies or impressions of letters, or other documents or drawings, and mounting photographs or drawings, substantially in the manner hereinbefore described.

Specifications issued during the Week.

959. T. Singleton—"Improvements in the construction of paper wrappers for photographic purposes." Price 2d.

This invention is designed for the purpose of utilizing and extending the use of paper wrappers for post purposes, and modes for preventing their contents from slipping out during transit, at the same time allowing them to be examined as under the present system by simply pressing them in the hand. In making the paper wrappers I make them taper or otherwise, thereby making a saving in the amount of paper from which they are produced of about twenty per cent., being of great commercial value, both as regards economy and cost. The various modes of securing the contents I accomplish in the following manner. The wrappers are provided with openings, holes, or slots on the address side, against which the contents to be sent are placed, being fastened by placing the ordinary stamps over the aforesaid openings, holes, or slots, the gum on the back of the stamps adhering to the wrapper round the sides of the openings, holes, or slots, the part of the stamps lying over the openings, holes, or slots adhering to the contents, thus securing them to the wrapper, and thus preventing them from slipping out. In another method the wrapper is made taper, the small or narrow end when folded is placed inside, after which the paper or other content is wrapped up, thus causing the large end of the wrapper to extend or project beyond the part over which it laps; this end being gummed, causes the part folding on the wrapper to secure itself, the extreme or projecting ends falling on the papor or contents enclosed, thereby securing both together. In another method I place the openings, holes, or slots on the back side of the wrappers, the gummed edges lapping over them, securing the contents hy the gummed part sticking to them through the aforesaid openings, holes, or slots. I also make the wrapper so that when it is folded, the gummed edge laps on half the opposite edge of the wrapper, the other half on the contents, or both ends may be gummed, the inner edge being secured to the contents.

1000. E. C. Hancock—"A process for rapidly etching and matting patterns, letters, &c., on glass."—A communication from Dr. W. Grüne. Price 4d.

This invention relates to a new or improved process of rapidly etching and "matting" or "deadening" patterns, designs, or ornamental effects, letters, and the like, on glass or other vitreous surfaces. Aqueous fluoric acid dissolves glass without exercising a visible influence upon the remaining surface, leaving it approximately bright. Profiting by this peculiarity in its corroding power, I avail myself of reserving materials which have before been thought comparatively useless in consequence of their feeble resisting capacity. These substances, if placed upon glass in very thin layers, and even dried and hard, will yield in a few seconds to a solution of fluoric acid in water if the solution is concentrated. Being simply used for the above purpose, very faintly marked and bright results will be seen; but if I powder them when placed upon the surface of the glass with very finely divided metal, copal, or other substances, resisting the action of the acid for a longer time, and allow them to dry on after treating them with the acid, I obtain at once a more or less matted result. The practical advantage of this invention is that the corrosive action being very quickly performed, those parts of the pattern required to be bright need not be covered by any resists whatever. Only feebly resisting substances being required, which would be useless for the ordinary method of procedure, not only all the well known methods of drawing with a brush, pen, stylus, &c., can be used for putting the drawing on, but impressions by all available methods of mechanical printing, typography, lithography, glass, zinc, and copper-plate printing, &c., as well as elastic stamping. I also take advantage of thin and thick resists, using sometimes fine and coarse materials for powdering, obtaining thereby a matted appearance of different density or grain. In a drawing one can therefore obtain different and variegated shading by the simple use of various materials in the same drawing. In describing the *modus operandi*, I shall divide the process into two parts—firstly, the simple process, by which a matted pattern or drawing is put upon the glass; and, secondly, the double process, by which a bright pattern may be reserved upon the glass, the ground work of the glass being matted or deadened.

Simple Process.—First, I put the drawing upon the object either by hand, transfer, or direct printing, with almost any oil or varnish mixed with a little colour to render it visible. I then powder it by means of a brush or a tuft of cotton-wool, or in other suitable manner, with pulverized metal, copal, or such similar substances. I find what is known commercially as "bronze powder" very suitable for the purpose. After having dried it, I dip it into fluoric acid; or this may also be put on with a brush if desirable. After a few seconds the powder begins to shale off. I then wash it in water. It is not necessary to remove the greasy printing colour. The fluoric acid destroying it, it comes off in the water.

Double Process.—First, I either paint, draw, or print the pattern in a material resisting fluoric acid, such materials being well known. When dry, I oil over the whole surface by means of an ordinary printer's composition roller with a greasy printing colour or oil varnish, powder, treat with acid, and wash, as described in the simple process. I then remove the resist pattern either with an alkaline solution, benzine, alcohol, or like solvent. Instead of applying the acid as a bath or by brush, I may apply it in the form of fine spray. It will be understood that the word "glass" through this Specification must also be taken to mean vitreous surfaces in general. A very important feature of my invention is this, that whereas other patterns or designs in vitreous etching with which I am acquainted are depressed below the surface, my "deadened" or "matted" portion is raised above the surface, as may be tested by running the finger-nail thereover.

The invention may be summed up as follows:—The powdered materials allow the acid to flow between the particles, thus leaving a series of minute spots or holes between each particle, caused by the acid directly attacking the minute uncovered portions, and indirectly attacking the particles forming the resist (leaving them deadened), and thus a series of minute and imperceptible holes or depressions produce the deadened effect. I may arrange the pattern to be bright and incised, while the groundwork is dead and intaglio; or the pattern may be intaglio, and the groundwork bright and incised. If desired, I may print in a drying oil, powder with asphaltum, warm, so as to reserve the part under it, oil again, dust with the powder, and treat with acid. Having now described the nature of the said invention as communicated to me from abroad, and the manner of performing the same, I would have it understood that what I believe to be novel and original, and desire to claim on behalf of the said Dr. Wilhelm Grüne, is:—Firstly. In vitreous etching the direct result of a "matted" pattern by the corrosion of fluoric acid, substantially as described. Secondly. The process of vitreous etching, or any mere modification or variation thereof, substantially as described.

ELIMINATION OF HYPOSULPHITE FROM GELATINE PLATES.

BY JAMES WATKINS.

When a gelatine plate has been fixed, a long protracted washing is required to remove every trace of hyposulphite, with all the risk of frilling, starting the film, injuring the image, and uncertainty as to whether the object sought is gained; any safe process, therefore, that shortens the work, and at the same time makes assurance doubly sure, must be a boon to dry plate workers.

After a fixed plate has been in the alum bath, had even a lengthy washing under a tap, and is partially drained, it will be found to be covered with innumerable little protuberances, like minute grains of sand. On examining these with a powerful magnifying glass, they are seen to be salt crystals. Further, if the plate be of no value, and at the risk of obliterating the image, it may be warmed over a spirit lamp or gas jet, till evaporation begins to take place; with the magnifying lens crystallization may be seen rapidly going on; and the same effect, though in a less degree, may often be noticed even after prolonged washings.

Some time back, and late in the evening, I had fixed a plate and given it its preliminary or "little go," when, according to custom, before proceeding further, I was scraping some of the gelatine, with which manufacturers almost invariably and unsolicited adorn or disfigure the backs of the plate, and which, if not removed at an early stage, is apt to be more troublesome further on. On this occasion, this secondary layer was larger and denser than usual, and to assist in its denudation, I vigorously applied the jack towel for some minutes; but I soon discovered, or suspected, that I was operating on the wrong side, which proved to be the case, from one or two scratches on the picture; but I was surprised to see how thoroughly free the gelatine was from any specks, and was satisfied that the hyposulphite was removed.

A few days after, I exposed a plate, cut it in halves, and treated one half to the usual washing of two or three hours, and the other I submitted to a similar experiment, using a clean pocket handkerchief. The result was the same, and on testing for hyposulphite, no trace was discernible; the handkerchief, however, left behind fragments of its own material, difficult to remove, which would leave spots on the print. I tried various other materials, such as silk, india rubber, but after many trials, the most satisfactory and safest, and at the same time thoroughly effective plan, was as follows. Immediately after development, wash off developer, and place the plate in a solution of alum, rather stronger than is ordinarily used, say a 20-grain, and leave it there for fully ten minutes, then fix as usual. After fixing and a good preliminary wash to get rid of the surface hyposulphite, place it in a 40-grain solution of alum (an addition of a little citric acid does no harm), leave it therein for at least another ten minutes (half-an-hour would not hurt), to harden the film. Remove any extra coating from the back previously, and then give it a good washing, and let it stand in water (face downwards, if possible) for a short time, say fifteen minutes, while another plate is proceeded with. The face of the film will be found full of protuberances. Now thoroughly wash the hands to remove any chemicals, and taking the plate in left hand, face upwards, flow a good stream of water from the tap, while with the front joints of the fingers of the right hand, with a circular quick motion and a fairly firm pressure, you well rub the plate all over for at least five minutes. On examination it will be found the gelatine is more or less a wholly smooth surface, or perhaps a few specks still linger in the corners, or here or there. At any rate, proceed as before, only rubbing the fingers from near the top down to the bottom, then reverse the plate and proceed as before, until all specks disappear. The plate will dry as fast again as it would after a lengthened soaking, and either a chemical or optical test will show the plate to be safe. No one who once tries this method will revert to the old tedious and doubtful washings.

ODD JOBS.

BY THE AUTHOR OF "LOOKING BACK."

No. 12.—Bath and Landsdown Races.

Bath! That world-renowned *rendezvous* of idle people; that home of the lame and "'arf dead;" that resort of old misses and half-pay officers; that El Dorado of doctors and hair-dressers; that hot-bed of flirting, scandal, hot springs, assemblies, and debt—that wonderful, historical, and picturesque city of Bath! It breathes of romance to its very foundation. When Beecham Cliff, Camden View, Sham Castle, and Coombe Down were unnamed, and when the Borough walls and Milsom Street were tracts of rotting herbage, overhung with gnarled oaks, and the sites of the Grand Hotel and Pump Room were muddy puddles, steaming away in the open air like the boiling wells in Iceland—then did history and romance touch it with their magic finger. Everyone knows how Prince Bladud and his pigs took to the order of the *Bath*—how they wallowed in the steaming waters, and walked away rejoicing in renewed health and the proud knowledge that they had discovered a boon for the unfortunate "bloated ones" that were doomed to follow after them. Everyone knows that Prince Bladud and his pigs were the making of Bath, just the same as Lady Godiva, when she threw a glamour of poetry and romance over the antique gables of Coventry by her extraordinary feat of horsemanship. Strange to say, artists and poets, as a rule, fail to extol the prognosticating faculties of the Prince and his grunters, while Coventry's lady seems to make slaves of them all. "Human natur' *is* rum," quoth Squeers. I wonder if Bill Stumps and his pigs had been the happy discoverers of the virtues of Bath waters, if it would have become the fashionable resort of the bearded nobles of Saxon Athelstane's court, or been patronized by the hybrid horde that came over with William the Conqueror? In such case, I hardly think you would, after a lapse of hundreds of years, have found the elegant Beau Nash doing the honours of the Pump and Assembly Rooms to the *élite* of "society."

Apart from all joking, Bath, at the present date, is a pretty place, and a rare one to amaze and tire out a stranger in. If a country cousin drops upon you in Bath, and wishes to see the lions, you must be a ninny if you do not manage to make him nearly break his neck coming down a hill, or burst a blood vessel climbing up one. The knowing ones in photography will see in a minute that Bath is the very *ne plus ultra* for a holiday. I take it that most photographers, when enjoying a holiday, would rather leave "shop" behind them—they would for the nonce forget all about cameras and dark-rooms, and whistle dry plates and instantaneous shutters down the winds. The city-bound worker rushes to the "briny," or to "bosky dells, lovely glens, and heath-clad mountains," and quaffs great doses of that clear nepenthe that blots out the worry of the past year. Then our pro's from the provinces, whose lives are passed within easy or every-day reach of maritime or rural beauties, vary the monotony by seeking relaxation in the roar and rattle of the busy city. Yet, I firmly believe, there is a larger number of photographers—both professional and amateurs—who, loving their art or their hobby, would fain go to some place where they could bring back some *souvenir* worth showing their friends, and at the same time give themselves an opportunity of proving how clever they are in doing work out of the routine of their every-day grooves. To this set, whether they toil in the city, or labour in the "country," I say emphatically, "Go to Bath!" If they are hale and hearty, and up for some fun, "Go to Bath!" If they want to recuperate, "Go to Bath!" If they want the excitement of a city commingled with the verdant delights of a rural life, "Go to Bath!" Whatever may be the matter with you (always excepting an empty purse), "Go to Bath," and you will get what will set you straight. It is really a wonderful place—a remarkable place—a celebrated place! Bath chairs, Bath bricks, and Bath buns are world-renowned.

But these are not the *souvenirs* my brethren would care about fetching home with them. They want to go, in the first place, to Orange Grove—just in front of the "Cross Keys"—and point their lenses at the grand old Cathedral. Let them do this about nine o'clock in the morning, when the sun has just come round, and sparkles all over the venerable pile; then will they get one of the prettiest pictures that ever an architectural antiquary gloated over. The Abbey (by-the-bye, it is called Bath Abbey). from the Green, is worthy of a plate, if it were only to reproduce the two "Jacob's ladders" on each side of the ancient doorway, with their load of delapidated angels hanging on their time-worn rounds. For those who love little bits of woodland, there is the Victoria Park, and the Avon side by Bathampton and Batheaston, both within easy walk of any part of the city. Bath is peculiarly situated for being photographed as a whole, being built in a valley and surrounded by hills. Splendid views of the city can be obtained from either Sion Hill, Claremont, Camden, Beecham, or Bathwick; but I fancy the best of all can be got at the base of Sham Castle, or Pope's Folly, as it is sometimes called. Behind Claremont there is one of the smallest churches and graveyards in England (the church all but hidden by a huge yew of dismal black), that well deserves a visit: it is called Charlecoombe. To those who love climbing, and wish to see miles and miles of a rich and fertile country, dotted all over with undulating hills and woodlands, and streams gleaming in the sunlight as they meander iu their midst, I advise au ascent of Salisbury Hill. Then, my fellow-workers, who may visit Bath, be sure you go aud pass a day among the green meadows at Limpley Stoke, refresh at the Viaduct, and come home over Coombe Down, and I think you will do me the justice to say I have not exaggerated the beauties of Bath and its environs.

Easter, or the Race Week in June, are very favourable times to see Bath at its best. At Easter it is "full," and fancy balls, amateur theatricals, and everything of that sort, are in full swing; while in June, the Grand, the Yorke, and the Castle, are seething with "swells," whose talk is all of dogs aud horses. During the latter excitement the resident photographer gets little or nothing to do, compared with the fancy balls at Easter; thus it was that two years since we were all surprised at being ordered to make sundry groups and single portraits of all the jockeys that rode at Landsdown. The ferment in the establishment at this news was great indeed. All the young fellows wanted me to get "the straight tip" for them, so that they might make sure bets with their shillings and half-crowns. Would you believe it, sir, each one of those sixteen jockeys, under a deep vow of secrecy, gave me "the tip," and each "tip" was to back the individual jockey who had for the time button-holed me? Was it any wonder that under these circumstances the young fellows should become rather mixed in their betting? There had been heavy falls of rain during the fortnight prior to the great event, so that the usually dry and breezy Course of Landsdown was completely soddened. By-the-bye, there are some spleudid woodland bits out in that direction; besides, the view from any part of the Course is glorious, and will well repay a trudge up the steep road, or a walk through the greeu lanes.

It was a bright, breezy, sunshiny day, and the Course was more than usually crowded. I need not describe the race (I allude to the principal event of the day's performance—the Duke of Beaufort's Cup, or something); all that I shall say is, that the result astonished even a good many of the knowing ones, for a short-hocked, heavy-boned outsider came thundering in, leaving the favourite nowhere. The soft state of the Course made it a matter of endurance instead of swiftness, so this strong-limbed steeple-chaser carried the bell. I had to photograph this horse under peculiar circumstances, so my next paper will be a sequel to this, entitled "At a Veterinary Surgeon's."

IMPROVEMENTS IN DEVELOPERS FOR DRY PLATES.

So far as we at present remember, there has been no systematic attempt made, writes the Editor of the *Photographic Times*, to notice the special effects produced by the use of different kinds of acids in the developer.

In an iron developer with wet collodion, when citric or tartaric acids are employed instead of acetic, the colour of the deposited silver is darker. This is much more noticeable with dry plates and acid pyrogallic development, in which case almost any quality of tone required may be got by varying the acids in the developer. In a less marked degree this is also the case when intensifying an iron-developed wet plate with pyrogallic acid and silver, acetic acid giving a somewhat warm brown colour; that yielded by citric acid being cold and black.

To discover in what manner the quality of gelatine negatives is influenced by the presence of acids of different kinds in the alkaline developer, Mr. Henry J. Newton is at present making a series of trials, with results which are quite interesting. The various acids hitherto tried by him have been citric, acetic, sulphuric, phosphoric, formic, boracic, oxalic, together with alum.

The following will afford some idea of the results obtained from such trials as have yet been made.

Citric acid gave a precipitate on the plate in the form of a fine powder.

Acetic acid, whether glacial or No. 8, gave a perfectly clear picture.

Sulphuric acid behaved very much like the acetic, only the colour of the film was rather yellow.

Phosphoric acid, concentrated (sp. gr. 1437), yielded a beautiful negative of a rich brown colour, and in every respect satisfactory. The proportion present iu the developer was five minims to the ounce.

Formic acid, when used in the proportion of from three to five minims per ounce, produces a negative having a fine colour.

Boracic acid was tried in the proportion of three grains to the ounce. When speaking of the effects produced by this acid, Mr. Newton said: "This is the most powerful restrainer I have ever used." Had the same quantity of this as of other acids been used in the developer, the exposure would require to be prolonged ten times in order to obtain a good negative.

Oxalic acid, three grains to the ounce, was quite satisfactory, and almost identical in its actions with the formic.

Alum, when present in proportion of three grains, entirely prevented the development of the image.

Now what, it will be asked, is the practical outcome of these experiments? We reply, that it is a formula for a developer which, in the estimation of Mr. Newton, is the best that has yet been brought before the public, and which we here give:—

I.

Carbonate (washing) soda	500 grains
Water	10 ounces

II.

Oxalic acid	30 grains
Pyrogallic acid	20 ,,
Bromide of ammonium	10 ,,
Water	10 ounces

The above are mixed in equal proportions immediately before developing, which is best effected in a flat tray. It will be observed that this is one of the most economical developers that can be employed, as there is only one grain of pyrogallic acid to each ounce of the solution.

There are certain brands of plates, such as those of the Cramer and Norden, and Beebe make, which do not require the addition of the bromide of ammonium in the developer; indeed, they work much better without it, while for those of other make the formula is recommended as here given.

Under some circumstances full printing intensity will be obtained with even one-half of the quantity of the pyrogallic in the formula, while it may, on the other hand, sometimes be necessary to increase the proportion of the bromide if great density be required.

A substitution of the carbonate of potash for that of soda in the formula just given has also been tried, the potash salt in question being that form of carbonate known in commerce as salts of tartar, but it has not been found to possess any advantage over the soda. Not only so, but it is inferior in its action; therefore, as between these two alkaline carbonates, that of the soda must be conceded to stand unrivalled.

The solutions Nos. 1 and 2 keep indefinitely, and are ready for use at any time. The pyrogallic solution, keeping pure and white, is in every respect to be preferred to the ordinary alcoholic solution. Mr. Newton recommends that at least two bottles of this solution be made, one containing two grains of bromide to the ounce, and the other no bromide. These can be mixed to produce such effects as may be required. Ordinarily, however, no bromide will be required, unless in case of over-exposure.

In the use of this developer great latitude is allowable; the quantities given in the above formula are not arbitrary, and may be varied to suit any kind of work. The soda present will be, when used, twenty-five grains to the ounce; a much smaller quantity can be successfully used for ordinary work. A developer with ten or fifteen grains makes an excellent one. If ammonia is used, let the solution be *water* four ounces, *ammonia* one dram. This will give thinner negatives, and cannot be used without a bromide. Its developing power is also much sooner exhausted.

TONING FOR YOUNG AMATEURS.

BY HENRY CLAY PRICE.*

One difficulty the young amateur frequently encounters in his photographic manipulations is that of toning. To give any definite rule for the accomplishment of this in a satisfactory manner is not easy. Toning can only be learned by practice.

It is necessary that the student proceed in a systematic manner to work it out, and the following plan is suggested by which a vast amount of information on toning may be obtained.

Select a strong, vigorous negative, and from it make a proof on sensitized paper, printing deeper than the finished print should be. Cut this proof into four equal parts, and on the back of each put a number, as 1, 2, 3, 4. Make a toning bath according to the formula in use; four pieces are washed in several changes of water, and then placed in the toning bath.

Watch the prints closely, and as soon as No. 1 assumes a very slight approach to the purple, remove it and place in a dish of clean water. Allow No. 2 to show more of the purple; No. 3 should be carried further; and No. 4 will receive the longest immersion in the toning solution. Wash well the four pieces in several changes of water, and fix in hyposulphite of soda (say four ounces soda to pint of water). After fixing, wash in five or six changes of water, and then transfer to a solution of acetate of lead. Again wash and dry the prints; then study each well.

Correspondence.

A PHOTOGRAPHIC NUISANCE.

Sir,—Is there any reason why dry plates cannot be cut true to size? A short time back, having a day's holiday, I packed my dark tent, camera, dark slides, and an unopened box of 5 by 4 by a leading maker. Arrived at the farm, and lunched, I proceeded to set up my tent in a barn, and load my three slides ready for the campaign. Out of the dozen, only four would go into my slides, and one by pressure. No diamond to be had within three or four miles, only one of those American glass cutters. With this instrument, in the narrow compass of a tent, I managed to cut, or rather boggle, two, and split two more, so gave it up, and confined myself, *nolens volens*, to six views, instead of a dozen. It is not the first time I have thus been served; nor was this manufacturer the only one, for I hear complaints frequently of the same nuisance from others. When I buy 5 by 4 plates, I do not want $5\frac{1}{8}$ by $4\frac{1}{16}$. To cut off a quarter of an inch requires some dexterity in a regular glazier; if the plates were an inch over, it would be better. Often the plates are anything but on the square, sometimes an additional corner. I think makers ought to pass every plate through a guage before sending out. I may say my carriers are rather over than close to measure. It is bad enough in the studio to have to cut and trim, but when out for a day's run, it really amounts to a photographic nuisance.—Yours obediently,

Exact Measure.

Proceedings of Societies.

London Provincial Photographic Association.

At the meeting of the above Association, held at Ashley's Hotel, Covent Garden, on Thursday, the 28th ult., Mr. R. J. Palmer occupied the chair.

Mr. W. E. Debenham showed a drying-rack for gelatine plates.

Mr. Henderson mentioned that a hundred quarter-plates could be drained on a piece of board 18 by 8 inches by standing them in rows against small French nails.

Mr. W. K. Burton showed a negative of a sea and landscape; it had been shaded as suggested by him at a previous meeting, so as to give one side an exposure of twenty seconds, while the other only received half a second.

Mr. Henderson mentioned that it had been suggested, during the recent discussions on varnishes, that if the plate were coated with albumen (coagulated) previous to varnishing, the gelatine would not swell if any damp got through the varnish, and he had coated several strips of a gelatine negative, when almost half dry, with a solution of albumen, and then dried; one half of these strips had been placed in a saturated solution of alum. These being now placed in boiling water for some time, it was found that the part that had been placed in alum was but little swollen, much less than a film that had been subjected to a chrome alum solution would have done.

Mr. Brown said that the breaking up did not occur when an oil varnish was used; he found copal varnish thinned with turps answered well, the only drawback being the time occupied by drying.

Mr. Cowan passed round the result of some experimental exposures in daylight, under a very dense sensitometer, of two makes of plates, one containing a large quantity of iodide, and the other but a very small percentage. The reversal of the image commenced much earlier in the first plate, and the experiment seemed to show that iodide tends to cause reversal.

Mr. Burton said he had removed silver stains from negatives by a weak solution of alum and cyanide.

Mr. Henderson then read a paper on "Cold Emulsification" (see page 598).

Mr. Debenham said he should like to see it established that more plates could be coated with a precipitated emulsion, than with the same quantity of a washed emulsion.

Mr. Cowan said he always found a great waste of bromide in a washed emulsion.

Liverpool Amateur Photographic Association.

The usual monthly meeting of this Society took place on Thursday, the 28th ult., Dr. Kenyon, in the absence of the President, being in the chair.

The minutes of the August meeting having been read and confirmed, the Rev. J. Bruster was elected a member of the Society.

The Hon. Secretary read a letter from the Librarian of the Free Library, specifying the conditions under which the Liverpool Amateur Photographic Association would be allowed the use of the room in future.

The Rev. G. J. Banner proposed the acceptance of the terms, with many thanks to the Corporation for their liberality and courtesy.

Mr. J. A. Forrest seconded the proposal, and it was carried unanimously.

The Hon. Secretary laid upon the table the reports of the annual proceedings of the Philomathic Society, and the Liverpool Naturalists' Field Club, for which votes of thanks were accorded.

The Hon. Secretary wished to remind members of the approaching *soirée* of the Associated Scientific Societies of Liverpool. He thought it most desirable that the Liverpool Amateur Photographic Association should continue to fill the important share it had hitherto taken in providing the instruction and entertainment of the visitors to St. George's Hall, and hoped that members would have ready for exhibition a goodly number of their productions of the past season.

Mr. Forrest urged the members to make a special effort, so that the Society might be well and numerously represented this year by exhibitors. He reminded the meeting that, although last year's exhibition of pictures was certainly a very fine one, it had been mainly contributed from the collections of Messrs. J. W. H. Watling and Ellerbeck.

Mr. E. Twigge said that members whose cameras were small were often deterred from exhibiting prints, under the impression that small pictures were monotonous and ineffective.

Mr. J. H. T. Ellerbeck thought that the great interest of these annual exhibitions should lie in the fact that the bulk of the exhibits were the work of members of the Society.

Mr. Forrest deprecated any discouragement of the producers of small pictures. All good work of every size should be wel-

* *Photographic Times.*

comed and exhibited, and, above all, the exhibits should be sent to the Hon. Secretary in good time.

The Committee appointed last year to receive and arrange the exhibits in the hall was then re-appointed, with the addition of the names of Messrs. Forrest and Rutter.

Mr. Ellerbeck wished to know if the Tuesday evening meetings, which had been held last winter at his house, should be resumed.

The Chairman thought that the Society were greatly indebted to Mr. Ellerbeck for his hospitality and kindness in giving the use of his house for these meetings last year, and that they should certainly be continued, inasmuch as very valuable information and assistance had been obtained by means of them.

It was, therefore, decided that Mr. Ellerbeck's kind offer to continue these social meetings during the coming winter should be accepted, and the Hon. Secretary was requested to give intimation to the members of the fact.

The Rev. H. J. Palmer (Hon. Sec.) passed round a very beautiful specimen of crystallization from a saturated solution of oxalate of potash, from which all the liquid had evaporated.

Mr. H. N. Atkins passed round a portfolio of prints on platinotype paper, and said that the process had given him the greatest satisfaction from its simplicity and the rapidity with which finished prints could be produced. He greatly admired the pure blacks and whites of the prints, and referred the members to the small portfolio of photographs done during a recent holiday, which would speak for themselves. He had printed and developed about a dozen prints in half-an-hour, and found that a proof under-printed, which would be absolutely worthless in silver, was more like a sketch in pure black and white than an imperfect print. He (Mr. Atkins) exhibited a camera of his own construction, which he commenced in June and had in working order on the last bank holiday. It was almost item for item, a *facsimile* of one afterwards extensively advertised by a London maker a fortnight later. It permitted him to take out and expose any number of plates, dispensing altogether with dark-slides, the plates being carried in a light-tight tin box, each box being made to carry ten plates. He had with it escaped all fog and imperfect registration of ground glass and sensitive plates. The camera—which was half-plate size—when closed and carrying ten 5 by 4 plates, measured 8 by $6\frac{1}{4}$ by 6 inches, and was very light. At first his greatest difficulty had been from over-exposure; but he had recently found the greatest ease in overcoming this by developing with the following formula:—

Saturated solution of oxalate of potash	1 ounce
,, ,, ferrous sulphate	$\frac{1}{4}$,,
Bromide of potassium, 20-grain solution	4 to 6 drops
Water ...	$1\frac{1}{4}$ ounces

This developer was placed in one dish, and the plates placed there in until all details were out. They were then transferred to another dish containing strong developer—

Saturated solution of oxalate of potassium	4 parts
,, ,, ferrous sulphate...	1 part

and in this they acquired density rapidly. The plates were clear glass in the margin, and printed remarkably quickly, with full half-tone and pure whites.

The Chairman expressed his thanks to Mr. Atkins for his interesting exhibit and communication. He thought that it was in the direction in which Mr. Atkins was leading by this contrivance that heavily-burdened amateurs must look for relief from the load of their cameras, dark slides, and plate-boxes. He suggested the exertion of further ingenuity on Mr. Atkins' part to increase the range of focus.

Mr. W. H. Kirkby thought that silver printing would soon die out in favour of platinotype.

Mr. Ellerbeck had found difficulty in obtaining pure white high-lights with deep shadows and satisfactory contrast.

Mr. J. H. Day remarked that details of weak negatives came out much more crisply and clearly in platinotype prints than in silver.

Mr. Atkins corroborated this.

The Chairman said that he had kept sensitive silver paper in a platinotype box, and had found a difficulty in toning in consequence.

Mr. Kirkby read a short paper on the "Illumination of the Developing Room" (see page 599).

Mr. Ellerbeck said that he had recently visited the studio of a well-known professional firm, and found them developing gelatine plates in a much brighter light than that usually used by amateurs.

Mr. Day had developed seven plates recently by bare gas-light without a trace of fog; but he found that a serious absence of detail resulted.

The Rev. H. J. Palmer (Hon. Secretary) then gave an account of some experiments upon heat-haze which he had recently made in Switzerland. In July of 1881 he had noticed from the Rigi that, on looking at distant Alps and glaciers (which were but dimly seen as to details through white glass owing to heat-haze) through ruby and orange glass, every crevasse on the snows and shadow on the precipices and mountain slopes became visible with amazing clearness. This year he had taken with him variously-tinted sheets of gelatine, and had made many exposures upon distance, interposing the clear gelatine in front of the lens. He had used violet, orange, green, and ruby films, and found that the result was an equalisation of the necessary exposure on distance and foreground, and a most amazing obliteration of haze, without a very serious increase in the duration of exposure. He had been unable to perfect his experiments in this direction, owing to the failure of his supply of plates; but he was certain that here was a most important field for future experiment and investigation.

Mr. Ellerbeck exhibited a very fine series of views of scenes on the river; Mr. J. Guyton a plate-box of great usefulness and ingenuity; the Hon. Secretary some negatives of Louvain, the Abbey of Villiers, and the old town of Laufenburg; Mr. Day some good prints of his recent work in Wales; and Mr. A. K. Bean some views of the interiors of St. Mark's, Rock Ferry, and Chester Cathedral.

Mr. Kirkby gave a description of a visit to the studio of Mr. Schenkenhofer, where he had seen a new and very clever apparatus, devised by that gentleman, for expediting the processes of toning, fixing, washing, and drying of silver prints. The apparatus seemed to be very effective for the purposes for which it was intended, and could also be used for rapidly drying the films of gelatine plates.

Votes of thanks having been passed to Messrs. Kirkby and Atkins, the meeting, which was well attended, was adjourned.

Halifax Photographic Club.

The annual meeting of this Club was held on Tuesday evening, the vice-president (Mr. W. C. Williams) taking the chair.

After the Secretary had read the minutes of last meeting held in June, the report was submitted, and showed a balance in hand of £3 14s. 7d., which was considered very satisfactory. Ten meetings of the Club had been held, and five papers read, with practical and experimental demonstrations; viz., "Emulsion Making" (two papers), Mr. John Smith; "Photo. Lens," Mr. W. C. Williams; "Photography, Past and Present," Mr. E. Gledhill; "Carbon Process," Mr. W. C. Williams.

The intervening meetings had been devoted to discussion on the various incidents, experiments, successes, and disappointments photographers—more especially amateurs—are heirs to.

The election of officers for the next session then took place, and after thanks for their past services, the following gentlemen were reelected:—

President—Captain J. B. Holroyd.

Vice-Presidents—Mr. T. Birtwhistle and Mr. W. C. Williams.

Treasurer—Mr. W. H. Bulmer.

Secretary—Mr. E. Gledhill, 15, New Bond Street, Halifax.

It was then resolved that an exhibition of work of the past and succeeding years should be held, and that in future three orders of competition, and three prizes in each order, should be given for the best photographs, &c., the exhibition to be held in the first week in January, 1883, at which exhibits from optical and photographic instrument makers will be gladly received.

The following papers were then promised:—Mr. Williams, on "Photo. Enlargements;" Mr. Illingworth, "Emulsion Making," and also "A Test on Exposure of Photo. Plates." Mr. Jones, who also promised a paper, then showed instantaneous prints of Scarboro', Filey, and the late Agricultural Show.

Mr. E. Gledhill showed thirty stereo prints of Scotland, Ireland, Bedford, and Buckinghamshire, taken during the last month.

Talk in the Studio.

The Late Dr. Van Monckhoven.—The photographic world will learn with deep regret the death of Dr. Desiré Charles Emanual Van Monckhoven, which took place on the 25th ult., at Ghent. Dr. Van Monckhoven was in his forty-eighth year, having been born in 1834, and during a busy lifetime had occupied himself with well-nigh every branch of photography. Thirteen years ago he occupied himself a great deal with enlarging apparatus, and it will be remembered that in 1869 he came to this country and read a paper before the Photographic Society, "On a New Artificial Light Suitable for the Production of Photographic Enlargements." His light was a species of oxy-hydrogen lamp, and was adopted by several gentlemen in this country. Afterwards Dr. Van Monckhoven proceeded to Vienna, when he entered into partnership with Herr Rabending, a firm much noted for its fine cabinet pictures. The partnership lasted, however, but a short time, and Dr. Van Monckhoven returned to Belgium, where he occupied himself jointly with photo-spectroscopic research, and in the manufacture of photographic requisites. He applied himself with some success to the preparation of carbon tissue, and of late the production of gelatine plates engrossed much of his attention. Indeed, he was for a long time the most successful Continental manufacturer of gelatino-bromide, the Monckhoven plates acquiring a high reputation. He steadfastly recommended the employment of the ferrous oxalate developer, and it is due to his teaching in a great measure that ferrous oxalate is so much in favour with our Continental brethren. Dr. Van Monckhoven was a most energetic photographic chemist, and it is some consolation to know that of late years his labours were successful in placing him in affluent circumstances.

Crayons in Vitrifiable Colours.—A French publication says:—"M. Lacroix, a Parisian chemist, has introduced crayons similar to the ordinary lead pencils, the lead being replaced by vitrifiable colours. The coloured designs which are executed with these crayons, on slightly roughened glass, bear the heat of a muffle, and are fixed like a painting upon glass; the greys especially give excellent results. A similar process which was tried upon porcelain some years ago was unsuccessful, probably because enamelled surfaces were used. On biscuit it is likely that good results might have been obtained." We happen to know, however, that Mr. F. J. Emery, of Burslem, who exhibited such an interesting series of photo-engraved copper plates at the last meeting of the Photographic Club, manufactured and patented crayons of a similar kind more than sixteen years ago; and excellent work was done on biscuit plaques with Mr. Emery's crayons. In the laboratory we have used these crayons for marking crucibles and other vessels of a similar nature. It is strange that M. Lacroix should be so much behind the time with his invention.

A Mathematical Calculation.—Miss Fanny Davenport is said to be the "most photographed" in America, as Mrs. Langtry is undoubtedly the "most photographed" lady in this country. Messrs. W. and D. Downey have now, it appears, taken a picture of the pair together, thus producing a mathematical problem, to be worked out by multiplying into one another the two "most photographed" English-speaking individuals.

Photographic Instruction at Liverpool.—We note that on Tuesday last (3rd October) a weekly class for photographic instruction assembled under the superintendence of Mr. Edwin Banks, at 9, Hackin's Hey, Liverpool. The course is to be thoroughly practical as well as theoretical, and deserves, therefore, to be well supported; we feel sure that if a similar undertaking were commenced in the metropolis, there would be many glad to avail themselves of it.

The Photographic Money Dispute.—At Clerkenwell, Captain Herbert Kerr, late of the 17th Regiment of Foot, of 22, Bushey Place, Clarendon Road, Hampstead, appeared on an adjourned summons to answer the complaint of Lieutenant Arthur Henry Loring, R.N., of Montague Place, Portman Square, of having, on April 20th last, he being managing director of the Photographic Artists' Co-operative Supply Association, obtained from him by fraudulent pretences the sum of £2,074, with intent to defraud. Mr. Besley appeared for the prosecution, and Mr. Grain for the defence. The latter gentleman proceeded with his cross-examination of the prosecutor. Mr. Arthur Vandeleur, an accountant, who had been bookkeeper of the company, was also examined, and said there was a balance due to the defendant at the beginning of 1881 of £2,000 odd, but that entered in the book as due to him on January 1st, 1882, was £1,400 odd. So far as he knew, that did not include any salary. Mr. Hosack further adjourned the hearing for a week.

"Truth" on Illustrations.—If, as *Truth*, says, the merit of illustrated papers is in proportion to their accuracy, we may speedily hope for the appearance of camera sketches or photo-engravings therein. Here is a piece of sharp criticism. "The aim of illustrated newspapers ought to be to give pictorial realisations of passing events. Their merit is in proportion to their accuracy. Of late they have, however, taken to fancy sketches. In this week's *Illustrated News* there is a huge drawing of the battle of Tel-el-Kebir, 'from sketches by our special artists.' It represents a number of our soldiers fighting with Egyptian soldiers on the earthworks. There is no smoke, in order that the faces of the warriors may be distinguished. The men are all crowded together. An English officer points his revolver at an Egyptian officer of singularly mild appearance, who replies by offering him the handle of his sword. Behind him, on a horse that is wedged in, is another Egyptian officer, endeavouring to conceal his head in his shoulders, and with his sword almost falling from his hand. In the foreground is a black soldier. He has a musket with a bayonet fixed to it, firmly grasped. The bayonet of one invading Briton is already stuck in his breast, and the end of another bayonet is a few inches off. The black man seems to like being spitted. He does not drop his musket—he does not parry—he does not fall, and he does not apparently even perceive that he is in danger; but he fiercely, and with grim determination, attacks some sand-bags. I should like to know where and when 'our special artists' drew the sketches from which this remarkable battle scene is drawn. Anything more silly—indeed, more absurd—I never gazed on."

Experiments with the Heliograph.—A detachment of nineteen men of the Sixth Cavalry and Twelfth Infantry, near Fort Grant, Arizona, under command of First Lieutenant M. P. Mans, First Infantry, has been testing the practicability of heliographic signalling since July 1, and it is pronounced a grand success. Lieutenant Mans has signalled messages from the top of Dos Cabezas Mountain to Fort Grant, a distance of forty miles, which were read at once by his party at Grant. Messages can be sent with the heliograph at the rate of from six to twelve words per minute, according to the ability of the operator, and it is a splendid substitute for the telegraph, should the Indians cut the lines, which they have been doing, and always can do, when on the war-path, while they cannot cut a sun flash. It is understood that heliograph lines are about to be established by Lieutenant Mans, and partly under direction of Colonel Bracket, commanding scouting operations connecting Bowie, Grant, Thomas, Apache, and points along the Gila River, in the vicinity of Solomonville and Clifton, enabling troops in the field to be in constant communication with one another, without waiting for couriers or the proximity of a telegraph office. The signalmen, on account of their elevated positions, are enabled to observe with their glasses the movements of the hostiles, and in a few minutes to communicate it to any command in the field, each of which is always to be accompanied by one or two heliographic signalmen. The great advantages of this system of transmitting messages in a mountainous and hostile country are self-evident.

Manufacture of Iodine in Peru.—The British Institution of Civil Engineers has just published a brief paper by Mr. Robert Harvey, of Tarapacá, Peru, descriptive of the method and plant used by him in manufacturing iodine from the mother liquor of the refining of nitrate of soda. This *aqua vieja*, or mother liquor, at the works in question, contains 28 per cent. of nitrate of soda, 11 per cent. of chloride of sodium, 3 per cent. of sulphate of soda, 3 per cent. of sulphate of magnesia, 22 per cent. of iodate of soda, and 33 per cent. of water. It is run into precipitators of lead-lined wooden tanks, which are provided with wings or fans for agitating the liquor by hand power. The precipitant consists of acid sulphite of soda, formed by saturating the aqueous solution of saleratus or impure carbonate of soda with fumes of burning sulphur. It contains an excess of sulphurous acid. The agitation of the liquor causes a part of the precipitated iodine to fall to the bottom, while some of it rises to the surface. The latter skimmed off, the iodine is put into clarifying tanks and washed with water, while the mother liquor is returned to the nitrate of soda department, when it is again used and again becomes impregnated with iodine. The washed iodine is partially dried in a filter-press, and is then pressed into forms eight inches in diameter and six inches thick. These cakes of crude iodine, containing from 80 to 85 per cent. of iodine and from 6 to 10 per cent. of non-volatile matter, are subjected to sublimation in a cast-iron retort, to which are attached eight earthenware receivers, each 3 feet long by 2·5 feet in diameter. The cost of the plant, drawings of which are given in the original paper, was $23,000, Chilian currency. It produced in two months 7,560 pounds of sublimated iodine.—*Engineering and Mining Journal.*

To Correspondents.

E. Dubois.—In by far the greater number of cases white is decidedly best, but the pink and mauve papers may occasionally be used with advantage. Very often these are tinted with colours so fugitive that a few weeks' exposure in a shop window will serve to bleach the colour.

A. A. Campbell Swinton.—Becquerel's treatise on light contains the information you require; but little has been done in recent times.

Godfrey C. Harkness.—Do not attempt to photograph them direct, but make plaster casts, and work from these. A trace of rose-pink may be added to the plaster with advantage.

B. Hannah.—1. The design round the photograph can be registered, but this will not in any way prevent other persons building up something of a similar character. You can, however, patent the general method of working, and if no one has done anything of the kind previously, your patent will be valid. 2. We can see no connection between them.

M. Stinton.—There is no way of preventing it in the case of albumenized paper; but if you use plain salted paper, the difficulty will not arise.

M. D. Jones.—There is nothing of the kind at present, but we hope that something may be organised. See paragraph in "Talk."

Studio.—The inside of the loaf, not the crust.

Mr. A. Ram (India).—Subscription duly received.

T. W.—Our Year-Book for 1882 has been out of print for over three months.

W. W.—Next week.

R. M. G.—It is obviously a matter for private arrangement, and if we were to do as you suggest, much unpleasant and personal discussion would be likely to arise.

Carl Kammerhauer.—The addition of a small proportion of chrome alum is advantageous in most cases, but the proportion must depend altogether on the quality of the gelatine and the season of the year. We have found it convenient to keep a twenty-grain solution of chrome alum in stock, and to add more or less of this as indicated by circumstances. When a plate shows signs of softness, you may moisten it with the standard solution of chrome diluted with a tenfold quantity of water, and allow it to become nearly dry before working from it. 2. We only know of one collotypic power press which has been used commercially in this country, and we believe that it could now be bought for a little over the price of old iron. There is certainly a strange lack of enterprise as regards this matter.

Vera.—1. Rather use the former, as only one-sixth of the exposure will be required. 2. Add enough of an alcoholic solution of iodine to give the fluid a pale sherry colour. 3. Ordinarily on a quarter-plate, or a glass $3\frac{1}{4}$ inches square. 4. It contains nothing but carbon, hydrogen, and oxygen. 5. A simple solution of shellac in alcohol will answer very well, and you had better shake up with a little dry kaolin and allow it to settle before using it. 6. Yes, a waxy constituent insoluble in alcohol.

C. Brookland.—Hardly good enough for commercial work. Study Major Waterhouse's articles on photo-lithography.

F. Stolt.—The markings are probably due to floating particles in the bath. Filter carefully through clean white blotting-paper

Master Builder.—We cannot imagine that you have any power to prevent the circulation or sale of the pictures. If it were otherwise, no street view could be sold without obtaining an authority from a large number of persons.

C. J. Timmins.—The gelatine you have been using is of far too soft a quality. Try the effect of replacing one half of it by the gold label gelatine of Coignet.

Iron.—1. There is no advantage in increasing the strength under the circumstances; indeed, you might reduce it somewhat. 2. Not at present.

PHOTOGRAPHS REGISTERED.

Messrs. Adams & Stilliard (Southampton)—Photos. of Sir Wm. Thomson and Dr. Acland.

Messrs. J. & A. McLeod (Newark)—Photos. of Mr. W. E. Gladstone, and Mr. and Mrs. Gladstone.

Mr. H. Robins (Landport, Hants)—Photos. of H.M.S. *Serapis*, *Jumna* and *Bacchante*.

Mr. Henges (Lytham)—Photo. of Ascent of Balloon, "The Colonel," at Preston Guild, 1882.

Mr. J. Shannon (Rawtenstall)—Four Photos. of late Mr. Thomas Kay Whitehead.

Mr. J. Whittaker (Oswaldtwhistle)—Photo. of Rev. Geo. H. Smith.

Mr. E. A. Maxwell (Barnet)—Photo. of Group, including Photographer.

Mr. W. Watts (Staines)—Photo. of Tomb of Miss Byng, designed and given by H R.H. Princess Royal.

Mr. W. V. Amey (Landport)—Photo. of Coombes and Co.'s Establishment.

Mr. J. D. Hannah (Shrewsbury)—Eight Photos. of Bishop Crowther.

Messrs. W. Norman & Sons (Haltwhistle)—Three Photos. of Featherstone Castle, one Photo. of Lambley Viaduct.

THE EVERY-DAY FORMULARY.

The Gelatino-Bromide Process.

Emulsion.—A—Nit. silver 100 grains, dist. water 2 oz. B—Bromide potassium 85 grains, Nelson's No. 1 gelatine 20 grains, dist. water $1\frac{1}{2}$ oz., a one per cent. mixture of hydrochloric acid and water 50 minims. C—Iodide potassium 8 grains, dist. water $\frac{1}{2}$ oz. D—Hard gelatine 120 grains, water several oz. When the gelatine is thoroughly soaked, let all possible water be poured off D. A and B are now heated to about 120° Fahr., after which B is gradually added to A with constant agitation; C is then added. Heat in water bath for half an hour, and stir in D. After washing add $\frac{3}{4}$ oz. alcohol.

Pyro. Developer.—No. 1—Strong liq. ammonia $1\frac{1}{2}$ oz., bromide potassium 240 grains, water 80 oz. No. 2—Pyro. 30 grains, water 10 oz. In case of an ordinary exposure mix equal vol.

Iron Developer.—Potassium oxalate sol. (1 and 4) 80 parts, ferrous sulphate sol. (1 and 4) 20 parts, dist. water 20 parts. To each 4 oz. of the mixed developer add from 5 to 30 drops ten per cent. sol. potassium bromide, and 30 drops sol. sodium hyposulphite (1 and 200).

Substratum or Preliminary Preparation.—Soluble silicate of soda 1 part, white of egg 5 parts, water 60 parts. Beat to froth and filter.

Fixing.—Sat. sol. of sod. hypo. 1 pint, sat. sol. of alum 2 pints, mixed.

Cowell's Clearing Solution.—Alum 2 parts, citric acid 1 part, water 10 parts. Edwards makes this sherry coloured with perchloride iron.

Eder's Method of Intensification.—The negative is whitened by soaking in sat. sol. of mercuric chloride, and after thorough rinsing immersed in potass. cyan. 10 parts, potass. iod. 5 parts, mercuric chloride 5 parts, water 2,000 parts. As film becomes dark brown, the actinic opacity is increased; but prolonged action causes brown tint to become lighter, until at last the negative is no denser than at first.

Fol's Backing Sheets.—A chromographic paste is prepared with gelatine 1 part, water 2 parts, glycerine 1 part, and a very small addition of Indian ink. Strong paper or shirting is coated, and the sheets are laid, face downward, on waxed glass to set. Press to back of glass plate.

The Wet Collodion Process.

The Nitrate Bath.—Water 14 oz., nit. silver 1 oz., nitric acid 1 drop. Before using coat a small plate, and immerse it for 20 minutes.

Cleaning Preparation for New Plates.—Alcohol 4 oz., Jeweller's rouge $\frac{1}{4}$-oz., liquid ammonia $\frac{1}{2}$-oz.

Film-removing Pickle for Old Plates.—Water 1 pint, sulphuric acid 4 fluid oz., bichromate potassium 4 oz.

Substratum.—Whites of 2 eggs well beaten, 6 pints of water, and 1 dr. liq. ammon.

Negative Collodion for Iron Development.—Alcohol 1 pint, pyroxyline of suitable quality 250 grains, shake well and add ether 2 pints. *Iodize this by mixing with* one-third of its volume of alcohol $\frac{1}{2}$ pint, iod. ammon. 80 grains, iod. cadm. 80 grains, brom. ammon. 40 grains.

Normal Iron Developer.—Water 10 oz., proto-sulphate iron $\frac{1}{2}$ oz., glacial acetic acid $\frac{1}{2}$ oz., alcohol $\frac{3}{4}$ oz. The amount of proto-sulphate iron may be diminished to $\frac{1}{4}$ oz. when full contrasts are desired, or increased to 1 oz. when contrasts are unduly marked. With new bath quantity of alcohol may be reduced to $\frac{1}{4}$ oz.; but when bath is old more is wanted.

Intensifying Solution.—Water 6 oz., citric acid 75 grains, pyro. 30 grains. When used, add a few drops of the silver bath to each ounce.

Lead Intensification.—After neg. washing, immerse in dist. water 100 parts, red pruss. potash 6 parts, and nit. lead 4 parts. When it is yellowish white wash and immerse in liquid sulphide ammon. 1 part, water 4 parts.

Fixing Solution.—1. Potass. cyanide 200 grains, water 10 oz. 2. Sat. sol. of sod. hypo.

Varnish.—Shellac 2 oz., sandarac 2 oz., Canada balsam 1 dr., oil of lavender 1 oz., alcohol 16 oz.

Printing Processes.

Albumen Mixture for Paper.—White of egg 18 oz., 500 grs. ammon. chlor. in 2 oz. of water. Beat to a froth, stand, and filter.

Sensitizing Solution.—Nit. silver 50 grs., water 1 oz., sod. carb. $\frac{1}{2}$ gr.

Acetate Toning Bath.—Chl. gold 1 gr., acet. soda 20 grs., water 8 oz.

Lime do.—Chl. gold 1 gr., whiting 30 grs., boiling water 8 oz., sat. sol. chl. lime 1 drop. Filter cold.

Bicarbonate do.—Chl. gold 1 gr., bicarb. soda 3 grs., water 8 oz.

Fixing Bath.—Sodium hypo. 4 oz., water 1 pint, liq. ammon. 30 drops.

Reducer for Deep Prints.—Cyan. potass. 5 grs., liq. ammon. 5 drops, water 1 pint.

Encaustic Paste.—Best white wax 1 oz., oil of turpentine 5 oz.

Sensitizing Bath for Carbon Tissue.—Bichromate potash $1\frac{1}{4}$ oz., water 30 oz., ammonia 1 dr., methylated spirit 4 oz.

Enamel Collodion.—Tough pyroxyline 120 grs., methylated alcohol 10 oz., ether 10 oz., castor oil 20 drops.

Mountant.—1. Fresh solution of best white gum. 2. Fresh starch.

Collotypic Substratum.—Soluble glass 3 parts, white of egg 7 parts, water 10 parts.

Collotypic Sensitive Coating.—Bichromate potash $\frac{1}{2}$ oz., gelatine $2\frac{1}{2}$ oz., water 22 oz.

Collotypic Etching Fluid.—Glycerine 150 parts, ammonia 50 parts, saltpetre 5 parts, water 25 parts.

Printing on Fabric.—Remove all dressing from fabric by boiling in water containing a little potash, dry, and albumenize with ammonium chloride 2 grammes, water 250 cubic cents., and the white of 2 eggs, all being well beaten together. A 70-grain silver bath is used, and the remaining operations are as for paper.

Cyanotype Printing.—Water 1 oz., red prussiate of potash (ferricyanide) 1 dr., ammonio citrate of iron 1 dr. Prepare and preserve in the dark. Float the paper and dry. Fixation by mere soaking in water.

Various.

Luckardt's Retouching Varnish.—Alcohol 300 parts, sandarac 50 parts, camphor 5 parts, castor oil 10 parts, Venice turpentine 5 parts.

Matt Varnish.—Sandarac 18 parts, mastic 4 parts, ether 200 parts, benzole 80 to 100 parts.

Encaustic Paste.—Best white wax, in shreds, 1 oz., turpentine 5 oz.; dissolve in gentle heat, and apply cold with piece of flannel.

Ferrotypes.

Collodion.—Ammonium iodide 35 grains, cadmium iodide 25 grains, cadmium bromide 20 grains, pyroxyline 70 grains, alcohol 5 oz., ether 5 oz.

Bath.—Silver nitrate 1 oz., water 10 oz., nitric acid 1 drop.

Developer.—Ferrous sulphate 1 oz., glac. acetic acid 1 oz., water 16 oz.

Fixing and Varnish.—Same as wet collodion process.

THE PHOTOGRAPHIC NEWS.

Vol. XXVI. No. 1258.—October 13, 1882.

CONTENTS.

THE PHOTOGRAPHIC EXHIBITION.

Whatever the opinion entertained as to the progress of our art in recent years, certainly there is a marked increase in the interest taken in the practice of photography. For some time past it has been evident that the Gallery at Pall Mall, spacious as it is, would soon be all too small to contain the gathering which, year by year, has attended the opening *soirée* in increasing numbers; and on Saturday evening last, about nine o'clock, when the atteudance of visitors was greatest, there was neither moving room nor breathing room to spare. Every attractive picture on the walls caused a dead block, and at one period of the evening the only "loose" space was towards the centre of the hall. To convoy a visitor from one end of the room to the other, in order to point out a noteworthy exhibit, was at once a task of patience and difficulty, while even with the aid of a catalogue it required no small enterprize to search out any given picture.

It is so seldom that the hanging committee and a jury of awards obtain anything beyond a grudging word of thauks, that we cannot help expressing a belief that on this occasion there has been less dissatisfaction expressed on their shortcomings than for some years past. The "horizon-line" is certainly lower this year than last, and if a little more discretion still as to the keeping back of works below mediocrity were exercised, it would be of considerable advantage to the Exhibition. The hard-working president, Mr. Glaisher, was as untiring as usual in his endeavours to make the Exhibition a success, and was present betimes at the *soirée* to welcome members and their friends. The hanging committee had completed their laborious task at an unusually early hour, and consequently plenty of time was at hand for the printing and issue of the catalogue; while by Saturday at noon, when the press critics were admitted, the green labels attached to the medal pictures showed that the awards had been duly considered and conferred.

Of the collection of pictures as a whole we must leave every visitor to form his own estimate. That it includes many charming and clever productions few will gainsay; but it is difficult to point to any pictures that indicate progress, either in the way of art or technical excellence. Indeed, to speak frankly, the Exhibition is curiously devoid of any surprises, aud seeing that we are still at the begining of the "new era," and have not yet fully developed "the new power" in our hands, it is not to be wondered at that many visitors on Saturday evening evinced disappointment. Whether there was any reason for it we do not pretend to say.

The medals bestowed were eleven in number, and, bowing with deference to the opinion of the gentlemen who made the selection, and of whose undoubted good faith and qualifications there can be no question, we shall begin by considering the works exhibited by the medallists. Taking these in alphabetical order—we will begin at the end of the alphabet for a change—they are Mr. Frank M. Sutcliffe, of Whitby; Mr. Henry Stevens, of Addleston Lodge, Surrey; Mr. Robert Slingsby, of Lincoln; Mr. H. P. Robinson, of Tunbridge Wells; Mr. Abel Lewis, of Douglas, Isle of Man; Mr. G. E. Horsey, of The Elms, Perry Hill, Catford; Mr. W. J. A. Grant (the Arctic explorer), of Cullompton, Devon; Mr. J. Gale, of Long Lane, Bermondsey; Mr. Adam Diston, of Leven, Fife; Messrs. John Chaffin and Sons, of Taunton; aud Messrs. W. J. Byrne and Co., of Richmond.

Mr. Frank Sutcliffe well earns his medal by a series of marine studies. There is a sadness and weirdness about many of the pictures—darkness falliug upon a lonesome fisherboat is a favorite subject—that approaches pathos; aud yet that Mr. Sutcliffe can thoroughly appreciate humour is evident from "Limpets" (67), which represents a couple of laughing fisher-lasses leaning against a wave-beaten bit of rock to which the tangled sea-weed clings. The life and gaiety of "Limpets" is no doubt heightened by contrast with other of Mr. Sutcliffe's pictures, none of which touch mediocrity. "Morning" (464) is au effective bit of lighting that young photographers will do well to study.

Mr. Henry Steveus is a large exhibitor, and takes his medal in that branch of photography which Mr. Frank Good and Mrs. Glen Payne have for some time past made their own, namely the depiction of flowers. Mr. Stevens' pictures are the embodiments of technical excellence, and denote high skill and tact in lighting and development. A tiger lily (323) is superb, and so, too, are orchids and pansies in china jar (325); whether it is a wax-like camelia or verdant maiden-hair fern, Mr. Stevens is equally successful in depicting them. He also shows in another part of the room some very good examples of portraiture.

Mr. Robert Slingsby's name among the medallists will be cordially welcomed. He exhibits several most excellent portraits, also one or two pleasing groups, such as "Brambling" (289), a group of youngsters out with mama blackberrying. But the picture for which Mr. Slingsby secures his medal is "Homeward" (239), an ambitious study, that bids fair to become as popular as the well-known "Alone." It is a twenty-inch picture, showing a three-quarter portrait of a girl, who with filled pitcher is returning homeward. The girl, if not handsome, is decidedly comely, and the pose of her figure is a most agreeable one. The draping, too, is graceful and artistic, the tone being smooth and even, while yet there is plenty of vigour. But the most pleasiug part about the picture is the contrast between figure and background, a grassy slope, fringed with trees; the shadows of the tall tree-trunks cast across the sun-lit landscape have a very telling effect; yet the whole is so soft and subdued, that, the sweet country scene notwithstanding, the eye is firmly rivetted upon the buxom damsel before us.

Mr. H. P. Robinson, of Tunbridge Wells, makes a brave show this year, and although his pictures are not so favourably hung as heretofore, they nevertheless set their mark upon the Exhibition. It must have been somewhat bewildering to a jury where to fix the green label bearing the word medal, for Mr. Robinson certainly sends half-a-dozen studies all of which are entitled to the distinction. "Wayside Gossip" (135), with the silver sunshine beaming through a wealth of foliage, a broad sheet of still water, and a picturesque group of wayfarers in the foreground, seems to have been the favoured one with the jury; but if "A Merry Tale" (128) had been hung a little lower, the verdict would probably have been different. The life and humour of this last have never been surpassed in photography; the interest of the story-teller and the effect of story on the different listeners—every countenance betraying humour, but in a different degree—from a tardy smile in the standing figure, to screaming delight in the recumbent model, who is lying back on the moss fairly overcome with laughter—make up together an *ensemble* which has the rare quality of being a picture complete in itself, with details, every one of which tells the spectator something. "Artist and Model" (133), again, is pregnant with humour—a rare quality hitherto in pictorial photographs—and so, too, is "Her Ladyship" (132), the groups lending an additional charm to the bright scenes of lake and woodland that no one renders so sweetly as Mr. Robinson. Another phase of this artist's work is shown in "Lady Mary" (241), a dainty miss in white ringlets and mittens, powder and patches, a belle of those days when our great grandmothers were belles; one can almost detect an odour of satinwood and lavender about the picture.

Mr. Abel Lewis, of the Isle of Man, sends only one frame of "Portrait Studies" (220) containing three pictures. Of these, the left-hand one is most to our liking—a little maid seated on a sofa in a most unconventional yet quiet and simple pose. Apparently quite unstudied, the portrait cannot fail to please; and the same may be said of the right-hand picture, where we have the same little woman standing with violin in hand at the "attaque." The draping and lighting of these are most effective. The central picture is not quite so successful, the two little girls taking little interest apparently in the butterfly on the window pane which occupies so prominent a position.

The medal given to Mr. Horsey, of the Elms, Catford, is awarded for a series of harvesting sketches, several of which indicate high ability on the part of the photographer. The reapers at work in "Near Betchworth" (60), standing in the half-cut cornfield, is a delightful photograph, with the waving crop beyond; and so, too, is "Near Shere," also a harvest picture, in which a group of stately trees are seen, their soft shadowy foliage bordering the rich cornfield, and affording a delightful contrast to the dark sheaves in the foreground.

Mr. W. J. A. Grant sends several frames, including some fine studies of trees and animals; but the medal is awarded to him for a collection of Arctic pictures taken on board the ill-fated *Eira*, in 1880. "The *Eira* anchored off a floe at Spitzbergen," and another picture showing "Furthest point reached," where a massive crust of translucent ice bars all further progress of the ship, are rare examples of Polar scenery; the still, limpid water bearing aloft huge frozen bergs, the stretches of desolate ice-bound coast, the streaming glaciers of congealed snow and ice, their glittering masses in high contrast with the black rocks that surround them—all these features of the frozen deep, Mr. Grant depicts as no other Arctic traveller has yet shown them to us.

It is no surprise to find Mr. Gale again among the medallists. His work is always refined and artistic, and this year he has imparted life into many of his pictures by including in them groups of fisher folk and cottagers. "Cornish Fishermen" (309), and "A Doorway Group at St. Ives" (308), are excellent little pictures. Mr. Gale has been visiting the Cornish coast, and has gathered a whole string of pearls; here is "Polpero" (221), the quaint little fisher village, renowned for its smugglers, where passes the action of Mrs. Parr's delightful novel "Adam and Eve;" here is a little sketch from Newlyn (359), the fishertown beyond Penzance; and here a "Caul of Pilchards" (293). Mr. Gale has earned his medal well.

A solitary picture comes from Mr. Diston, of Leven, but it has found favour in the eyes of jurors, and receives a medal. It is entitled "Gloміn" (391), and contains just that "touch of nature" which is so difficult to realise in a picture. In a humble cottage, a solitary old woman seared by time and bent with years busies herself over a lamp which she is about to trim and light; it is, in truth, eventide with her. Mr. Diston has produced many more ambitious works, but never one so full of pathos and meaning.

Messrs. Chaffin and Sons, of Taunton, are also among that small number who desire that photography shall reflect something more than a pretty face or a bright landscape, and if they are not always successful in carrying out an idea, it is not for want of trying. "Cherry Ripe" (231) gives Messrs. Chaffin their medal; two ladies in a garden are regaling themselves with cherries, thrown to them by a neighbour who is seen above the wall. But there is more ambitious work in "Sisterly Intercession" (240), which is very near a big success. A lady kneels at the feet of her father; the latter, with his hard unforgiving expression, is very well conceived and represented, and so, too, is the sister on her knees. The weak point is in the standing figure of a man, who stands by awaiting the result of the intercession; it would have been better, we think, to have placed the last more in shadow, say at a half-opened door.

Messrs. Byrne and Co. of Richmond, secure their medals with a frame of panel portraits (182) representing children. The collection includes some very good work, and the work, moreover, possesses qualities which, unfortunately, are rare in gelatine plates. Brightness and brilliancy are the characteristics of Messrs. Byrne's pictures, and it would be well if our portraitists would give up a little of the monotonous softness so often seen in these days of gelatine, to attain these desirable results. We do not say that Messrs. Byrne's pictures in this respect have our unqualified approval, for in some instances the high lights are too extensive to please us; still, briliancy is now-a-days not so often met with in portraiture as in the collodion days.

Mr. Payne Jennings' work was "not for competition," and therefore had no chance for a medal. Mr. Jennings, indeed, only sends three pictures, but they fully sustain his high reputation as a sun-painter of landscapes. A shadowy pathway beside a pebbly stream (436) is a delightful scene, and so, too, is a group of graceful trees, their trunks in deep shadow, through which the sun-lit water beyond sparkles with all the merriment of summer. We desire, too, in this first notice to mention the pictures of the two other exhibitors whose work we consider of a very high order. The first is a "Misty Morning on the Wear" (23), by Mr. McLeish, of Northgate, Darlington, which, on the score of its beauty, no less than its originality, deserves high commendation. The graceful boughs of a tree, its supple twigs and delicate foliage sharply limned, compose an artistic foreground, beyond which, clothed in the silvery mist, is seen the magnificent pile of Durham Cathedral. There is no middle distance; we see simply the grand proportions of the north country cathedral in a most delightful and tasteful setting. The other exhibit to which we desire to call special attention is the frame of lake pictures by Mr. Alfred Pettit, of Keswick (52). These sweet sketches from our English lakeland are superb, the two central pictures representing very fine work indeed. The soft, shadowy hills, the placid water, the dappled sunshine, all exhibit rare taste and exquisite skill on the part of the artist.

Next week we propose to consider the exhibition in detail, but meanwhile append a complete list of exhibitors.

Captain W. de W. Abney, 3, St. Alban's Road, Kensington, W.; Messrs. Adams and Stilliard, Southampton; Mr. W. Adcock, Melton Mowbray; Mr. G. E. Alder, Croydon; Mr. Charles Andrea, Clapham Common; The Autotype Company, 74, New Oxford Street; the Rev. W. Barlee, Norwich; Mr. F. Beasley, jun., 30, Hamilton Terrace, N.W.; Mr. W. John Belton, 26, St. Paul's Crescent, Camden Square, N.W.; Mr. L. Berry, Chorley; Mr. F. Bills, 8, Peckham Grove, Camberwell; Mr. J. W. Boord, M.P., 14, Berkeley Square; Mr. Julius Braats, Stettin; Mr. J. A. C. Branfill, 137, Chadwick Road, Peckham; Mr. Edward Brightman, Redland House, Bristol; Mr. J. Milman Brown, Shanklin, Isle of Wight; Mr. T. M. Brownrigg, Artington House, Guildford; Mr. George Bruce, Dunse, N.B.; Mr. Peter Burges, The Ridge, Chipping Sodbury; Mr. W. K. Burton, Adelphi Chambers, 7, John Street, W.C.; Messrs. W. J. Byrne and Co., Richmond; Mr. J. S. Catford, Ilfracombe; Messrs. John Chaffin and Sons, Taunton; Mr. Archer Clarke, 8, Plough Lane, W.; Mr. Seymour Conway, Inglecroft, Beckenham, Kent; Mr. G. Christopher Davies, Orwell House, Town Close, Norwich; Mr. W. Davies, Rose Villa Studio, Greaves Street, Ripley, Derby; Messrs. E. Day and Son, Bournemouth; Mr. Arthur Debenham, 28, Union Street, Ryde; Mr. W. E. Debenham, 158, Regent Street; Mr. George F. Dew, Norton Street, Coventry; Mr. Adam Diston, Leven, Fife; Messrs. Henry and T. J. Dixon, 112, Albany Road, Regent's Park, N.W.; Mr. W. F. Donkin, Malvern Lodge, Upper Tulse Hill; Mr. F. Downer, Watford; Mr. John Duncuft; Mr. Edward Dunmore, 28, Oseney Crescent, Camden Road; Mr. G. Selwyn Edwards, Crick Road, Oxford; Mr. B. J. Edwards, The Grove, Hackney; Mr. P. H. Emerson, 4, Park Side, Cambridge; Mr. Robert Faulkner, 21, Baker Street; Mr. C. A. Ferneley, Reigate; Mr. Edward Fox, 44, Market Street, Brighton; Mr. Joseph Gale, 225, Long Lane, Bermondsey; Mr. G. T. Garrett, 60, Doughty Street, Mecklenburgh Square; Mr. J. T. Glossop, Silver Hall, Isleworth; Mr. Ernest H. Goold, 4, Danes Inn, Strand, W.C.; Mr. W. J. A. Grant, Hillersdon, Cullompton, Devonshire; Mr. David Green, 39, Circus Road, St. John's Wood; Major J. E. Gubbins, R.A., Yarmouth, Isle of Wight; Mr. R. V. Harman, Bromley, Kent; Mr. Robert Harris, Port Elizabeth, South Africa; Messrs. Heath and Bullingham, 24, George Street, Plymouth; Mr. Alfred Hendry, Godmanchester; Mr. T. C. Hepworth, 32, Cantlowes Road, Camden Square; Mr. J. B. Hilditch, Asgill House, Richmond; Mr. W. J. Hollebone, Linwood, St. John's Road, Putney Hill; Mr. Fred. Hollyer, 9, Pembroke Square, Kensington; Mr. S. G. Hooker, Sevenoaks, Kent; Mr. John G. Horsey, The Elms, Perry Hill, Catford, Kent; Mr. J. Hubert, 39, Lauriston Road, South Hackney; Mr. Edmund Hyde, Hill Crest, Castle Bar, Ealing; Mr. D. Ireland, Jun., Rockhill, Broughton Ferry, Dundee; Mr. Payne Jennings, Elm Grove, Rosendale Road, West Dulwich; Mr. A. Johnson, Wick; Mr. J. A. Kay, 160, St. George's Road, Bolton; Mr. H. N. King, 4, Avenue Road Villas, Goldhawk Road; Messrs. W. J. Lancaster and Sons, Colmore Row, Birmingham; Mr. J. A. Langton, 309, Euston Road, N.W.; Mr. Charles R. Lenthall, Wray Park Studio, Reigate; Mr Abel Lewis, Douglas, Isle of Man; Messrs. Lombardi and Co., 13, Pall Mall East; Mr. Fred. G. Lupson, 9, Church Street, Stoke Newington; Mr. H. Manfield, Campbell Square, Northampton; Mr. W. P. Marsh, Bognor; Mr. Peter Mawdesley, 363, Portobello Road, Notting Hill; Mr. E. A. Maxwell, Barnet; Mr. McLanagan, Douglas, Isle of Man; Mr. W. McLeish, 71, Northgate, Darlington; Mr. McLellan, Glasgow; Military School, School of Engineering, Chatham; Messrs. Morgan and Kidd, Greenwich; Mr. William Muller, 194, Aldersgate Street; Mr. Arthur H. Mure, Hill House, Greenhill Road, Hampstead; Messrs. Murray and Heath, Jermyn Street, W.; Mr. John Nesbit, 18, Lancaster Road, Finsbury Park; Messrs. Neustadt and Co., 25, Mincing Lane; Mr. Simeon Norman, Burgess Hill; Mr. Joseph Paget, Stuffynwood, Mansfield, Notts; Mr. C. J. Palmer, Harrow, Paddington; Mr. E. R. Palmer, Lawn House, 135, Dulwich Road, S.E.; Mr. Silvester Parry, The Cathedral Studios, Chester; Mrs. S. Glen Payne, Aylesbury; Mr. S. Glen Payne, Aylesbury; Mr. Alfred Pettitt, Keswick; Mr. W. H. Plaster, M.R.C.S., F.R.G.S., Pembury, Tottenham; Mr. H. Waterhouse Pope, West Holme, Alderley Edge; Mr. Andrew Pringle, Craigcleuch, Langholm, N.B.; Mr. Clive F. Pritchard, 2, Alwyne Place, Canonbury; Mr. Charles Reid, Wishaw, N.B.; Mr. George Renwick, 20, Station Street, Burton-on-Trent; Mr. J. H. Ritchie, Cedar Band, Hyde Vale, Greenwich; Mr. H. P. Robinson, Tunbridge Wells; Mr. J. B. Robinson, Jun., 6, Gladstone Terrace, Gateshead; Mr. W. D. Saunderson, Dean's Gate, Manchester; Mr. Frederick S. Schwabe; The Sciopticon Co., 26, Colebrook Row, N.; Mons. Emil Seelig, 6, Standplatz, Cassel; Mr. Cecil V. Shadbolt, Beechcroft, Chislehurst; Messrs. Shew and Co., 89, Newman Street; Messrs. Skill Bros., 62, Vail Gate, Lincoln; Mr. Robert Slingsby, Lincoln; Mr. Arnold Spiller, 2, St. Mary's Road, Canonbury; Mr. H. Stanley, Spital Street, Guildford; Mr. C. S. Stephens, 8, Woodley Hill, Early, Reading; Mr. Henry Stephens, Addleston Lodge, Addleston, Surrey; Mr. F. M. Sutcliffe, Whitby; Mr. A. Bisset Thom, 49, Torrington Square; Mr. John M. Thompson, King's College; Mr. F. Thurston, Luton; Mr. W. Trenemen, 7, Great Sutton Street, Goswell Road; Mr. George Tuohy, Richmond; Mr. W. Wainwright, Jun., Hoe Place, Woking; Messrs. Watson and Sons, 313, High Holborn; Mr. John Werge, 11A, Berners Street, Oxford Street; Messrs. G. West and Sons, 97, High Street, Gosport; Mr. H. E. White, Tangier, Africa; Mr. G. Sydney Whitfield, 14, Sandringham Gardens, Ealing, W.; Mr. Matthew Whiting, Lavender Hill, Wandsworth; Mr. Charles F. Wing, Tunbridge Wells; Mr. H. Trueman Wood, Society of Arts, Adelphi; The Woodbury Co., 157, Great Portland Street; Mr. Alfred Youngman, Sidcup, Kent.

DR. SZEKELY'S METHOD OF PREPARING GELATINO-BROMIDE WITHOUT WASHING.

The late Dr. Van Monckhoven, it may be remembered, published a method of preparing gelatine emulsion without washing. He dissolved carbonate of silver in hydrobromic acid, and thus prepared his silver bromide; unfortunately, the resulting emulsion generally contained the silver particles in a coarse and unsatisfactory condition.

Dr. Szekely has proposed another plan of working. He precipitates nitrate of silver with carbonate of soda, washes the residue with water, and then dissolves it in ammonia. The solution of silver thus obtained he adds to warm gelatine, with which a soluble bromide has previously been mixed, and digests the whole at a temperature of 40° C., or 86° Fahrenheit. The resulting emulsion is at first rather insensitive, but after a few hours, this quality rapidly improves, and in the end a product is at hand endowed with a high degree of sensitiveness. The ripening of the emulsion is slower than in the case of ammonio-nitrate of silver.

The emulsion of Dr. Szekely is applied to the glass plate without undergoing any process of washing, and gives vigorous negatives free from fog. But it is found that if the emulsion is permitted to remain warm for too long a time, fogged plates are the result.

It is a remarkable point in the process, that emulsion produced in this way does not stand washing very well. If the preparation is treated with water, the particles of bromide of silver, curiously enough, become coarse, notwithstanding the circumstance that the emulsion is in a set condition, or in the form of jelly. Negatives produced with the washed emulsion exhibit a granular character of a decidedly objectionable nature.

ALUM AND CHROME ALUM IN THE DEVELOPER.

BY CAPTAIN W. DE W. ABNEY, R.E., F.R.S.

It has been so often asserted as to almost have become an axiom, that alum destroys the photographic image when applied to gelatine plates. Now, on no theoretical grounds should this be the case, and for that reason I had always intended to try its action, or, rather, to investigate the cause of its refusing to allow the development of an image. In all my experiments, plates were exposed behind a negative to obtain a developable image. My first trial was to place the exposed plate in the alum bath for five minutes, and then, after a wash, to develop with ferrous-oxalate developer. My astonishment was great to find that not only was there no destruction of the image, but, on the contrary, an increased rapidity of development, and a denser image than usual. Here, then, was a plate seemingly behaving quite contrary to all established rules. It ought to have refused to develop at all, according to what we have so often read in the journals. A second plate was then taken, and half of it immersed in a cell containing a saturated solution of alum, and left for a quarter of an hour, after which, without washing, it was placed in a dish, and ferrous oxalate developer applied. Here we had the result that the print immersed in the alum showed more detail and was denser than the other half. It struck me that this might be due to the soaking of the film first, and thus allowing the developer more ready access to the image, as I have already shown is the case in dry and warm weather. A parallel experiment made with pure water seems to have almost confirmed the idea.

Treating a plate, however, with ferrous oxalate was not everything; the alkaline developer remained to be tried. A plate was exposed and placed in the alum as before, with the result that the half which had been placed in the alum solution *refused to show the least signs of any image whatever.* Here, then, we meet with the phenomenon described by so many photographers, who, finding no image appearing on application of the developer, naturally conclude that the image is destroyed. It certainly looked very much as if such were the case, and yet when ferrous oxalate was employed the image remained intact. The question then arose as to whether the alkaline developer plus the alum had not destroyed the image. How was this to be ascertained?

Taking the plate the half of which had been developed by the alkaline developer, and the other half of which was blank—the blank being caused by the alum—it was washed under the tap, and again placed in the alum bath, and left for five minutes. It was then taken straight to the dish containing ferrous-oxalate, and watched. The image rapidly appeared on the blank space, and after a couple of minutes nearly caught up in density the half already developed, though it, too, increased in intensity. This demonstrated the fact that alum is no destroyer of the image, neither is alum plus the alkaline developer, and theory again was proved to be right.

The same series of experiments were conducted with chrome alum instead of alum, with precisely the same results, excepting so far I am inclined to think that density was given to the image by its use with ferrous-oxalate. This will form the subject of more deliberate experiment before it can be seriously announced as a fact.

The question arises as to what is the cause of this remarkable difference in the behaviour of the two developers, and here, for the moment, I do not wish to commit myself. One thing we know, that alum is acted on by ammonia; but even when the solution was strong with ammonia, and after thorough washing, the same result was found to hold good. Hydrokinone behaved like pyrogallic acid, and both are complex organic bodies, with which alum might form a compound. Whether it is that the gelatine is altered in character, or what, I am not certain; but most probably a more simple explanation will be found for its behaviour. Be the cause what it may, the facts remain, and whether they may prove to be of use where plates which frill are to be developed, remains to be seen. One fact that should be noticed is, that the brown dye which shows so markedly when no sulphite is used with the pyrogallic acid disappears entirely when the ferrous-oxalate is applied to the washed image; in fact, the deposited silver is similar in character to that obtained by using the ferrous-oxalate alone. This, too, may be of use, and I hope photographers will not grudge the time to look into the matter.

THE DECORATION OF POTTERY BY PHOTOGRAPHY.

BY F. J. EMERY.*

I was last night privileged to be present at the weekly meeting of the Photographic Club. I had, indeed, left home specially to avail myself of the opportunity, and with the object of proposing a comparatively new departure in photography to gentlemen who, guided by the laborious researches of their predecessors in the art of photography, have, so to speak, put the "bit" in the mouth of the great Sun itself. I say "comparatively," because, although photography has been applied to pottery, it has generally, I think, been confined to the production of works of advanced art.

It will at the outset be desirable, for the better understanding of each other, that I attempt to do for you in five minutes what I have failed to do for myself in thirty years, and that is, to make you accomplished potters. I will endeavour to convey my lesson in narrative form—one that I engage shall have as much truth in it as the famous story of the willow-pattern plate, while it shall convey an eminently salutary moral.

Know, then, that "once upon a time," there were two earthen vessels, both made of the same clay, and both fashioned on the same wheel. The curves and lines of both differed only in degree, and yet the fancy of the thrower had destined them to very different ends; for the sloping shoulders and slim form of the one clearly indicated an easy future, while the matter-of-fact proportions of the other as clearly shadowed a bustling, busy existence. They went through the same training at the hands of the turner, were fitted with the necessary appendages by the handler, and together had mutually "a very warm time of it" preparatory to their emerging from the saggar in the biscuit stage of life. But here their companionship came to an end—the vase to go into the hands of an artist of note, there to receive the direct impress of genius, and in due time to find an honoured retreat at South Kensington.

As a maker of every-day crockery my sympathy goes with the companion of the vase—the homely teapot. Remembering that the biscuit of the vase is no more susceptible of tender impression than the humble teapot, it is no matter of wonderment that, even with a foreknowledge of its ultimate retreat being the ash-pit, it yearned for at least a modest adornment. To be brief, it coveted the engraved design of a copperplate. The prospect of this ambition being achieved was not promising, for nothing could well exceed the rigidity of the teapot nature, while it was perfectly certain that the copper would never accommodate itself to the curved whim of the thrower. At last a go-between was found in a sheet of tissue paper, which was not above accommodating itself to the curvature of crock. Mark, however, how its good-nature was rewarded. No sooner did the teapot find itself decorated with the coveted design, than, remembering that further companionship with the paper would militate against the acquiring of that lustrous covering which was necessary to fit her for the world, she availed herself of the knowledge of an old standing feud between oil and water, and, plunging herself into a bath of the latter, got rid for ever of the simple-hearted tissue to which she owed the success of her scheme for self-advancement. Moral: Could anything be more human?

Forgetting that moral as though it never existed, I propose the industry which I presume to represent shall be the teapot, your art the copperplate, and I myself the paper, premising that the courtesy with which I have been received last night and to-night is the return for my interposition; for if any of you think well to experiment in the direction I shall indicate, you will always find me ready to bring your experiments to a practical test.

I would here observe that, had I anticipated the kindly interest which manifested itself last night at the Photographic Club, and which has led to this courteous invitation to appear before you this evening, I would have been at some trouble to prepare a paper worthy of your kindness, and illustrated by examples much more complete than those which I am able to put before you to-night. You are doubtless aware that the exports of our staple to lands beyond sea are very extensive—notably to North America. Up to forty years ago, the demand for pottery consisted mainly of printed and common goods. About the time indicated there came a change in taste, the printed goods giving place to a superior white ware. Consequent on this, an important artistic department of our business suffered considerably. Able men found their profession waning, and abandoned it for other pursuits. No apprentices (or scarcely any) were put to pottery engraving, and consequently it is not at all surprising

* A communication to the South London Photographic Society.

that, both in quantity and in quality, the engravings for potters' use have seriously fallen off. And yet our potteries' district has furnished the art-world with some of its best men, among whom may be honourably mentioned Greatbach, Lightfoot, and notably Bourne.

As an evidence of what has been done for pottery I call your attention to an engraving by Mr. William Bourne, of Fenton, which is so delicate and artistic, as almost to be too good for the necessarily rough usage of the pottery printer. I also show an impression from a copper engraved some years back, and beneath it another average modern one, in which the decadence is painfully apparent.

Anticipating a possible return of the demand for printed pottery, and foreseeing that in that event the demand for skilled work would exceed the supply, I have for years looked to your profession to supply the want. I, therefore, as closely as my opportunities allowed, watched the wonderful progress which photography was making; and a further study of the subject has enabled me to prosecute my experiments to a point which has warranted my asking for protection of a modification of the Niépce bitumen process, specimen of which I now exhibit. On examining the copper you will see that the graver has been used for supplementing some portions, about three hours' hand-work having been given it.

I have had the privilege of making the acquaintance some year or two back of Mr. Whitfield and Mr. Fry, of the Woodburytype Photographic Printing Company, and their kindly aid —which I take this public opportunity of gratefully acknowledging—enables me to show two very beautiful specimens of prints from metal plates, wanting only greater depth to render them suitable for potters' use.

Thus far I have considered the application of photography to potters' engravings; but there is still another opening for its usefulness, and that is in the obtaining of low reliefs in the clay itself, to be afterwards developed by a coloured glaze. I show specimens—a view of Chiswick Church—reproduced from a plaster cast taken by the swelled gelatine process, and two portraits made from Woodburytype blocks kindly supplied to me by Mr. Whitfield and Mr. Fry. Had I had time before coming to London to cover these with a coloured glaze, the delicacy of the details would, I am sure, have surprised you.

To bring these desultory observations to a practical point, let me say that copperplates made on the principle of heliogravure or electrotype (provided that the lines or indentations are of depth sufficient to carry colour to the extent of the prints I have produced) are all applicable to pottery printing.

There is, I am satisfied, a good opening for the profitable extension of photographic processes in the direction I have endeavoured to indicate, and its successful prosecution can be best effected by interfering in no way with the existing methods of taking off and transfer.

THE PAST SEASON.

BY EDWARD DUNMORE.*

At the urgent request of our esteemed Treasurer, I have attempted to provide a paper for this evening, choosing a title that leaves little to be found fault with on the score of elasticity. The extreme difficulty, as I have frequently remarked, of writing papers that will be fairly interesting to the majority of members is a task much more exacting than might be expected by those who have never tried to produce one; for it is not now, as in the early days of photography, when the knowledge of it was but partially understood, and any day or any hour might give birth to some astounding and unexpected revelation indicating lines of research before undreamed of, and fraught with germs of a new knowledge whose ultimate value it was impossible to estimate. But now year after year passes, and only occasionally some new process crops up, or an old one revived for new applications.

The photographic world has of late been occupied in revolutionising the practice of photography by substituting a dry gelatine film for a wet collodion one, and with, it is allowed on all sides, remarkable success. At present it is, however, barely understood. Numerous faults occur that the users of the process are at a loss to understand, and I do not think that I am far wrong in saying that many of the makers of commercial plates are themselves in the same fix. Until such faults and shortcomings can be fairly traced to their source, understood, and remedied, the average of gelatine work must, of necessity, be below that of our tried and thoroughly-comprehended friend wet collodion. In all probability, however, some considerable time will elapse before this desirable end is attained, and it is now incumbent on those who adopt the process to freely communicate their failures and successes—the means by which difficulties have been overcome, the conditions under which their failures occurred, and the plans pursued that have scored them a success. Mutual confidences are the most practical and expeditious means of gaining a thorough mastery of the process.

From my own experience I have drawn certain conclusions which, though adverse to the dictum of some experimentalists in the matter, have been in a measure supported by repeated experiments of my own, and by the examination of numbers of negatives by various photographers. It is that for general landscape work (not isolated cases) very rapid plates are unsuitable, the slower plates being infinitely preferable. The principal care of manufacturers of commercial dry plates has, I believe, been that of producing as sensitive a film as can possibly be produced—plates that will work in the fraction of a second; and, looking on this quality as the quality a dry plate should possess, they are somewhat careless of another very important factor in the production of a good printing negative—that of quality of image. More than either rapidity, ease of development, or brilliancy of image is the quality of giving a regular and distinctly-graduated series of tones from the light to the deepest shadow—a quality more frequently absent than otherwise, although on it depends the solidity and atmosphere in the resultant print. In the majority of cases, supposing the subject be a trying one—deep shadows in the foreground and with a bright, open distance—a proof from the gelatine negative will either show the distance blurred and indistinct, or the foreground flat and deficient in detail, which is so very different from our old collodion wet-plate work, where all would be atmosphere and harmony. This I do not mean to say is, of necessity, the case, as similar subjects have been most successfully rendered by the gelatine process. I am talking of the average of work.

There is no doubt whatever that much depends on development—very much; also, much depends on the film to be developed. At the same time there are many plates upon which no skill in development could produce a good result, the condition of the emulsion itself entirely precluding the development of satisfactory images. It seems to me that the temptation of doing "a good stroke of business" has induced many, after having just mastered the difficulties of the manipulations of mixing and coating, or scarcely that, to commence supplying the public with gelatine plates, aided by puffing advertisements, which plates are profitable only to the vendor, but to the confiding purchaser a source of irritating loss and disappointment. After the novelty has worn off this sort of thing will rectify itself, and the conscientious, careful, and scientific manufacturer will be the only source of supply to those who take pride in their work. We have not yet emerged from the experimental stage; but I anticipate every year will bring improvements, and the time may not be far distant when we shall cease to hold up the wet-plate negative as a model for imitation.

I would suggest, as a test of the qualities of a gelatine plate, that two large cylindrical objects—one perfectly white and one of some non-actinic colour—should be photographed in the open air with one exposure. We know what a wet collodion plate would do. The white cylinder would be represented with one line of high light and a multitude of pearly half-tones over the remainder, and a roundness and modelling be common to both dark and light objects. If we could obtain the same results with a gelatine plate we might fairly infer that a landscape taken on similar plates would have the same equality and the same range of tone. Unless the plates were equal to this test it would be hoping against hope to expect a perfectly printing landscape negative result from the plates used. This deficiency in scale of tints is, in my opinion, the greatest drawback to the (I was about to say the process, but I think the process is not to blame) use of a vast number of gelatine plates now on their trial. If, on the other hand, great rapidity be added to other good qualities, my objections would in some measure be removed, and it would resolve itself into convenience of practice. The question is—Whether any operator could as accurately time the exposure when working in fractions of seconds as in seconds—with all the varying lights and subjects with which he may have to deal, and with the certain amount of uncertainty in the actinism of the light that is always an important factor in the case? Speaking for myself, I do not think I could; but this is an open point, and a matter of practice and skill.

* Read before the South London Photographic Society.

Since we last met, one of our members has succeeded in practically demonstrating a method of photography without camera or lens. The idea is old, but I believe had never before been illustrated with anything like the completeness or perfectness it now has. I need scarcely say that the success of the experiment was facilitated, if not suggested, by the exalted sensitiveness of our gelatine plates, which, being placed in position behind a minute perforation in a piece of thin metal, received the image formed, and by a somewhat protracted exposure it was found possible to develop a good negative. The result is, anyway, exceedingly interesting, and points out that in an emergency, no lens or camera being available, dexterity and a good and rapid dry plate will enable one to secure a picture.

Another matter affecting the social status of the photographer has recently been brought home to me in an unpleasant manner. As a householder of some three or four and twenty years' standing, only within the last few years have I been summoned, as a loyal subject of Her Majesty, to act as a common juryman. I inquired the cause of one of the officials, and was informed chemists were considered more as professionals and were passed over, but photographers were classed with shoemakers and greengrocers, *et id genus omne*, and were selected to serve. This, then, is the enviable position a photographer holds, and that members of a profession requiring varied scientific and chemical knowledge to successfully carry out a profession which is, perhaps, one of the most useful scientific helps of modern times, are considered only on a par with the butterman, whose scientific knowledge is probably limited to distinguishing between "bosh and Dorset." I certainly think photographers should agitate for a position in the social scale somewhat better than this.

During the past season some few improvements have been introduced into our working plant, in the direction of lightness and portability, by an exceedingly light and rigid tripod stand for tourists, an additional stay to each leg imparting the extra rigidity. A camera, also, about half the weight of the usual make, and with few or no loose pieces, commends itself to the peripatetic photographer, the weight of whose *impedimenta* is an important consideration.

A simple velvet cap, secured with elastic round the lens, is one of those trifles that lead to make the life of the wandering photographer happy. A portable changing-box, contrived to carry the spare and exposed plates, and folding into camparatively little compass, has been designed and made; also a small wire frame for use in development of plates by those who object to soil their fingers, together with some few other useful and simple matters which, I have no doubt, will find a place at our technical meeting. Several instantaneous shutters have been added to an already long list. The drop shutter is, however, still able to hold its own, and for real, simple, inexpensive, and practical utility perhaps is as good as any. An improvement in it has been made by causing a flexible shutter with an elongated opening and working on small spring rollers, thus obviating the necessary bulk of the ordinary drop arrangement.

Sulphite of soda has been fought over considerably during the past six months, the advocates and opponents to its use being pretty equally divided. The charge made against it as a restrainer of development depends a good deal on circumstances. If kept in solution with citric acid and pyrogallic there is no doubt it has considerable restraining action; but omit the citric acid and the conditions will be altered, and very little slowing effect perceived.

I have now exhausted the topics that have occurred to me as providing something to talk about, and leave it to the members to continue the discussion.

A VISIT TO WEST CORNWALL.

BY WM. BROOKS.*

During my stay in Cornwall I received a letter from the Secretary asking me to give a few notes on the Royal Cornwall Polytechnic Society, to which I consented. In addition I give a few notes of my trip to the Lizard, which I hope will be of interest; therefore, I give the title "A Visit to West Cornwall."

The Royal Cornwall Polytechnic Society was first established in the year 1833, by Miss Anne Maria Fox, of Penjerick, near Falmouth, who is still living, and was present at the opening ceremony of the recent meeting—the jubilee year. A Miss Caroline Fox was the authoress of the name "Polytechnic," which has since been adopted by a number of kindred institutions, and the Royal Cornwall Polytechnic Society can fairly claim to have been the pioneer.

The first exhibition of this Society took place on Monday, the 23rd of December, 1833, and was kept open for two days only. This first exhibition was held at the Falmouth Classical School. The first patron was the Right Hon. Lord de Dunstanville, and the first president was Sir Charles Lemon, Bart., M P., F.R.S. In 1835 His Most Gracious Majesty King William IV. became the illustrious patron of the Society, and the Society was thenceforth called "The Royal Cornwall Polytechnic Society." In the year 1837 Her Most Gracious Majesty Queen Victoria became patroness, and H.R.H. the Duchess of Kent remained vice-patroness until her death. I must not omit to mention that Her Majesty this year gave a donation of £25 in aid of the funds to meet the extra expenses of the jubilee year.

In the year 1841 H.R.H. Prince Albert was elected vice-patron. In 1850 the freehold of the Polytechnic Hall and premises was purchased. The funds were raised by donations and the proceeds of a bazaar, so that it should not encroach on the general funds of the Society. In the year 1852 the Art-Union of Cornwall was established in connection with the Society, and has been continued ever since. It is a great feature in the annual exhibitions that all the prizes are selected by the winners from the works of professional artists and photographers whose works are in the exhibition, and by this means many works are disposed of annually. This year I was informed by the Secretary that one of my tickets in the Art-Union had been successful in drawing a prize of £5, and I selected a water-colour drawing, value £7 7s., paying the difference. The subject was "St. Michael's Mount—Sunset," by my friend Mr. T. Hart.

Photography from its earliest days has been a feature at the exhibitions. The year 1863 appears to have been the first year that awards were made by the Society to photography. Mr. H. P. Robinson and Colonel Stuart Wortley received first silver medals, and from this date the photographic art has received a very large amount of patronage and encouragement from the Society. In 1864 I received my first award from the Society. From this year to the present, full reports have been published in the journals of the doings of the photographic department.

It has often been a matter of wonder to me why photographers had never personally put in an appearance from a distance at these meetings, now that tourist tickets for two months or more are so reasonable; and those who take an annual holiday (and I suppose that there are many who do) could not do better than pay a visit to the west. The best way is to book through by the Great Western Railway to Falmouth, which will be found a very good centre for the surrounding country after visiting the exhibition. Although the journey is rather a long one, the price is not. The above company issues tickets for the double journey—first-class, £4; second-class, £2 15s.; and third class, £2 4s. Accommodation in the way of apartments and living is far below the average of the watering-places near London. If any should feel inclined to pay the exhibition a visit next year, I shall be pleased to give all possible information that I can.

This year's exhibition was a decided success in every department. During the opening ceremony an excellent photograph was taken of the platform by Mr. E. Gael, of Falmouth, which I hand round for inspection. In the Photographic Department a very notable feature was the even technical excellence. There was not, so far as I could see, a single bad specimen of the photographic art. The greatest novelty was Mr Henry Stevens' flower studies. All the photographs of flowers that I have previously seen have been bouquets, but in Mr Stevens' examples he photographs a single specimen, and by so doing there is a great charm in the result he obtains. In some the only addition that he makes is the introduction of a single specimen of fern, such as the maiden-hair, which in no way detracts from the beauty flower above. Mr. King's transparencies of the private apartments of Windsor Castle were very fine indeed. Mr. York's admirable collections of lantern slides were also greatly admired. For the rest of the exhibits I must refer you to the reports as published in the journals a week or two since.

Leaving Falmouth, I drove out to the Lizard, a distance of twenty-four miles, on a visit to my friend, Mr. T Hart, the marine artist. At the present time there is a great attraction at the Lizard, namely, the wreck of the steamship *Mosel.* She struck on the morning of August 9th, at 8.30 a.m., in a fog. She was a North German Lloyd's bound for New York, having on board 650 passengers and a valuable general cargo. When she struck, the second mate informed me, she was going at the

* A communication to the South London Photographic Society.

rate of fourteen knots an hour. The steamer *Rosetta*, of Falmouth, was near at hand when she struck, and took off the specie and mail to Falmouth. The reason I introduce this disaster is because wrecks at all times make good subjects for the camera and the incidents connected therewith. I have three pictures of this wreck. The first one I hand round is a woodcut from the *Illustrated London News* from a photograph taken from the sea a few days after she struck, by Mr. Moir, of Falmouth. The reason I put in this print is, that it is perfectly correct in every detail. On the top of the cliff it shows the signal station and a private residence. At this station is the telegraph office. The signalmen are on the watch night and day, their duty being to signal vessels and telegraph immediately to their owners as having passed the Lizard. In the daytime the signals are by flags; at night by signal lights of different colours. The *Mosel* was the vessel that some infernal machines were to be shipped on board at Bremerhaven; but, owing to one of them exploding on the quay, the design was frustrated.

I have omitted to mention where this vessel struck. It is to the east of the headland, Penolver, and just under the signal station, about two miles east of the Lizard headland. It was quite calm when she struck, and all lives were saved without any great difficulty. The Church Cove lifeboat, I believe, rendered the greatest assistance.

The second photograph I now hand round was taken from the land, by Mr. Gael, of Falmouth (this was produced about a fortnight after the vessel struck); and the third one was taken by myself in a gale of wind, on September 9th, the wind blowing from the east, and everything in the ship shaking violently as the sea struck her. This picture is a faithful representation of a wreck on a rock-bound coast. The photograph was taken about three hours before the ship's funnel went over the side, on September 9th. Any amount of pictures could have been taken at different times with the divers at work trying to save the cargo, and a lot of small boats dredging by the villagers, and all sorts of things were landed, too numerous to mention.

A FEW PRACTICAL HINTS TO BEGINNERS.

WITH PRACTICAL ILLUSTRATIONS.

BY WILLIAM CROOKE.*

My subject to-night, as you are all aware, is "A Few Practical Hints to Beginners." Now, to begin photography aright, there are certain qualifications necessary, viz., an abundance of patience, presence of mind, dexterity in manipulating, a slight knowledge of chemistry, a little artistic taste, and a quick eye for the beautiful. A sense of order, "a place for everything, and everything in its place," will be found useful in enabling you to put your hand upon any chemical or appliance at any moment, even in the deep ruby light of the dark room during development.

It is not my intention to enter into the manufacture of gelatine plates, for it is my opinion that you will make better progress by practising first on plates by some known maker until you get satisfactory results. Some believe in this maker, and some in that. I use chiefly Wratten and Wainwright's, a few of which I shall develop this evening. With regard to size, $6\frac{1}{2}$ by $4\frac{3}{4}$ will be found convenient, the camera for this size being portable, the prints fitting into ordinary albums also being suitable for framing.

After camera and lens have been considered, a drop shutter is a necessary commodity, but I would here warn you to avoid a certain make of shutter, with a spring to be pushed either towards or from the camera, as this is sure to move the instrument during exposure, unless great care is exercised. The shutter cannot drop too easily; any concussion that may take place once the opening has passed the lens is not detrimental.

For out-door work a fishing-basket to hold camera, lens, and slides, and legs in the form of a rod, is a convenient arrangement. I have found the cape of an overcoat to make an useful focussing cloth; the opening for the neck round the lens, and fastened underneath between the legs, holds the entire thing light and water-tight, leaving plenty of room behind for drawing the slide, and keeping it covered while drawn, a most important point.

Being equipped, we will imagine you start on a short trip. The day is all that could be desired—fleecy clouds abound, and spots of sunshine adorn the landscape. You climb a hill, from which an extensive view is to be obtained. A fine old mansion occupies the foreground, with plantations sloping down to the river, the windings of which can be seen for miles. The point of sight is chosen, and all ready for exposure. Now you must be careful. Don't take off the cap as soon as you have drawn the slide, but wait until the conditions are favourable for a good and pleasing picture. Get the distance a little shaded if possible, and a spark of sun on the thickly-wooded foreground. Previous to this you should have determined the exposure. Supposing it to be two seconds, you lift off the cap and simultaneously commence to count one, two, three seconds, putting on the cap as you say three. If you have drawn the slide next the lens the plate has received two seconds.

Rambling on in search of another "nice bit," you come across a friend on horseback, and thinking they would make a good picture, you thereupon plant your camera, and focus, while the animal stands in a beautiful attitude. Just as you draw the slide he moves his legs, and instead of four, only two are visible, which would look bad in the picture. To alter this the horse must go forward, making it necessary to focus again. If you had first taken the precaution to mark the spot where he stood, you could trot him round till all his points were shown. Suppose your next subject to be a few swans on the margin of a lake, take care that the sun does not shine from behind the camera too flatly on their plumage, as rotundity in this class of picture is desirable.

If you exposed many plates during the day, there would be a likelihood of getting confused when you proceeded to develop. You would find it a great assistance to enter in a little book, published for the purpose, the number of plate, size of stop, subject, and exposure.

To those who use larger cameras and various sizes of plates, I would relate the experience of two professional photographers who travelled a good many miles to photograph a detachment of Her Majesty's auxiliary forces. All the necessary preliminary was gone through, and two plates exposed. Then the detachment received orders to "right about turn, quick march." Pushing home the slide, one of the professionals exclaimed, "We're in luck," but lo! a change came over his countenance, and thoughts of the shortest way to the banks of the Clyde rushed into his mind (by this time the detachment had retired half-a-mile), when he reluctantly broke the tidings to his companion that he had used the wrong slide. A preventive for a similar blunder would be to stick a small gummed ticket on the slide, upon which you can write the size of plate.

I would like to say something to-night about indoor photography, there being such great facility for the production of really pleasing portraits of one's friends, with the same exposure, or even less, than in the studio. I shall give my opinion as to the best position of sitter and camera. For instance, at an oriel window; the sitter should be placed against the shutter, the camera close to the opposite one, a little more in the room, and well shaded from the light with a screen acting as a reflector towards the sitter, to carry the light as much to the front as possible; on the shadow-side a semi-circular reflector, well in front of the sitter, in fact until the edge of it appears on the ground glass; a clothes-horse with a blanket over it answers the purpose very well. The portion of window immediately beside the sitter should be darkened. When the sun is shining, a very rapid light is produced by fixing some sheets of tissue paper, slightly moistened at the corners, on glass.

In a room with two ordinary windows, not too far apart, the sitter might be placed about the centre of the room, on a line with the first and facing the second window, the camera shaded from the latter; the same system of reflectors answers in this case. Where there is only one window, the sitter should be placed close to and slightly facing it; here tissue paper will be found an advantage if judiciously used. The camera should be a few feet into the room. The least under-exposure in this branch is very detrimental, as it produces still greater contrasts. A weak solution of pyrogallic should be used on this account, and the development not carried too far. I shall not enter upon the subject of posing to-night, but just point out a very common error, viz., giving sitters a certain point to fix their eyes on, thereby to get mesmerised. Now nothing relieves the eye so much as a little motion during the exposure. This can be attained by placing a circular object, twelve inches in diameter, and about twelve feet distant, with a series of pretty faces round the edge, to be looked at consecutively.

A word about interiors. First see your camera is level (this applies also to exteriors). If the ceiling happens to be high,

* Read before the Edinburgh Photographic Society.

and something of importance in it, raise the front a little, but do not tilt the camera if you can possibly avoid it. The illumination on the ground glass in most instances being poor, makes it difficult to focus. In most cases a piece of white paper will be found sufficient, but if very dark, a light must be carried about from place to place to enable you to get the image sharp. Plates for this class of work should be thickly coated, and backed with some non-actinic substance. As our most worthy president can tell you, some very great obstacles present themselves in this his favourite hobby.

Notes.

Dr. Eder has written us on the subject of Obernetter's new emulsion process, of which the former seems to think very highly. There is little doubt that if we can thus avoid the chemical difficulties hitherto so inherent to the process, and can prepare an emulsion in half a dozen hours without the painful glare of ruby light, the Obernetter process will be received on all sides with open arms. But it seems almost too much to hope for the Gordian knot to be severed in this simple fashion.

Professor Piazzi Smyth has made a good defence of the "rain-band."

> "A rain-band captain eke was he,
> Of famous Ed'nbro' town."

He does not deny that a mere observation of the "band" alone will tell us if it is going to rain, but that if the observation is made by an intelligent man, who will place the records side by side with those of the "barometer, thermometer, and wet-bulb hygrometer, not forgetting both wind and cloud," he is likely to learn something of the condition of the atmosphere. It must not be forgotten that Piazzi Smyth has already made several meteorological suggestions of value, which entitle his opinion to respect; one of them—that of taking photographs of the clouds, in order to prognosticate the weather—being likely to be generally adopted in our observatories.

It is not very nice to be awarded a gold medal, and yet get none of the glory and none of the gold. But this is precisely what has happened to Mr. G. F. Williams, whose picture entitled him to the highest award in the Alexandra Park Competition. In the first place he received none of the honour, for his name was not mentioned in connection with the gold medal when the result of the competition was first published; and in the next place, when the time came for giving the medal, the givers were in the Bankruptcy Court. Nor is this all; for, so far from being able to get his medal, Mr. Williams cannot even get his pictures back again. Who would be a gold medallist in these circumstances?

Mr. Arthur Debenham, who has just returned from a tour in Italy, confirms Mr. Robinson in his view that many plates are spoilt by the diaphragm slit in the lens. Mr. Debenham tells us that nearly all his spoilt plates were spoilt by light entering his camera in this way; and as the Italian skies are very bright, the gelatine plates suffered accordingly. Mr. Debenham informed us, too, that he knows no better plan of remedying matters than the one given in the News—namely, to sew an elastic band on one margin of the dark cloth, so that the latter clasps the lens tightly during exposure.

The *Times* criticism on the Exhibition is in keeping with its usual slow and solemn utterances. The writer gravely commences with a dull account of the early history of photography, which takes up a whole column, and then devotes a short half-column to a notice of the pictures. Still, he tells us several bits of gossip, which, if not actually criticism, are nevertheless very gratifying to hear. "We should have had some illustrations of the new St. Gothardt route to notice," we are told, "only that the collection was not completed in time for the Exhibition." And again, he says of one medallist, that he had "only taken up the active practice of photography within the last year." This is capital small talk, but we think exhibitors would have been better pleased with a few remarks upon their pictures.

The American system of phototyping English books, and issuing them in the New World without permission, is being met by the simple expedient of performing the operation here and forwarding the plates. "Skeat's Etymological Dictionary," recently printed at the Clarendon Press, Oxford, is an example, the whole having been phototyped on a reduced scale in England, and sent off in advance. The phototypic process is of especial value in the case of such a work as this, owing to the number of "peculiars" and foreign quotations.

A second name, well known in photographic circles, has become associated with electric discovery, and, as in the case of Mr. Swan, the discovery relates to the problem of domestic lighting. A son of Mr. Ferranti, of Liverpool, has come forward with a process which from the very first seems to have inspired confidence. "Without pretending to have pitched upon the very best system," says the *Daily News*, "we may confidently assert that the sample of estimates for supplying light by the new Ferranti process is far from being the worst." In a word, Mr. Ferranti, Junior, who is, by the way, but eighteen years of age, has devised a house-to-house electric system that compares favourably with the price of gas.

A good deal of fuss has been made over the appearance of an electric launch on the Thames—that is to say, a launch worked by engines set in motion by a number of secondary batteries. The secondary batteries were charged ashore, and subsequently were made to part with their electricity to turn an electric machine which worked the screw of the little craft. As a practical experiment, no doubt the matter deserves record, but the public should have been fairly informed at what expenditure of force the boat was sent on its journey. Thus, very few readers of the daily papers imagined that not ten per cent. of the force originally employed was available to make the screw revolve, the other ninety per cent. being lost over the experiment. Loss of power resulted in every operation, the burning of the coal to heat the boiler, the boiler in setting the steam-engine to work, the steam-engine in turning the dynamo-machine, the dynamo-machine in charging the batteries, and the batteries in discharging their electricity to set the machine on board in action; indeed, we believe it would not be far wrong to set down the power put forth in the last operation as equal only to three or four per cent. of the original energy at hand at the beginning.

Attention has been recently called to the danger of acidity in papers, many descriptions having a marked acid reaction when tested. No doubt acid paper is to be deprecated in photography, and therefore it is well to have a ready method of testing at hand. The best plan is to moisten a piece of blue litmus paper with distilled water. and lay it between the sheets for twenty-four hours; its tint at the end of that time establishes the absence or presence of acid.

It will not be the fault of scientific societies if we learn nothing of the next transit of Venus. France alone sends out eight different observing parties, and England six. Germany, Russia, and America are also to be represented. The phenomenon takes place on the 6th December next, and Lieutenant Darwin, R.E., late Honorary Secretary of the Photographic Society, is already in Australia making arrangements for an English observing party in that part of the world.

The Germans are becoming alive to the advantages to be derived from photographing the scene of a railway accident. It is necessary, of course, to put the line in order as quickly as possible after a breakdown, but still, if the "breakdown gang" that is sent to repair damages included among them a photographer with his apparatus, evidence might be collected on the spot without delay. The state of affairs immediately after an accident teaches much, both as to its "cause" and "effect," and we feel sure the day is not far distant when our Home Office will make it a stringent rule that a photograph be secured of the débris before any step is taken to set matters straight. The Germans adopted this plan on the occasion of the serious accident at Hugstetten, and the position of the locomotives, and of the wrecked trains, have materially helped to demonstrate how the catastrophe was brought about.

It is a moot question among scientists how far an investigation may be undertaken by deputy—that is to say, how far a principal may claim a discovery made by his assistant. If we were to read of the defeat of the Egyptians and taking of Cairo by the Duke of Cambridge, most of us would regard it as a joke; and yet, among the papers presented to the Academy of Sciences a little while ago, there is one entitled, "On an Observation of the great Comet of 1882, seen from a balloon, by M. de Fonville." This would be all very well if it were not followed by, "M. Mallet made the ascent at his (Fonville's) request, having keener vision, and took measurements."

"We meet at Ashley's Hotel, Henrietta Street, Covent Garden, on Wednesday evenings, at eight o'clock, and shall be glad to welcome among us any photographic brethren who may be in London during the Exhibition time." So writes the Secretary of the Photographic Club. The agreeable air of non-formality and good fellowship which characterise the Club gatherings, altogether distinguish them from the meetings of the photographic societies.

Heard in the crowd on Saturday night. Said one visitor at the Exhibition, as he hustled another: "Fearful crush, is'nt it? I hear three instantaneous shutters have been smashed already."

Another fragment of conversation at the same time and place. "Yes; he is growing quite a man, isn't he? We all wish him to marry, but he says he wants to save up his money and buy a camera."

Patent Intelligence.

Application for Letters Patent.

4747. Francis Joseph Emery, of Burslem, Staffordshire, Earthenware Manufacturer, for an invention of "Improvements in photographic engravings."—Dated 5th October, 1882.

Notice to Proceed.

3190. John Henry Johnson, of 47, Lincoln's Inn Fields, in the county of Middlesex, Gentleman, for an invention of "Improvements in the manufacture of cardboard, pasteboard, and the like, and in the machinery or apparatus employed therein, and for cutting the same into sheets, and for coating sheets of paper or cardboard, or the like, with adhesive material."—A communication to him from abroad by Jean Müller, of Schaffhausen, in the republic of Switzerland, Card Manufacturer.—Dated 6th July, 1882.

Patent Void through Non-payment of Duties.

3352. Robert Slingsby, of the town and county of Lincoln, for an invention of "Improvements in the construction of photographic studios."—Dated 24th September, 1875.

This invention consists "in constructing the 'sky-light' as well as the 'side light' of a photographic studio with a double pitch or inclination inwards from the two ends to the middle of its length, where the two inclined or sloping surfaces meet at an angle of about 120 degrees." Thus advantage is secured at whichever end of the studio the sitter may be placed. Instead of the sky and side lights meeting at an angle, they may be separated a few feet by an unglazed or darkened portion of straight roof and side, under which the camera may be placed in comparative obscurity. Instead of the side light being vertical, it may be sloped outwards from top to bottom, the sky light being at one slope and the side light at another slope. Or, they may both be at the same slope, and combined in one in the form of a "Mansard" roof, but with the double pitch or inclination inwards at the centre. The inward pitch or inclination of the sky and side lights may be adapted, in a single form, to studios in which the sittings are made at one end only.

Patents Granted in France.

147,655. Enjalbert, of Montpellier, for "A photographic apparatus for the pocket, called 'photo-revolver.'"—Dated 14th February, 1882. Class 17.

Certificates of Addition (French).

116,533. Perier, for "Reproducing photographs, drawings, &c., by means of the camera lucida, &c."—Dated 6th March, 1882. Class 17.

146,702. Olive, for "A funeral frame for photographs."—Dated 22nd February, 1882. Class 20.

THE PHOTOGRAPHIC EXHIBITION.

[*From the* Times.]

Just thirty years ago (in December, 1852) the first exhibition of photographs over held was opened by the Society of Arts at their house in the Adelphi. In the following year the Photographic Society was founded, that Society whose annual exhibition opened on Monday last at the Gallery of the Society of Painters in Water Colours, Pall Mall. It would be hardly too much to say that between the dates of these two exhibitions, the art of photography as we know it has grown up. In 1852 photography was passing from the range of scientific experiment to practical use. Fox Talbot, at the request of the Earl of Rosse and the President of the Royal Academy (Sir Charles Eastlake), had just consented to forego, for the benefit of amateurs, the patented rights in his "calotype" process, of which an unsuccessful action at law a year later entirely deprived him. Collodion, introduced by Archer a year before, was coming into use, but principally for portraits, for most of the pictures shown at the Society of Arts Exhibition were produced by the transparent paper negatives of the calotype process. But Archer's beautiful discovery soon drove the waxed paper from the field, and for long all photographs were taken on a film of moist collodion. Still, there were drawbacks. The necessity that the film should be fresh and moist, in order that it might absorb into itself the sensitive salts of silver from which the picture was to be built up, obliged the landscape photographer to carry with him a cumbrous appurtenance of chemicals and apparatus, together with a dark chamber or tent, in the recesses of which the various manipulations had to be performed. Hence arose a demand for a sensitive plate which could be prepared at home, taken to the spot where the picture was to be produced, exposed, and brought back after exposure for the final operations, by which the invisible or latent image is made visible and permanent. Various applications of collodion and albumen were tried, with considerable success, the only drawback being that the plates were "insensitive." They required a prolonged exposure to the rays of light before the picture was formed. Exposures were measured in fractions of the hour, instead of in fractions of the minute, or, as is now frequently the case, in fractions of the second. At last the idea occurred of employing gelatine as the vehicle for the haloid salt of silver, and the result was the production—after many experimentalists had expended much trouble and time in the research—of the wonderfully sensitive plates now in the hands of every photographer. It was some time before the photographic world would trust itself to gelatine, but when the change once began it was very rapidly completed. This is clearly shown by a single fact. In the exhibition catalogue of two years back a special note was added to the entry of any picture produced by a process other than wet collodion. Now it is assumed, unless otherwise stated, that the negatives of all the pictures shown were taken on gelatine dry plates.

By the introduction of the new process, the powers of the photographer have—as is sufficiently well known—been very largely increased. The portraitist can catch fleeting expressions. He can render with some approach to truth the mobile features of infancy. He may even dispense with that appalling, if harmless, implement with which he was wont to clamp his victim's head into a fixed position. The landscape photographer can render effects once entirely out of his reach. He can truthfully represent the clouds of a stormy sky, or the foam of a breaking wave. He can introduce figures without much risk of their spoiling his picture by walking out of it in the middle of the exposure. The photographer who cares neither for portraits nor landscapes can, if he so pleases, invade the domain of the painter and depict for us, more or less faithfully, according to the skill of his models, scenes of domestic, rural, or sea-faring life. Even objects in rapid movement can be caught. In so short a time can an image be impressed on the sensitive gelatine, that the displacement of moving objects during that time may be insufficient to affect the sharpness of the picture, and we got representations of express trains, flying birds, race-horses at full speed, and the like.

The present exhibition affords a good test of the manner in which these increased powers have been employed, and it is a most interesting and important point to consider whether, while the scientific processes of photography have been so greatly and so rapidly improved, there has been any corresponding advance in the actual results. That artistic progress should keep pace with technical is no more possible in photography than in any other art, but some advance might have been expected. It is, however, difficult to find evidence of such improvement, at all events as regards pictures of the highest class. That the general average has been considerably raised is, on the other hand, equally certain. There are now in the Pall Mall Gallery very few pictures that do not possess considerable merit, either technical or artistic; there are many showing evidence of both qualities. This is doubtless to a large extent due to the fact that modern inventions have smoothed the photographer's path for him. The manufacture of photographic plates has become a commercial business. They are made on a large scale, with regularity and uniformity, so that, despite occasional disappointments, the purchaser from a respectable dealer can rely on getting an article varying as to excellence at all events within not very wide limits. The manipulation, too, is by no means difficult, and, indeed, a fair amount of success may be attained by mere rule-of-thumb work. This is the case with very many amateur photographers. They work away, spoiling a good many plates, getting a good many average pictures, and every now and again turning out a perfectly successful one. The successes are shown, the failures are forgotten. Like a bad shot, who forgets how many cartridges he started with, our photographer neglects to count the number of plates his maker has supplied him with. More than this, the amateur may, if he chooses, send the exposed plates back to the maker to develop and print from, his share in the production of the finished picture being confined to the choice of a suitable subject and a good point of view. The natural result is that the process of picture-making is considerably simplified, and an average standard of excellence, such as may be expected in an extended manufacture, is secured.

But, turning to the finest specimens of photography now on the walls of the Gallery, it is hardly possible to avoid the opinion that, while recent progress has rendered more easy the attainment of good results, it has not improved the results themselves. There is no special new feature among the pictures of this year, nor are the best of them better than their predecessors of any year for some time back. Two years ago, when "instantaneous" work was more or less of a novelty, the walls were hung with pictures of express trains and other objects in motion, only less violent. The interest attaching to the first of such pictures was very great; the scientific value of the power they demonstrate is considerable, but their artistic value is nothing. The human eye is not so constituted that it can follow rapid changes of position in the object observed. The image formed on the retina is retained for a certain interval, and is blended with the images of the previous and following instants. This generalized impression is what we see, and this it is or should be the effort of every artist, painter, or photographer to represent. The attitudes of a galloping horse as shown by the camera are not the same as those the eye perceives. The photographic lens does not see in the same way as the eye. For artistic purposes, it is no more true to present us with a picture of a horse which the eye cannot recognize, than it would be to give us a likeness of a friend whose skin should be represented as it appears under the microscope. As actual facts, both are equally true; as representations of what we see, both are equally false. This is now evidently recognized by photographers, for there appears to be nothing in the exhibition moving faster than a yacht or a steamer. Here the waves, the wake of the vessel, the broken water from the paddles, sufficiently convey the idea of motion, and we get what is at once a good picture, and a true representation of fact. Few more beautiful examples of what can be done in photography are to be found than some of the sea pieces with yachts and shipping sent to the present exhibition by Messrs. Sutcliffe, A. Johnson, S. Conway, M. Whiting, and others.

Another class of subjects which cannot well be treated, except by the use of gelatine plates, is that comprising groups of fishermen, reapers, haymakers, and the like—pictures, that is to say, in which living figures form a principal part. It is true that to a limited degree such subjects have always been capable of photographic treatment. Mr. H. P. Robinson has long enjoyed a well-earned reputation for his rustic groups and scenery. But, truth to tell, there is always a terribly artificial look about Mr. Robinson's groups of picturesquely-attired maidens in more or less conventional attitudes; and clever as the groups are, they always seem to carry with them a taint of the theatre into the woods and fields, where we find them planted. This objectionable feature is emphasized when, as in the present exhibition, half-a-dozen such pictures are placed together showing, apparently, the same girls in the same dresses, enacting different little rustic dramas in different scenes. Decidedly the best of these is the one to which the judges have awarded a medal, and it is just the one in which the figures are most carefully subordinated to the surroundings, seeming, as they do, to give life to a scene which, without them, would have lost half its interest. No such fault can be found with the pictures of the other exhibitor of this class, who has received a medal, Mr. Gale. He has taken his subjects where he found them; a little judicious grouping and a quick plate have done the rest. Those who deny the artistic capabilities of photography should be made, before again expressing an opinion, to study carefully the pictures sent to the exhibition by Mr. Gale.

The landscapes are as good and as interesting as ever. They come, as usual, from all parts of the world. From India, New Zealand, Palestine, South Africa, the far North, and elsewhere, we get views which have more than a photographic or pictorial interest. Mr. Donkin sends several of his well-known Swiss views. He seems as yet to be the only member of the Alpine Club who regularly carries a camera among the higher Alps. Another series of Swiss views expected from one of our cleverest professional landscape photographers, Mr. England, was not completed in time for the exhibition, or we should have had some illustrations of the new St. Gothard route to notice.

Among the portraits there is really nothing calling for special remark. It was announced that the judges would have placed at their disposal three medals to be awarded for portraiture, but of these only one has been given. It has been taken by Mr. Byrne for an excellent case of children's portraits.

A medal has been deservedly awarded to Mr. H. Stevens for a singularly fine series of flower studies, a reward to which the greater interest attaches from the fact that its winner has, if we are not misinformed, only taken up the active practice of photography within the last year.

There are many other pictures to which it might be desirable to draw attention, but they must be left for visitors to the exhibition to discover for themselves. Some few, however, cannot be passed over without mention. First among these may be placed Mr. Grant's photographs taken on board Mr. Leigh Smith's yacht *Eira*, during her cruise to Franz Josef Land in 1880. Then come some views of Captain Abney's, taken in the Alps, near Zermatt, and showing the enormous difference in the photographic quality of the light reflected from the sky at considerable altitudes (nine to ten thousand feet), and that reflected at lower levels, the photographic power of the former being only a twentieth part of that of the latter. A photograph taken by Mr. Shadbolt from the car of a balloon at the height of 2,000 feet, showing the streets and houses below, is also curious, though to those who do not know the difficulties attending this class of work it is a little disappointing.

[*From the* Daily News.]

The Exhibition of the Photographic Society of Great Britain, now open at the Gallery of the Royal Society of Painters in Water Colours, marks, as distinctly as such things can be marked, an epoch in the history of sun-printing. Without dilating on technicalities, it may be briefly observed that a great advance has been made during the last two years in the process of photography. Ever since photography became popular, the main conditions of the operation have remained almost identical. Whatever the subsequent treatment might be, whether silver printing, autotype, heliotype, or Woodburytype, the primary operation depended on the figure received on a plate of glass coated with collodion, and rendered sensitive by a bath in salts of silver at the last moment. This process is now known as that of the "wet plate," and required an appreciable time for exposure and development, causing a certain difficulty in the case of ships crossing each other, of irritable sitters, and of breezy landscapes. When collodion was well established as the medium by which nitrate of silver could be made to produce a sun-picture, gelatine appeared as a rival medium or vehicle for the employment of silver salts. No sooner was this found out than gelatine displayed qualities not possessed, so far as experience has demonstrated, by collodion. It was found to be in sensitiveness, and consequent speed of work, when compared with collodion, as a racer to a common cab-horse. This extreme sensitiveness made the gelatine process very difficult at first, but all drawbacks are more than compensated by the faculty of a properly prepared gelatine plate taking its impressions while dry, a condition invaluable in field work or on a voyage. The dry plate, being already sensitive, only requires to be kept carefully from the light, and will do its work at any moment without preparation. This convenient portability, and the speed with which pictures may be taken, drew attention strongly to the dry plate method, which at length seems to have proved so far satisfactory to the general body of photographers, as to secure adoption for everything but studio work under exceptionally favourable circumstances. The result of this revolution in the ordinary practice of photographers is displayed this year, and shows some striking results, especially in the department of marine photography. Perhaps the council of the Photographic Society may be said to err in the direction of hanging too many works, but it must be conceded that a large proportion of the photographs of this year are remarkable for the evidence they bear of rapid work. There is a prominent exception in the case of the School of Military Engineering, which contributes some fine views of "Lynmouth and the Valley of the Lynn," taken by the wet collodion process; but the great majority are "dry plates," and some like those taken on board Mr. Leigh Smith's yacht, the *Eira*, by Mr. Grant, impossible by any other plan. A medal has been assigned to Mr. Grant, also to Mr. J. G. Horsey for some beautiful views in Surrey and Berks, and to Mr. H. P. Robinson for his fine series of figure subjects taken by the gelatine and collodion processes. Some views in Tahiti by Colonel H. Stuart Wortley have been well produced by the Autotype Company, whose enlargement-pictures in permanent carbon also possess great merit. Particular mention is also due to Mr. Henry Stevens' pictures of orchids and other flowers, and to a charming piece, "Gloamin," by Mr. Adam Diston.

[*From the* Morning Advertiser.]

It would be unreasonable to expect a pronounced development in the province of photography at each of the annual exhibitions of the Photographic Society of Great Britain. A few years ago the gelatine or dry-plate process was introduced, and it is worthy of remark that nearly all the original negatives of the pictures exhibited this year were taken on gelatine plates, the exceptions being so few that they alone are noted in the catalogue. The period of transition having reached its fulness, for a time there is little to indicate any new departure, although naturally certain modifications in the now almost universally adopted method of procedure are presented by the photographic manipulator. The exhibition, is remarkable for its large proportion of amateur productions, and it is satisfactory to find that these are by no means deficient in artistic merit. The non-professional photographers particularly excel in landscape work, of which there is a large variety; while the professional likeness-takers have fewer exhibits than usual. This is not altogether to be regretted, for there is at best a wearisome monotony about their productions, and in many examples the negatives have undergone so much artistic sleight-of-hand in the shape of "touching up," that they are as much the product of the pencil as of the camera. In other examples the sitters are apt to look like lay-figures, wanting in freedom, and painfully suggestive of their cognizance of the fact that they are undergoing some kind of operation. This sort of work has happily been almost weeded out, so far as this exhibition goes, and what of portraiture remains shows high artistic training and the acme of chemical manipulation. It may be noted that the specimens embracing the grouping of figures in selected landscapes are remarkably successful, for the most part eclipsing previous efforts in this direction. This improvement is unquestionably the natural result of the process of instantaneity. Formerly the figures in a landscape or piece of architecture would be gazing in one direction, and that towards the photographer; but now they need not trouble themselves to pose, but may pursue their labours, while by means of the instantaneous shutter the operator is effigiating them as with a lightning flash on his sensitive plate. A capital example of this is afforded in Mr. John G. Horsey's "Views in Surrey and Berks" (60), in one of which the natural attitude of the reapers in the harvest field is specially commendable, while the extent of country beyond forms a charming feature of the picture. For general excellence this series of views is unsurpassed. Mr. Horsey has been awarded a medal, as also has Mr. Frank M. Sutcliffe, of Whitby, for studies of fisher folk and fishing boats, all of which are natural in the extreme, and could only have been limned by the instantaneous process in skilful hands. Mr. A. Johnson, of Wick, has been similarly successful in his frame of "Studies of Fishing-boats from the Pier-head, Wick" (80), in which the movement of the sea has been caught with the happiest results.

Another interesting series of photographs, taken under circumstances of the utmost difficulty, is exhibited by Mr. W. J. A. Grant, Hillersdon, Devonshire, and brings vividly before us reminiscences of the Arctic regions during the cruise of 1880 to Franz Josef Land, the views being taken from Mr. Leigh Smith's yacht *Eira*. These also have been awarded one of the Society's medals. They are numbered 53 in the catalogue. Mr. H. P. Robinson, of Tunbridge Wells, contributes, too, some remarkably good work, showing thoroughly artistic grouping of appropriate figures in well-chosen landscape views, on 15in. plates, by the gelatine and collodion processes, the superadded skies being clear, and harmonising both in tint and form with the more material parts of the subjects. No one but a real artist could have produced examples of such surpassing loveliness. Skies are usually printed separately from the landscape, and it is not always that the particular cloud-form or effect of atmosphere selected adapts itself kindly to the foreground objects and distance; but Mr. Robinson is too appreciative and refined an artist to err in this respect. His compositions are unified, and only an expert would imagine that they have been built up by separate printings, so perfect is the arrangement, so complete the amalgamated parts, whether of sky, landscape, buildings, or figures. A medal has been very properly adjudged for these triumphs of photography.

The Autotype Company, 74, New Oxford Street, are as usual large contributors, and amongst the most noteworthy of their exhibits are the reproductions by Mr. Sawyer's collotype process, by means of which drawings in monochrome and engravings are printed in *fac simile* from a press, without any necessity for sunlight. They show in this process a frame of elaborately designed fans from the cabinet of Mr. Robert Walker, of Uffington, in which the most delicate tracery is clearly brought out (97). They also exhibit a *fac simile* of the "Codex Alexandrius," containing the New Testament and the Clementine Epistles, the original of which is in the Royal Library of the British Museum; also a copy of Magna Charta, and other ancient manuscripts published by the Palæographical Society; and a frame of "Views in Tahiti" (147), from negatives by Colonel H. Stuart Wortley, for the book on Tahiti, by Lady Brassey, now in the press. The collotype process seems eminently adapted for illustrations, the design being printed direct on the paper, leaving margins for binding. The Autotype Company has long been celebrated for its carbon enlargements, and they display in this exhibition a view, "Near the Dargle Rock, County Wicklow" (125), from a 12 by 10 negative by Mr. Payne Jennings, the enlargement being of the size known as antiquarian, and untouched. They have also good examples of portrait enlargements from cabinet negatives, showing how completely the process is under control.

Mr. Edmund Hyde is the exhibitor of two pretty views in Devonshire, "Rushford Mill" and "Lustleigh Village" (157 and 158), which are enlargements from negatives, the prints of which are exhibited on the screen (426). The panel and cabinet portraits of children by Messrs. W. J. Byrne and Co., of Richmond, have been awarded a medal which they richly deserve, for anything more exquisitely beautiful as photographs could not be conceived.

Mr. Robert Faulkner, Baker Street, exhibits a number of instantaneous photographs of children (184), the like of which, however, has been seen before; and the same observation will apply to the portraits printed in carbon, soft and charming as they are, of the sons of the Rev. Canon Farrar (185). By this process of printing a variety of tints may be obtained, and the example in question is produced in the red chalk or Bartolozzi style.

The portrait studies (220) of Mr. Abel Lewis, Douglas, Isle of Man, are good specimens of the art, and have gained a medal. A great advance has been made of late years in figure-subject pictures, and this year this class of work forms one of the most satisfactory features of the exhibition. "Cherry Ripe" (231), by Messrs. J. Chaflin and Son, Taunton, and "Homeward" (239), by Mr. Robert Slingsby, Lincoln, both have received the Society's medal, and no one will venture to deny that they thoroughly deserve the honour. The "Sisterly Intercession" (240), by Messrs. Chaffin, has dramatic power of no mean order, the attitudes and expressions of the three *dramatis personæ* being natural and unstrained. Mr. Joseph Gale, Long Lane, Bermondsey, an amateur, has been awarded a medal for studies of Cornish fisher folk (307), the great merit of which is their spontaneity, the grouping being happy, and the subjects selected with tact and judgment. There are some clever studies of flowers (323), by Mr. Henry Stevens, Addleston, Surrey, which have gained honours. A charming little figure subject called "Gloaming" (391), by Mr. Adam Diston, Leven, Fife, is deserving of high commendation. It represents an old lady about to light a paraffin lamp, and the sense of approaching night is by judicious toning cleverly conveyed. Mr. Diston has also been awarded a medal.

Amongst the amateur contributors Mr. J. W. Boord, M.P., holds a conspicuous place, his frame of "Marine Views" (462) being highly creditable productions. There is some good landscape work by the Photographic School of Military Engineering, Chatham, by Mr. Ernest H. Goold, Mr. T. M. Brownrigg, Mr. E. Fox, Mr. H. Mansfield, Mr. F. Hollyer, and others. Photographic apparatus and chemicals are displayed on the table and in the room by the different makers, and professionals and amateurs will doubtless find this not the least interesting part of the Exhibition. It may be mentioned, in conclusion, that the Council have resolved to keep the Exhibition open till November 16th; and that as a new feature, and one likely to prove of great advantage to those interested in photography, the Gallery will be open every Monday, Wednesday, and Saturday evening, at a reduced charge, the object being to enable persons whose stock in trade consists in no small degree of sunlight to visit the Exhibition without sacrificing that to them indispensable natural commodity.

[*From the* Morning Post.]

Though photography has already advanced far on the road to perfection, it does not seem to have made any marked progress towards that desirable goal during the last few years. The quality of the collection opened for private view on Saturdap is, taken in general estimate, good, but it is certainly no better than that of its immediate predecessors. The art seems stationary. A remarkable feature of this Exhibition is the vast preponderance of dry-plate photographs. Wet collodion has all but disappeared. Whether a more vigorous negative and greater delicacy of detail have been obtained under the "dry" system is perhaps a mootable point, which, however decided, must still leave to that process the signal advantage that it is less dependent than any other upon variations of temperature. It has been found that in the dry plates the films retain their smoothness and evenness of texture in all climates. The best works in the Gallery are the landscapes, sea-views, and flower pieces. Of portraits there is a fair, though not abundant, display; but the fancy figure subjects grouped to the semblance of *genre* pictures too often want strength of character and grace of composition. From the censure must be excepted "Cherry Ripe," by Messrs. J. Chaffin and Son, a charming little picture, fine in tone and full of expression. Among the most attractive things in the collection are Mr. H. Stevens' flower subjects; Mr. M'Leigh's "Misty Morning on the Wear;" Mr. W. J. A. Grant's photographs taken on board Mr. Leigh Smith's yacht *Eira*, during the cruise to Franz Josef Land; Messrs. Byrne's panel portraits of children; Mr. H. P. Robinson's "Wayside Gossip;" Mr. Frank Sutcliffe's seaside scenes; Colonel H. Stuart Wortley's views in Tahiti, for the book on Tahiti, by Lady Brassey, now in the press; Mr. J. A. Kay's portraits of ladies; and the various views of picturesque scenery by Messrs. Trenemen, W. K. Burton, Matthew Whiting, J. G. Horsey, E. Hyde, A. Pringle, E. Loelig, and the Photographic School of Military Engineering.

Correspondence.

OBERNETTER'S NEW EMULSION.

Sir,—I am not in the habit of publishing my failures, but the notice of Obernetter's new method recalls the fact that some two years ago I conceived an idea very similar to that of Mr. Obernetter, *i.e.*, to form the bromide in solid gelatine.

My experience ran thus. My bromide salt was dissolved in the gelatine in daylight, and when this was set, the silver solution was poured on the top. I left this for about three weeks; no combination took place beyond a very thin layer of bromide about the thickness of tissue paper, formed on the top of the set gelatine. From that experiment I came to the conclusion that a combination would not take place, although in this case I thoughtfully put the denser liquid (the silver solution) on the top, thinking it would dialyse through the gelatine. I fail to see, without having tried any further experiment, how that by a reversal of the operation a successful issue would result. I have published the fact that bromide of silver formed in an excess of silver is far more sensitive than when made in excess of bromide: its extreme sensitiveness, I have no doubt, caused many to fail. If bromide of silver is formed cold, and without ammonia, and when set is immersed in a solution of—

Ammonia carbonate ... ... 1 ounce
Water ... ... 20 ounces

for twelve hours, it will increase in sensitiveness very much; of course it requires washing in the usual way.

Granularity in bromide is not a necessity to sensitiveness; a sensitive fine bromide gives density; on the contrary, a granular bromide gives thinness. It may not be generally known that ammonia will not ripen gelatino-bromide emulsion nearly so much when the nitrates are removed.—Faithfully yours, A. L. Henderson.

PHOTOGRAPHIC NUISANCES.

Sir,—For some time past I have been thinking of writing to you respecting certain photographic nuisances, and now that "Exact Measure" has commenced, I will continue a little complaining of the nuisances connected with the use of commercial dry plates. I have been a user, and often a maker of gelatine plates ever since Mr. Swan advertised his first plates in the News, and must say that nothing has ever proved such a nuisance to me as commercial plates have done. It is only occasionally that I am bothered with plates that are too large, although now and then a pair of plyers are required to take off an extra width at one corner; but the greatest nuisance has been a too thin and uneven coating. I have not confined myself to one maker, but have had plates from at least ten different makers. Some have had only a few faulty coated ones, others have had a general thinness, and one maker's plates have proved very bad, not more than one dozen out of the last half-gross being at all fit to put into the dark-slide. All the others are so thin either at one end or all over, that they can be easily seen through, and as these plates are very rapid you may guess what sort of negatives they yield.

The next serious nuisance is that makers will label plates ten or twenty times, when they prove only about three or four times as rapid as a good collodion plate; also plates of different batches, but labelled the same, prove very different, not only in rapidity, but in other qualities. A short time since I was out working three sizes of plates, all labelled alike, but while two sizes worked with quite clear shadows and full density, the other size was about twice as rapid, tending to fog and thinness, and gave a halo around any extra light. As a rule, the emulsions used on the plates have proved excellent, but occasionally a batch is inclined to fog, or does not give a sufficient range of tones, so that if they are exposed for the shadows the high lights have no modelling; but if these plates are about half-timed for shadows, the lights will be round, or in the case of landscapes or architecture, outlines of skies will run into the subject like a fog. I have often written to the makers of these plates in as kind a way as I can, as I should much rather get good plates than grumble about indifferent ones; but, with one honourable exception, I have always been told that no one else out of their many customers ever find fault, but are continually praising the plates and sending fresh orders. The exception above-named was a case where six dozen half-plates proved a great trouble from too thin and uneven coating. The maker sent me four dozen quarter-plates as some recompense, although stating at the same time that my complaint was quite alone. But, unfortunately, my negative box contains the proof of their thinness, especially at one end of the plate; sometimes, when the first two or three dozen of a gross has not pleased me, I have returned the remainder, and some fresh ones have been sent, but always with the information, soon or late, that those returned turned out "simply perfect," or "splendid."

But just now I am come to a standstill with one house. Several weeks back I sent them an order for plates, which, after a considerable delay, was attended to; but the plates proved very badly coated, so that four or five of each dozen were useless. When I had had enough of them, I sent the remainder back, stating my reason, but no notice was taken; so in about six weeks I wrote to enquire if the plates and letter had reached them, when in about ten days a letter arrived stating that a parcel of plates were sent to replace those returned, and that they were from a splendid, well-tested batch which had given great satisfaction to all who had used them; but alas! they were worse than the first; for, as I said at the beginning, out of six dozen there were not more than one dozen usable. After seeing the first dozen, I wrote to the maker stating the case, and he wrote back quite sharply, calling my complaints "totally unaccountable," and stating that he used those returned before, and "found them most splendid," and asking to be obliged by the return of the other five dozen unopened, when cash to their value would be remitted. Now, as I thought it very strange that I should always manage to open the only faulty packets (according to the makers), I determined to see what the other five dozen were like. So one night after work I opened the lot, and did not find six worth exposing. They were all very thinly and unevenly coated, most of them can be easily seen through if held between the eye and window of dark room, and are now in one lump in my cupboard as witnesses to the carelessness of their maker; and if I hear of any technical meeting in London this year, I shall most likely submit them to the judgment of the meeting, if such proceeding is in order.

Now that I have had a good grumble, I hope someone else will take the trouble to do likewise, for it is not likely that I am the only one to suffer, even if I am "the only one to complain," as the makers tell me. If any one should require proof of what I have written, I can furnish it, and should be happy to send a specimen of the half-gross named above to any one interested.—Yours truly,

E. Williams.

A PROPOSED PIRACY SYNDICATE.

Dear Sir,—In the later development of photographic publications, there is perhaps no greater source of annoyance or loss to the successful producer of art studies, &c., than to find the result of his labour copied and sold about the streets by hawkers, and, in many instances, by well-to-do tradesmen, for a merely nominal charge. As in many cases the photographer does not know how to stop these piracies, and may be unable to afford either the time required to enquire into the matter, or the necessary expenditure attending the prosecution, could not some sort of photographic defence association be formed, to be managed by an honorary committee, and employing a secretary and solicitors well versed in matters pertaining to copyright, which should contain within its registered members all photographers who would care to join by the payment of, say, £1 1s. per annum into the general fund? Such a society could take in hand the case of any member whose registered work had been pirated, and by some division of damages, when obtained, render itself self-supporting. In this manner the society, I think, would succeed in doing away with piracies, and would doubtless in most instances compensate those on whose behalf action was taken.—I am, your obedient servant, W. E. Downey.

Proceedings of Societies.

South London Photographic Society.

The opening meeting of the present session was held on Thursday evening, the 5th inst., the Rev. F. F. Statham, M.A., President, in the chair.

The minutes of the previous meeting were read and confirmed.

The Chairman expressed regret at seeing so small a gathering at the opening meeting of the session, which he attributed to the fact of several members being absent from town, but hoped it would not prove to be a precedent with regard to the rest of the session. He announced that at the next meeting nomination must be given in for election of officials of the Society in December.

Mr. Emery then read a paper on the "Decoration of Pottery by Photography" (see page 612).

The Chairman thought the members were very much indebted to Mr. Emery for giving them the benefit of his valuable experience, which he thought contained the germs of what might prove to be a very useful process.

Mr. A. L. Henderson thought the difficulties in the process were such as photographers might overcome; the depth of colour in the examples shown seemed to be quite sufficient, and he could not see any more insurmountable obstacle in the process than that which might proceed from the opposition shown to the process by painters on porcelain.

Mr. Emery, in answer to a question as to the kind of ink used, said the oil used, in its cool state, was of the consistency of bird-lime. All the colours used must have a mineral basis, but they were not expensive, none of them costing more than 8/- per lb.

Mr. Brooks asked if it would be possible to use a gelatine film inked with colour, take an impression off it on to the piece of pottery, and then continue inking the film for successive pieces.

Mr. Emery replied that a flexible typograph, something like the relievo impression Mr. Brooks alluded to, could be made use of, as, for instance, the india-rubber stamps now so much in vogue. He said that they could and did use that kind of thing for putting stamps on the back of earthenware; but that their best specimens were produced from engraved copper plates, and the colour left upon the base of bisquit earthenware when washed away would be sufficient for the base of an electrotype mould.

Mr. Henderson thought they might employ the platinic salts in lieu of other pigments. In producing some thousands of enamels during the year, he used platinic salts.

Mr. Emery said that the difference between Mr. Henderson's artistic work, and what they required to produce in pottery, was a wide one. They sold twelve plates for 2s. 6d. By producing intaglio plates in any way, provided only the impressions were sufficiently deep to contain the ink, they obtained what they needed.

In reply to Mr. Brooks' question whether a gelatine intaglio would be sufficient, Mr. Emery said that it would not, as they must have something that would bear rough usage.

A vote of thanks was passed to Mr. Emery, who was invited by the Chairman to be present at the technical meeting in November.

Mr. E. Dunmore next read a paper entitled "A Resumé of the Past Season" (see page 613).

The Chairman, referring to Mr. Dunmore's remarks with regard to gelatine and collodion respectively, said he quite agreed that quality was often sacrificed to rapidity, and that this would probably to a certain extent continue until the mania for very rapid plates, which was the outcome of the gelatine process, had somewhat subsided.

Mr. Brooks was of opinion that the inferior results obtained from gelatine plates were, in many instances, due to development.

Mr. Dunmore said some of the emulsions used would not give sufficient gradations of tone, which was the fault of the particular sample used.

Mr. W. Brooks next read a paper entitled "A Visit to West Cornwall" (see p. 614).

The Chairman remarked that the Royal Cornwall Polytechnic Society seemed to stand foremost among such societies in Great Britain in encouraging photographers to send in their works, both for disposal and for competition for the prizes offered, in the same manner as the paintings sent to the Royal Academy.

Votes of thanks having been passed to Messrs. Dunmore and Brooks for their papers, the meeting closed.

London Provincial Photographic Association.

At the meeting held on Thursday, the 5th inst., Mr. B. B. Prestwich in the chair,

Mr. Henderson showed a print of a group of ladies and gentlemen from a negative taken in Paris by the light of a number of Chinese lanterns, the exposure being about fifty seconds.

Mr. Debenham passed round some negatives that had been marked by rain, but on flooding them with rainwater the spots almost entirely disappeared.

Mr. Haddon said he found that either rain, distilled, or tap water would give these markings, but if the negative was soaked in tap water they were then only visible by reflected light.

Mr. Debenham also showed a negative with a small semi-transparent spot enclosed in an opaque spot in the film. In the course of a lengthy discussion which ensued,

Mr. Brown attributed the spot to a small piece of glass which had lodged on the plate, and stated that he had noticed deep holes or pits gradually formed in solidified gelatinous solutions if kept for any time, and attributed it to particles of matter which had fallen on the surface.

Mr. Haddon had noticed the same, but attributed it to a fungoid growth.

Mr. Henderson showed the draining-board alluded to by him at the last meeting, and it was suggested that brass nails should be substituted for the iron ones.

It was announced that arrangements had been made for the meetings of the Association to be held at the Mason's Tavern, Mason's Avenue, Basinghall Street, E.C.

Edinburgh Photographic Society.

The ninth ordinary meeting of the Society was held at 5, St. Andrew Square, on the evening of Wednesday, the 4th inst., John Lessels, Esq., President, in the chair. There was a very large attendance, the room being inconveniently crowded.

The minutes of the last meeting were passed unanimously, and the following gentlemen admitted ordinary members:—Messrs. Robert Wright, John V. Gregory, and James Dick.

Mr. William Crooke read a paper (see page 615), specially intended for the benefit of beginners in the practice of photography, and illustrated by practical demonstrations of the development of gelatine negatives, and showing his mode of securing uniformly good results when the negatives were known to be correctly exposed, over-exposed, and under-exposed. Proceeding to develop, he said:—The solutions required, and which for convenience sake we shall designate A, B, C, D, E, are as follows:—

A.—Pyrogallic acid	30	grs.
Water	10	oz.
B.—Liquor ammonia (s. g. ·880)	1	oz.
Bromide of potassium	1½	dr.
Water	2	oz.
C.—Liquor ammonia (s. g. ·880)		
D.—Bromide of potassium (sat. sol.) ...	2	dr.
Water	2	oz.
E.—Liquor ammonia	1	dr.
Water	2	oz.

Plate No. 1, having received the proper exposure, should be developed by first soaking it for about a minute in two ounces of solution A; then, by adding half a dr. of B, the image will soon make its appearance. When the details are almost out, add another half dr. of B; in about thirty seconds the image will have received its full density; then wash for a few minutes previous to fixing. Plate No. 2 has received three times the correct exposure, and must first be immersed in two ounces of D for a few seconds; then pour off, and apply two ounces of A, half a dr. of B, and half a dr. of D. When the image has appeared evenly over the plate, as much pyrogallic as can be heaped on a florin should be added, and after a few seconds have elapsed, add 1 dr. of B, keeping the plate in motion until the full density is attained; wash and fix as before. Plate No. 3 got only half the exposure necessary, and consequently will need immersion in two ounces of E for about a minute; this is poured away, and two ounces of A, with 1 dr. of B, added; when sufficiently dense, wash off. Plate No. 4 is similar to 3 in point of exposure, but shall be treated in a slightly different manner. Immerse first in two ounces of A for a few seconds, add half a dr. of B, then 1 oz. of water, and last of all, 1 dr. of C in 1 oz. of water. The plate must be lifted while the latter solution is added, for if poured on any one part of the plate it may cause fog.

Fixing Solution.

Sodium hyposulphate (sat. sol.)	1	part
Water	4	parts

Mr. N. Macbeth, R.S.A., said that amateurs or others who were now commencing to study photography had a great advantage over those who commenced in the old wet-plate days. Then the greatest difficulties were encountered in the preliminary processes of preparing a good sensitive plate, involving many details, any one of which being faulty necessarily interfered with the results; now all these troubles were non-existent, and the difficulty only began at the development. He advised some mechanical appliance to correctly indicate time of exposure, as the agitation of the moment often caused a mental incapacity to appreciate correctly the length of time given, and thus an element of uncertainty was introduced.

Mr. Turnbull said he was not too old to learn, and he had noticed a few hints in Mr. Crooke's communication that he should adopt in practice. He, however, advised Mr. Crooke to employ rapid rectilinear lenses for interiors instead of doublets, as recommended, as, under all conditions, the correctly constructed rectilinear lens gave straight lines if the camera were not tilted.

Mr. W. Nelson said that he had found a whistle sharply blown induced a most acceptable pose in horses, and when it was necessary to take portraits in the open air, one of the best things to aid in securing desirable relief by shadows was an ordinary umbrella.

Mr. W. Hulme considered a simple drop or spring shutter the best for every-day use.

Mr. Lessels always used ferrous-oxalate developer—he found it much more manageable in his practice than the alkaline. He chiefly employed his camera to secure architectural details, and occasionally he was reluctantly compelled to tilt his camera. In such a case he found the double swing-back of the very greatest value in lessening the distortion of the image. In the focussing he always compared, when possible, some perpendicular line in the subject with perpendicular lines drawn on the focussing screen. For architectural interiors he advised a long exposure and small stop, with selection of time of day to secure the most appropriate light for the special subject.

Mr. Pringle found difficulty in securing harmony when much foliage occurred with architectural subjects. He greatly appreciated Mr. Crooke's advice in regard to the taking of portraits in ordinary rooms.

Mr. Crooke said that his experience led him to prefer exposure by hand in all cases, except when the extremest rapidity was absolutely necessary. A hearty vote of thanks was accorded to Mr. Crooke.

Mr. Alexander Mathieson directed attention to the splendid display of photographs which adorned the walls of the room, the work of members of the Society during the past season. He said that while a general invitation had been sent out to all the members, the exhibited pictures were produced by those members who had constituted themselves into the Edinburgh Photographic Club. Very great good had resulted from these meetings, as on each night demonstrations and discussions of an eminently practical character occupied the meeting. This made the evening meetings extremely interesting and profitable, hence it very rarely happened that any member of the Club was absent; in fact, the members felt they could not afford to lose the advantages of attendance. In consequence of the limited capacity of the room, the number of members was of necessity limited, but when vacancies occurred he advised the members of the Society to show themselves worthy of election by bringing forward practical matter at the ordinary meetings of the Society, and by entering heartily into the discussions. Each member of the Club was expected to supply at least one specimen of his work each season. These specimens were exhibited on the walls that night, and at the next meeting of the Club they were to be exchanged among the various contributors by ballot.

A hearty vote of thanks was accorded Messrs. Jameson and Matheson for the great trouble they had taken in carrying through the necessary arrangements for the display.

Mr. Bashford intimated that the committee for opening the packages sent in for the International Competition would meet on Monday the 9th inst., in the large room belonging to Mr. Andrew Elliot, Princes Street, who had most generously lent it for the purpose, and where the pictures would be on exhibition first to the members and then to the public. He said the council in instituting this competition, bearing in mind the extreme difficulty they have experienced in obtaining pictures suitable for presentation, and after the most laborious endeavours finding that the selected prints have not on all occasions given the general satisfaction that is desirable, have determined to leave the selection of the presentation prints for the next five years in the hands of the members themselves, so that the pictures deemed the most acceptable shall unmistakably be selected.

It is believed that this competition is the first of its kind, and the council is specially anxious that the awards shall be strictly in accordance with the popular acceptability of the pictures; hence they could not leave the awards in the hands of one or two experts or judges.

Every member will be entitled to indicate the five pictures in the Exhibition which he shall feel the greatest desire to possess, and it is particularly requested that each member will place the numbers of the pictures he selects in the spaces on the voting paper in what he considers their order of desirability. The committee of scrutineers will be governed by the number of votes awarded to each picture, and their positions on the voting paper. Voting by proxy will not be allowed.

Full details will be found on the voting papers, which members will receive by post, together with other necessary information.

Mr. Wane exhibited a camera that had been lent for the purpose. It was devised to carry eight sensitive plates, so arranged that any plate could be exposed and mechanically adjusted to the plane of the focussing glass by means of a dial. It appeared very compact, simple, and not likely to get out of order. A tripod stand was also shown; each leg was composed of a three-draw telescopic brass tube, with screws to adjust the legs at any length within the maximum.

After a vote of thanks to the chair, the meeting adjourned, the exhibition of pictures keeping members till a late hour.

Sheffield Photographic Society.

The above Society held their annual meeting in the Masonic Hall, Surrey Street, on Tuesday, October 3rd, when a goodly number sat down to an excellent tea, provided by the steward, to which full justice was done.

After tea the chair (in the absence of Dr. Morton, who has gone to India for a brief period) was taken by Mr. Dakin, Vice-President.

Mr. Chadburn was proposed and unanimously elected a member of the Society.

The Secretary reported that in consequence of illness, and consequent absence from home, of the Treasurer, the accounts for the past year had not been audited as usual. They were, therefore, left for consideration to the next meeting.

The election of officers for the ensuing year then took place, with the following results:—

President—Dr. T. H. Morton.

Vice-Presidents—Mr. J. D. Leador, Mr. J. H. Rawson.

Treasurer—Mr. W. B. Hatfield.

Hon. Secretary—Mr. J. Taylor, Holland Place, London Road, Sheffield.

Council—Messrs. Dickenson, Ainley, together with the officers.

Mr. Dakin then vacated the chair, which was taken by Mr. Rawson, one of the newly-elected Vice-Presidents, who briefly expressed his thanks for the honour done him.

Some modifications of the rules were then taken into consideration, and ultimately agreed upon, after which the meeting was adjourned.

Talk in the Studio.

Electricity and Speculation.—Some experiments which have been recently made on electrical locomotion serve to indicate the utter impracticability of storing a useful amount of motive force, by means of the Planté secondary battery, which has recently been brought before the public under other names; and it is to be regretted that published accounts of these experiments are calculated to mislead the unwary investor. In one case an amount of force equal to that exerted by a large locomotive during less than half a minute was stored by 45 ponderous secondary batteries, the operation of charging and removal costing sufficient to pay for something like sixty-five times the force as generated by means of a steam engine. When such results as these are put forward as a practical and industrial success, one cannot help looking back more than forty years, when the illustrious Jacobi actually realised a somewhat more economical propulsion by electricity on the waters of the Neva. The following quotation from a leader which appeared in the Photographic News over a year ago, may be re-read with advantage. "Some of the daily papers have been predicting extravagantly great results from the use of secondary batteries, because four cells constructed on the above-described principles, and weighing, with their packing-case, about 75 pounds, stored up an available force of a million foot pounds, and this potential force was transmitted from Paris to Glasgow. The newspaper writers appear to have been influenced by the large look of the word million, and they probably lost sight of the circumstance that in conveying the box several million foot pounds of force were expended, and this circumstance somewhat damps the half prediction that the force of the Niagara Falls will some day be stored in secondary batteries and conveyed all over the North American continent, if not all over the world. A million foot pounds represents the actual work of a strong horse during a period of rather over half an hour; the force developed by a powerful locomotive in about ten seconds, or the energy produced in actual practice by the combustion of three farthings' worth of coal in a gas motor engine." The electrical *transmission* of force will prove of undoubted value in numerous cases, a pair of dynamos being used, one as a generator, and the other as a motor; but the so-called storage of electricity is quite another matter.

FERRANTI'S DYNAMO-MACHINE.—In reference to a "Note" in another column, we take from the *Times* the following:—"It has been evident from the first introduction of the electric light by the arc and incandescent systems that inventors would busy themselves to discover some means of producing the current at less expense. When the electric light companies were being so rapidly formed and supported by public subscriptions some time back, we warned especially the buyers of the shares at high prices of the risk they ran of having the ground cut from under them by a new discovery. Electrical scientists have been diligently at work trying to improve upon the bulky and expensive dynamo machines now in use, and we understand that Sir William Thompson patented a new invention for a simpler and more efficient dynamo machine only a short time before an electrician in Messrs. Siemens' establishment hit upon much the same thing. The great feature in the new machine is the absence of iron in the revolving armature, very greatly decreasing its weight, and, by enabling the field magnets to be brought very close together, greatly increasing its efficiency. In fact, it is stated that a Ferranti machine to produce 10,000 incandescent lights, or an equivalent number of arc lights, can be manufactured for less than one-fifth of the cost of the cheapest dynamos at present before the public. The increased efficiency of the new machine is aided by the abolition of the commutator. The announcement of this new machine has been, we are informed, greeted with incredulity, and naturally some perturbation has been caused among those interested in existing dynamo machines leading to letters having been addressed to us raising points in reference to engagements entered into with subsidiary companies. Before publishing the numerous letters referred to, we thought it better to make enquiries, and the result in the case of the Hammond Company is the following letter which, as regards the engagements of that Company to the subsidiary companies will, it is hoped, be satisfactory:—'The Hammond Electric Light and Power Supply Company (Limited), 110, Cannon Street, E.C., Sept. 21.—Sir, In order to correct certain misapprehensions which seem to exist in reference to our Company, I beg to advise you that we were not constituted to work the Brush system solely, though we acquired the Brush rights over certain counties. In order to extend our field over the whole of Great Britain, we have now acquired the sole agency of the Ferranti machine for the districts not covered by our Brush concessions, which we still hold. In reference to those subcompanies which we have founded, our directors desire to give them the full benefit of the new invention, and will offer them the use of the new dynamo without demanding any further payments for a new licence beyond that which they have already paid to our Company, the desire of the Board of this Company being that all their offshoots should participate fully from time to time in the successes of the parent Company.—Yours faithfully, ROBERT HAMMOND, Managing Director.'"

THE LONDON AND PROVINCIAL PHOTOGRAPHIC ASSOCIATION.—We have been asked to state that this Association has changed its place of meeting, and that for the next three months, at least, it will meet every Thursday evening at eight o'clock at the Mason's Hall Tavern, Coleman Street, E.C. The London and Provincial Association will be glad to welcome to its meetings any visitors to the exhibition of the Photographic Society of Great Britain. For the information of such of these as incline to join the new Association, we may state that the annual subscription is 5s.

THE PHOTOGRAPHIC MONEY DISPUTE.—This case was resumed at the Clerkenwell Police Court, on Wednesday, when, after further evidence, Mr. Hosack, who said there was a great deal too much animus shown on both sides, again adjourned the hearing.

ACCIDENT TO A PHOTOGRAPHER AT BIRMINGHAM.—A remarkable accident occurred near to Stourbridge on Sunday. Mr. Charles Moody, a local photographer, was walking along the old Stamber Mill viaduct, on the Great Western Railway, when he was suddenly seen to disappear. It turned out that he had fallen through the old bridge into the river Stour below, a depth of about a hundred feet. He was speedily rescued, though in an insensible condition, and it having been ascertained by medical examination that no bones were broken, he was conveyed home. Mr. Moody has recently been photographing the old viaduct from different points, and it is supposed that he was studying a position for a new picture when he fell through.—*Birmingham Daily Post.*

SUPPOSED INCENDIARISM.—A PHOTOGRAPHIC STUDIO BURNT DOWN.—On the 4th inst., the photographic studio of Mr. D. S. Jones, of Matlock, Bath, was destroyed by fire. The building was only partially insured in the Lancashire and Yorkshire Insurance Company. Much sympathy is felt for Mr. Jones, who is regarded as an accomplished man in his profession. The origin of the fire is supposed to be incendiarism, and the damage is estimated at about £200.

A PHOTOGRAPHIC ACTION.—At the Metropolitan Court, Bloomsbury, on Friday last the case Easterbrooke *v.* Mathews was heard before Mr. Judge Bacon, in which the plaintiff, a photographer, trading as S. I. Mair and Co., 272, Regent Circus, sued the defendant, John Mathews, 135, Oxford Street, to recover the sum of £1 16s. for work done. The plaintiff's manager said the work mentioned in the particulars before the Court was supplied at the defendant's request, who ordered the goods personally; he had done work with the firm of Mathews and Son up to 1880, which had always been paid for. The work now sued for was executed upon the order of the present defendant, Mr. John Mathews. The defendant stated that he was merely manager at the time of the firm alluded to, and was not a partner at the time the action was brought; but in cross-examination admitted that he became a partner in March, 1822, and that his sister, Catherine Mathews, was the original firm. After considerable legal discussion, the learned Judge said he was of opinion that at the time the goods were ordered the defendant was merely a paid servant of the firm, in which capacity he was not liable to pay any trade debt. Judgment must therefore be entered for the defendant with costs.

To Correspondents.

*** Several answers are unavoidably postponed until next week.

*** We are reluctantly compelled to leave over till next week our article on "Swan Lamps for the Show-Case" and "At Home."

J. BULLOCK.—1. There is no doubt that constant exposure to the vapour of ammonia is likely to tend to be injurious to the eyes, and even to affect the health; but it must be remembered that many have sufficiently strong constitutions to resist such influences for a long time. 2. Common washing soda answers fairly well, but is perhaps not quite so convenient as ammonia. Borax and phosphate of soda may also be used.

FRANK JOLLY.—A cautious treatment with a weak solution of cyanide of potassium, or a mixture of cyanide of potassium and alum, is sometimes effectual, but there is a considerable probability of utterly ruining the negative. If you value the picture, it would be well to make as good a transparency as possible before commencing to work on the negative.

G. WEST & SON.—Notices appear in the PHOTOGRAPHIC NEWS from time to time, and we can suggest no method of obtaining earlier information than writing to the secretary of each Society.

J. SIMMONDS.—1. A weak solution of Rosaniline dye in warm water, a small quantity of acetic acid being added to prevent the deposition of the colouring matter. 2. Rub down with a stick of charcoal cut at an angle of about 30° to the direction of the axis. 3. You had better use ordinary sweet oil, unless the arrangement is of such a nature that the parts are likely to become much heated. 4. One part of shellac in five or six of alcohol. 5. Light has either no action on it, or so little as to be of no importance; but if you procure some of the natural bitumen there will be no difficulty. We have obtained it from Hopkin and Williams.

RETFORD.—Very little is gained as regards colour by bleaching it, as the film is so thin as to make the tint almost imperceptible. On the other hand, the mechanical qualities almost invariably suffer to a great extent by the bleaching.

IN TROUBLE.—The glaze is very bad, containing a large proportion of lead, and being very imperfectly fixed, while the whole body of the ware is thoroughly saturated with partially decomposed emulsion. No wonder you are troubled with red fog; use either glass or thoroughly vitrified porcelain.

SILVER.—It is the effect of damp, and if you take care to thoroughly dry your paper, no fresh cases will arise.

N. T. NEWSON.—1. The mineral constituents are phosphate of lime and carbonate of lime.

THE PHOTOGRAPHIC NEWS.

Vol. XXVI. No. 1259.—October 20, 1882.

CONTENTS.

DIRECT POSITIVES IN THE CAMERA.

Scarcely have we had time to appreciate the due importance of Herr Obernetter's simplified emulsion process, than another hardly less important communication comes to us from that gentleman's laboratory. This last relates to the production of direct positives in the camera, and, according to our contemporary, the *Mittheilungen*, the method is both a practical and simple one.

Here are the details. A gelatine plate is exposed in the camera about double the ordinary period, and then developed in the usual way with ferrous oxalate. The development is continued, indeed, until the back of the plate is completely black. About ten to twelve minutes are generally required to bring about this result.

The plate is now perfectly black on both sides. A two per cent. solution of chromic acid, or a solution of one gramme of bichromate of potash and five grammes of nitric acid in one hundred grammes of water, is then poured over the un-fixed plate until the black colour has disappeared, and a bright image composed of pure chromate of silver is produced.

The plate is then further treated in day-light. To remove all the chromate of silver, it is washed with very dilute ammonia, say one part of the latter mixed with one hundred parts of water.

Finally, the plate is again laid in an oxalate developer, and this is permitted to act until the desired vigour is obtained. If the plate gets too vigorous, the action of the developer is at once suspended, and the image is washed and fixed.

Herr Obernetter prefers to employ for the process an emulsion poor in gelatine, such as he produces by his new *modus operandi*; if there is much gelatine in the film, the manifold operations to which the plate is subjected naturally enough lead to difficulties, such as frilling, creasing, &c., of the film. In fact, the great thing is to work with a film containing as little gelatine as possible.

At the last meeting of the Berlin Society for the Advancement of Photography, a number of plates produced by this process were submitted to the meeting, and invoked universal admiration. It was then remarked that the method was an improvement of Jaehn's plan of producing direct positives, which, our readers may remember, we published in these columns about two years ago.

Herr Obernetter now prefers to make all his reproductions by his new plan, in preference to employing the clever graphite method that he has used for years past; indeed, he has had it in operation, it appears, for the past twelvemonth. It is very frequently of importance to secure a negative direct in the camera, from another negative, especially in the case of enlargements, and this new method affords an easy plan of doing so.

The last number of the *Mittheilungen* has an illustration, which has been printed from reproductions obtained by the new method.

THE SWAN LAMP FOR THE SHOW CASE OR WINDOW.

Mr. Mayland has thoroughly demonstrated the practical value of our suggestion to use the small Swan lamp for the illumination of photographic pictures, and we now propose to give full details as to the fitting up and management of the lamps.

Our readers know that when the course of a voltaic current is partially obstructed by an indifferently good conductor, heat is generated; while the imperfect conductor may become white hot, and serve as a source of light. A thin thread of carbon is the bad conductor usually chosen, and in order to prevent its combustion it becomes necessary to enclose it in a glass bulb, carefully emptied of all traces of atmospheric air. Here, then, we have the Swan lamp.

The battery most suitable for supplying the electric current is that devised by Bunsen, and a single cell or element of this form of electric generator is represented below. C represents a carbon rod or block, and this

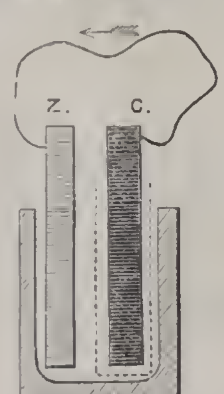


Fig. 1.

stands in a cell or tube of porous earthenware, as represented by the dotted lines. The interspace between the carbon block and the porous cell is filled, to within about an inch and a half of the top, with strong nitric acid. The porous cell stands in an outer jar of salt-glazed stoneware, and this outer jar contains dilute sulphuric acid; one volume of the strong acid diluted with nine volumes of water. A plate of amalgamated zinc is immersed in the dilute sulphuric acid; but this zinc element is ordinarily made cylindrical, so as to encircle the porous pot, instead of being shaped as represented in the diagram. When the battery is charged, as described above, and the projecting portions of the polar elements are joined by a conducting wire, a current passes; and the wire becomes more or less heated according to its diameter and length. Although there is every reason to believe that the electric transmission is not strictly of the nature of a current, we shall use the ordinary language, and assume that the current passes in the direction of the arrows. When a current of high potential or tension is needed, several cells of the battery are connected in series, as shown below (fig. 2), so that the currents become (to use a figure of

Fig. 2.

speech not altogether orthodox) reinforced or exalted as regards tension; and to satisfactorily work two of the five-candle Swan lamps, it is necessary to use seven cells of the battery; cells holding about a pint and a-half being suitable in ordinary cases.

Before considering the mode of charging the battery, and setting the lamps in action, we will give a list of the articles required for setting up and working a pair of lamps, together with the cost, assuming the articles to be bought at semi-wholesale houses in London.

Apparatus:—

Seven $1\frac{1}{2}$ pint or quart cells of Bunsen battery, with brass terminal clamps for the connecting wires	£1	18	6
Two five-candle Swan lamps	0	12	0
Two stands for ditto	0	3	0
Three pounds No. 18 cotton-covered copper wire	0	6	0
Files, emery cloth, &c.	0	1	0
	3	0	6

Stock of Materials for Commencement.

One Winchester quart of commercial nitric acid, s.g. 1·42, at ... ... 6d. per lb.	0	4	2
One Winchester quart of commercial sulphuric acid at ... ... 2d. per lb.	0	2	4
One pound of mercury...	0	3	0
	0	9	6

Just £3 10s. serves, then, to instal the necessary plant; and now as to the working details. First arrange the batteries in a row on an outside window sill, and fix up a board so as to shoot off any rain which may fall. Next undo each brass clamp, and replace them, after having carefully filed or cleaned those parts which come in contact with the battery plates, and also brighten the inside of each hole through which a connecting wire may pass, using a small rat's-tail file for the purpose. Starting from one end, connect the carbon of the cell with the zinc of the next; and the carbon of this next with the zinc of the following, and so on, just as represented in the diagram; while the greatest care should be taken that those ends of the connecting wires which are held by the terminal clamp are carefully cleaned or filed, as metallic oxides are very indifferent conductors of electricity. The arrangement just described will leave a free carbon plate at one end of the series, and a free zinc plate at the other end, and to it are connected the main conducting wires. These conducting wires may pass through walls or under floors until they terminate in the case or the window to be illuminated, where they must be bifurcated or branched, as shown in the diagram, so that equal currents pass through the lamps A and B. The branches are best soldered on, but a firm twisting together will answer. The actual placing of the lamps in relation to the picture or pictures to be illuminated must depend altogether on individual taste; but it should be remembered that the Swan lamp may be placed in a position which would be altogether impossible in the case of a gas flame. Either the small stands sold in the shops may be used, or the lamp may rest against the pictureframe; while in some cases it may prove convenient to make use of a wide-mouthed bottle as represented below.

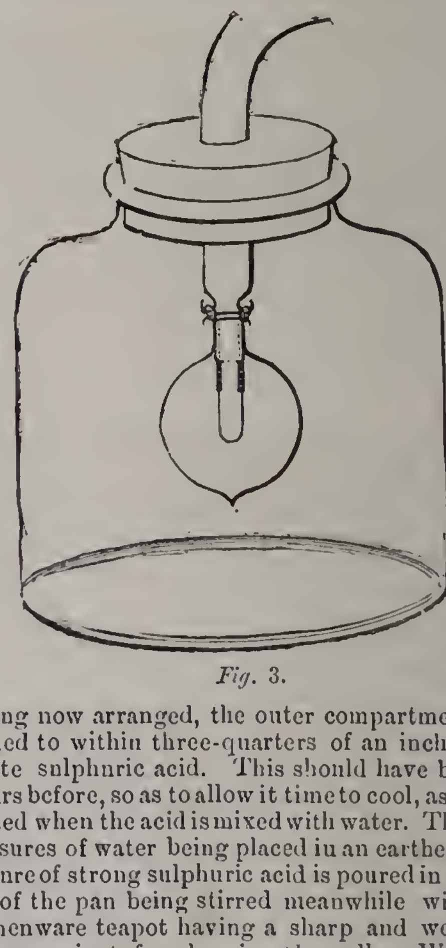


Fig. 3.

All being now arranged, the outer compartment of each cell is filled to within three-quarters of an inch of the top with dilute sulphuric acid. This should have been mixed some hours before, so as to allow it time to cool, as much heat is generated when the acid is mixed with water. The required nine measures of water being placed in an eartherware pan, one measure of strong sulphuric acid is poured in slowly, the contents of the pan being stirred meanwhile with a stick. An earthenware teapot having a sharp and well-pouring spout is convenient for charging the cells. When all the outside compartments are thus nearly filled with the dilute surplus acid, the next step is to fill the interspace between such carbon plate and its porous cell with the strong nitric acid, using an earthenware teapot as before, and taking care that the level of the nitric acid shall not be higher than that of the dilute sulphuric acid in the outside compartment. As soon as the last cell is charged with nitric acid, the lamps will start into action, and continue until either the circuit is broken by disconnecting one of the wires, or the acids are exhausted; this latter event ordinarily taking place about twelve hours after charging. As soon as the battery commences to act, it is well to listen carefully with the view of detecting any evolutions of gas bubbles from the zinc plates; and if any effervescence is detected, it is a sign that the coating of mercury which has been applied to the zinc is discontinuous or defective. To remedy this, the plate is removed, and a little mercury is applied to the defective spot, and spread by means of a piece of rag attached to a stick. The mercury is best projected on the plate by means of a spurting bottle, such as is represented by fig. 4. This simple

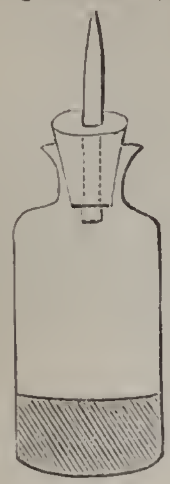


Fig. 4.

arrangement, which was first shown to us by Mr. G. F. Williams, consists merely of a small vial, fitted with a drawn out jet of glass tube, adapted to it by means of a cork; and a slight jerk serves to project the mercury in small and easily regulated doses.

When the light is no longer required, the acids should be emptied out—if exhausted they are best poured into a small hole dug in the ground—and all parts of the battery should be well rinsed. The metal portions of the carbon plates and the outer glazed cells may be laid out to dry after the rinsing, but the porous cells ought to be left in water until again required, supposing that they are to be used next day. If it is intended to dry them and store them away, they should be soaked for a few days, the water being occasionally changed.

It is generally advisable to start with fresh acids on each evening, but two short evenings' work may be got out of the batteries, as evidenced by the following quotation from a letter which Mr. Mayland addressed to us.

"The light has been a great success. I have reduced the expense by disconnecting it each night, and pouring the nitric acid back. It burns splendidly for two nights, but not so brilliantly on the third. I think of putting on another cell, freshly charged, for the third, and seeing the effect. I came to grief over it one night in lifting out the porous pot with nitric. Probably it was held a little too tightly, for it broke up, smothered me, and burnt a whole suit of clothes. Carefully filing the screws, &c., pays well. To-night it is burning splendidly."

Two lights cost from 9d. to 1s. per evening for materials consumed.

RETOUCHING.

The subject of retouching is one which is seldom discussed in the photographic periodicals. It is difficult to say why this should be. There is no doubt that when it is employed within limits, there is no process which may be more useful to the photographer than that of retouching. It serves to reduce, or even to annihilate entirely, many of the faults peculiar to photography. At the same time we venture to say that nothing has had a greater tendency to degrade photography as an art than the abuse of the power which the retoucher possesses.

We have from time to time taken the opportunity of pointing out where might be seen at photographic exhibitions, and other places, examples of how not to do it, in the way of retouching; in other words, we have shown cases in which the utmost manipulative skill has been expended to degrade a photograph from a picture to a nonentity. Let us not be misunderstood. We are not speaking against legitimate retouching, but against the abuse of retouching.

We ought possibly, before going further, to say a few words as to what we consider to be legitimately within the bounds of the retoucher's art, and what without. We are speaking purely of portraiture. Let us suppose a certain number of negatives—untouched—to be placed before us. We will take two as typical. The one is that of an aged man—a face furrowed with the lines which tell a history, and indicate a character; the other that of a young and lovely girl—a face which painters love to draw, because, in doing so, they give the reflection of a pure and happy soul.

Now let us descend to the practical details of the matter. In each case it is possible—that is to say, the skilful retoucher is able, by the use of his pencil—to obliterate any effect which, in the print, will show as a dark spot against a light background. Such effects show on the negative as transparent portions against more opaque ones. In the case of the patriarch, these portions will be the representation of the lines and furrows which, as we said, told the history and the character of the man—in fact, make him a patriarch; whereas, without them, he would appear imbecile.

What is the inclination of the retoucher? Without doubt, to work with his pencil on these more transparent parts of the negative till he has made them equally—or almost equally—dense with the rest of the face, with the effect that we have represented a mixture of age and youth. We have the features of an old man, with the smooth skin of a young one. This we take as an example of the abuse of the retoucher's art, the practice which serves only to degrade photography in the eyes of all men of good taste.

We pass now to the other case—that of the lovely maiden. Here, at first sight, it would appear to the observer that such perfection reigned in the subject that no improvement could possibly be made in the representation which the camera would give thereof. Yet look a little more closely. Here, on the cheeks and forehead, are one or two marks. What are they? Tell it not in Gath! There is no doubt that on the face of our beauty there are several freckles. Yet the reader will say—but so incipient and undecided that it takes an almost microscopic examination to detect them. Perhaps so; but let us refer to the negative. Here, doubtless to the surprise of the non-photographer, the marks which an occasional observer would fail to detect in our model are distinctly—nay, strongly—indicated, the fact being that they are of a yellowish or non-actinic colour. With a single circular ouch of the pencil each disappears. Here we have a ttypical example of the true use of retouching.

We have taken two extreme cases. What would a portrait of the picturesque, patriarchal, bareheaded *Echo*-seller of the Strand and neighbourhood, whom we all know, or rather knew, be with the lines all touched out of the face? What would a portrait of one of our "little beauties" be, were the freckles which show themselves to the camera, but not to the eye, not removed?

These are extreme cases, and between them lies a vast range of others in which the greatest discretion ought to be exercised as to whether or not the pencil is to be used, and if it is to be, then to what extent. The mistake, in nine cases out of ten, certainly lies in retouching, when a better, more artistic effect would have been produced without.

There is no doubt that photography tends to exaggerate certain defects, to make them more pronounced than they are to the eye. We have given as an example of this the case of the strong manner in which incipient freckles are rendered. We shall sum up a thousand other details when we say that, as a rule, the print from an untouched negative gives the impression of a person older than the sitter in reality is. To counteract this tendency is evidently nothing more than a leaning towards truth, and is therefore not only justifiable, but commendable. Nay, we shall go even farther. We will admit that in the cases of "persons of an uncertain age" it is allowable to give the benefit of a doubt, and to carry the retouching process a shade farther than a strict adherence to truth will allow. What we protest against—and that most earnestly, because we believe that by the practice much harm is done to our art—is the custom of obliterating entirely those marks and lines which give beauty to many an old and withered face.

We remember, on the occasion of last year's exhibition, looking through the portraits shown. Here we found excellently rendered the faces of those who were young and fresh; but nowhere could we find what may be so well rendered by photography, a face giving the idea of decided and vigorous character. We say nowhere, but at last we came on one. It was hung so high that we could not closely examine it. We were surprised at this, as the picture was evidently an excellent rendering of a splendid head, and the more so as there was, not far away, but on the line, a photograph of a well-known man whose head might have made an excellent picture, but for the over-zealous use of the retoucher's pencil. Our surprise vanished when we looked at our catalogue. Alas! the high-hung picture was a copying from a painting. What an opportunity here for those who say that photography is not a fine art to hold up the finger of scorn! Such an example is almost enough truly to make us side with those who cry down retouching altogether, and say it is a vicious practice. Yet our better reason tells us that these are not correct. It is not the use, but the abuse, that is to be decried. Our most earnest hope is by no means to see the art of retouching discarded, but to see it kept within its proper limits; then it will be truly useful.

We are well aware that in blaming photographers in the matter of over-retouching, we are in reality laying the onus on the wrong party. It is the sitter who is most to blame. It is his indiscriminating vanity which demands that, when he is an old man, he shall be shown as a youth, and it is this same vanity which leads to his being represented as a characterless imbecile—which, perhaps, after all, he is; still, surely the photographer is not blameless in pandering to this vanity for the sake of filthy lucre, instead of holding out for his art. A painter would not so give in.

THE PHOTOGRAPHIC EXHIBITION.

Second Notice.

Turning our attention to the screens, and beginning at the last picture, we come to an enlargement of an artistic group (466), in crayon style—three graceful girls—by Mr. W. E. Debenham, who in another frame (392) shows the original, together with some other excellent portrait work. Major Gubbins, R.A., exhibits some interesting album views (465) of Indian scenery, and also a collection of tiny sketches from the New Forest (102) printed in platinotype. Mr. H. Manfield contributes a goodly number of good pictures, some of them also printed in platinotype. "Lynmouth Harbour" (463), and "A Devonshire Cottage" (98), are capital studies, the latter, with its leafy trees and bowery foliage, charmingly composed; while another delightful picture is that of "Studland in Dorset," a green paradise on the South Coast, which we congratulate Mr. Manfield on having discovered. Some pictures of Cape scenery and Madeira scenery are also in Mr. Manfield's collection—an Ostrich Farm, that we have before noticed, is very curious—all of which denote a landscape photographer of high skill and excellent taste.

Mr. J. W. Boord, M.P., makes his first appearance as an exhibitor in Pall Mall, contributing a series of Marine Views (462); of these, we like best the yacht *Swift*, taken from on board another craft. The yacht is in full sail, making its way through a rough bit of water, the waves brisk and forcible to a degree. Messrs. W. A. and T. J. Skill send some fine pictures of Lincoln Cathedral (461, 119, 142), all of which do justice to the grand proportions of the ancient pile. Mr. George F. Dew, of Coventry, is represented by half a dozen frames which contain for the most part excellent work. Of them, we admire most "St. Michael's, Coventry" (136), in which the elegant taper spire is rendered with exceeding skill and good taste; it is a subject that only a courageous man would attempt, and that only a patient one could succeed in. Two views in Warwickshire (160, 161) also call for praise, exhibiting, as they do, considerable artistic training. Mr. George Bruce, of Dunse, whose pretty collodio-chloride prints are still fresh in the memory of most of us, has forwarded several portrait studies: "The Flower Girl" (459) is an excellent picture; and so, too, is "Dominica" (254), a smiling Italian girl, playing the accordion, who is looking at us with her pleasant olive face as if soliciting patronage. Mr. Frederick Hollyer, who has always shown himself an adept in platinotype printing, forwards several productions this year. "Richmond" (457) is a pleasing sketch, and so is "Hastings" (70); but perhaps the most effective is "A Winter Morning," a drear view of one of the London bridges, which might fittingly illustrate Tom Hood's "Bridge of Sighs."

Mr. C. Stephens exhibits studies of sea and cattle (456); and Mr. Emil Seelig, "Views at Cassel (455) and England (367), of which the winter scenes are the best; some of the pictures are rather too dull to please. Of Mr. E. A. Maxwell's exhibits we like best "Deerman's Lane" (306), and of those of Mr. Peter Burges, the studies of ferns and silver birch (413). Mr. Burges' "Storm Brewing" (453) is also an effective picture. Mr. Cecil V. Shadbolt exhibits his clever balloon photograph (171), certainly the best taken in this country, and a frame of leafy landscapes (452), of which the Old Mill, Ambleside, will probably find most admirers. Mr. E. H. Goold is another exhibitor of platinotype prints, of which there are many this year; he shows "Pareham Park" (450) and other pictures. Mr. J. R. Ritchie, working with his so-called Arabin emulsion, has sent half-a-dozen frames: Killicrankie (117), in which the still waters and overhanging foliage are effectively shown, is one of the best in the collection. Mr. Archer Clarke forwards two frames, of which the one representing shipping in the Thames and Atlantic (448) contains the most praiseworthy work. Two series of views taken around Lowestoft by Mr. W. J. Hollebone (446, 447) contain some bright little sea pictures; the interiors are, however, too dark for our taste. A capital picture of Chingford Mill (445), with its timber, and mirror-like mill-pond, is contributed by Mr. J. Herbert.

Of Mr. Alfred Hendrey's pictures we prefer "The Fisher's Haunt" (432), a sequestered nook where the waving rushes and yellow waterlilies grow; but "The First Primrose" (82) is scarcely less taking. Mr. F. Bills sends some clever studies of fruit and fish, of which "In the Store Room" (433) and "A Neglected Corner" (434) are good representatives. Mr. J. T. G. Glossop's nice little sketches about "Virginia Water" (431), and his coast scenes, "Torbay" (371), indicate considerable taste, while his management of foliage is in some cases masterly; Mr. Glossop also exhibits six Daguerreotypes taken in 1843 at Rome by Borghesa (472). Mr. W. K. Burton shows some good pictures taken with emulsion of his own preparation; "Whitley" (412) is his best contribution, we think. Mr. G. A. Ferneley contributes three frames, of which we like "Riverside Sketches" (385) the best. Mr. A. Youngman shows an instantaneous yacht picture (428), and Mr. S. G. Hooker has several marine views that denote unmistakable talent; a quaint group of Boulogne fisherwomen (427) is one of these, and a study of a beggar is not less successful. Some bijou sketches of North Wales (408), also by Mr. Hooker—to wit, those of Carnarvon and Conway Castle—are also pleasing, full of detail, and very well lighted.

The work of Mr. Edmund Hyde is all of it so good that it is difficult to point out the most worthy. Mr. Hyde has devoted himself more especially to village scenes, and

"Lustleigh Village" and "Rushford Mill" (426) are trite examples of our rural homes. In another part of the room enlargements of these same pictures are to be found; but for ourselves, we prefer the miniature impressions of the sweet English homesteads that Mr. Hyde depicts so well.

Mr. T. M. Brownrigg's careful work is known to every visitor at Pall Mall, and the pictures he exhibits this year will sustain his well-earned reputation. "Beachy Head" (424) and Lake at Blackwater (31) are both fine pictures, the latter being exceedingly good; two views near Goring (34, 35) are also well worth looking at. Messrs. G. West and Sons, of Gosport, exhibit some regatta sketches (423), and also a fine representation of a torpedo explosion (74). Mr. J. A. G. Branfill, also a skilful marine photographer, shows a series of yacht pictures (421, 422), together with a pleasant view in Cheshire (285). Mr. W. Davies' leafy pictures, "The Comb Factory" (420), and "Millers' Dale" (406), are delightful productions; and scarcely less satisfactory is "Near Ashford Hall" (19); indeed, Mr. Davies unites a keen eye for the picturesque with a thorough knowledge of technical photography. Mr. Charles Reid exhibits two frames of studies of animals, &c. (270, 411).

Mr. George Renwick shows some capital work, among which the "Lighthouse, Douglas Head" (72), the white beacon deftly poised upon the black strata of rock, cannot fail to strike the spectator by its wonderful force and vigour. "Off Ramsay" (139), and "Douglas Harbour" (394), clear and bright photographs, also by Mr. Renwick, are pictures that likewise repay study. "Richmond on Bank Holiday" (407) is sent by Mr. Hilditch, who also exhibits a transparency of St. Paul's Cathedral (168). Mr. F. Downer shows some studies of children (105), and three excellent examples of crayon work on opal (284, 382, 404). Messrs. E. Day and Son, of Bournemouth, send two of the sketchy portraits for which they have of late years acquired a high reputation, the best being "Surprise" (400); they also forward two very creditable studies "In the Hayfield," and "Working Homewards" (401, 402). Mr. Arnold Spiller has four pictures: "Leverton" (399), a village scene, in which the shadows are subdued, while yet there is plenty of warm sunlight, is a painstaking bit of work: and the same may be said of the river winding among the tall rushes "On the Kennett" (398). Mr. J. S. Catford, of Ilfracombe, sends two frames of soft sketchy portraits (253, 397), exhibiting much taste and artistic feeling; they are mounted on glass, a measure that adds to their brilliancy.

Mr. G. Sydney Whitfield is represented by three pictures of Welsh scenery (197, 395, 396). Mr. J. A. Kay, in "Waiting for my Lady," shows a clever sketch of "Horse and Trap," and in another part of the room exhibits some good portrait work (153, 172); a study of Mr. Perrini (208), likewise by Mr. Kay, is also excellent. Mr. D. Ireland, Junior, of Broughty Ferry, sends a collection of magnificent views from Norway, which are called in the catalogue "Views in Germany" (373). Of these productions of an amateur of the Dundee Photographic Society we have already had occasion to speak, and we are very glad that visitors to the Pall Mall Exhibition have an opportunity of seeing them. "Molde Fjord" is a delightful sketch, and so is "Lillehammer." The clearness and brightness of Mr. Ireland's pictures are wonderful, and we may say, in a word, that we have never seen Scandinavia so well pourtrayed before. Mr. Ireland has most happily seized the characteristics of the country—the still meres with their pine-fringed banks, and the rocky headlands so sharp and clear in the pure north light. Here we must leave our notice for this week; we take the opportunity, however, to mention the names of the following exhibitors who were omitted from our list of last week, viz., Mr. G. M. Jones, Mr. H. Schüren (of Hamburg), Mr. G. Hadley, and Mr. Lydell Sawyer.

At Home.

MR. FREDERICK YORK AT BRIDGWATER.

When Rear-Admiral the Duke of Edinburgh was plain Prince Alfred, and but a simple midshipman on board the *Euryalus*, he made a voyage to the Cape of Good Hope and Natal. The voyage was undertaken, of course, in the ordinary pursuit of duty; but still it was the Queen's intention that the young Prince should learn something more than navigation during the long sea journeys his profession compelled him to undertake. In those days the Prince had no thought of becoming a musician, and fiddling took up none of the time that generally hangs so heavily on the sailor's hands; but he had another hobby, and that was photography. So that he might be at no loss for assistance and instruction in the art, Her Majesty commissioned a gentleman well skilled in the art to accompany His Royal Highness, and this gentleman was Mr. Frederick York.

Mr. York still speaks with pleasure of the days when he formed one of the Ward Room mess on board H.M.S. *Euryalus*. Prince Alfred and he worked together indefatigably to secure pictures of the places visited, and many were the pleasant excursions made in company. Together, they passed from Natal into the Boer country, of which we have heard so much lately, the little detachment from the ship making a right Royal progress. "The people everywhere were overjoyed to see the Prince," says Mr. York, recounting his travels, "and whenever they could, they gave us a Royal salute. At Blomfontain there happened to be but one gun, and this a very old and crazy one; however, they fired this one gun, and burst it, too, killing a couple of men." Of course there was hunting and shooting in plenty; "but I never was much of a shot," adds Mr. York, "and they used to laugh at me a good deal in consequence. What caused them most merriment, I think, was my mistaking, one evening, a gnu, with his bushy mane, for a lion. I took a shot at him from my tent, and missed, and was fearful he might be coming after me."

There are no gnus at Bridgwater, but game that Mr. York pursues with much better success. For here, at this busy little town on the river Parret, where it is said every bath brick in the world is made, Mr. York produces all those charming lantern slides, or transparencies, that have made many a Christmas party jolly, and changed, for an hour at least, those sorry little urchins of workhouse and infirmary into bright and happy beings. Here, in this big brick building, is the fountain of delight and amusement to thousands; here is concentrated at this moment the essence of pleasure soon to be diffused throughout our Kingdom and Colonies. If giving pleasure to others is indeed the highest form of happiness, then must Mr. York be a happy mortal, for during the past ten years an average of 50,000 slides has been annually produced here in Bridgwater.

Mr. York's establishment is not a very big one, but it gives employment to fourteen assistants—male and female—and takes up every nook and corner of a large house. His slides, or transparencies, are all made in the camera, and with wet collodion, being toned with bichloride of platinum. The original negatives are of various sizes, and herein lies the first difficulty Mr. York encounters in his work. It may be said: "But why should this be the case; why not have all negatives taken the same size?" For the simple reason that Mr. York has to get what he can; he wants the best pictures possible of a certain object, and with this intention buys perhaps half-a-dozen negatives. He soon finds out which yields the finest transparency, and when the negatives are put away, this one bears a distinguishing mark. The negative may measure twelve inches or only six, but the mark upon it specifies the kind of camera to be used—for all slides are made of the same dimensions—when more transparencies are desired.

We say "the kind of camera to be used," because Mr. York has, so to speak, no movable cameras on the premises. His cameras are solid, roughly-made apparatus, constructed by a carpenter on the premises, and every sized plate has its own camera. In these circumstances there is obviously no time lost in experimenting and focussing. You give an assistant a negative, and tell him to make a hundred transparencies; he looks at the mark on the negative, reaches down the proper camera, and the work proceeds forthwith.

The glass plates used are large enough for four transparencies. After cleaning, they are albumenized in the ordinary way, and then coated with collodion and sensitized. There is a repeating back to the camera, so that there is no difficulty about taking the four images one after another.

Let us take a glance at the work itself. At the back of the building are two yards—the lantern yard and the printing yard. We proceed to the former. Here are a collection of out-buildings, and under one of them we find two assistants busy at work making transparencies. The cameras slope upwards at an angle of 45°, and the roof is uncovered where the light enters them. The cameras at this moment are facing west, for it is afternoon, but similar arrangements exist on the other side for morning work. Before each assistant is an American clock, so that all four exposures of the one plate may be precisely the same, this exposure varying from ten to sixty seconds according to circumstances. The exposures are simply brought about by capping the lens, and after four exposures have been made by means of the repeating back, the dark-slide is withdrawn, and taken into the laboratory; here it is at once developed, and, after washing and draining, handed over to another assistant to tone.

Mr. King, who is Mr. York's manager at Bridgwater, is good enough to give us his toning formula. He makes up his stock solution of:—

Bichloride of platinum	4 ounces
Water	40 ounces

and of this he puts two ounces to a Winchester quart of water, the result being one grain of platinum salt to one ounce of water. Mr. King employs no less than eight toning baths for his transparencies, these being ranged of a row. No. 1, however, into which the plate is first dipped, is a well-nigh exhausted solution, and No. 2, into which the transparencies go next, is little better. The baths, in fact, increase in strength until No. 8 is reached. As the baths get exhausted, they are thrown away, or, at any rate, No. 1 gets thrown away every time a new No. 8 is made. The transparency is brought step by step from one bath to another, until in No. 8 it assumes a black tone; it is then taken back again to No. 3 or No. 4, and immersed until the blackness begins to turn once more to brownness, when the tone is deemed a desirable one. The toning usually takes about ten minutes; prolonged toning gives a red tint, which must be avoided.

Mr. York tests his transparencies by laying them on a sheet of white paper. In the transparent portion there should not be a trace of covering; if the least film be visible, the image is rejected.

Outside the laboratory, in the sun, is a row of Winchester bottles standing upon a shelf. These contain the silver baths in course of doctoring. The silver solution, when not actually in the dipping bath, is here set to sun, and if it has become surcharged with alcohol and ether, it is also boiled before further use. "I like to boil down my baths until the liquid pretty nigh crystallizes," says Mr. King, "and then I am quite sure of getting rid of all volatile matter."

Here, in the varnish room, are the transparencies drying. They are a heterogenous lot. This picture of the Tower of London, and this one of Jumbo at the Zoo, illustrate "A day in London," an interesting lecture by Dr. Croft, in which the spectator is taken by the aid of photography to all the wonderful sights in town. Here is another set of slides illustrating the war in Egypt; here pictures of the Arctic regions; and here, again, science slides, designed to help youngsters to understand something of light, astronomy, physics, the spectrum, heat, &c. Mr. York takes up one of the quadruple pictures—it has now been varnished—places it on a cutting-board, provided with a suitable guard, and with two cuts of a diamond divides the plate into four. Thus divided, the plates go into the mounting-room, where by means of black paper masks and strips of the same material, and a little paste, the lantern slide is speedily completed. But it is only by exceeding care, and rejecting probably twenty-five per cent. of his pictures, that Mr. York is enabled to maintain a high level of excellence. No branch of photographic industry, in fact, presents from first to last more difficulties and troubles than this delicate one of producing lantern slides of a uniform character.

We pass through room after room devoted to the various manipulations. A large kitchen with water-supply, sinks, &c., is made to serve three purposes, by simply fitting the window with a blind of yellow tammy. Glass plates are cleaned here, paper after sensitizing is here dried, and the toning of prints is also conducted here, the yellow blind being simply pulled down when these last two operations are in progress. The negative store-rooms are likewise of interest; the negatives are all put away in boxes, these latter being in huge pigeon-holes, and all labelled according to the nature of the subject they contain. Here is the carpenter's department, where cameras, packing-boxes, printing-frames, and all sorts of photographic apparatus, is made on the premises. Here is a sort of retouching room, or, rather, room where lantern slides representing statuary and the like are blocked out with black varnish, applied with a camel's hair brush. Here is the print-drying room—for Mr. York produces a vast number of paper prints, besides his lantern work—and in this room we pick up a hint of value. In the centre of the room, exposed to the full air of the apartment, is a sort of dinner-wagon—or rather central structure supporting shelf upon shelf of canvas, or, as it is called, coarse "shirting." The prints are laid upon these canvas shelves to dry; but before this, they are put, a score or two at a time, upon a thick glass plate, and rolled with a wooden rolling-pin. In this way the water is readily expressed in a most perfect manner, and subsequently the drying upon the canvas is very quickly completed.

A final word on the subject of residues. Mr. York does not proceed in any unusual manner; he employs old paraffin casks, to be purchased for half-a-crown a piece, to collect the liquors, putting in a tap about a third of the way from the bottom. As the precious metal is thrown down, either in the form of chloride or sulphide, he draws off the waste liquid from above. By having several casks always in use, he can treat them one after another, and thus manages to recover the last trace of silver from his waste. The value of Mr. York's residues last year was seventy pounds.

PHOTOGRAPHY IN AND OUT OF THE STUDIO.

The Ramsgate Sands Photographer—The Electric Lighting Act—Amateur Photographers and Gelatine Plates.

The Ramsgate Sands Photographer.—The photographic tout, or "doorsman," as he used to be called in the glass positive times, is rarely seen now-a-days, but he is not extinct. He, or his descendants, to speak correctly, have passed into the stage of full-blown photographers, and are to be met with in London in small numbers on Blackheath or Clapham Common, at Margate and Ramsgate in shoals. The sands at these watering places, beloved of by the Cockney, are the happy hunting grounds of the touting photographer, and here he does in the season a thriving business. Of course, he has competitors in the niggers the donkey boys, and the thousand and one persons who have some excuse for extracting money out of the visitors' pockets, and he has to hold his own in the race. We do not know, in respect to pushing his wares, that he is worse than the others; but the police of Ramsgate seem to think so, and they have determined, to use the words of their superintendent, to "make an example." Some days ago, one of these wandering photographers was hauled before the magistrates for pestering people to have their portraits taken, and we learn, from the policeman who gave evidence, that the defendant "pursued a gentleman, took hold of his arm, and wanted him to go to the place where the machine was. Defendant asked almost every person that passed him to have their photos. taken, and if they refused, insulted them." We should like to know precisely the policeman's notion of an "insult," since the superintendent afterwards stated that there were forty or fifty young fellows who were taking likenesses, but that "he did not think the defendant was worse than the others." If, therefore, the whole fifty observed the practice of offering the alternative of either being photographed or being insulted, the sands must be unbearable; so that, on the whole, it is probable the constable exaggerated a little, so far as the "insult" is concerned. But there is no doubt the fifty are very pertinacious, because "one lady who came to him (the superintendent) said that the man pestered her so much to have her photo. taken, that she hired three chairs for herself and children to get out of their way. They then came and asked her again, and when she refused, they said she had better have her child's likeness taken, as he was very sickly, and would not live through the winter." We are not sufficiently acquainted with the manners and customs of people and photographers on Ramsgate Sands to quite understand how the hiring of three chairs could protect one from solicitations to have one's "photo." taken, unless chairs are used as weapons of assault and battery, which is scarcely likely in the present instance; but we do not hesitate to condemn the species of intimidation adopted. The photographer who resorted to this mode of getting custom was certainly no student of human nature, and he would have had a far better chance of success had he gone into ecstacies over the beauty and grace of the child. It is interesting to learn from the superintendent that it is "high time the Improvements Commissioners obtained a provisional order from the Local Government Board to enable them to frame bye-laws to regulate these fellows." This is bewildering, to say the least, as it is news to learn that the powers of the Local Government Board, which we, in our ignorance, have always thought had to do with paupers, will have to be invoked before the photographers on Ramsgate Sands can be "regulated." It is certain, however, that the authorities at Ramsgate mean war to peripatetic photographers, as the magistrates fined the defendant half-a-crown and ten shillings cost, and threatened that if any other case came before them it would be dealt with more severely. Perhaps before the Improvements Commissioners commence the regulations which might end in improving photography off the sands altogether, it would be as well if the photographers tried to regulate themselves.

The Electric Lighting Act.—The photographer should be interested in the provisions of the Electric Lighting Act, as when the time comes for electricity to be laid at one's door, it will be strange if he cannot avail himself of the electric light on dark and foggy days. It must be confessed that the companies which have been formed in so great a hurry will have a good deal of up-hill work to do. A company can acquire powers in two ways—either of a licence for seven years, to be obtained from the Board of Trade; or of a provisional order—or, in other words, a special Act. The initial step of obtaining a licence is one of some difficulty, because the consent of every local authority having jurisdiction within the area proposed must be first obtained. The consent involves competition among the companies themselves, and as every metropolitan vestry and the majority of provincial local boards have already been applied to by all the companies now in existence, the contest is likely to be a remarkably lively one. To this may be added the not unlikely prospect of the local authority itself undertaking to supply electricity, and, in this case, of course, all competition for outsiders will be shut out. One of those debateable points which appear inherent in every Act of Parliament crops up in this Act. Although a licencee must obtain the consent of a local authority, nothing is said about the latter having power to refuse unconditionally all applicants. The inference, indeed, to be drawn, is that the Act compels a local authority to adopt some system of electricity, but leaves open the question of which one. Anyway, the point is one which will delight the heart of lawyers, and contains quite enough in it to fight over. In the case of a provisional order, the consent of the local authority is not necessary; but the said authority can, if it chooses, petition against the order while it is pending before Parliament, and the Bill will be referred to a select committee in the usual way. These, briefly speaking, are the initial conditions for the supply of electricity; but, of course, the Act specially provides for details in relation to the breaking up of streets, &c.; but these details are of more concern to local authorities than to the photographer. What is, however, of special concern to him is that the "undertakers," as the licencees are termed, are not to require consumers to use any particular form of lamp or burner. This is highly important, because it is clear that all lamps are not suitable for photographic purposes, and if any restriction were enforced, the photographer might not be able to avail himself of electricity for his work in the studio. It will, in all probability, be some time yet before electricity takes the place of gas; but that this period is fast approaching is almost certain.

Amateur Photographers and Gelatine Plates.—The critic of the *Times* in his (on the whole) favourable notice of the Photographic Exhibition, makes a statement about which it would be interesting to have some little information. In noticing that, while the general standard of excellence in artistic results has been raised, it is difficult to find an improvement as regards pictures of the highest class, he accounts for the average excellence by the increased facilities offered by gelatine plates. Amateurs "work away, spoiling a good many plates, getting a good many average pictures, and every now and again turning out a perfectly successful one. The successes are shown, the failures are forgotten." Probably there is truth in this, but we fancy it may be said with equal truth of the man who does not work in the hap-hazard way in which the *Times* critic seems to infer. As every one who has ever dabbled in photography well knows, there are any number of contingencies operating against a perfectly successful result, and though the photographer may be the most careful, painstaking, and artistic of men, if he be not favoured by luck, his best result will have some flaw. This, however, by the way. The point to which we desire to direct attention is this. The writer of the notice says: "The amateur may, if he chooses, send the exposed plates back to the maker to develop and print from, his share in the production of the finished picture being confined to the choice of a suitable subject and a good point of view." No doubt this is possible; but, we would ask, is it a fact? It is very certain that all our most skilful amateurs, though they may purchase their gelatine plates, would scorn the idea of having them developed by hands other than their own. If it really be that this plan forms one of the elements in the "general average" of excellence as shown by the Photographic Exhibition, it will become necessary for the council to institute some rule that the exhibitor of a picture shall state whether he or the maker of the plate has developed it. At present, however, we fancy there is not much need; at all events, the manufacturer of the gelatine plates should be able to settle the doubt.

Notes.

The inauguration dinner of the Institute of Chemistry takes place this evening at Birmingham under the presidency of Professor Abel, C.B., F.R.S.

"The Studios of Europe" is out of print, the first edition being completely exhausted. No other edition will be printed till next year.

The twelve elementary lessons in dry-plate photography, which appeared in these columns, and are now published as the "A B C of Modern Photography," are translated into French and German, and will be issued by M. Gauthier-Villars of Paris, and Dr. Liesegang of Düsseldorf.

Mr. Plener is at present in Vienna, prosecuting his experiments connected with the preparation of pure bromide of silver, which he separates, it will be remembered, from the lighter gelatinous mass by the simple expedient of centrifugal force. Dr. Eder has kindly proffered Mr. Plener his aid, and this, indeed, is the reason why Mr. Plener is continuing his experiments in the Austrian capital. So we may well expect to hear something of importance before long.

The sensation of the week—at any rate, among the learned societies—has been the discovery of a Gallo-Roman town near Poictiers. A temple has been unearthed more than three hundred feet long, a theatre and a hostelry. There are fine steps and massive columns, sculpture of rare execution, bronze and earthen articles—in short, it is a little Pompeii in the middle of France. But we have had no confirmation of the story so far by photography; the camera is a capital antidote for exaggeration, and in a few weeks no doubt we shall be able to judge how far the discovery is romance, and how far reality.

Without wishing to discredit in any way this particular "find," we may point out that travellers' stories have been far less wonderful since the days of photography. Especially is this remarkable in the case of "natural wonders." When the illustrations in our books of travel could not be compared with photographs, it is surprising how tall mountains used to be, how mighty were the waterfalls, and how curious the trees and foliage of foreign lands. The camera not only tells the truth, but is the cause of truth in others.

Judging from the number of photographers who attended the Convention in the United States this year at Indianopolis, the meeting was a great success. No less than 328 votes were taken on the subject of the next meeting-place, which has been fixed at Milwaukee. The President-elect is Mr. J. E. Beebe, of Chicago.

A capital portrait, by the Ives' process, of the late Mr. J. H. Fitzgibbon, Editor of the *Practical Photographer*, is given this month in the *Philadelphia Photographer*. This photo-engraving process is one of the most satisfactory yet brought out, since it is the only one that has been presented to the public printed in an ordinary journal alongside ordinary type.

The *Daily Chronicle* is indignant because a ganger or foreman, superintending some railway works, was so unmindful of police orders as to clear away a quantity of earth which had fallen on a man and killed him. If the police, instead of giving childish orders which they have no power to enforce, had secured photographs of the scene, the jury would have been able to form an excellent idea of the nature of the accident.

No less than twenty-two millions of money have been subscribed to Electric Companies in Great Britain, France, and America; the last has invested about ten millions, and the balance represents the money paid for shares by English and French. People will soon be asking when dividends are likely to be paid on this enormous sum, and then, perhaps, we shall hear of a rapid fall in electric shares.

As we chronicled the departure of the Arctic yacht *Kara* on her dangerous journey due north, we must not omit to tell of its safe arrival home again on Monday last. The brave little craft, which our readers will remember only measures forty tons, met with some terrible vicissitudes; and on one occasion, Mr. Grant writes us, they were hard and fast in the ice for three weeks. After touching Novaia Zemlia, and falling in with Mr. Leigh Smith and the crew of the *Eira*, the *Kara* coasted northwards some two hundred miles. But here, again, the yacht got into difficulties—jammed by icebergs against a small island until its bulwarks were stove in—and it was deemed expedient to land the ship's stores and begin building a store-house. On the 3rd of last month, however, the crew managed to get out of the trap, and by great good fortune found the ice-masses loose enough to steer southward.

"I have done very little photography," says Mr. Grant, "for we have had enough to do to look after the ship and ourselves. The scenery in many parts was wretched; nothing to see but bleak rounded hills and ugly rocks, all of which soon got covered with snow." Mr. Grant tells us it was not the relieving ships that found Mr. Leigh Smith, as has been narrated; as a matter of fact, Mr. Smith found them. Moreover, there was a Russian ship lying in the bay when the crew of the *Eira* rowed into it, so if our expedition had not been there, the poor fellows would have found their way safely to Norway or Russia. Bye-the-way, Mr. Grant must have been very pleased on his return home to find his pictures at Pall Mall had secured a medal.

It is more than two years ago since we suggested in these columns the recording by means of photography of the sunshine signals transmitted by the heliographic mirror. Signals can be reflected for upwards of a hundred miles by simply employing a mirror to turn a ray of sunshine into a particular direction, and it is but the other day that we recorded the feat of sending a message by this means from one of the pyramids near Cairo all the way to Alexandria. The signals of the heliograph, we said, appear to the receiver like pin-points of brightness, or stars seen in the daylight, and whether these signals are of long or short duration, so they are termed long or short signals, and the signalling alphabet, like the Morse code in telegraphy, is built up of these long and short signals. Our suggestion was to photograph the pin-points of brightness upon a movable sensitive film, when of course the long-shining signals would appear as long lines, and the signals of short duration as short lines; the signals thus recorded might be read by any telegraphic operator.

Our suggestion is about to be adopted in Mauritius. There is no telegraphic communication between the islands of Mauritius and Réunion in the Indian Ocean, so the authorities are about to resort to the simple expedient of communicating by sunshine signals. The distance is 134 miles, and if the ray reflected cannot always be seen by the naked eye, there will be no difficulty about doing so with a telescope. Mr. L. P. Adam is organizing the signalling service, and he hopes, it is said, to record his messages by causing the light-spot to impress a moving band of gelatino-bromide of silver paper. Not only sunshine signals, but the light from a bright petroleum lamp, it is thought, will travel the distance, for the atmosphere is very clear; in fact, it has been found that a sunshine beam reflected from a mirror 150 miles distant is to be seen in the telescope after passing through six thicknesses of smoked glass. If a cheap apparatus for moving the photographic film could be devised—and there is no reason why it should be more costly than the Morse telegraph instrument—we see a likelihood of light signals being substituted for the electric telegraph in other countries besides Mauritius; for if sunshine is not indispensable, and messages can be written down, this cheap method of telegraphing will obviously have much to recommend it.

M. Chabot, the well-known expert at handwriting, died this week. He was generally called as a witness in cases of disputed handwriting, and made comparison a good deal by the aid of a magnifier. His experience of the vagaries of penmanship was very great, and if he had only given more attention to photo-enlargements of handwriting his evidence would have been still more valuable. They manage these things better in France, Lawrence Sterne would have told us; photographic enlargements, in which the upstrokes and downstrokes are represented twenty inches high, are produced of the handwriting in dispute and of the authentic handwriting, and these are then handed to the judge or jury for comparison. It is much more satisfactory to let the latter form their own opinion on the characteristics made apparent by the camera—tiny splutterings, saw-edges, unsteady hair-lines, &c.—than have them sworn to by a witness with a spy-glass, who may be called by one side or the other.

Unfortunately, our English Law Courts, unlike those of Paris, have no Government photographic establishment at their service, on which to rely for the discharge of such duty impartially. It is true our judges admit photographic evidence to a certain extent, but they would scarcely be warranted in accepting it in all circumstances. The most readily obtained authentic handwriting appears to be that upon receipt stamps; we have seen photographs of these, at Paris, enlarged to monster dimensions, so that every stroke of the pen can be analysed with accuracy.

The question of forming an Association for the Defence of Photographic Copyright is attracting considerable attention, and we think that if an energetic secretary took the matter now in hand, the Society would be as good as established. We doubt, however, if the calling of a public meeting of photographers would be the best way to initiate proceedings. Our advice would be, first of all to get a list of photographers who publish, and to apply to these for their goodwill, inviting a small donation of 5s. or 10s. towards preliminary expenses. Then a general meeting might be held; and if the Association could be established on a firm and impartial basis, there is no reason why it should not thrive by payment of a small annual subscription. In many cases, to show a bold front would suffice to stop piracy, and expensive legal proceedings are unnecessary.

The perforating pen of Edison is like a black-lead pencil, in which the lead is replaced by a fine needle kept in rapid motion by a minute electro-magnetic engine. Pfaundler makes a retouching pencil on the same principle, the black-lead being made to rapidly move up and down like the needle of the Edison pen, thus producing a fine stipple on the negative.

Thanks to the exertions of Mr. H. Trueman Wood, the energetic secretary of the Society of Arts, a Siemens' dynamo machine has been secured for the rooms of the Society. As an eight-horse Otto engine already exists on the premises, it will be possible at an early period to institute some interesting photo-electric experiments before an audence.

The last theatrical event of importance is the production of Rip Van Winkle at the Royal Comedy. Despite the charm of the music and brilliancy of scenery and appointments which have secured the general approval of the press, we protest once more against the lack of intelligence displayed by the scene-painter. It may be difficult to fix upon the exact whereabouts of Sleepy Hollow, or to localise the village of Falling Waters; but the home of Washington Irving's sweet romance is nevertheless well known to us all. It passed at foot of the silvery Kaatskills, beside the green-shored Hudson river, a mountain paradise that the American story-teller has ofttimes depicted with his loving pen.

Now photographs of the Kaatskill Mountains show us the craggy peaks with a foreground of rich foliage, while the banks of the Hudson, we know from the author's own description, are the reverse of sterile and barren. Yet, at the Comedy Theatre, we see in the landscape nothing but scrub and stone, stunted trees and grey boulders, the broad river, in fact, flowing through a wilderness. This is all the more unreasonable since romance does not call for such a change of scenery, for dear, delightful, drunken Rip lived in a happy thriving village, and it was because the wild mountains were so far away that he sometimes remained out of a night. There is not the least objection in the world to enhancing the charm of a poem by altering its setting; but in this case, both romance and reality suffer without rhyme or reason.

Patent Intelligence.

Grants of Provisional Protection.

4527. Butler Julius Carter, of Edith Road, West Kensington, in the county of Middlesex, for an invention of "Improvements in electro-magnetic engraving machines."—A communication to him from abroad by George McKendree Guerraut, of New York, United States of America. —Dated 22nd September, 1882.

Notices to Proceed.

2780. William Thomas Morgan and Robert Leamon Kidd, both of Greenwich, in the county of Kent, for an invention of "Improvements in the manufacture of sensitive paper, and blocks or tablets thereof for photographic purposes, which invention comprises an improved method of reproducing pictures from such paper."—Dated 13th June, 1882.

2790. Albert Aron, of Rose Street, Newgate Street, in the city of London, Importer, for an invention of "Improvements in albums for holding photographs and such like articles."—A communication to him from abroad by Adolphe Aron, of Rue Turenne, Paris, France.—Dated 14th June, 1882.

Patent Void through Non-payment of Duties.

3968. George Smith, of Great Portland Street, in the county of Middlesex, for an invention of "Improvements in the construction of lamps for magic lanterns and other purposes."—Dated 3rd October, 1879.

This invention relates more especially to lamps used for the purpose of obtaining light for magic lanterns, but it is also applicable to lamps used for other purposes, such as signalling on railways or on board ships. It has for its objects improved methods of constructing and arranging and fixing the several parts of the flame chambers of the lamp, that is to say, the chamber in which the flame burns from which the light is derived, and also improved methods of increasing the amount of light utilized from such flame. My improvements are especially applicable to lamps burning mineral oil, but they may also be applied to lamps burning other oils, or inflammable liquids, or gas. In such lamps as heretofore ordinarily made, the flame chamber is provided with suitable apertures for regulating the supply of air to the flame, and carrying off the products of combustion; and it is made of sheet iron or other metal, having its two ends quite open, but closed when the lamp is in use by plates of glass somewhat larger than the openings, and kept in their places against the ends of the chamber by clips or springs. It has been found, however, that in lamps so constructed, these glass plates are liable to break from becoming unequally heated, their outer edges remaining comparatively cool, and being exposed to currents of cold air rushing between them and the ends of the chamber; also that such currents of air affect the steadiness of the flame. The first part of my present invention consists in novel methods of constructing the flame-chamber so that the glass plates which form its ends fit closely, and are less liable to be broken by the heat. I make the flame-chamber cylindrical in end view, and I close its ends by circular plates or glass, talc, or other sufficiently transparent material fitted into cells formed or fitted upon the ends of the cylindrical chamber, and of nearly the same diameter as the latter. The glass plates being somewhat less in diameter, therefore, than the cylinder, become equally heated, and are little liable to break, whilst the ends of the cylinder being sufficiently accurately closed, currents of cold air cannot pass between them and the edges of the glass plates. I prefer to make the cylindrical cells in which the circular glass plates are fitted in such a manner that they enter the cylinder for a short distance, and are then provided with narrow flanges against which the glass plates rest, and are held in position by wires or rings sprung into their places outside the plates, or by screws or other equivalent means. By this method of construction the plates are not only less liable to break, but if one of them becomes cracked in consequence of the heat, the pieces are prevented from falling out, and the light is not so materially affected as in the case of ordinary lamps, where the pieces are liable to fall entirely away. Flat plates of glass may be used for the purpose described, but I prefer to make them concave, more especially the one used for the purpose of closing the back end of the flame chamber. I place such plates in their cells with their convex side outward, and upon the plate at the back end I deposit upon such outer side a thin coating of silver by any of the ordinary well known methods, the silver acting as a reflecting surface, whilst if thin enough it is sufficiently transparent to allow the flame to be examined through it for the purpose of adjustment and regulation. In order to increase the whiteness of the flame in such lamps I sometimes adjust and fix in the flame one or more wires or thin plates of platinum or other metal not easily fused. Having now described my invention, and the manner in which it is to be performed, I claim the method of fitting and fixing circular, flat, or concave transparent plates in cells in the ends of the flame-chamber of lanterns substantially as described and shown in the drawing. Also the concave glass reflectors, so fitted into a cell at the end of such flame-chamber, and coated with a film of silver sufficiently thin to be transparent, substantially as and for the purpose described. Also, the introduction of metal wires or plates not easily fusible into the flame, for the purpose of increasing the light from such lanterns.

Patent Granted in France.

58,807. Ricard and Co., of Paris, for "Coloured photographs on stuff and tissues of silk, wool, &c., and means and processes of obtaining them."—Dated 19th August, 1882.

Patent Granted in America.

265,226. Thomas A. Willson, of Reading, Pa., for "Lens and manufacture thereof."—Application filed 20th March, 1882. No model.

Specifications Published during the week.

Disclaimer and memoranda of alteration. Nos. 2101 (1870) and 3101 (1872). The Celluloid Manufacturing Co. Pyroxyline and solid collodion. The alterations refer to the details of the celluloid manufacture.

1166. J. J. Sachs, for "Improvements in the production of surfaces for printing, &c." Price 4d.

In carrying out my said invention I proceed as follows. I first prepare the surface to be engraved or etched, which surface may consist of a plate or roller or other form of surface. Taking, for example, a roller, I first coat it with a varnish or layer of some substance or material which will resist the action of the chemicals in an etching bath or metallic or galvanic bath; when this resist is dry, I paint over the surface with some sticky substance, as, for instance, solution of gums, gelatine, starch, paste, or the like in water or other solvent, and while this sticky substance is wet I lay round the rollers, or on the surface, the design, which may consist of any open or closed fabric or material or substance—for instance, gelatine, rubber cloth, paper, and the like. Suppose, for instance, I take a piece of lace, I wrap it round the roller, and it adheres to the roller, the substance super-imposed on the resist causing it to do so. The lace is thus attached to the roller, and I can now adjust the edges of the lace so that the pattern repeats itself perfectly round the roller; or the lace edges may be sewn together previously, thus forming, as it were, a tube, which I can then slip over the roller; or I can place the lace or pattern on the roller, and cause it to adhere afterwards by means of the sticky substance mentioned, without first covering the surface with the sticky substance, and in that case I cover it afterwards with the sticky substance, which soaks through and causes the pattern to adhere to the roller or surface. While this sticky solution is still wet I can adjust the pattern in any way, and arrange it so that it shall repeat itself round the roller; or if the ends be sewn together as before mentioned, the repeat is provided for in the sewing. In the latter case, when lace or any woven or worked fabric is used, and the two ends joined or sewn together so as to form a repeating pattern, this is then slipped over the roller. The moisture in the gum or sticky substance causes the pattern to contract and clasp the roller tightly, so that when the pattern fits the roller moderately well when dry, the addition of water only, or of acid, or alkaline or other liquor, is sometimes sufficient to hold it in its place, during the subsequent operation, especially if the pattern be kept damp or moist; or in some cases the pattern can be fixed on the roller or surface in a dry state, and kept dry throughout the process; but I prefer to use the wet process, as it produces better results. When gum or sticky substance has been used as mentioned, the roller or surface, with the lace or pattern adhering, is dry, and when dried is ready for cleaning out. This can be done by hand, using an instrument pointed by preference like a chisel, with which the gum or equivalent, and the resist beneath, showing through the interstices of the pattern, are removed and are scraped away, leaving the bare copper, metal, or other surface which is subsequently acted on so as to be etched by an etching liquid, or metal can be deposited thereon by galvanic or other means. This cleaning can also be effected by means of the sandblast, or similar contrivance where metallic or other hard particles are substituted for sand, and this is the most expeditious manner of doing it; or the exposed parts may be cleaned of the resist by a brush the bristles of which are stiff or composed of wire, which brush scrapes off or detaches the resist through the interstices of the pattern, but leaves the covered parts untouched. After cleaning, the roller is ready for etching, but to prevent error I prefer to take off the pattern first, by soaking it in water or acid or other solvent for the sticky substance used, and then (cutting the lace or pattern if it has been joined before putting it on the roller) the pattern can be easily removed and the surface inspected, and any faults rectified before etching. The etching is or may be carried out as stated in the specification of my previous patent No. 266, dated the 21st day of January A.D. 1881, with or without the aid of an electric current. To produce the reverse effect, instead of etching the roller or surface prepared in the above manner, I deposit copper or other metal on the exposed bare parts by electro deposition, the metal depositing on the bare parts, whilst the parts covered with resist remain unaltered. To produce, for example, say pin engraving, I take a mill covered with pin engraving, and run it over the roller or surface before commencing the process, and thus the whole surface is covered with this engraving. I then proceed as before, and when finished, I have as result a roller or surface, the outstanding parts of which print the pin or other engraving while the sunken parts print a solid pattern, thus giving beautiful effects. This is especially useful for printing oil colours, as for instance, for printing on oil cloth.

1252. W. D. Saull and W. R. Brooks, for "Spring Clips for holding programmes, notices, &c." Price 2d.

This invention relates to improvements in the construction of spring clips which are specially applicable to holding programmes in theatres and other places of amusement or entertainment, and which are also suitable to be employed for suspending notices, and for other analogous purposes. The said improved clips are constructed in the following manner. A plate is arranged between two projections or enlargements on a suitable bed plate or base, and is retained in that position by means of a pin or pins, or other similar contrivances so arranged that the plate is capable of rocking thereon when actuated, as will be well understood. The front end of the said plate is bevilled or slightly cut away towards the bed plate, and is caused to bear against the latter by a spring, of any suitable form, placed between the bed plate and the under surface of the opposite end of the said rocking plate.

A GLANCE AT THE FRENCH PHOTOGRAPHIC EXHIBITION.

On our return to Paris after a couple of months' sojourn in central France we hasten to the *Palais de l'Industrie*, in order to run through the photographic exhibition, which we had left in full course of preparation. That which first strikes us as characteristic of this exhibition is, that quality certainly outweighs quantity—the exhibits only take up two rooms. It is the number of instantaneous pictures which deserves admiration. This interesting style of reproduction, which constitutes one of the most beautiful and useful applications of photography, tends to generalize itself more and more, since it can be employed with very rapid dry plates; it is, therefore, not surprising that such splendid specimens have been sent, notably those by M. Grassin, of Boulogne-sur-Mer, and Maison Neurdien, of Paris. The studio of Carlos and Marguerite Relvas is represented by a magnificent collection of photographs of all kinds, printed for the most part by the phototype process—that is to say, in a permanent manner.

The houses of Guinsac of Toulouse, Berthaud frères of Paris, Aubry of Brussels, Lemercier and Co. of Paris, Roches of St. Cloud, Unchelut and Walkmau of Paris, and Gutekunst of Philadelphia, exhibit very fine phototype prints. Under this head we have much pleasure in observing the marked progress made in the application of this remarkable process, which has unfortunately been too long without its full importance and practical utility being appreciated. The various photographic journals published in Germany, Austria, and Belgium continually show fine specimens of phototype printed in new establishments for that purpose. The *Bulletin* of the Photographic Society of France publishes in a recent number a phototype from the machine presses of the house of Brunner and Winterthur (Switzerland). This reproduction is due to M. Lugardon, a painter of Geneva, and a very clever amateur photographer. It represents children in the baths of the Rhone at Geneva; as an instantaneous picture, it leaves nothing to be desired. These young swimmers give themselves up to their sport, and even the splashes resulting from their frolics in the chopping waves have been immobilised and fixed on the negative. Mr. Muybridge has had a very complicated apparatus constructed for his study of animated nature, but really that is not necessary: with a simple tourist camera, gelatine plates, and a good shutter, one can realize every minute what he has with a cumbersome apparatus of considerable size. There is nothing else striking to note in this exhibition, which shines, it is true, in the artistic character of the greater number of works shown, most of the fine scientific applications, and even experiments towards technical progress, having been excluded. It must be remembered that in this exhibition of the decorative arts photography only comes in as a graphic process for decorating paper. Special processes have nothing to do in this artistic exhibition, or else they occupy insignificant places. This accounts for the small number of works shown, and the imposed omission of most of those applications so worthy of admiration which honour the actual photographic science. Leon Vidal.

SWING BACKS AND RISING FRONTS.

BY W. E. DEBENHAM.

The use of wide-angle lenses in photography is commonly spoken of and written about, with reference only to their employment for producing pictures of large size in proportion to the focal length, when their characteristic, the wide-angle, is brought into full play. It is of course obvious that with a lens of the same length of focus, a picture identical in every respect may be produced on a plate of given size with a wide-angle lens, as with one of ordinary angle stopped down to the extent for out-door work. The one circumstance in which the wide-angle lens will not do work that the smaller angle one will accomplish, is that which arises when, from deficiency of light, or from the desire to work instantaneously, a larger aperture or diaphragm is employed with the latter instrument than the former will define properly with.

Wide-angle lenses, then, will do everything except work so quickly as the narrower angle instruments; and they have a special use in some cases, where the plate to be covered is not larger than an ordinary angle lens will suffice for. The particular use referred to is that which occurs when a high building is to be photographed, the distance from which (where the camera can be retracted to) is limited.

Take the case of a building of such a height, and the distance available for the camera to be such that the whole subject, building, sky, and foreground, would be properly contained on a plate, the length of which equals the equivalent focus of the lens, and the foreground and lower part of building up to the level of the camera occupy one-quarter of the height of the plate. Now, with a small angle lens, the only method of getting in the whole of the subject is to tilt the camera upwards, and the inclination of the vertical lines must then be overcome by the use of the swing-back.

This use of the swing-back, in exactly the reverse direction to that in which it is generally turned, when it is desired to bring foreground and distant objects simultaneously into focus, puts all the image except across one line, out of the plane of definition. The plan which I consider far better, under the circumstances, is to use a wide-angle lens, to have the camera level, and to raise the front carrying the lens to the height requisite. The accompanying diagrams will illustrate the two methods, the size of plate, and amount of included picture being the same in each.

In all lenses, particularly those intended for out-door work, the field is made as flat as the optician can make it; that is, the focus of the marginal pencils is so lengthened that a good image is obtained upon a flat plate, instead of requiring a curved or cupped surface as would otherwise be the case. The illustrations, therefore, are those of a flat field lens. With the amount of curvature generally present, there would arise a somewhat different result; but not at all different enough to invalidate the argument.

In fig. 1 the camera is level, and the lens front is raised to the height necessary to bring the centre of the subject on the centre of the plate. The plane of definition, *d d*,

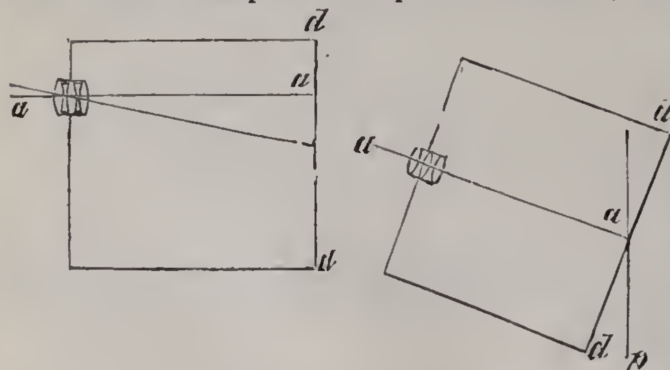


Fig. 1. *Fig.* 2.

is at right angles with the axis, *a a*, of the lens, and the plane of the plate is coincident with that of definition.

In fig. 2 the camera is tilted, and the back, *p p*, swing, to keep the perpendicular lines parallel, and the plane of definition only cuts the plane of the plate, *p p*, in one line. It must be noticed that not only is the focus displaced to the extent indicated, but that this is aggravated by the fact that the top of the building, being farther from the lens than the lower part and foreground, has its focus nearer the lens than the latter, whilst the swinging of the back has removed the plate further.

There is one other advantage in the use of the rising front rather than the swing-back; it is that the foreground receives more illumination through the lens than the top of the building and the sky. With the tilted camera the rays from the centre of building pass through the circular opening of the diaphragm, and those from the top and bottom are diminished, owing to the elliptical form which the diaphragm assumes to rays passing it diagonally. With the raised front and level camera the lower part receives the greatest illumination, and the ellipticity, and consequent diminution, of the bundle of rays progresses regularly upwards, so that the sky and brightly-lighted top of the building get considerably less exposure than the foreground.

The late Mr. Thos. Sutton contrived an arrangement of the diaphragm with a single lens to produce this effect. The stop, instead of being at right angles to the axis of the lens, was tilted forwards, so as to give the foreground more exposure than the middle and upper part of the picture. To tilt the camera upwards produces, to a certain extent, exactly the contrary result.

In many cases it is not necessary to have remarkably wide-angled lenses in order to obtain the required image with a high-rising front instead of a tilted camera; but cases do arise in which the widest angle that can be obtained in a lens is none too great. It is to be regretted that there is a disposition among opticians to cut down the margins of the lens, so that the angle is limited to that at which good definition is given. From this cause it sometimes happens that a picture, otherwise good, is marred by the sharp circular line cutting off the sky from the top or corners. Fine definition is not wanted on these blank spaces; but if the glass had been a little larger, light would have passed through, and a good sky effect rendered.

THE CITY AND GUILDS TECHNICAL INSTITUTE.

We extract from the prospectus just issued all that relates to the examination in photography. Although the word "gelatine" is not mentioned throughout, we presume that it is included under the emulsion processes. Still, we should have thought that the gelatino-bromide process was important enough to be printed at full-length with the other minor methods cited.

I. The Examination will include questions founded on such subjects as the following, but will not necessarily be confined to these subjects:—

1. The characteristic properties of pyroxiline for the manufacture of collodion, and the various substances employed for the purpose, as well as the solvents, such as ether, alcohol, wood, naphtha, &c. Different qualities of collodion.
2. The Daguerreotype process, the calotype process, the wet process, dry plate processes with the silver bath, emulsion processes, and the principles involved in each.
3. The theory of development by the acid and alkaline methods. The theory of intensification.
4. Printing in silver and other metals, toning, and fixing; printing in carbon, Woodburytype, vitrified enamels.
5. Special applications of photography to engraving, typography, lithography. The principles of the Woodbury and calotype processes.
6. Special applications of photography to astronomical and microscopical purposes, as well as for recording meteorological and other observations.
7. General principles of portrait and landscape lenses. The principles of construction of cameras.
8. The various apparatus in ordinary use by photographers.

II. Full Technological Certificate. The Candidate, who is not otherwise qualified (see regulations, rule 33), will be required to have passed the Science and Art Department's Examination, for the full Certificate in the Ordinary Grade, in the Elementary Stage at least; and for the full Certificate in the Honours Grade, in the Advanced Stage at least, in *two* of the following Science subjects:—I. Practical, Plane, and Solid Geometry. VIII. Light and Heat. X. Inorganic Chemistry. XI. Organic Chemistry.

III. Works of Reference:—"Researches on Light," by R. Hunt, "La Lumière," by E. Becquard; "Philosophical Transactions; Royal Society," 1840 to 1843; "Scientific Memoirs," J. Draper; Miller's "Chemistry;" "Treatise on Photography," by W. de W. Abney.

Correspondence.

OBERNETTER'S NEW EMULSION.

Dear Sir,—Feeling deeply interested in Obernetter's method of making emulsion, of which you gave a sketch in your issue of the 6th inst., I lost no time in trying to ascertain how far such a method was practicable, but I must confess I went to work with grave apprehensions of hopeless fog.

I dissolved 1 gramme of gelatine and 1·5 grammes nitrate of silver in 20 c.c. of water, and allowed to set. I then broke up the jelly with a silver folk, and poured over it 2 grammes bromide of potassium dissolved in sufficient water to cover the mass. I left this standing for three hours, poured away the liquid, and washed the set emulsion for another three hours. I then dissolved the emulsion, made up to 30 c.c., and coated plates.

I will now refer to two of these plates upon which I printed transparencies, and which I send for your inspection.

No. 1.—I was amazed to find this plate develop absolutely free from fog. After development I placed it in my fixing bath, one in which plates had been previously fixed, and upon removing it I was disgusted to find that it was thickly veiled with yellow fog.

No. 2.—This plate developed similarly to No. 1, but I took care to fix it in perfectly fresh hyposulphite, with the result that I obtained the most perfect immunity from fog of any kind.

I may say that the plates, as far as I can judge, are not very rapid, but I mean to try how far speed can be obtained by boiling. At any rate, I can speak for the simplicity and rapidity of the method, and believe it has a future before it.—Yours truly, Vero C. Driffield.

[The plate marked No. 2, which Mr. Driffield sends us, is quite free from fog.—Ed. P.N.]

Dear Sir,—In your account of the Obernetter emulsion you mention that German photographers can purchase details of the process for £5, an amount, I believe, equal to one hundred marks (German). Can you tell me (1) whether photographers in this country are expected to pay the same; (2) whether amateurs will be required to pay the same as professionals, who will obtain profit from the process? Thanking you, in advance, for an answer to these two questions—Believe me, yours very truly,

An Amateur.

[We believe no arrangements have yet been made by Herr Obernetter for the sale of his process in this country; all we know of the matter is contained in the announcement which will be seen in our advertisement columns.—Ed. P. N.]

Dear Sir,—My attention has been drawn to your notice of a new process or mode of compounding an emulsion by Herr Obernetter.

At a meeting of the Halifax Photographic Club, November 11th, 1881, Mr. Councillor Smith gave a practical demonstration of the making of gelatine emulsion. I took part in the discussion that followed, stating that for some time previously I had been experimenting with a view to obviate the necessity for prolonged cooking and its attendant evils, and my aim had been to discover some method by which silver bromide could be formed in the finest possible state of division, my theory being that the mode of effecting the combination of the silver and bromine, as then practised, attained this end "too rapidly" for the silver bromide resulting to be of the most suitable character for high sensitiveness, unless subjected to after treatment by the application of heat. I therefore sought out some method by which a retarding influence might be brought to bear at the time of combination, causing this operation to proceed more gradually and under control.

I also came to the conclusion that the plan of using a very small quantity of solvent for the silver caused the latter to be brought into contact with the bromide in too concentrated a form to favour fineness of division in the resulting silver bromide. I therefore decided to mix the silver in a larger quantity of water, and then add the greater proportion of the gelatine proposed to be used, and, after dissolving, allow to set hard. This I carried out. I then mixed the bromide with the remaining quantity of water and gelatine, and slightly heated until the latter was dissolved. With a clean shaving-brush I applied the bromide liquid to the argentic gelatine pellicle, passing the brush rapidly to and fro, painting, as it were, the one into the other. After the compound had been treated in this manner, gentle heat was applied, the liquid filtered, and allowed to set; afterwards it was washed and drained, again dissolved and filtered, *but not cooked.* I tested this sample of emulsion in a week's time, when I found the results to be about medium rapidity, the quality being excellent.

In the meantime, still thinking over the matter, it occurred to me that the brushing might be dispensed with, and the argentic gelatine pellicle simply cut up into very small pieces and allowed to soak in the bromide solution until combination was effected by absorption, finishing this process by gentle heat, and agitating, then filtering and washing and finishing as before without cooking—results about the same as before, but, for some reason, a very slight trace of fog, though not sufficient to do any harm.

I next proceeded as above, but reserved a portion of the silver in solution unmixed with the gelatine; the remainder was carried through all processes up to the point of washing. The emulsion, after being thoroughly set, was again cut up into fine pieces, and the remaining silver solution added, and allowed to be absorbed as far as it would, and the whole slowly dissolved and agitated; then it was set, washed, and finished in the usual way, the cooking again being omitted. When tested, this gave clean and rapid results, but not extremely so.

Mr. Illingworth, an able emulsion worker, and a Polytechnic medallist for the present year, volunteered to try my plan and report results at the next monthly meeting of the Society. This he did, stating that a finer emulsion he never saw, and it was very sensitive. I believe he used a formula by Mr. Forrest for his proportions, but of this I am not certain.

As my method appears to me to be extremely similar to that of Herr Obernetter, claiming, as I do, priority of adoption for "little England," I have asked our Secretary to verify the above details; not that I would for a moment begrudge "big Germany" an equal share in any merit there may be in the new principle propounded, should my surmise prove correct.—Yours most respectfully,

W. Clement Williams.

I beg to state that the foregoing is a correct report of what Mr. Williams laid before the Halifax Photographic Club on November 11th, 1881.

Edward Gledhill,
Hon. Sec. to Halifax Photographic Club.

THE DEFENCE ASSOCIATION.

Dear Sir,—I should be quite ready to support the suggestion for an Association; but how are we to begin? How are we to get photographers to feel confidence in it? I see Mr. Downey suggests a subscription of £1 1s. per annum. I should think half or quarter of this amount would suffice, and then we should have plenty of members. The subscription to the French Syndicate of Photographers is but seven francs, I believe. We could do it quite as cheaply—could we not?—Yours faithfully,

October 17. One who has been Pirated.

Dear Sir,—With reference to Messrs. Downey's letter in the News of the 13th *in re* the "Piracy of Photographs of Celebrities," I would suggest that they, or some other photographer, call a meeting of photographers interested in the matter, and make an attempt to form a society to deal with photographic piracy. If this is done, I am quite ready to undertake the secretarial duties *pro tem.*

Unless some such society be formed the evil will become intolerable, but with energetic measures it may be stamped out; and, as so many are interested, it is scarcely fair to wait for one man or firm to undertake the prosecution.—Yours faithfully, W. T. Wilkinson.

PRACTICAL INSTRUCTION IN PHOTOGRAPHY.

Dear Sir,—Seeing a note on "Photographic Instruction" in your paper for the 6th inst., I am sure it would meet with great support if some enterprising photographer were to start a class in London, as there are many amateurs who would be glad of learning the different processes, myself amongst the number. By printing the above note, no doubt some one will start a class; if this were done, I am sure it would be well supported.—I remain, yours, &c.,

F. R. G.

THE FERROUS OXALATE DEVELOPER.

Dear Sir,—In my recent article upon the "Development of Gelatine Dry Plates with Ferrous Oxalate," I was taxed with animus by the author of the article in "Autotype Notes." Now, to disprove that accusation, I shall be glad if you will insert this letter in the News.

In the article above referred to, I made the assertion that when using certain plates, under no circumstances was it possible with a ferrous oxalate developer to get as good results as when pyrogallic was used. To this assertion, "The Author, &c.," gave it as his experience that ferrous oxalate, on the contrary, gave much better results than pyrogallic.

Since writing the article, I have had an opportunity of trying some plates that are sent out by the Autotype Co. specially prepared for ferrous oxalate development, with the result that my previous experience is entirely reversed. With Autotype plates, the ferrous oxalate developer not only gives a negative in *about half the time*, but of a much superior quality than when pyrogallic is used; in fact, these plates are evidently prepared for ferrous oxalate development, and only yield the best results when that developer is used. This statement is, I hope, sufficient to acquit me of animus.—I remain, yours faithfully,

W. T. Wilkinson.

PHOTOGRAPHIC NUISANCES.

Sir,—Your correspondent, E. Williams, seems somewhat relieved after he has, as he says, had a good grumble, and hopes someone else will do likewise. Now, for my part, I am not inclined to do likewise, but otherwise. E. W. is quite mistaken in thinking there are no good commercial plates in the market. While being willing to admit some makers' plates are very inferior, those, at any rate, of one firm whose films I have used for several years daily, are everything to be desired. I have got them from different dealers, and thus have had the chance of getting different batches. I could always mix them without the least fear of getting different results, but always found them the same both in quality and uniformity in sensitiveness, and never do I remember having a bad batch of this maker's plates. I could also say the same of other makers; but when I am satisfied with one, my motto is to stick to it, and I would advise E. W. to do the same if he wishes to succeed; he would then, I think, have less complaints to make. As to makers labelling their plates ten or twenty times when they prove less rapid, I will admit it is a fault they would do well to remedy; but that is not so bad as E. W. would have us believe. Trusting he will take courage from the fact that there are many good makers of commercial plates yet,—I am, yours truly, Geo. Pendry.

Dear Sir,—Kindly grant me space to pour out my pæan of praise and gratitude to those two worthy souls, Messrs. "Exact Measure" and E. Williams, for their letters entitled "Photographic Nuisances." May every earthly blessing fall upon them! May their hands be strong to labour! &c., &c.

I, too, have suffered. Listen to my plaintive cry. Boxes labelled, "These plates are from ten to twenty times as rapid as wet plates," have brought sorrow and anguish. In boxes said to contain one dozen, I have found from six to eight fit to use; the others all duffers—spotted with powdered glass, dead flies, thumb-marks, scratches, dents, and fancy portraits of Jumbo in different poses; the coating of the plates in some parts too thick, in others too thin; some glasses too large, some too small, some cut askew. All these, when complained about, the indignant manufacturer calls "microscopic" defects.

Mr. Editor, can you call it a microscopic defect that blots out, perhaps, one of the dearest, prettiest little noses that ever a dainty little miss of sweet seventeen brings you to photograph for her? And then the temptation to bad language! Oh! my dear friends and dry plate makers, think of this, and of the little boy in the dark room, whose mother has sent him to you to benefit by your artistic taste and Christian example. Do try and be more careful in future, because your plates are all very good if only prepared with ordinary care and judgment.—Faithfully yours, Augustus W. Wilson.

Proceedings of Societies.

Newcastle-upon-Tyne and Northern Counties Photographic Association.

The ordinary monthly meeting was held on October 10th, in the College of Physical Science, Newcastle, Mr. Sawyer in the chair.

In the absence of the Secretary, Mr. J. P. Gibson read the minutes of the last meeting, which were confirmed.

Messrs. Pae, Galloway, Martin, Cambell, Swinton, and Templeton, were nominated as candidates for election at next meeting.

It was resolved that three judges be appointed for the November exhibition of photographs—one to be an artist, one an amateur, and one a professional photographer; and Mr. Way, Professor Herschel, and Mr. Laws were elected unanimously.

It was decided that pictures for competition be sent in without the sender's name attached, which, with some identifying mark, were to be enclosed in an envelope to the Secretary. It was also decided that only pictures taken since Jan. 1st, 1882, be eligible for competition. A suggestion that the council be requested to ask members to furnish photographs of their own production for decorative purposes as well as for competition was adopted.

Mr. Laws reported that the sub-committee appointed to procure an enlarged photograph of the late Professor Marreco had not as yet been able to find a negative suitable for reproduction.

The meeting concluded with a vote of thanks to the Chairman.

London and Provincial Photographic Association.

At the meeting of this Association held at the Mason's Hall Tavern, Basinghall Street, E.C., on Thursday, the 12th inst., Mr. P. F. Richards in the chair,

A Member showed an unexposed gelatine plate prepared from commercial pellicle on which were a number of spots, which the maker of the pellicle attributed to over-heating. In the opinion of the meeting they were identical with what are known as "Coignet's spots."

Mr. Cowan said that he had caused these spots with a gelatine that did not otherwise give them, by keeping the emulsion in a sieve for about fifty hours previous to coating. He thought they were caused by fermentation; this, in a measure, bore out Mr. Henderson's theory that they are caused by carbonic acid gas, which can be removed by continuous exhaustion under a receiver.

Mr. Burton showed a negative with several splinters of glass in the film; there were no insensitive spots round these, and no repulsion of the emulsion seemed to have taken place.

It was suggested that it would be interesting to know the form of the glass crystals, and also at what stage they fell on the film.

Mr. Burton said that if a plate had flaws or marks in it, it could be easily ascertained if they would show in the prints by placing a piece of white paper at the back, and if then visible on looking through the glass, they would print in a diffused light.

Mr. Reiman showed a transparency developed by the addition of three grains of oxalic acid to the pyrogallic developer; it was a good rich colour, but he found it slow in developing.

Mr. Prestwich had tried the formula, and found it slowed the development about ten times, and also slowed the plate.

It was said that the colour of the plate in daylight was a green yellow.

Mr. Henderson said that some two years ago he had experimented with a view of forming the bromide in solid gelatine by a somewhat similar process to that of Mr. Obernetter. In his case the bromide salt was dissolved in the gelatine by daylight; this was then allowed to set, when the solution of silver was poured on the top, and the whole allowed to stand for three weeks, without any combination taking place, except that a very thin layer of bromide was formed on the top of the gelatine.

An interesting but desultory conversation followed, in which Messrs. F. W. Hart, Debenham, Cowan, Burton, Coles, and others took part.

It was resolved that a register should be kept at the Association of situations vacant, and of assistants requiring employment.

Photographic Society of Ireland.

The opening meeting of the session was held on Friday last, the 13th inst., in the Royal College of Science, E., and was largely attended, Mr. George Mansfield being in the chair.

Mr. Hutchinson Smith explained the results of his summer's work on rapidly moving subjects, and explained Messrs. Watson's patent Addenbrook exposer, which had been kindly lent by them for exhibition, and which was much admired. He considered that personally he had obtained his best results with an ordinary shutter of simple form; many of the others, though of more complex construction, failed to expose the plate as equally as might be desired.

Professor Barrett exhibited a curious sample of crystallization on a gelatine plate, which was generally considered to be that of alum which had not been sufficiently removed by the washing.

The names of ten new proposed members were handed in to be balloted for at the next meeting, which will be held on the 10th November, and which will be the annual general meeting of the Society.

Photographers' Benevolent Association.

The Board of Management held its monthly meeting on October 4th.

After minutes of the previous meeting were read and confirmed, Mr. E. G. Ballard, of Rochester, was elected as an ordinary member of the Association.

The Photographic Society of Great Britain having placed their Exhibition at the disposal of the Association on Thursday, November 16th, from 7 till 10 p.m., it is hoped that members will make a point of attending the Gallery at 5a, Pall Mall East, on that date.

Talk in the Studio.

Photographic Society of Great Britain.—The next technical meeting of this Society will be held on Tuesday, October 24th, in the Exhibition Room at the Gallery, 5a, Pall Mall East; when, amongst other matters, the apparatus exhibited will be explained. The chair will be taken at 8 p.m.

Electro-deposition of Copper on a Large Scale.—The steel telegraph wire used for overhead lines in the United States is now copper plated, the present works being in a position to deposit two tons of copper a day. When all arrangements are complete, it is estimated that by an expenditure of 980 horse-power no less than 15,000 lbs. of the metal will be deposited in twenty-four hours, or about 16 lbs. per day for each horse power.

Isolation.—Men's pursuits have an isolating tendency. Sporting, literature, art, science—whatever may absorb attention—helps to cut off those absorbed from the rest of the world. It is curious to look on at a railway bookstall at a busy hour, and to notice the varying tastes that have to be gratified, and also to see how one man's predilection is a puzzle to his neighbour, and *vice versa*. Half-a-dozen of us rush into a compartment and begin to be absorbed in our papers. One has, let us say, the *Athenæum*, and soon he is gloating over the prospects of the book-season. His thirst for literary novelties is gratified by the announcement of the volumes which this or that firm have in preparation for the winter, and he is gratified at the prospect of the splendid harvest. The absorbing interest thus excited is a puzzle to the purchaser of the *Sportsman*, whose interest is centred in horses and their doings, or in the "records" of athletes and others whose names are ever on his lips. What an absurd fellow the man of books is to him; and, in return, how that individual wonders that the other should waste his time over columns of racing stuff, or the doings of people he never heard of. The man with the *Era* finds its pages a mine of interest, and even the advertisements have a charm that is irresistible. Frivolous and foolish, indeed, does this seem to the sedate reader of the *Guardian*, the church news in which alone seems worthy of a reasonable being. Yet the possessor of the Photographic News smiles compassionately on him as a harmless enthusiast with a hobby, while he absorbs into his brain technical details relating to his beloved art; while he, in his turn, excites the commiseration of the severe student of the *Economist* seated by his side. In all these cases special objects of interest invest the lives of those devoted to them with a peculiar zest, for the man is to be pitied who has no hobby; but none the less is the effect isolating. Were the readers to throw down their papers and begin a conversation each on his own topic, it would be singularly wanting in vitality. And the impression created in each and every breast would be that the rest were ignoramuses worthy of commiseration. The fact that Tennyson had in the press a new poem would not impress the backer of "Own Brother to Potiphar." Both would seem to be devoid of natural curiosity if they were indifferent to the claims of the new actress at the Foldcrolity, all these would appear heathens from caring nothing about the rumours of Churchmen having claims to the vacant mitre, while an indifference to the latest discoveries in photography or the newest problem in finance would certainly stamp the company in the eyes of two of them as devoid of reasonable enthusiasm in respect of subjects closely associated with social progress.—*South London Press.*

The Heliograph in Mauritius.—Some time ago we drew attention to the importance of establishing telegraphic communication between the Islands of Mauritius and Réunion in the Indian Ocean, in order that the approach of cyclones could be signalled from one place to the other, and thus the great damage to ships and property which they cause be avoided by taking proper precautions. The idea of employing the heliograph for this purpose, in default of a submarine cable, has occurred to Mr. L. P. Adam, who has procured in France two great telescopic heliographs of Colonel Mangin's design for the purpose of establishing communication between the plateau of Pouce in Maritius, and the crater of the wood of Nèfles in Réunion. The distance between these two elevated stations is 134 miles, and the crater bears south-west of Pouce. When we remember the recent heliographic successes of General Ibanez and Colonel Perrier over a distance of 180 miles between the frontiers of Morocco and the coast of Spain, it will be seen that Mr. Adam has a good chance of success. Moreover, by aid of a small automatic eclipser devised by M. Viger, a clockmaker in Maritius, he is enabled to transmit despatches automatically on the Morse system. He also hopes to register the messages by the use of selenium in a process similar to that employed in some observatories for recording with the middle wire of a meridian telescope, or by causing the light spot to impress a photographic gelatino-bromide of silver band of paper passing under the spot. Experiments with Colonel Mangin's apparatus shows that at a distance of 150 miles the luminous beam is visible in the telescope even after it passes through six thicknesses of smoked glass which have considerably reduced its intensity. The conclusion, therefore, is that signals produced by a petroleum lamp with flat wick seen edgewise placed in the focus of one of M. Mangin's apparatus will be visible from one island to the other, and will allow of a cyclone being announced from Maritius twenty-four or thirty-six hours before it reaches Réunion.—*Engineering.*

Scientific Investigation by Photography.—The nature of vibratory motions which accompany the propagation of flame in combustible gaseous mixtures have been investigated, says *Nature*, by MM. Mallard and Le Chatelier. They have studied, with the help of photography, the period of accelerated and very irregular velocity, accompanied by sound, which follows a (first) period of slower, silent, and regular propagation, in a tube closed at one end, and having its combustible gaseous contents (bioxide of nitrogen and sulphide of carbon) lit at the other. A vibratory movement is indicated, the amplitude increasing as the last third of the tube's length is neared (where is one of the ventral segments of vibration). A mean pressure of at least 5 atm. is produced for a few ten-thousandths of a second. The mean velocity of propagation is accelerated as the amplitude and rapidity of the vibrations increase.

THE ABSORPTION SPECTRUM OF OZONE.—Chappuis has recently made a careful study of the absorption spectrum of ozone, and finds no less than eleven bands, the positions of which he has carefully determined. Mere traces of ozone may be detected if a column of sufficient length is examined spectroscopically. When traces of nitrogen are present in oxygen used for partial conversion into ozone, a compound of oxygen and nitrogen is formed, which gives a peculiar spectrum of fine dark lines.

THE COLOUR OF WATER.—Experiments made by J. Aitken confirm the usual notion that pure water has a blue tint; but he finds that the theory of selective reflection is insufficient to account for all the variations as to tint met with in the case of natural accumulations of water. Whitish particles are suspended in the water of the Mediterranean, and the tint varies from deep blue to chalky blue-green, according to the proportion in which these particles may be present.

THE PRINCE OF WALES' VISIT TO BRADFORD.—Shortly after the Prince and Princess of Wales visited Bradford, Mr. J. M. D. Worsnop, of 154, Leeds Road, forwarded through the Right Hon. W. E. Forster a cabinet sized instantaneous photograph of the Prince in the act of receiving the key from Sir Henry W. Ripley to open the Technical School. On the 16th of August Mr. Worsnop received through Mr. Forster a letter from Sir F. Knollys, dated from Marlborough House, stating that the Prince will be happy to accept an enlarged copy of the photograph. Shortly afterwards Mr. Worsnop forwarded to Marlborough House an enlarged copy, beautifully framed. On the 30th of September he received a letter from Sir F. Knollys, dated from Abergeldie Castle, Ballater, Aberdeenshire, acknowledging the receipt of the picture, which has been handed to his Royal Highness and accepted by him.—*Bradford Daily Telegraph.*

AERIAL PHOTOGRAPHY AND TELEPHONY.—The Municipal Council of Paris having voted a grant of 1,000 francs to the Academy of Meteorological Ascension for the purpose of making experiments in aerial photography, an ascent was made on Sunday by members of the Academy from the Carrefour de l'Observatoire. They carried with them an apparatus for taking instantaneous photographs. This had six lenses pointing to different directions, so as to embrace the whole of the horizon and to produce a panoramic photograph. The balloon rose 200 metres. A telephone was afterwards fitted up in the car to enable the occupants to communicate with their friends below.—*Daily News.*

PHOTOGRAPHIC EXHIBITION IN EDINBURGH.—Yesterday afternoon there was a private view of an exhibition of some 150 photographs in No. 16, Princes Street, under the auspices of the Edinburgh Photographic Society. The photographs are all of more than ordinary excellence, and in one or two instances a high level of art has been attained. One of the best pictures in the exhibition is a landscape with figures (No. 104), which has scarcely a fault—either from an artist's or a photographer's point of view. The landscape No. 82 is a well-balanced composition, the details being brought out with a pleasing softness. No. 58, a Continental village view, is praiseworthy in many respects, as is also No. 59; but here the sky is suspiciously like a "made-up." Taken as a whole, the landscapes are superior to the figures. Two ambitious *Genre* pictures, one of them called "Well-earned Repose," have the artificial setting much too prominent. "Brambling" is, however, a good composition, the figures of a number of children being happily poised over a bramble bush. In "Chequered Sunshine and Shade" the woodland scene is marred by the figure of the lady who leans against the tree being in too studied an attitude. "Gloaming," an old woman trimming a lamp, is skilfully managed, the figure being thrown in fine relief against the darkened background of a cottage interior. There are a number of studies (principally of expression) by that gelatinous process which gives the appearance of a red chalk drawing. They are all of them very successful, and are presumably by a well-known photographer, who has made this description of photograph a speciality. One of these studies, "Speak, for thy Servant Heareth," is perhaps as fine a treatment of fleeting sentiment as any in the room. No. 48, "The Knight's Daughter," a lady seated reading a letter at a small table, is remarkable for the easy poise, careful arrangement of drapery, and softness of tone. Among a number of other pictures, all of them possessing merit, may be mentioned a series of photographs of palatial rooms, views from the Cape of Good Hope, and groups of young ladies in Egyptian dresses and with Egyptian surroundings, the latter a memorial of the ball of the Black Watch in the Music Hall last season. A very interesting specimen of work by a new process is shown. Instead of the subject being printed from the negative on to silver paper, a sheet of prepared gelatine is used, an electro-type is taken of this gelatine, and the result is a plate from which very fine copies have been taken in ordinary ink.—*Edinburgh Courant.*

A SHAM PHOTOGRAPHER.—A not altogether novel species of fraud was disclosed during the hearing of a case at the Derby Sessions on Wednesday. A man named Frederick Ward was charged with obtaining sums of money from various persons by false pretences. It appears that the prisoner went about with something which resembled a photographic apparatus, and, under pretence of taking likenesses, obtained the money he was charged with fraudulently procuring, as the sitters never received their photographs. The apparatus was examined by a professional photographer, who pronounced it a "dummy." The Recorder sentenced the prisoner to twelve months' imprisonment.

To Correspondents.

H. HOWARD.—1. By reading the specification, you will be able to see if your arrangement is practically identical with that patented. Supposing it to be practically identical, and that you make it for sale or for use in your profession or trade, you will be liable. 2. We cannot undertake to advise as to the validity of any patent. A principle cannot be patented, only an arrangement. 3. See description of Mr. Spinks' shutter on page 321 of our present volume. 4. You had better reject the defective emulsion and make fresh.

SOUTH DEVON.—You may be quite sure that when a lens is included, the circumstance is certain to be stated in the advertisement.

CONCAVE GLASSES.—Several correspondents are informed that concave glasses suitable for coloured photographs on glass are to be had from J. Barnard and Co., artists' colourmen, 339, Oxford Street. Mr. Ashman's paper appeared on page 465 of the present volume.

WATER.—1. It will do no harm, as there is no trace of silver left. 2. Add three grains of chrome alum to each ounce, and if this is not enough, try a larger quantity.

CHARLES KNIGHT.—No. 1249. See notice under *Concave Glasses.*

ENQUIRER.—Boxwood dippers are occasionally used, but there is some risk of contaminating the bath. Silver wire is far preferable.

W. W.—See notice under *Concave Glasses.*

J. HAVERSON.—A leader on the subject will appear shortly.

H. J.—You will be likely to find what you require by looking through our advertising columns.

C. E. G.—We do not know of any satisfactory remedy applicable to such a case.

C. BARRINGTON.—It is pretty evident that you have purchased a useless instrument in which one lens has been replaced by a glass having no qualification for the position except that of fitting into the cell. Its value is that of the metal forming the mount.

SAMUEL BONTHORNE.—1. Make it of dry pine, and thoroughly saturate with melted paraffin wax. 2. Certainly not, as such a proceeding would lead to the destruction of the whole arrangement sooner or later. 3. About one-tenth of an inch thick. 4. Yes. 5. It can be bleached quickly by means of a solution of chloride of lime, the action being especially rapid if sufficient hydrochloric acid is added to partially decompose the compound.

H. G. H. CONYBEARE.—1. The markings probably arise from the presence of a trace of greasy matter; perhaps condensed petroleum vapour, as you suppose. 2. It is certainly very annoying to receive plates so carelessly cut as regards size, and there can be no doubt that the makers are in strict law responsible for any loss which may have arisen from the faulty condition of the goods.

G. KEDGWIN TURVEY.—You will find full information on the matter in Mr. Debenham's paper, which appears in our present issue.

PHOTOGRAPHS REGISTERED.

Mr. H. G. PIKE (Chester)—Photo. of Statue of Daniel Rowland.
Mr ANCKORN (Arbroath)—Photo. of Group of Officers of Salvation Army.
Mr. J. WHITE (Littlehampton)—Three Photos. of Ulsters and Dresses.

THE PHOTOGRAPHIC NEWS.

Vol. XXVI. No. 1260.—*October* 27, 1882.

CONTENTS.

PLATINOTYPE PRINTING.

As the days draw in at this time of year the number of prints which can be got from a negative in a day becomes fewer, and this more especially in London. This is particularly trying to the landscape photographer, because the time has just passed when he may, with profit, use his camera, and, could he turn his spare hours to the production of prints from the negatives he has taken, he would save time which must otherwise be taken from the brighter months of the spring, when he will grudge it, because once more he will wish to take to the field. This of course applies particularly to the amateur, who is his own printer. To the professional, who keeps a printer working whilst he is taking negatives, the loss of time is not so much felt.

Taking these facts into consideration, the amateur ought to hail with delight any process which curtails the exposure which it is necessary to give the print under the negative. In the platinum process we have such a saving of time made as is represented by something like three to one. This does not sound very great, but few who have not tried it can conceive what a difference it makes in a day's work to get from two to three prints in place of one. It makes it possible to get as many impressions in a dull winter day, as with the slower process may be had in a bright summer day, working the same number of hours.

We have mentioned the waning strength of the light as a special inducement to the use of platinum for printing at the present season, but the greater sensitiveness of the medium under consideration over albumenized paper is only one of its minor advantages. We believe that if all the advantages of the platinum process over the silver printing processes were fully appreciated by photographers, the use of the former would become much more general than it is.

We believe that several misconceptions as to the capabilities and adaptabilities of the platinum process are common. One of these is that it is only possible to get a good platinum print from such a negative as would, with albumenised paper, give a hard result. This is a mistake, and arises from prejudice acquired by the long practice of silver printing. Let us suppose the case of a negative somewhat too thin for silver printing. What is the reason why we cannot get a good print from such a negative? We know that if we take a very light impression from it, and look at it as it comes from the frame, we may find that the result is charmingly soft and beautiful; but we know that we cannot retain this appearance. The picture will not tone. It will be impossible to get any richness of colour. The consequence is that the negative is considered too thin; but this is not because the picture from it will necessarily have too little contrast to give an artistic result, but because it will not have sufficient depth of colour to satisfy the conditions necessary for the obtaining of a satisfactory tone.

It is quite different, however, with platinums. Here there is no such thing as toning. The colour is the same in all cases, and is always artistic. The consequence that a picture having less contrast in it than is necessary for a silver print will be pleasing to the eye if it be light enough. This is enough to counterbalance the fact that, from the same negative, a platinum print will always show a somewhat weaker contrast of light and shade than with a silver one, and it may be said that if a negative be dense enough to give a good silver print, it will be dense enough to give a satisfactory one in platinum.

The greatest advantage of all in the platinotype process is of course the permanency of the results. It is unfortunate that photographers do not give the attention which they might to this point. They look more to the praise of the moment than to the production of lasting results.

Probably (next to the permanency of results) the greatest advantage of the platinum process is to be found in the extreme simplicity of the manipulations. These are inconceivably less troublesome than those involved in silver printing, if the best results are to be had by the latter process.

The terrible toning bath is replaced by a solution in which it is merely necessary to dip the prints for a second, when a never-varying result is gained. The fixing and prolonged washing of the silver print are replaced by the dipping in an acid solution, and the subsequent rinsing in a few changes of water; whilst an advantage greater than might appear at first sight is to be found in the fact that platinum prints do not cockle in drying.

The only stage at which difficulty can possibly be found is in judging the time necessary to leave the prints in the frames. The faint yellow or greyish image looks strange at first, but very soon the photographer gets used to it, and will probably lose fewer prints by misjudgment of exposure than he would if he were using albumenized paper. Few photographers seem to remember how long it took them to acquire the judgment necessary to allow, in printing, for the reduction in depth which will take place in the toning and fixing baths.

The only point where any real difficulty is to be found in the use of platinum paper as compared with silver, is in that of combination printing. For example, in printing-in skies, it is almost necessary to use an actinometer, or to judge the time by guess, because, if a sky be printed till it is visible before development, it will be far too dark afterwards.

The ultimate appearance of a platinum print calls for little remark here. We would only say that it always appears at a disadvantage when hung alongside of silver prints. So, for the matter of that, does a soft and mellow painting alongside of harsh and garish pictures. This does not prevent the less brilliant picture from being the most artistic, and, when viewed alone, the most pleasing.

Probably the reason why the platinum process has not done more to oust our old but fickle friend, albumenized paper is, that it affects the photographer's pocket. It is more expensive Probably, however, if the greater waste in the silver process were duly considered, the difference in price would be less than is generally supposed.

The one great and absolutely necessary precaution to take in platinum printing if success be desired, is to keep the paper dry. The other conditions may, it is our experience, be varied considerably without much damaging the final results.

THE COLLOTYPE PROCESS IN PRACTICE.

That theory and practice are two very different things holds good in photography especially, and perhaps in no other branch of our art have so many theoretical formulæ been promulgated than in the Collotype or Lichtdruck process. As our readers are aware, we have had an opportunity of seeing collotype printing in operation in several European establishments of note, and have, from time to time, published in these columns our experiences. But requests still come to us so frequently for information on the process, that we have deemed it well to make a practical summary for the benefit of those who are working—or desire to work—the method.

The formulæ and manipulations here set down are those of Löwy, Albert, Allgeyer, and Obernetter, four of the best authorities on the subject, and we can assure our readers there is nothing described but what is actually practised.

Glass Plate for the Printing Block.—Herr Albert, of Munich, uses patent plate of nearly half-an-inch in thickness, as most of his work is printed upon the Schnell-press (machine press). Herr Obernetter, of Vienna, since he only employs the slower and more careful hand-press, prefers plate glass of ordinary thickness, as being handier in manipulation, and better adapted to the common printing-frame.

Herr Löwy, of Vienna, again, uses plate glass a quarter of an inch thick, as his productions range from the finest to the roughest.

Preliminary Coating of the Glass Plate.—Herr Albert's original plan was to apply a preliminary coating of bichromated gelatine to the thick glass plate, the film being exposed to light through the back of the glass, and thus rendered insoluble and tightly cemented to the surface; this film serving as a basis for the second sensitive coating, that was afterwards impressed by the negative. This double treatment is now definitely abandoned in most Lichtdruck establishments, and, instead, a preliminary coating of soluble silicate and albumen dissolved in water is used.

Herr Löwy's method and formula are as follows:—

The glass plate is cleaned, and coated with—

Soluble glass	3 parts
White of egg	7 ,,
Water	9 to 10 ,,

The soluble glass must be free from caustic potash. The mixture, which must be used fresh, is carefully filtered, and spread evenly over the previously cleaned glass plate. The superfluous liquid is flowed off, and the film dried either spontaneously or by slightly warming. The film is generally dry in a few minutes, when it is rinsed with water, and again dried; at this stage the plate bears an open, porous film, slightly opalescent—so slight, however, as only to be observed by an experienced eye.

Application of the Sensitive Film.—We now come to the second stage of the process, the application of a film of bichromated gelatine to the plate.

Herr Löwy's formula is as follows:—

Bichromate of potash	16 grammes
Gelatine	$2\frac{1}{2}$ ounces
Water	20 to 22 ,,

According to the weather, the amount of water must be varied; but in any case the solution is a very fluid one. An ounce is about 35 grammes, as most of our readers know. A practical collotypist sees at a glance the quality of the prepared plate without any preliminary testing. A good preliminary film is a glass that is transparent, yet slightly dull; the film is so thin you can scarcely believe it is there. The plate is slightly warmed upon a slate slab, underneath which is a water bath; it is then flooded with the above mixture of bichromated gelatine, leaving only sufficient to make a very thin film. When coated, the plate is placed in the drying chamber.

Drying the Sensitive Film.—Much depends upon the drying. A water bath with gas-burner underneath is used for heating, and a slate slab, perfectly level, receives the glass plate. The drying chamber is kept at an even temperature of 50° C.

The object to be attained is a fine grain throughout the surface of the gelatine, and unless this grain is satisfactory, the finished printing block never will be. If the gelatine film be too thick, then the grain will be coarse; or, again, if the temperature in drying be too high, there will be no grain at all. The drying is complete in two or three hours, and should not take longer.

The Negative to be Printed from.—The sensitive film being upon the surface of a thick glass plate, it is necesssary that the cliché or negative employed should be upon patent plate, or not upon glass at all, so as to ensure perfect contact. Best of all, is to employ a stripped negative, in which case absolute contact is ensured in printing. It is only in these circumstances that the most perfect impression can be secured. If the negative is otherwise satisfactory, and only requires stripping, it is put upon a levelling stand, and fluid gelatine of a tolerable consistence is poured over it. When dry, a pen-knife is run around the margin, and the film leaves the glass without any trouble.

Herr Obernetter says that many of the negatives he receives have to be reproduced before they can be transformed into Lichtdruck plates, and he employs either the wet collodion process or the graphite method, according to circumstances. If the copy is desired to be softer than the original, collodion is employed; if vigour be desired, graphite is used, and here is his formula:—

Dextrine	62 grains
Ordinary white sugar	77 ,,
Bichromate of ammonia ...	30 8 ,,
Water	3·21 ounces
Glycerine	2 to 8 drops

The film is dried at a temperature of 130° to 140° F., in about ten minutes, and whilst still warm is printed under a negative in diffused light for a period of five to fifteen minutes. In a well-timed print the image is slightly visible; the plate is again warmed a little above atmospheric temperature in a darkened room, and then fine levigated graphite is applied with a fine dusting brush, a sheet of white paper being held underneath to judge of the effect. Breathing upon the film renders it more capable of attracting the powder. When the desired vigour has been attained, the superfluous powder is dusted off, and the plate coated with normal collodion. Afterwards the film is cut through at the margins of the plate by means of a sharp knife, and put into water. In a little while—from two to five minutes—the collodion with the image will be detached from the glass; the film is at once turned over in the water, and brought out upon the glass plate. Under a soft jet of water any air-bubbles that may exist between the collodion and the glass are removed, and then a solution of gum-arabic (two grammes of gum dissolved in one hundred grammes of water) is poured over, and the film is allowed to dry spontaneously.

Exposure of the Printing Block under the Negative.—The exposure is very rapid. Anyone conversant with photolithographic work will understand this. At any rate, every photographer knows that bichromated gelatine is much more rapid than the chloride of silver he generally has to do with.

There is no other way of measuring the exposure than by the photometer or personal experience, and the latter is by far the best.

After leaving the printing-frame, the plate is immersed in cold water. Here it remains at discretion for half-an-hour, or an hour; the purpose, of course, being to wash out the soluble bichromate. It is when the print comes out of this bath that judgment is passed upon it. An experienced eye tells at once what it is fit for. If it is yellow, the yellowness must be of the slightest; indeed, Herr Furkl (the manager of Herr Löwy's Lichtdruck department) will not admit that a good plate is yellow at all. A yellow tint means that it will take up too much ink when the roller is passed over it. The plates of Herr Obernetter, however, are rather more yellow than Herr Löwy's —certainly only a tinge, but still yellow; and Herr Obernetter's work proves, at any rate, that the yellowish tinge is by no means inseparable from good results.

The washed and dried plate should appear like a design of ground and polished glass. The ground-glass appearance is given by the grain. If there are pure high-lights (almost transparent) and opalescent shadows, the plate is a good one.

Printing from the Block.—We have now a printing-block ready for the press. If it is to be printed by machinery—that is to say, upon a Schnell-press—the surface is etched; if it has to be more carefully handled in a hand-press, etching is rarely resorted to—it is moistened only with glycerine and water. To etch a plate for a Schnell-press, it is placed upon a levelling stand, and the following solution is poured upon it :—

Glycerine	150 parts
Ammonia	50 ,,
Nitrate of potash (saltpetre) ...	5 ,,
Water	25 ,,

Another equally good formula, recommended by Allegeyer, who managed Herr Albert's Lichdruck printing for some years, is :—

Glycerine...	500 parts
Water	500 ,,
Chloride of sodium (com. salt)...	15 ,,

In lieu of common salt, 15 parts of hyposulphite of soda, or other hygroscopic salt, such as chloride of calcium, may be employed.

The etching fluid is permitted to remain upon the image for half-an-hour. During this time, by gently moving the finger to and fro over the surface, the swelling or relief of the image can be distinctly felt. The plate is not washed, but the etching fluid simply poured off, so that the film remains impregnated with the glycerine and water; at the most, a piece of bibulous paper is used to absorb any superfluous quantity of the etching fluid. After etching, the plate is taken straight to the printing-press. The inking up and printing are done very much as in lithography. If it requires a practised hand to produce a good lithographic print, it stands to reason that in dealing with a gelatine printing-block, instead of a stone, skill and practice are more necessary still. Therefore, at this point the photographer should hand over the work to the lithographer, or rather the Lichtdruck printer. It is only by coaxing judiciously, with roller and sponge, that a good printing-block can be obtained, and no amount of teaching theoretically can beget a good printer. To appreciate how skilful a printer must be, it is only necessary to see the imperfect proofs that first result, and to watch how these are gradually improved by dint of rolling, rubbing, etching, cleaning, &c. In all Lichtdruck establishments, two kinds of rollers are used—viz., of leather and of glue. In some establishments, too, they employ two kinds of ink; but Herr Löwy manages to secure delicacy and vigour at the same time by using one ink, but rolling up with two kinds of roller.

Collotype printing is not merely done by hand-presses, but is also done by machinery. At Herr Albert's a gas-engine of six-horse power is employed to drive the machines, and each machine requires the attention of a skilled mechanic and a girl. The press is very like the lithographic quick press. Upon a big steel bed lies the little collotype block. The glass printing block, with its brownish film of gelatine, moves horizontally to and fro, and, as it does so, passes under half-a-dozen rollers, which not only supply ink, but disperse it. Some of the rollers are of leather, and others of glue, and whenever the printing-block retires from underneath them, an inked slab takes the place of the block, and imparts more ink to the rollers; sometimes as many as eight rollers are used, for the difficulty of machine printing is to apply the ink as delicately and equally as possible. It is necessary at intervals to damp the block, and when the printer in charge finds this to be the case, he stops the press, and applies a little glycerine and water with a cloth or sponge; then a leather roller is passed over to remove superfluous moisture, and the press is again started.

Herr Obernetter relies upon the Star or *Stern-press*—a small lithographic press—one man sufficing to manage it, who turns a wheel with large spokes, reminding one of the steering-wheel of a ship. The Lichtdruck plate, gelatine film upwards, is laid upon a sheet of plate-glass by way of a bed, the plate having first been treated with a solution of glycerine and water; it is then inked up as previously described, except that Herr Obernetter uses two kinds of ink—a thick one and a thin—applied by two rollers of glue. In the first place, a moist sponge is rubbed over the surface; then a soft roller, covered with wash-leather, and of the appearance of crêpe, is passed over two or three times to remove surplus moisture; then a roller charged with thick ink is put on, and then another with thin is applied. It takes fully five minutes to sponge and roll up a plate, the rolling being done gently and firmly. A sheet of paper is now laid upon the plate, the tympan is lowered, and the scraper adjusted with due pressure; a revolution of the wheel completes the printing, the well-known scraping action of the lithographic press being used in the operation.

Some Lichtdruck prints are printed upon thick plate-paper, and are ready for binding without further ado, these being for book illustrations. Other pictures that are to pass muster amongst silver photographs are, on the other hand, printed upon fine thin paper, and then sized by dipping in a thin solution of gelatine; after drying, they are further dipped in a solution of shellac in spirit.

THE PHOTOGRAPHIC EXHIBITION.

Third Notice.

The pictures of Herr Julius Braatz, of Stettin, attract attention, if only by reason of their subject matter. "Boy Assuming Manhood" (379), being rather too high for close inspection, is, to our thinking, the best; a little fellow busy with his father's pipe, which might well illustrate the amusing story Mark Twain tells, with a Dutch accent, about "my first shmoke," the scene shown in the picture being none other than "De Leetle Room Where I Shleeps." But the most conspicuous of Herr Braatz's contributions are two scenes from Little Snow-white and the Seven Dwarfs (317 338), in which the photography is excellent, but the grouping and draping a little too stagey and stiff. Mr. W. Adcock, whose interiors are always good, has essayed this year to impart life into his pictures, and in two cases, at least, with considerable success. There is a ludicrous humour very telling about "Yesterday—a threat of discharge" (376), where two maid-servants appearing at their master's breakfast-table are bidden to behave themselves better in future under pain of dismissal; and in the companion picture "To-day—they give notice to leave," where the same prim serving-maids tell the lord of creation. to his amazement, to suit himself this day month. Mr. Adcock's "Game is Won" (354) is scarcely so successful.

Mr. F. Beasley, Junior, a landscape photographer of high reputation, exhibits several prints of merit. Two little pictures of a Scotch Smithy (375, 353) represent excellent work, full of detail, vigorous, and yet with that evenness of tone characteristic of the man who has his work perfectly under control. The Mediterranean scenes and studies of Tropical Foliage (191, 192) are no less praiseworthy. Of Mr. Joseph Paget's pictures (374 358), we like best the Russian Church at Jerusalem, the Church of the Nativity at Bethlehem, and the Parthenon; the hard contrast of light and shade to be found in the East, which mars so many photographs, is here avoided entirely, and while there is the bleaching action of the sun and weather upon the stone monuments plainly marked in Mr. Paget's pictures, none of them offend with glaring light and pitchy darkness. Indeed, Mr. Paget's Eastern scenes are among the most successful we have ever seen. Mr. John Duncuft shows two pictures, of which "The Salmon Ladder" (372), with a fine bit of massive rock in the foreground, is the most striking. Mr. G. M. Jones has a frame of meadowland pictures (370), several of which are very pleasing. The right-hand print at the top is our favourite, where some pollard willows overhang the sedgy stream, and the lazy river scarce moves beside the rushes. Mr. G. Hadley's frame (366) also includes several praiseworthy pictures; he is more successful, however, in his interiors —Hostel Library, Lincoln, is a capital bit of work—than in his landscapes, some of which are a little too dark to please us.

Messrs. Morgan and Kidd forward several portrait enlargements (362-365) made upon their gelatino-bromide paper, which are more than satisfactory; the portraits of Sir G. Airy and Miss Marten are, indeed, exceedingly fine, combining a high degree of softness and vigour with excellent effect. Mr. L. Berry's best exhibit is "The Ploughman's Baggin" (360), in which a pair of dappled Flemish horses are shown standing in the deep furrows; this fine picture Mr. Berry has wisely enlarged, and is to be seen amplified in another part of the room (25). Mr. Berry's "Gleanings from Nature" (347) is also well worth looking at. Mr. T. J. Dixon's sole exhibit is a frame showing the interior of some artists' studios (355). These peeps into palatial abodes—painters of late have become very luxurious in their surroundings—are rendered with exceeding skill and taste, the rich tapestry and carpets, the screens and knick-knacks that abound, affording a contrast that the photographer must have found rather trying. Herr H. Schüren, of Hamburg, sends a study of "Faust" (352), which has much to recommend it, being forcible, well draped, and admirably lighted; the only fault we find is, that the aged philosopher does not look old enough. Herr Schüren has also several fine examples of portraiture.

The Woodbury Company, as usual, exhibit some magnificent enlargements. One of the finest is an exquisite portrait of Madame Modjeska (300), by Messrs. W. and D. Downey; and two others from negatives by Mr. J. E. Mayall, of New Bond Street (44, 56), are scarcely less beautiful. There is a smoothness and brightness about the work rarely to be seen in photographic enlargements. Some fine landscapes are also shown by the Woodbury Company, one of them being Mr. Boord's yacht *Swift*, a picture already noticed (341). Mr. B. J. Edwards forwards a series of sea sketches (345, 346), of which "Leaving Lowestoft," a remarkably fine bit of work, is one of the most successful. Mr. Edwards has also several New Zealand views (312, 313), of which "The Pink Terrace" and "The White Terrace" have a special charm; a study of "Stalactites," in the same collection, is also a beautiful picture. Of Mr. Milman Brown's contributions we prefer the "English Cottage Home" (45), a rustic homestead amongst the trees, led to by a pathway through the meadow, which serves as foreground. "The Landslip" (344), by Mr. Brown, will also please. "Holiday Memories" (340), which is entered in the catalogue as the work of Mr. Garrett, is in reality a contribution by Mr. G. Christopher Davies, and contains some delightful sketches of bracken and foliage. "On the Banks of the Orwell" and "Pin Mill" are sweet little rustic studies. Another frame by Mr. Davies is made to tell the story of decoying wild duck (318), and is most interesting. Mr. G. P. Garrett shows "English Views" (339), and "Views in Switzerland" (319), the latter including some very careful and successful work. The most attractive is a view of Mont Blanc, a difficult subject, as many photographers know to their cost. Mr. Garrett shows the hoary giant in his full proportions, the shining white glaciers being made to contrast well with the matt snow slopes around; a study of rugged firs in the Alps also merits notice. Mr. F. S. Schwabe has some good views of the Pyramids and the Sphinx, but they are unfortunately hung too high for close inspection. Mr. Edward Fox's best picture is a tree study "Elm" (75), a monarch of the park laid low by the storm; Mr. Fox's prints are also for the most part hung too high to see with comfort. Mr. T. C. Hepworth exhibits six interiors (329); in some of them the shadows are too deep.

The Autotype Company show specimens of various branches of photography. One of the most interesting of their exhibits is some Collotypes which are *facsimiles* of the Codex Alexandrinus (511). There are, as our readers may know, but three authentic manuscripts of the Bible in existence, one in Berlin, a second in St. Petersburgh, and the Codex Alexandrinus, which the Autotype Company have copied. Twenty years ago a copy of the Bible M.S. was therefore priceless; now the whole can be purchased for twenty-five pounds. A frame of vitrified portraits (328) is noticeable not less because it is the only exhibit of the sort, as because it includes some very large and very fine specimens of ceramic-photography. A study of a female head—a ten-inch plaque—in red pigment is exquisite; and another specimen scarcely less perfect is the portrait of Mrs. Admiral Maxse. The Autotype Company also send many brilliant enlargements; a view on the Dargle by Mr. Payne Jennings, the big grey boulders in the foreground, between which the mountain stream forces its way, the steep banks and overhanging trees hung with deep foliage and interlaced with creepers, is a wonderful example of the enlarging camera. Nor are the portraits, several of them life-size, less successful. Notwithstanding their size, there is a refinement and a finished "engraving-like look" about them which will do much to dispel the dislike still entertained in many quarters for photographic enlargements. If work of this standard can be produced, we shall not find portrait painting so widespread in years to come.

Mr. Charles Andreae, who, like a thorough-going amateur, makes his own plates, sends several specimens of careful work; "Oak Struck by Lightning" (314), the rugged giant knee-deep in bracken fern, is one of his best, though Mr. Andreae's pictures of Portsmouth (115) are some of them exceedingly good. Mr. W. J. Belton's "Cottage" (311) is very English in its aspect, and is a delightful print; in another part of the room, among some instantaneous studies of steamers (69), also by Mr. Belton, there is other noticeable work, in the water left behind by a steamer, the changing surface of the waves being caught in all its beauty, and appearing almost iridescent to the eye. Mr. McLeish's well-known study of a "Fiddler" (292), which we have noticed at other exhibitions, is here, and therefore needs no additional praise on this occasion; but we must not forget to call attention to two other fine pictures of Mr. McLeish: "Views on the Tees" (22), close to "A Misty Morning," of which we have already spoken, and cannot speak too highly.

Mr. Seymour Conway's pictures (288, 81) this year will add further to his high reputation. Their soft brilliancy is such that at first sight they appear to have been printed upon collodio-chloride paper. They recall the admirable work of Russell Manners Gordon, by their clearness and purity; there is plenty of vigour, but no hardness. Look at "Llamberis Pass and Lakes," or "Dwygyfylchi," as ugly a name as ever was given to a pretty picture. Mr. W. R. Marsh contributes some wave effects at Bognor (287), which were decidedly well worth photographing, and should command the attention of some of our learned physicists. Mr. F. Lupson shows a picture of a Newfoundland dog (286). Mr. R. N. Harman exhibits some leafy studies (275, 194, 193), which would have been better for a little lighter printing.

Captain Abney sends half-a-dozen little Alpine pictures. The huge crystalline masses of the Görner Glacier (278) are exceptionally fine, and in Lyskammon and Riffelhorn (279) there is a charming effect obtained by a soft shadow falling on the delicate white slope of the Lyskammon. A brilliant sunset contrasting with the black hulls of some beached fisher-boats at "Broadstairs" (280) is another effective study by Captain Abney. Mr. Andrew Pringle's "Views of the Scotch Lakes" (271) include some enchanting scenes, as witness his delightful peeps at Loch Katrine and the graceful falls at Inversnaid; a richness of tone pervades Mr. Pringle's work, that must be the envy of every landscape photographer. Mr. Arthur Debenham only sends one picture, a bold sketch of the massive columns at the entrance of the Forum Civili at Pompeii (269). Mr. Glen Payne sends a series of studies (257), and some farmyard scenes (264, &c., 246, &c.), several of the latter exhibiting considerable merit; while of Mrs. Glen Payne's we like best, "Rustic Music" (228), a lad piping to his little sweetheart, whose black eyes and pensive expression, framed in a quaintly frilled bonnet, are simply delightful. In other juvenile studies, Mrs. Payne shows also much taste and artistic ability. Mr. W. Wainwright, Junior, exhibits both land and sea studies (258, 79), and in both is equally successful. His foliage pictures are clear and full of detail, and yet with plenty of shadow, and the same knowledge of light and shade is admirably put forth in the dashing yacht studies he also shows. Mr. H. Waterhouse Pope shows a picture of a dog (256). The Reverend Mr. Barlee exhibits a haymaking group (252), together with some tasteful views of Yarmouth (178, 151). Mr. G. E. Alder's "Game of Cards" (251) is good photography, although we do not care for the subject. Mr. W. D. Sanderson has several fine studies of "Woodland Monarchs" (249, 238), the latter picture exhibiting the fine proportions of a fallen tree in a singularly effective manner; several interiors are also the work of Mr. Sanderson, but we miss the grand landscape pictures he was wont to exhibit years ago.

APPARATUS AT THE PHOTOGRAPHIC EXHIBITION.

Although pictures form the staple of the Pall Mall Exhibition, the various photographic appliances placed on and around the table are not altogether without interest. Apparatus for wet-plate work is only notable for its absence, excepting so far as Mr. Shew exhibits one of his expanding or accordion-like changing-boxes, fitted up with a water-tank, and the old-fashioned paraphernalia for out-door operations; still it appears to us that Mr. Shew's compact and neatly-made changing-tent or box, excellent as it is, would hardly admit sufficient light to enable development to be carried on with certainty. Shew's light-tight plate-box (No. 474) is one of the best and lightest which we have seen, as its efficiency does not depend on the excellence of one joint—it being built up out of several layers of textile material. A stepped plate store or case, arranged something after the fashion of the usual letter paper-case, and connected with an electric bell, is shown by Mr. Langton, the bell being screwed on the back of the box, and the battery being placed under the table; when the box is opened the electric circuit is completed, and the bell begins to ring, continuing to sound until the case is once more closed. It would of course be quite easy to arrange this kind of thing so that a distant bell—say in the principal's office—should ring during the time the case is open; but it would be better to place the contact piece so that the bell should sound as soon as the catch or fastening of the box is drawn back, as we noticed that the box exhibited could be opened to the extent of one-eighth of an inch without sounding an alarm, and that the ringing ceased as soon as the box was nearly shut. Folding ruby lanterns are exhibited by the Sciopticon Company, Mr. Werge, and Mr. Shew, that first mentioned being the lightest, and no doubt the cheapest, while that contributed by Mr. Shew is a trifle heavier, as the cardboard of which it is composed is neatly covered with, and strengthened by, book-binder's cloth. Mr. Werge's lamp is a pyramidal arrangement with red silk sides, the whole folding down into a wooden box.

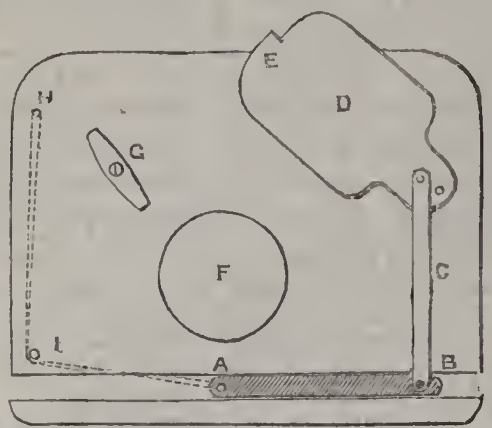
The dark slide appears to find increasing favour as a means of carrying the sensitive plate afield, as complex mechanical changing-boxes, such as were shown last year are not to be found in the present Exhibition. Photographers evidently appreciate the advantages of being able to take a small or large number of plates with a corresponding amount of luggage, and it is certainly unpleasant to know that one slip of the hand, or careless movement, may be fatal to the whole day's work. The light double slides of the Sciopticon Company have already been described in the News. Mr. George Smith, the manager of the Company, makes a point of lightness, and his portable camera, with his brattice stand, are evidently the out-come of careful study, and do him much credit.

The "eclipse" light apparatus of Mr. McLellan appears to be a very useful invention, and consists of an arrangement for burning magnesium wire in oxygen. A metal gas holder, capable of containing about twelve gallons, is fitted with a glass globe, so arranged that by filling it with water, and opening two stop-cocks, it becomes charged with oxygen from the holder; a stopper is then removed, and a piece of lighted magnesium wire, coiled in the form of a helix, and mounted on the usual laboratory deflagrating plate, is introduced into the globe of oxygen. The actinic intensity of the magnesium light is so enormously increased by the presence of the oxygen that a cabinet picture may be taken with an exposure of one second, and even drop shutter pictures may be obtained. It is said that about one hundred exposures may be made with one gas-holder full of oxygen, this costing about 6d. The apparatus is simple in form, and, consequently, inexpensive—probably something less than £5 would cover the whole expense of apparatus and materials.

As regards cameras, there is little to be said, good cabinet work being contributed by various makers and dealers. The Brooks Academy camera and the Enjalbert, each of which is intended to contain a number of plates, have already been described by us. On a camera exhibited by Messrs. Watson and Son, we find a simple arrangement for obviating the convenience of turning the focussing screen back over the camera when the dark slide is placed in position; instead of being simply hinged to the back of the camera, the focussing screen is attached by a double hinge or toggle-joint, this arrangement allowing the screen to be fixed parallel with the back, and about an inch behind it, when the dark slide is to be placed in position.

At the social gathering, held on Tuesday evening last, some of the apparatus shown was brought under discussion; but the main interest of the meeting centred on the exhibition, and trial of several forms of quick shutter ; after which Mr. McLellan demonstrated the method of working with his " Eclipse " light apparatus.

Messrs. Watson and Son called attention to a simple form of " go-and-return shutter," embodying the principle carried out by Mr. Harrison some two years ago. The shutter in question is made of ebonite, and is intended to be fitted in front of the lens.



A sliding piece, AB, is joined to the flap ED by a connecting rod, C, and it is obvious that a motion of the slide, either to the right or to the left, will serve to close the flap over the opening F. Let us suppose that the slide is pushed to the right, the flap covers A, and that the detent, E, is made to engage in the notch E. Under these circumstances the shutter is closed and the india-rubber band, HIA, is stretched to the utmost, on releasing the flap by withdrawing the detent, the shutter rapidly opens and shuts as the sliding piece AB travels to the end I of the groove. The shutter is very neatly made in ebonite, and works with a degree of smoothness and steadiness which one would hardly expect in a return-motion shutter.

Mr. E. Hyde next exhibited a simple flap shutter, mounted inside a camera, the flap being so recessed into its seating, and fringed with a bordering of velvet, as to thoroughly ensure the obstruction of all rays of light. Mr. Hyde's shutter is actuated by a small crank which projects from the side of the camera, and a very ingeniously-constructed metal shield serves to cover the slot which allows the apparatus to be raised with the front of the camera. Mr. Hyde's shutter has satisfactorily stood the test of rough usage in various parts of the world.

A double flap shutter of the " go-and-return " type was exhibited by Mr. Shew, this apparatus being provided with a brake, intended to reduce the speed. Such a shutter is comparable to Watson's shutter made with two flaps, and it of course opens from the centre. Mr. Collins introduced a shutter of this character about eighteen months ago ; but we believe that the difficulty of adjusting the brake so as to give the required speed proved an obstacle to its general use. The Addenbrooke shutter was exhibited, and this somewhat complex instrument is doubtless calculated to do good service when time and attention can be devoted to the management of such a delicate and complex apparatus. Among the cameras shown at the meeting, that of Rouch may be classified with the cheaper instrument made by the Sciopticon Company, a separate base-board, or mainstay, being used in each case. This system, so general on the Continent, is certainly conducive to lightness, although such cameras take rather longer to set up than the model ordinarily used in this country.

An interesting feature of the meeting was the ardent enthusiasm with which various amateur photographers set forth the special advantages of those cameras which they had used during the past season, but it must not be lost sight of that intelligent and thoughtful manipulation are far more important than the possession of a highly-organized and extremely well-made camera. We have seen admirable work executed under very trying circumstances by a very cheap and roughly-made camera of the scenograph type.

Mr. Cowan demonstrated the rapidity and exactness with which glass may be cut—even in a nearly dark place—by means of his patent cutting-board and guides.

A NEW AMERICAN STUDIO.

There are some extensive studios in the United States, if the new establishment, opened last month by Mr. Frank L. Morrill, has many equals. According to the *Lowell Daily Citizen*, the rooms of the new establishment are twelve in number, and occupy about 6,000 square feet. The main room, which is to be used as a reception room, is, we are told, 32 feet square, and 15 feet high.

It is lighted by a large skylight, and is shaded by a screen suspended from the roof. The walls are tinted in India red, with olive trimmings, and an open fireplace with heavily carved mantel occupies one end of the apartment.

At night the room is illuminated by rows of gas jets suspended above the screen, and so arranged that the light falls on the walls. The atelier is the finest in the country, being supplied with a skylight 18 feet square, the glass being one quarter of an inch in thickness, and set in an iron frame. The room is 25 by 40, and is finished in natural colours. Leading from it are two ladies' retiring rooms ; two dressing rooms, supplied with marble set bowls and plate glass mirrors ; two laboratories and a printing room 18 feet square. There are also a finishing room, a printing room, a negative room, and an artist's room. All the rooms, with the exception of the reception room, are finished in pine, with hard wood floors. Electric bells and speaking-tubes connect the rooms, and steam is supplied through radiators. The conveniences are unexcelled for completeness, and it is very questionable if there is such another photographic gallery in the country. The view of the city from the windows is very fine, and will alone repay a visit to the rooms.

By-the-Bye.

A NEW SCIENTIFIC INVESTIGATION BY PHOTOGRAPHY.

We have already pointed out how much photography has aided scientific research of recent years—how the astronomer, the chemist, the surgeon, the botanist, the meteorologist, the physicist have availed themselves of the camera in their work. We have shown, too, that photography does not merely in this connection act in a servile capacity, simply recording fluctuations and changes—as in our observatories, for instance—but that it is also employed for observing the most subtle phenomena and in detecting delicate symptoms which are to be observed in no other manner. In fact, the camera, like the microscope, has of late earned for itself a place among select philosophical apparatus, and has become one of the most trusted of investigating instruments.

Within the last few months one other department of science has been added to the many that have recognized photography as a valuable means of investigation. Mathematicians have now found an important use for the camera, and before long we may expect to see the apparatus in the study of the theoretical man of science, as it is now an indispensable adjunct to the scientific experimentalist. The laws of motion, the theories of Newton, the governing rules of dynamics and statics, over which theory has long held supreme sway, are about to enter the realm of practice, and photography is to demonstrate to us what previously only the mathematician could determine by abstruse calculation. The important function that photography here performs will at once be understood when we mention that many problems and recognized data are based upon calculation alone, and although the mathematical accuracy of these can scarcely be doubted, it will be with the utmost satisfaction to all men of science to have these experimentally demonstrated, and by such an unerring witness as the camera. Again, it is always possible in a mathematical calculation that, while there is no error in the final result, there may be error in detail—the errors in question neutralizing one another; these, if they exist, photography will at once discover, so that here is one benefit the more that is likely to result from the adoption of the camera by mathematicians.

Most of our readers have heard of the catenary curve—the curve, that is to say, taken by a suspending chain. Knowing the weight of a chain and its length, any mathematician can calculate the curve it would assume, and he could, in this instance, after setting it out, verify his calculation by actual experiment. But there are many cases where the mathematician must rely upon his calculations alone, and is unable to verify his result—at any rate, experimentally. It is so in the case of the trajectory curve, or curve made by a stone flying through the air, or a cannon ball as it is sent on its speedy journey. Two things determine the nature of this curve—namely, velocity and gravity. The resistance of the atmosphere interferes with the speed of a projectile, and this, of course, the mathematician takes into consideration when he estimates the velocity; but it is extremely unlikely, although he may sketch the beginning and end of the trajectory curve correctly, that the intermediate points he sets down are without error. Photography, however, is now capable of depicting this curve, and of showing the mathematician if he is right or wrong in his theoretical result. Thanks to M. Marey's ingenious photographic apparatus, which has already been described in these pages, we are now able to follow the mathematician in his work; we shall be able to confirm many of the beautiful Newtonian laws of gravity and velocity, and no doubt, in many cases, detect errors—they may be but minor ones, but still errors—which, but for the existence of photography, might never have been discovered.

It would be foolish to deny that Mr. Muybridge's instantaneous photographs of animals in motion constitute the germ of this new departure in scientific investigation. M. Marey was one of the first to appreciate the teachings of these pictures, which demonstrate the motion of limbs and muscles in a way that had never before been imagined. The study of animal mechanics became a new science in the presence of these photographs; and not only in science, but in art, are the Muybridge pictures instructive. For, in the same way as a knowledge of anatomy is, if not imperative, highly conducive to good painting and sculpture, so we may take it for granted that the numerous positions assumed by animals in motion—regarding them, if you will, as a mere bundle of dry facts—cannot but fail to teach the art-student something of the functions of limbs and muscles. M. Marey, who had for some time past occupied himself in study inganimal mechanics in birds, at once set about applying photography to his investigation, and, proceeding with his interesting research, passed from the observation of animate to inanimate things. Systematically progressing step by step, he soon forged ahead of his teacher, and now M. Marey is on the threshold of an investigation which is drawing upon him the eyes of the scientific world.

We may here, in a few words, briefly refer once more to M. Marey's instrument, and to the results he has achieved. Muybridge, it will be remembered, employed for his experiments a series of cameras set up in a row, alongside a sort of race-course, and as the animal came by, it was successively photographed in these cameras. Across the race-course were stretched very light threads, every one in connection with a camera, and the horse, or whatever the animal was, as he touched these threads, one after another, made the exposure. The consequence was, that in the end, Muybridge secured pictures of the animal in the various positions he assumed while moving. Marey only employs one camera instead of many. Again, instead of using a perfectly white background, as Muybridge did, he uses a black one, illuminating the moving object as brightly as possible. As it would be very difficult to produce a dead-black screen, Marey uses a darkened recess for background, and his object moves across this. If he kept the lens of his camera open during the whole time the moving object is in the field of his camera, the result would naturally be no well-defined image, but a blurred one right across the plate. To obviate this, the camera is made to expose a hundred times during a second, and thus he gets not one, but many successive images. In front of the camera is a rotating wheel with spokes, which alternately caps and uncaps the lens, and the velocity of this wheel being accurately timed, it permits you to make some very important observations. The motion, during one-hundredth part of a second, is recorded, and to further make the result complete, at certain intervals the spokes of the wheel are double size, so that another check and means of registration is at hand. To indicate the rapidity and completeness with which M. Marey's camera works, we may mention that he has been able to photograph letters and words traced by means of a black stick having a white nob at the end. Spelling his name with this rod against the dark background, while the camera was set in action, he was able to obtain the word "Marey" upon his gelatine plate when this came to be developed.

We published a wood-cut of one of M. Marey's photographs some weeks ago, it will be remembered, the picture representing a man in the act of running. He has now proceeded further, and is engaged, as we have said, in depicting various curves, an indication of which previously could only be divined by the aid of the mathematician. Thus the path taken by a stone thrown across the field of the camera is shown on the gelatine plate. The stone is enveloped in a bit of white paper to be as visible as possible, and M. Marey secures on his sensitive film the parabolic curve taken by the stone as it rises and falls in its flight. The photograph secured is not a blurred image, but a clear dotted line, each dot and space representing the one-hundredth of a second. As the intervals of exposure are accurately measured by the spoked wheel, it is possible, therefore, not only to secure in the form of a dotted line the path of the projectile, but to have, as well, a tell-tale of its velocity through every instant of its flight. Thus, in the case of a stone being thrown into the air, the dotted lines appear short and close together at the top of the curve where the velocity is least, while the lines are longer in the photograph at the lower part, that is, where the stone is rapidly falling. A stone at the end of a string whirled round by a person alternately standing still and walking forward, has also given some instructive photographic records, which are likely to explain something more than we know at present of the laws of motion.

M. Marey has so far, of course, only entered upon the threshhold of this interesting investigation, and what he has done is only preliminary to a more exhaustive research. Still, the novelty and interest of the results already obtained are very great, and we may look forward with confidence for some remarkable disclosures from M. Marey's ingenious photographic apparatus.

The next "By-the-Bye" will be "About Photographic Journals."

Notes.

The Emperor of Brazil, one of the few princes who has a practical acquaintance with chemistry and photography, is personally organising four expeditions to observe the Transit of Venus in December next.

We print in another column information on the subject of producing incombustible designs upon an incombustible surface. One of these days, by the aid of the platinotype process, we may be able to print incombustible photographs upon asbestos fabric.

The Austrian *Jahrbuch*, which annually makes its appearance in Vienna under the able editorship of Dr. Hornig, the president of the local photographic society, will contain this year, as frontispiece, a heliogravure portrait of Captain Abney. Another German annual—the *Kalender*—makes its second appearance this year under the direction of Herr Karl Schwier.

Mr. J. H. Jennings, whose interesting paper on micro-photography we published last month, is good enough to sends a charming example of the *Navicula Lyra*. He says:—"I have taken many photographs with a $\frac{1}{16}$ inch objective, yet I never cease to wonder at the results gained from using such a tiny atom of glass. From six to nine flashes of burning magnesium—pieces of wire half-an-inch long—give sufficient illumination for a well-exposed negative, sharp to the edge; the biggest portrait lens would scarcely be as rapid."

Photographers in London and Paris who desire to prosecute their labours in a balloon are more fortunate than their brethren in Vienna. By a recent municipal law in the capital of Austria, those who desire to enter the car of a balloon to take photographs or for any other purpose must first of all comply with a series of strict regulations. In fact, in Vienna, no one is permitted in a balloon until he has shown that he has been through a thorough course of instruction with a competent aeronaut, a dictum that savours of the well-known warning never to enter the water until you can swim. Moreover, before being permitted passage in a balloon, aspirants are to be compelled to procure a permission, in the first case, from wife and family, should they happen to be married men.

With a paternal government to take care of them, however, the Austrians do not seem to be free from balloon accidents. Only on Sunday last a misfortune happened that dangerously injured the occupants of a car, who foolishly made an ascent during stormy weather. In descending, the wind dragged the balloon a distance of four kilometres into a churchyard, where, rushing along with terrific speed, it knocked down a dozen marble monuments and a high brick wall. The two occupants of the car were thrown out, and found among the graves very grievously hurt.

The custom of adorning the *menu* at a dinner with a photographic portrait of the hero or founder of the feast is one that should become popular. Last week at Paris, on the occasion of a banquet to Mr. Stanley the African Explorer, this was done, and our contemporary the *Standard* speaks in high terms of the elegant card placed upon the plate of every guest. "The *menu* was adorned with Stanley's photograph," we are told "and was in itself an artistic *bijou*." The specimens in a studio reception room, are generally in the same groove, and photographers would do well to bestow a little thought in designing some tasteful applications of photography, to catch the eye of visitors. Here is a hint to be noted.

Several attempts, more or less successful, have been made to produce photographs upon an ivory-like surface. The difficulty, for the most part, lies in the production of an artificial ivory. This can be done in a most simple way, we are told, by dissolving shellac in ammonia, and then adding finely-divided oxide of zinc. A white pasty material is in this way furnished, from which the ammonia is driven off by heat. It may be pressed into any desired shape in this condition; but a better result is obtained, it is said, by powdering the material first of all.

Our friendly correspondent, Dr. Hermann Fol, of the Geneva University, has devised a repeating camera to take snap shots rapidly one after another. It can be held in the hand, so as to take aim, and as many as eleven plates may be exposed in rapid sequence. The size of the plates is obviously somewhat small, measuring four-fifths of an inch; but as the lens is sharply focussed, the photographs may very well be enlarged. Dr. Fol tells us the mechanism is rather elaborate; still, with the aid of diagrams he hopes shortly to describe it in an intelligible manner.

"Friends on the jury" has always been a ready explanation by the green-eyed monster, why other people have medals and he has none, and to avoid unfair play of the sort, it has been suggested again and again to forbid all labelling of the pictures exhibited. Some such plan is now being tried in the North, but with what success we do not know. For ourselves, we have little faith in it, for if the jurors are familiar with photographic work—and none other should serve—they will probably be able to name correctly without any prompting the authors of much of the work before them. On the occasion of the Newcastle Exhibition last year, it was at first intended to deny the jurors a list of the exhibitors; but since more than half of the pictures shown were as familiar to these gentlemen "as household words" the uselessness of such denial was at once obvious.

A new style of portrait has been introduced into Germany, in which it is sought to blend the visiting card with the carte-de-visite. The origin of the latter was due years ago to the same intention, it may be remembered, and hence the name. The new idea, therefore, is only an old one resuscitated; but the proposed way of carrying it out is novel. The modern "visiting card" is a thin black mount with gold edge measuring 7 by 4 centimetres, say $2\frac{3}{4}$ by $1\frac{1}{2}$, inches. The front of the card carries a miniature portrait with a gold line running round it, and with the name of the firm in small type at the bottom; while, on the back of the card, is the name of the owner, also written in gold. The combination of black and gold is said to be very effective on the little card, and the idea is to produce them cheaply so that purchasers may be tempted to put them into their card-cases. The only objection that strikes us, for the moment, is that the result may be mistaken for a mourning card.

The gentleman who travelled all the way from Blackburn to Pall Mall on Tuesday last, and then found the newly-organised Social Gathering of the Parent Society not to be the "Technical Meeting" of the South London Society, thinks that any title which has become the property of a Society through ancient use should be respected by other associations.

A Paris contemporary presents its readers with a picture of a group of crocodiles reproduced from a photograph taken at Kurrachee. Although many of our readers have doubtless seen the picture, they may not be familiar with the story of its taking, as told by *La Nature.* So we translate it for their benefit.

An English traveller exploring the neighbourhood of Bombay, and carrying a camera, in which to secure the beauties of nature, passed by Muygapier in the vicinity of Kurrachee. Among other things, our tourist-photographer desired to secure a negative of a magnificent group of trees on the margin of a still stream, and with this view set down his tripod, drew the cloth over his head, and begun to focus. Suddenly he perceived a huge crocodile put its head above water and make for the shore; a second monster followed, then a third, until a whole band lay open-mouthed before him. Other people would have beat a hasty retreat; our Englishman remained. He coolly proceeded with his focussing, and when he done, with all the phlegm that characterises his race, slipped in his collodion plate, and took the creatures portraits as they basked in the sun. When he had finished, he put on his hat, and retired.

"Enamelled by Oeffelein" we see appended to some charming young ladies at the Exhibition in Pall Mall; but whether the smiling faces have been enamelled before being photographed or afterwards, we are not told. As all visitors to the Exhibition are not versed in photographic manipulation, in fairness to the fair ones, they should be more explicitly labelled.

In collecting residues it is a matter of importance that the silver should be thrown down as quickly and completely as possible. Most photographers have two or more receptacles for waste liquids, so that in one of them the liquid may remain in a state of subsidence, after suitable treatment, for at least twenty-four hours, when the exhausted portion at the top of the receptacle is drawn off to make room for more. This is a very good plan, and it is better still to stand the receptacles in full daylight. The precipitation of the chloride or sulphide takes place more quickly in the light than in the dark, and in summer more rapidly than in winter.

Let any one try this experiment. Obtain two tall glasses, twenty inches high, if possible, and fill them with a dilute solution of nitrate of silver. Add enough hydrochloric acid, and to spare, to precipitate all the metal, and then cover one of the vessels up from the light. At the end of a dozen hours uncover again, and examine the two vessels side by side. The solution that has been screened from the light will still be turbid, containing, therefore, silver in suspension; while in the other the silver is all of it at the bottom, and the liquid is clear and transparent. It stands to reason, therefore, that if the liquor in the first instance had been drawn off and thrown away, some silver would have gone with it; while in the second case the liquid might have been run off without loss. *Ergo*: stand your residue tubs not under cover, but exposed to daylight.

An interesting experiment in light signalling has been made in Paris by M. Mangin. A small balloon filled with pure hydrogen was sent up, being held captive by a rope containing two copper wires. A Swan lamp, placed in the gas inside the balloon, was made incandescent by a current from below, and the whole aërial machine thus rendered brilliantly translucent. As the balloon could be illuminated and darkened according to the will of the person holding the rope, signals could be made to a distance without difficulty. According to our contemporary—*Nature*—the Morse system of long and short signals was adopted, and read with success. Here, then, is a valuable means of telegraphing with light that is likely to be useful, especially for military purposes. Of course the balloon envelope must be transparent to render the experiment successful, and the hydrogen pure, if its full effect is desired.

Patent Intelligence.

Application for Letters Patent.

4954. James Templer, of 8, Park Place, London S.W., in the county of Middlesex, for an invention of "An improved means or method for utilizing balloons for photography, photographic surveying, or other purposes."—A communication to him from abroad by Henry Elsdale, of Halifax, Nova Scotia.—Dated 18th October, 1882.

Grants of Provisional Protection.

4324. Lorentz Albert Groth, K.G.V., Civil Engineer and Managing Director of the Universal Inventors' and Patentees' Financial Company, Limited, 30, Finsbury Pavement, London, E.C., for an invention of "A new or improved apparatus for enlarging or reducing maps, drawings, and other such like delineations."—A communication to him from abroad by Josef Eymannsberger and Marcus Menn, Engineers, of 73, Rue SeJaine, Paris.—Dated 12th September, 1882.

4651. John Young McLellan, of Glasgow, in the county of Lanark, North Britain, Analytical Chemist, for an invention of "Improvements in artificial-light apparatus for photographing, and applicable otherwise."—Dated 30th September, 1882.

4671. Charles Picton Evans, of Birmingham, in the county of Warwick, Gentleman, for an invention of "Improvements in the art of photography."—Dated 2nd October, 1882.

TWELVE ELEMENTARY LESSONS IN PHOTOGRAPHIC CHEMISTRY.

No. IX.—Estimation of Silver Nitrate, Chloride Bromide, and Iodide of Potassium.

In an article in the Photographic News on "A Plea for the Burette," we described a process for estimating the amount of silver nitrate in a silver bath; but in the present lesson we are about to explain a method which will enable the student to analyse silver solutions with greater exactness, and indirectly estimate soluble chlorides, bromides, and iodides.

In silver estimations, a standard solution of sodium chloride and a dilute solution of *neutral* potassium chromate is required.

For preparing the standard solution, absolutely pure sodium chloride must be prepared, unless colourless rock salt can be obtained. Dissolve about three ounces of common salt in the smallest quantity of water, filter the solution, and add to it about three times its volume of pure, strong hydrochloric acid, when a white precipitate of pure sodium chloride will be formed. Filter the acid liquor, and wash the precipitate on the filter with a little dilute hydrochloric acid (1 : 4), and transfer the salt from the filter to a large porcelain crucible. Heat gently at first, and when all the moisture and acid are driven off, increase the temperature for a few minutes, so as to make certain any trace of adhering moisture is expelled. When cool, powder the salt, and preserve it in a *dry* well-stoppered bottle.

Weigh very carefully 58·5 grammes of powdered colourless rock salt, or salt prepared as above, place a small funnel in the neck of a *litre flask*, put the weighed amount of salt in the funnel, wash the salt into the flask with water by means of the wash-bottle, and fill the flask up to the graduation with distilled water. When all the salt is dissolved, pour the standard solution into a dry stoppered bottle, and label it

Standard Solution.—Sodium Chloride.

1 c. c.	=	·0,585	grammes	sodium chloride
,,	=	·17	,,	silver nitrate
,,	=	·108	,,	silver.

To perform an analysis of commercial silver nitrate, weigh out exactly 3·4 gramme of the sample, dissolve it in about 30 c. c. of distilled water, and make the solution up to exactly 50 c. c. by the addition of water. The object of dissolving the salt in a small quantity of water, and afterwards diluting it, instead of dissolving it at once in the 50 c. c., is that a solution of silver nitrate occupies a greater volume than the water in which it is dissolved. Pour the solution into a burette, take 10 c. c. of the standard sodium chloride by means of a pipette, and place it in a small evaporating-basin with two drops of a three-grain solution of neutral potassium chromate. Let the silver solution drip slowly from the burette into the basin, stirring its contents with a glass rod till a permanent blood red precipitate is formed, when at once turn off the tap of the burette, and note how many c. c. of the silver solution has run out.

In order to calculate the result, multiply the amount of silver nitrate which one c. c. of the standard solution of sodium chloride is equal to, by the amount of the latter solution taken. Divide the product by the number of c. c. of silver solution run out of the burette, and multiply the quotient by the amount of water used to dissolve the sample of silver nitrate.

The calculation may seem a little difficult at first sight, but an example will make the rule more intelligible. First turn to the label on the bottle of sodium chloride solution, we see that 1 c. c. = ·17 of silver nitrate; now ·17 multiplied by 10 (the amount of standard solution placed in the dish) gives 1·7. We will suppose that 26 c. c. of silver solution was run out, therefore 1·7 divided by 26 equals ·0,654; but 50 c. c. was used to dissolve the silver nitrate, therefore ·0,654 multiplied by 50 equals 3·27, the amount of pure silver nitrate contained in 3·4 grammes of the sample analysed; or, calculated in percentage, it equals 96·2 per cent.

To determine the amount of silver nitrate in a negative bath, fill the burette with the bath solution, instead of the solution made by dissolving the sample of silver nitrate in 50 c. c. of water, and proceed exactly as in the analysis of silver nitrate. To calculate the result, multiply the number of c. c. of standard sodium chloride solution used by the amount of silver nitrate, which is equal to 1 c. c. of the standard solution, and divide the product by the number of c. c. of the bath solution run out at the burette, the quotient being the amount of silver nitrate contained in 1 c. c. of the silver bath.

For example, the burette was filled up to the top graduation with an old silver bath, 10 c. c. of standard sodium chloride solution (1 c. c. of which equals ·17 gramme of silver nitrate) was poured in the dish, and 12 c. c. of the silver bath was required to produce a permanent red precipitate; therefore. 10 multiplied by ·17 equals 1·7, and 1·7 divided by 12 equals ·14 grammes, the amount of silver nitrate contained in 1 c. c. of the bath solution, or about 57 grains to the ounce.

In estimating soluble chlorides, bromides, or iodides, a standard solution of silver nitrate is required. Weigh out exactly 17 grammes of silver nitrate (the triple crystallized, if dry and colourless, will answer the purpose), and transfer it to a small funnel placed in the neck of the litre flask, washing the adherent crystals into it by means of a wash-bottle, and, when the salt is dissolved, fill the flask up to the graduation with distilled water, pour the solution into a large stoppered bottle, and label it

Standard Solution.—Silver Nitrate.

1 c. c.	=	·017	gramme	silver nitrate
,,	=	·00,585	,,	sodium chloride
,,	=	·0,119	,,	potassium bromide
,,	=	·0,098	,,	ammonium bromide
,,	=	·0,166	,,	potassium iodide

To analyse a sample of potassium bromide, weigh out exactly ·238 grammes of the salt, dissolve it in about 20 c. c. of distilled water, and pour the solution into a small evaporating dish with two or three drops of the dilute solution of potassium chromate. Fill a burette with the standard solution of silver nitrate, and allow the solution to slowly drop out through the stop-cock into the solution of potassium bromide, and proceed with the process exactly as described above in the analysis of silver nitrate.

To calculate the result, multiply the amount of potassium bromide, which 1 c. c. of silver nitrate solution represents (see label), by the number of c. c. of standard silver solution run out of the burette, and the product is the amount of the pure salt contained in ·238 grammes of the sample.

For example: ·238 grm. of potassium bromide was taken, and 19·5 c. c. of silver solution required to produce a permanent precipitate; therefore, as 1 c. c. of the standard solution represents ·0,119 grammes of potassium bromide, ·0,119 multiplied by 19·5 equals ·232 grammes of pure salt contained in ·238 grammes of the sample under examination, or 97·5 per cent.

For analysing ammonium bromide by this method, ·196 gramme should be taken; while for potassium iodide as much as ·332 grammes are required. The amount of soluble bromide contained in a washed or unwashed gelatine emulsion can easily be estimated by this process.

For example: 50 c.c. of unwashed emulsion was poured into an evaporating basin, with about an equal volume of distilled water, and two or three drops of a dilute solution of potassium chromate. Standard silver solution was run in till a permanent red precipitate was formed, 5 c. c. being required; therefore, as 1 c. c. of silver solution represents ·0,098 gramme of ammonium bromide (the soluble bromide used in the preparation of the emulsion), ·0,098 multiplied by 5 equals ·049 gramme, the amount of excess of soluble bromide contained in 50 c. c. of the emulsion.

FRENCH CORRESPONDENCE.

INSTANTANOGRAPHS—DR. VAN MONCKHOVEN'S WORK—THE POITEVIN SUBSCRIPTIONS.

Instantanographs.—We must just say a few more words on this interesting subject of instantaneous pictures, so much the order of the day. It is very evident that the aim of all photographers, and especially amateurs, is to reproduce animate nature in such a manner as to immobilise movements in any situation, however rapid the movement may be. We have already, by this means, arrived at very fine results, and have seen M. Neurdins' pictures, for instance, of yachts and steamers taken while in motion on 10 by 12 plates, occupying almost the half of the surface of the negative, and the ropes are rendered as sharply as if the vessel has been still; and, as ships travel irregularly, extreme rapidity of exposure is required. M. Lugardon, whose name we have already mentioned, has frequently taken horses prancing, and has seized the moment when all their four legs were off the ground, but one must work with lightning speed to obtain such results. The shutter employed, in this case, is that by MM. Thury and Amey, of Geneva. We have by us a remarkable collection of instantanographs by a Swiss photographer, M. Schaufelberger. There are swans swimming on the waters with wings spread, and taken in every possible position, whether in motion or repose. These photographs are perfectly sharp. Instantaneous photography is, to our mind, the greatest triumph of the art. By this marvellous result everything may be produced, rendering great service both to the art of drawing and science. Inanimate objects and living creatures in repose may be accurately copied without the help of photography—with less exactness it is true—but by dint of patience and talent it may be done; while with instantaneous photography the rapidity of sight of the human eye is too feeble to allow the numerous varieties of motion which operate at once in a bird on the wing, or an animal running at full speed to be seized. That which the eye is incapable of seeing, of course the imagination cannot retain for the purpose of drawing. The photographic lens sees, and the sensitive plate retains it. We assist daily at similar wonders, and the idea has come to us that these instantaneous studies ought to be encouraged by special prizes given in the exhibitions where only instantaneous studies of objects in motion would be admitted. We predict that the greatest success would attend the first exhibition of this kind, and we shall suggest it to the Photographic Society of France. The prints would be of minor importance as the negatives would be examined and might be printed by whatever process one liked. If the idea be good, and it responds well to the present state of photography, we hope it will be taken up and carried out to its full and entire extent.

On Dr. Van Monckhoven's Work.—Poor Monckhoven, whom we so highly esteemed, and whose name was continually cited in the PHOTOGRAPHIC NEWS, as in every other photographic publication, is no more. He has been suddenly taken from his family, friends, and the service of photography at the moment when he dreamed of still greater destinies for all the sciences with which he occupied himself with so much ardour. He hoped to have played his part in this new progress. But why speak of dreams never to be realised. Let us be more practical. The great industry of the preparation of gelatine plates at Gand, started by Monckhoven—will it survive him? In this respect, we can answer in the affirmative. Our late friend, as if he had a presentiment of his premature end, had initiated his people in the preparation of his excellent emulsion in such a way that everything would be provided for, not only for the continuation of this manufacture, which is not less than 1,200 dozen half plates per day, but also for its increase which it requires at this moment, for the success of Monckhoven's plates has been such up till now that the demand exceeds the supply. There are certainly other manufacturing houses well supplied with apparatus, the products of which are very good; but there has not been any on the Continent to rival with the Belgian factory. A total of 1,400 plates per day means a surface of 336 square meters coated with gelatino-bromide, constituting the amount of from 7,200 to 1½ million francs per annum. By putting these figures together, an idea may be formed of the immense importance of this single factory, the direction of which is incumbent upon the the widow of our deeply regretted friend.

In the midst of such an industrial success, Monckhoven ever sought to raise himself to the highest summit by his researches in the science of physical astronomy. He applied all that he obtained from photographic science to extend its rights to universal consideration, and to conquer by the help of splendid and purely scientific works still more serious claims to renown. Although he had not been able to accomplish such noble projects, he cannot have left this world without having the sweet satisfaction of having led a most useful life, and of whom it may be said that he left a name destined long to survive him.

Poitevin Subscriptions.—The Poitevin subscriptions have reached the amount of about 5,500 francs; but it is fully expected that new donations will considerably raise the sum of this last result. It is all one can do to consecrate the memory of this *savant*: but this sum will, however, be insufficient if the idea is to be carried out of raising a monument in a public square. In this case, perhaps the State will complete the necessary sum.

Our photographic societies will not commence their work until next month; we hope then to have interesting technical doings to address to the NEWS. LEON VIDAL.

PHOTO-LITHOGRAPHY AND PHOTO-ZINCOGRAPHY.*

BY MAJOR J. WATERHOUSE, B.S.C.,
Assistant Surveyor-General of India.

Intensification.—The redeveloped negative is placed in a saturated solution of bichloride of mercury, to which a little muriate of ammonia may be added, and allowed to remain till it is quite white; or, if there are fine lines, the action should not be carried beyond the dark grey stage, for fear of filling up the lines. It is then well washed, and flooded with a dilute solution of hydrosulphate of ammonia, about one part to four of water. This at once changes the colour of the film to a dense opaque black, and if the foregoing operations have all been properly carried out, the lines will have perfectly retained their clearness and transparency. Should they, however, be slightly yellow, they may be cleared with a weak solution of citric acid in water.

Instead of hydrosulphate of ammonia, many operators use a solution of cyanide of potassium about 5 grains to the ounce, containing sufficient nitrate of silver to form a permanent precipitate. This gives a good black ground with clear lines. A solution of ammonia, about 1 part to 8 parts of water, may also be used to blacken the image.

The use of bichloride of mercury being in many ways undesirable, it may often be usefully replaced by Carey Lea's solution of cold saturated solution of—

Bichromate of potash	3 parts
Hydrochloric acid	1 part
Water	48 parts

After re-development the plate is plunged into a tray containing this solution, and in a short time the film will become of a uniform bright citrine yellow. It is then

* Continued from page 598.

taken out, washed, and treated with the hydrosulphate of ammonia, which changes the colour of the film to a dense purple or chocolate brown. A solution of Schlippe's salt may be used instead of the hydrosulphate, in which case the colour of the ground will be more scarlet.

A mode of intensifying that has been found very satisfactory by Mr. Baden Pritchard and others, is that proposed by Messrs. Eder and Toth (Photographic News, Vol. XX., pp. 100 and 573). The developed and fixed negative having, if necessary, had all trace of deposit on the lines removed by treatment with iodine and cyanide of potassium as before described, is thoroughly washed in ordinary, and finally in distilled water, and immersed in a filtered solution of—

Nitrate of lead	4 parts
Ferridcyanide of potassium ...	6 ,,
Distilled water	100 ,,

and allowed to remain until the deposit has become quite opaque. The plate is then well washed till the film becomes of a clear white, and is then flooded with a solution of hydrosulphate of ammonia 1 part to 5 of water. This at once blackens the deposit, and as soon as the action has penetrated through the film the plate is well washed with ordinary water.

Should a thin negative not become sufficiently dense even after a prolonged application of the lead bath, it is a good plan to treat it with a 10 per cent. solution of sulphate of cadmium. The sulphide of ammonium is then applied as before.

The greatest care is required in washing, when using this intensifier.

Instead of hydrosulphate of ammonia, a solution of Schlippe's salt may be used :—

Schlippe's salt	10 parts
Water	100 ,,
Caustic ammonia	5 ,,

A solution of bichromate of potash may also be used, and will give a dense yellow negative. Eder and Toth recommend a ten per cent. solution of the yellow chromate of potash as giving images of a deeper yellow than the bichromate.

A very satisfactory way of obtaining density after the lead intensifier is to treat the plate first with a solution of iodide of iron made by digesting 10 parts of iron filings and 5 parts of iodine with a little water, and, when the iodine is dissolved, add water to make up 300 parts.

The plate is then well washed, and flooded with a two per cent. solution of permanganate of potash, which turns the colour of the film black. The solution of permanganate may also be used without the previous application of the iodide of iron, but a stronger solution at five per cent. will then be required, and the colour of the film will be browner.

Another mixture commonly used for intensifying black and white line subjects is the double iodide of mercury and potassium used in one or two solutions.

Abney gives the following single solution. To a solution of—

Bichloride of mercury	2 grains
Water	18 ounces

add a solution (10 grains to the ounce of water) of iodide of potassium till the red precipitate formed by its addition is on the point of becoming permanent. This may be used stronger with advantage for map work.

In using the double solution, the plate may first be flooded with a solution of iodide of potassium at two per cent.; this is allowed to act for about a minute, then poured off and replaced by a solution of bichloride of mercury 1 part to 200 of water. This treatment is continued till the required density is obtained. Or, as recommended by Mr. Bolas, the plate may first be immersed in a saturated solution of bichloride of mercury, and left for five or ten minutes till perfectly white. After a rinse in water it is transferred to a solution of iodide of potassium one grain to the ounce of water. The whitened deposit becomes yellow, and when the yellow tint has quite penetrated the film, the plate is well washed, dried, and varnished.

Additional density may be obtained, if desired, after treatment with the iodide of mercury, by the application of the solutions of hydrosulphate of ammonia, silver cyanide, or ammonia as before described.

(*To be continued.*)

THE VALUE OF PHOTOGRAPHY IN THE TRANSIT OF VENUS.

Professor Harkness, in his recent address before the American Association for the Advancement of Science, on the Transit of Venus, expressed himself, says *Anthony's Bulletin*, in the following terms on the importance of photography in connection therewith :—

The question of instrumental outfits having been disposed of, stations were selected and parties despatched to almost every available point. The United States, England, France, Germany, Russia, Holland—in short, nearly all the nations of the civilized world—took part in the operations. The weather was not altogether propitious on the transit ; but nevertheless a mass of data was accumulated which will require years for its thorough discussion. When the parties returned home, the contact observations were first attacked ; but it was soon found that they were little better than those of the eighteenth century. The black drop, and the atmospheres of Venus and the earth, had again produced a series of complicated phenomena, extending over many seconds of time, from among which it was extremely difficult to pick out the true contact. It was uncertain whether or not different observers had really recorded the same phase, and in every case that question had to be decided before the observations could be used. Thus it came about that, within certain rather wide limits, the resulting parallax was unavoidably dependent upon the judgment of the computer, and to that extent was mere guess-work. Attention was next directed to the photographs, and soon it began to be whispered about that those taken by European astronomers were a failure. Even yet I am not aware that the Germans have published anything official on the subject; but the English official report has appeared, and it frankly declares that, "after laborious measures and calculations, it was thought best to abstain from publishing the results of the photographic measures as comparable with those deduced from telescopic view." From the way in which these photographs were taken, Sir George Airy saw that they could not yield position angles of any value, and therefore differences of right ascension and declination could not be determined from them ; but they did seem capable of giving the distance between the centres of Venus and the sun with considerable accuracy. Upon trial this proved not to be the case. No two persons could measure them alike, because "however well the sun's limb on the photograph appeared to the naked eye to be defined, yet, on applying to it a microscope, it became indistinct and untraceable, and when the sharp wire of the micrometer was placed on it, it entirely dissappeared." In short, the British photographs are useless for the present ; but Sir George Airy hopes that in the future some astronomer may be found who will be capable of dealing with them.

We turn now to the American photographs. They present a well-defined image of the sun, about 4·4 inches in diameter, and are intended to give both the position, angle, and distance of Venus from the sun's centre. A special engine was at hand for measuring them ; but when they were placed under the microscope, only an indistinct blur could be seen. Here, again, was the same difficulty which had baffled the English ; but fortunately its cause was soon discovered. The magnifying power of the microscope was only 37½ diameters, which seemed moderate enough. But was it really so ? The photographic image of the sun was about 4·4 inches in diameter, and this was magnified 3·31 times by the objective of the microscope, thus giving an image 14·56 inches in diameter. To yield an image of the same size, a telescopic objective would require a focus of about 1·563 inches ; and if the eye-piece of the microscope, which had an equivalent focus of 0·886 of an inch were applied to it, a power of 1·764 diameters would be produced.

This, then, was the utterly preposterous power under which the image of the sun was seen when the photograph was viewed through the microscope, and no useful result could be expected from it. Means were immediately provided for reducing the power of the microscope to 5·41 diameters, and then the photographs seen through it appeared as the sun does when viewed through a telescope magnifying 255 diameters. After this change all difficulty vanished, and the photographs yielded excellent results. The measurements made upon them seem free from both constant and systematic errors, and the probable error of a position of Venus depending upon two sets of readings made upon a single photograph is only 0·553 of a second of arc. To prevent misunderstanding, it should be remarked that this statement applies only to pictures taken between second and third contact, and showing the entire sun. The small photographs taken between first and second contact, and, again, between third and fourth contact, proved of no value.

Correspondence.

THE DEFENCE ASSOCIATION.

Sir,—Passing the other day through Farringdon Street I saw for sale, price one penny, a copy of one of my royal portraits; it was in company with half-naked French women. You may therefore well believe that I should hail with delight the formation of an association, such as Mr. Downey suggests. I think, however, with "One who has been Pirated," that a subscription of five shillings would be quite sufficient.—Yours, &c.,

Arthur James Melhuish.

Dear Sir,—In reference to Mr. Downey's letter of the 13th inst., I beg to say I shall be most willing to become a member and pay a guinea a year. As all photographers are not equally concerned in this matter, would it not be feasible to accept members at different subscriptions?—Very faithfully yours, Harry Pointer.

Dear Sir,—Having read the correspondence in the Photographic News, relative to the formation of a syndicate to protect photographic copyrights, I beg to suggest that the present is the most opportune of times for such formation, as the proceedings before the Lord Mayor's Court will, of necessity, attract considerable attention, and will aid some in coming to a conclusion whether the action of such a syndicate is likely to be attended with success or not. May I suggest, in reply to "One who has been Pirated," that so far from Mr. W. E. Downey's estimate of a guinea subscription being excessive, that in addition there would, of necessity, in starting such an association, have to be a guarantee fund—in the first place, to enable the promoters to secure reliable legal information, and also to establish the confidence referred to by one of your correspondents. If some of the firms more particularly interested would subscribe to such a fund, and one of their number—say Mr. Downey—were to call a meeting under the presidency of some gentleman well known to the profession, the whole matter could be thoroughly considered, and action taken at once.—I am, sir, your obedient servant,

Edwin A. Cade.

FERROUS OXALATE DEVELOPMENT.

Dear Sir,—We see that the illogical, but irrepressible Mr. Wilkinson has rushed into print *re* Dry Plates in general, and Autotype dry plates in particular, and, by an amusing process of reasoning, seeks to show that the purchase and trial of Autotype plates in October acquits him of a charge of "animus" brought against him in August. Here are the facts: The Autotype Company publish now and then, for private circulation amongst clients, a certain modest sheet, which they dub Autotype Notes. In the "Notes" for July appeared an article recommending ferrous oxalate developer for dry plates; the Editor of the Photographic News reproduced this article in his journal of July 28. A week after, Mr. Wilkinson is in print with a short article entitled "Ferrous Oxalate Redivicus" and commences it in these words: "There is a disposition in some quarters to advocate a return to ferrous oxalate developer, especially by *manufacturers of plates* who. for some reason or other, *cannot make emulsion free from chemical fog.*" Considering that the article, extracted from the *Autotype Notes*, appeared the previous week, that it strongly advocated the use of the ferrous oxalate developer—that the *Autotype Notes* is very well-known as the occasional *brochure* of the Autotype Company—we think there will be little difference of opinion as to to the animus shown, and, moreover, against whom it was shown.

But your correspondent was not allowed to have the matter quite his own way; he has been considerably sat upon for this article of his, to say nothing of the author of the article in *Autotype Notes* who brought up heavy guns and pounded away. A week or two later, Mr. Campbell Swinton, Mr. O. C. Smith, and Mr. John Doe oppose Mr. Wilkinson's estimate of the ferrous oxalate developer, set at naught his experiments, and send work of their own to the Editor of the News as a practical testimony of the error of Mr. Wilkinson's notions.

Mr. Wilkinson states that, "with Autotype plates, the ferrous oxalate developer not only gives a negative in *about half the time*, but of a much superior quality than when pyrogallic is used." Now will Mr. Wilkinson be "surprised to hear" that this is absolutely and entirely a mistake on his part—that no such peculiarity of development exists, and if it did, from the mode of testing plates employed by the Company, must have been instantly discovered.

The mode of testing is this: A 9½ by 6½ plate is cut in two, the halves are exposed one after the other to a test scale and transparency with a constant source of light; one-half is developed with ferrous oxalate, the other with the saccharine pyrogallic, as given in the Autotype Company's instruction. Very frequently two portraits are taken on a double half-plate in a camera with a repeating back, the plate cut in two, and one-half developed with pyrogallic, the other with iron.

Mr. Wilkinson may, perhaps, not be inclined to believe us when we say that, in most cases, these two developers show nearly identical results; that sometimes the pyrogallic shows a number more on the scale, sometimes the iron. Very frequently there is nothing to choose between them, and if anyone should doubt these facts, abundant demonstration can readily be afforded. The Autotype Company.

Proceedings of Societies.

London and Provincial Photographic Association.

At the meeting of the above held at the Mason's Hall Tavern, Thursday, Oct 19, 1882, Mr. A. Reimann in the chair,

M. Julio Valleto, of Mexico, was introduced to the meeting, and showed some excellent specimens of Mexican photography (promenades and cabinets) they were on wet collodion plates, and having much the appearance of gelatine pictures. He stated that the light in Mexico was very good, and even the exposure for the prints exhibited being about 25 seconds with Dallmeyers 4 B lens stop about 2¼ inches. One great feature in these photographs was, that in many instances the backgrounds were wholly or in part put in by hand in the back of the negative by working in a film of varnish with a needle or crayon.

Mr. W. S. Orsman gave the results of some experiments he had made in the action of a solution of alkaline bromide on a cake of gelatine containing bromide of silver; the experiments had been made in two test tubes, the silver in one case being placed in the gelatine and in the other the bromide. A piece of parchment paper was stretched over the bottom ends of the tubes which were open, and they were then stood in water a quarter of an inch deep, the result, in each case, was that the solution on top was stronger than that contained in the gelatine, and he found that the action had only extended part of the way into the gelatine, the action going on longer when the bromide was contained in the gelatine. He had not tested the water for any salts that might have dialysed into it from the gelatine. He had also placed some of the gelatine solution in a concave glass dish, and allowed it to set, and partially dry round the edges, afterwards pouring the bromide solution over it, and found that the drier the gelatine the quicker the silver was absorbed; the time taken to go through the centre portion where it was wet and thick was one and a-half hours.

Mr. Henderson, in reply to a question, said he thought the gelatine used in his experiments was a neutral one.

Messrs. A. J. Brown and W. Coles thought the reason that Mr. Henderson failed in converting the whole of the silver into bromide, was due to the thickness of the gelatine, the bromide first formed forming a barrier between the two solutions and preventing further action taking place.

Mr. A. Haddon showed a combination pipette and stirring rod blown from a piece of stout glass tubing, which he thought would be useful in mixing silver solution with the bromide in preparing emulsions; it differed from an ordinary pipette in being made of tubing with a wide bore, so allowing the solution to be poured in at the top, and the bottom being drawn out to a very fine point, it would trickle out very slowly, while the hand was at liberty to stir at the same time.

Mr. Henderson showed a cutting-board of Mr. Cowan's, across which he had stretched a piece of string, so that, as the diamond passed along, the pressure of the glass on the string would cause the glass to divide. He had made some experiments upon the so-called "reversed" action of light upon gelatine plates, using a ferrous oxalate developer, $4\frac{1}{4}$ plates were exposed behind a sensitometer, for four, ten, thirty, sixty seconds, the first three being developed with 3 ounces fresh developer to each used all at once; the last had 5 ounces developer used in successive portions, throwing each lot away as the action grew weak. In those exposed for thirty and sixty seconds he noticed the appearance of reversal; but by continuing the development, the parts which at first were clear instead of dark, gradually darkened; he considered the appearance of a reversed image was due to liberation of bromine which retarded develepment in the much over-exposed parts of the plate, and that by using fresh solution and continuing the developing action, all appearance of reversal would disappear.

Mr. W. E. Debenham remarked, that by the term reversed action of light was not meant that the exposed portion was brought into its original condition or anything more that the over-exposed portion was no longer amenable to development.

Mr F. W. Hart had successfully intensified some thin gelatine plates by treating, first, with an alcoholic solution of bichloride of mercury, then, after washing, placing first in water containing $1\frac{1}{2}$ drops strong ammonia to each ounce, then into a solution of 1 1 drop of a solution of sulphide hydrogen gas in glycerine to 4 ounces of water.

Mr. Debenham enquired if this method possessed any advantage over the use of Schlipp's salt, which did not smell so strong as sulphide of hydrogen solutions.

Mr. Hart said the advantage was in not introducing salts into the film, and thereby the time much required for washing lessening.

Mr. Henderson asked Mr. Hart if he thought mercury followed by lime water would give a stale result.

Mr. Hart thought it would, but objected to it on the ground of the introduction of solid mater into the film.

Mr. G. Thorpe, Nelson House, Stoke Newington Road, was elected a member of the Association.

Manchester Photographic Society.

The annual meeting of this Society took place on Thursday, Oct. 12th 1882, at the Manchester Mechanics Institution, Mr. E. Leader Williams, President, in the chair.

The minutes of the previous meeting were read and confirmed.

The Hon. Secretary (W. J. Chadwick) then read the Annual Report:—

"On this, the 27th annual meeting of this Society, your council have to congratulate you upon the very successful year we have just passed through. It is satisfactory to be in a position to state that, notwithstanding the heavy calls that have been made upon our exchequer, we have been able to meet them promptly, and to still preserve a balance in hand. Although we have had 29 new members added to our list, we have to record several resignations; our numerical strength is now 104 against 89 last year. The attendance has been on the increase, the average being $46\frac{1}{2}$ this year against 44 last year.

"On referring to the proceedings of the Society we find that the following papers have been read:—'Ammonia Bromide,' by James Young; 'Light,' by Harding Warner; 'Gelatino Bromide Films (with practical demonstrations),' by A. Pumphrey; 'Opals and Paper Printing by Gas Light,' by Percy Collis; 'Stray Thoughts Touching Our Recent Exhibition,' by J. Pollitt; 'Hyposulphite or Thiosulphate,' by A. Brothers; 'Legal Points Relative to Instantaneous Shutters,' by E. Dutton. In addition to these we have had negatives, prints, and apparatus exhibited by many members of the Society, including Messrs. E. Leader Williams, A. Brothers, J. Leigh, J. Pollitt, Sefton, Greatorex, Schofield, Brier, Coote, Openshaw, Young, Kershaw, Bainbridge, Dale, McLellan, A. Knott, Chilton, W. Blakely, Taylor, Percy Collis, A. Booth, Edmund Eccles, C. Pearson, Woodward, and the Hon Secretary, whilst many of the leading commercial firms have largely contributed to the interest of the meetings by forwarding novelties and interesting subjects in the shape of pictures and apparatus.

"But the great event of the year was the Photographic Exhibition—consisting of nearly 3,000 photographs—visited by over 5,000 persons; and although the cost of this Exhibition approached nearly £200, we have the satisfaction to record that it surpassed any previous photographic exhibition ever held in the North of England.

"The use of the magic lantern has not been omitted from our proceedings, and some very beautiful slides have been shown on the screen by many members.

"The out-door meetings have again been very successful, and considering the very unfavourable weather, they were well attended.

"Our Rooms for meetings have been changed, and our rules have been revised.

"We have now to conclude by stating that we have elected more new members than in any previous year; we have more members on the rolls of the Society than ever. More subscriptions have been paid, though, we regret to say, many are in arrear. More calls have been made upon the finance of the Society, and more friends have been ready to meet the demands. More members have attended the meetings, a sign that more interest has been displayed; and more members have come forward with papers or exhibits.

"Our worthy Treasurer will now lay his balance sheet before you, after which we beg to resign our respective offices, wishing you the same success and prosperity in the coming year."

The Hon. Treasurer (W. G. Coote), submitted the accounts, and presented each member present with a printed copy of the balance sheet.

The report and balance sheet were well received by the members, and it was resolved that they be accepted.

It was resolved that the accounts relative to our late Photographic Exhibition be published for the guidance of other societies:—

Exhibition Account.

	£	s.	d.		£	s.	d.
To Cash for sale of Tickets, 1st week ...	46	10	6	By Advertising, Posters, Circulars, &c.	29	9	3
Cash taken at door, 1st week	21	14	0	Carriage of Photos. to or from Manchester ...	58	0	5
2nd week	22	16	9	Refreshments for Committee and Attendants	11	8	8
For Sale of Tickets, 2nd week	3	10	0	Wages to Door-keepers, Cash-takers, &c. ...	7	4	0
Sale of Catalogue and Advertisements ...	21	2	8	Rent of Rooms	12	10	6
Balance, viz., Cost out of Pocket	66	2	9	Printing and Stationery	13	1	9
				Cost of Catalogues ...	13	0	0
				H. Whaite, for Hanging Pictures	16	10	6
				Joiner, and for Packing	6	17	2
				Sundries	15	14	11
	181	16	6		181	16	8
					£	s.	d.

The election of officers next took place, resulting as follows:—

President.—Mr. A. Brothers.

Vice-Presidents—Mr. J. Leigh, Rev. Canon Beechey, Messrs. R. Atherton, J. Dale, J. Warburton.

Council—Messrs. W. Blakeley, John Brier, Thomas Chilton, F. Flowers, Joseph Greatorex, S. D. McLellan, John Pollitt, John Schofield, Thomas Sefton, and N. Wright.

Treasurer—W. G. Coote.

Hon. Secretary—W. J. Chadwick.

Messrs. J. G. Jones, R. H. Raynor, and Geo. H. Sidebotham, M.D., were elected members.

Mr. S. D. McLellan exhibited an instantaneous shutter attached to a quarter-plate camera, explained the working, and showed how he dispenses with the use of a tripod stand by fixing it under his arm at the time of exposure.

Mr. W. G. Coote showed a drop shutter in which a strip of writing paper served for a very effectual trigger. He also exhibited some splendid prints from negatives taken during his holiday rambles.

The late President (Mr. E. Leader Williams), in vacating the chair, made an appropriate little speech, and the new officers took up the reins, when the meeting was dissolved.

The next meeting will be on November 9th, which evening is to be devoted to an exhibition of members' work during the present year, and a demonstration of "Platinotype Printing," by Mr. Openshaw.

Talk in the Studio.

South London Photographic Society.—The annual Technical Exhibition Meeting of the South London Photographic Society will be held in the large room of the Society of Arts, John Street, Adelphi, on Thursday evening, November 2nd, 1882, at 8 p.m., and admission will be free. The Sub-committee beg to call attention to the rules framed to facilitate business, in order that all subjects brought before the meeting may receive adequate attention :—1. That papers be allowed to be read (which must be as short as possible, and as much to the purpose as can be written), such papers to be sent to the Secretary on or before Nov. 2nd. 2. That opportunity be granted for practically working a process, or making an experiment, consistently with the time at the disposal of the Committee. 3. That secret processes or patented articles, with the names of the inventors, and their objects, be only briefly stated by the Secretary or by a member of the Committee. 4. That explanations be allowed, but only absolutely in reference to the practical uses of the articles shown. 5. That questions may be asked of exhibitors, referring only to a clearer understanding of the subject; but that no discussion be allowed respecting objections or differences of opinion on any matter. 6. That packages be delivered, free of charge, by six o'clock on the evening of the meeting, the exhibitor to arrange for clearing away the same. The meeting for members will commence at 7·30 p.m. for the nomination of officers for the ensuing year. All communications to be made to the Secretary, Mr. F. A. Bridge, Hon. Sec. (*pro. tem.*), 9, Norfolk Road, Dalston Lane, London, E.

The Balloon Society.—At a meeting held on Friday Dr. Jabez Hogg read an interesting paper on Protoplasmic Evolution, and it was stated that light is not only very unfavourable to the development of bacteria, but that exposure to bright sunshine rapidly destroys these organisms, and to the circumstance that it is of the greatest importance for patients suffering from zymotic diseases to occupy well-lighted rooms was commented on. Discourses of notable interest are often delivered at the Friday meetings of the Balloon Society, but there appear to be radical defects in the business arrangements of the Association. Although the annual subscription is no more than five shillings per annum, any member who arrives over fifteen minutes after the opening of the meeting is subject to a demand of one shilling for admission to the Aquarium before he can gain access to the lecture room. As a set off against this, we may mention that, after the lectures of the Balloon Society, it is usual to distribute tickets for the following meeting indiscriminately to those asking for them, these being available for admission to the Aquarium between 6 and 8.15 on the following Friday, and a large proportion of the tickets thus issued are used by persons merely seeking free admission to the Aquarium.

Robbery at Messrs. Wratten and Wainwright.—We regret to hear that a serious robbery was committed on Thursday in last week at the premises of Messrs. Wratten and Wainwright, in Great Queen Street, Long Acre. As will be seen by an announcement in our advertising columns, a large number of valuable papers were secured by the housebreakers; but, strange to say, the thieves left behind them many articles of considerable value. Thus, while securing a certain amount of cash that happened to be on the premises, they left untouched a large quantity of nitrate of silver and a collection of costly lenses, the intrinsic value of which was considerable. For this reason it may be presumed that the theives had little acquaintance with matters photographic, and that they were, indeed, of the ordinary burglar type.

Piracy in Photographs.—At the Mansion House Police Court on Wednesday, William Smith attended before the Lord Mayor in answer to summonses issued at the instance of Messrs. Elliott and Fry, and Mr. Downey, photographers, charging him with pirating photographs of Miss Kate Vaughan and Lady Lonsdale, belonging to them. Mr. Montagu Williams appeared for the complainants; Mr. Selberberg, solicitor, represented defendant. Mr. Williams said there there were a number of summonses to be heard by the Court for the piracy of certain photographs, the property of Mr. Downey, photographer, of Pimlico, and Messrs. Elliott and Fry. He had communicated with the other side, and was content that the following terms should be come to—namely, that the defendant should plead guilty upon two of the summonses—one of Miss Kate Vaughan's portrait, belonging to Mr. Downey, and the other of Lady Lonsdale, the property of Messrs. Elliott and Fry, and that the full penalty of £10 should be inflicted in each of the two summonses, with such costs as the Court might think proper to allow; and further, that the other summonses should be adjourned *sine die*, in order to see whether the practice would be discontinued by the defendant. There had been in the City of London and elsewhere a very large piracy of valuable works, the property of Mr. Downey, Messrs. Elliott and Fry, the London Stereoscopic Company, Mr. Bassano, and other photographers, and it was at last felt that a stop must be put to it. The defendant was not liable in respect to what he was he was going to say; but he might inform the Court that even opposite the Mansion House there were barrows full of these photographs which were being sold to the public. He (Mr. Williams), however, thought he was doing right in taking a plea of guilty on the two summonses, and he should ask the Court to adjourn the others *sine die*, the defendant agreeing to give up all the copies in his possession, and not to sell any more. The Lord Mayor said he thought the prosecutors had met the case in a very proper spirit. Mr. Solberberg, on the part of the defendant, said he had agreed to the course mentioned, on the ground of propriety. There could be no doubt that these photographs were the property of the prosecutors, and in all the circumstances, so as not to raise any useless objection, the defendant would plead guilty. However, it must not be taken that the defendant had had anything to do with the sale of the photographs in the streets. The Lord Mayor then fined the defendant £10 on each of the two summonses relating to the photographs of Miss Vaughan and Lady Lonsdale, with £6 6s. costs. The money was immediately paid.

The Photographic Money Dispute.—At Clerkenwell, Captain Herbert Kerr, of 22, Busbey Place, Clarendon Road, appeared on an adjourned summons to answer a charge of having unlawfully, by false and fraudulent pretences, obtained from Lieutenant Arthur Henry Loringe, divers sums of money of the value of £2,070, with intent to defraud. The allegation was that the defendant had, by false pretences, induced Lieutenant Loringe to invest the sums mentioned in the Photographic Artists' Supply Association, the affairs of which Company are in liquidation. Mr. Besley appeared for the prosecution, and Mr. Grain for the defence. The case has on previous occasions been before the Court. After some further evidence Mr. Hosack said he must again adjourn the case. He asked Mr. Besley whether there was any probability of the case being brought to an end before Christmas. He could not at present see that the slightest evidence of fraud had been brought forward. Mr. Besley promised to finish his case at the next hearing, and the case was adjourned for a fortnight.—*Daily News.*

The Velocity of Light.—Preparations are nearly completed at the Case School of Applied Sciences, Cleveland, Ohio, for a re-investigation of the velocity of light, by Professor A. A. Michelson, late of the Naval Academy at Annapolis. The velocity found (186·380 miles a second) differed slightly from that obtained by M. Cornu at the Observatory at Paris, in 1874, and also, it is said, from that obtained more recently by Professor Newcomb, at Washington. The results of the last-named observations have not been published. Mr. Michelson has accordingly been requested to repeat his experiments; money for the purpose, about 1,200 dols., having been promised from the Bache Scientific Fund. The Cleveland *Leader* says that two small buildings have been erected for the experiments on the grounds of the Case School. The larger of the two, 16 by 45 feet, contains the chief apparatus. Two thousand feet west of it is a smaller building containing a stationary mirror. In the experiments the light traverses the space between the buildings and back again to the apparatus, by whose movement data are obtained upon which the velocity of the light is measured.

Incombustible Writing and Printing Paper.—Asbestos fibres of the best quality are washed in a solution of potassium permanganate, and bleached with sulphurous acid. Ninety-five parts of the prepared fibre and five parts of wood fibre are mixed in water, saturated with lime and borax, which renders the paper, after rolling, capable of being written upon. To obtain an ink which resists fire, a mixture of platinum chloride and lavender oil is added.—*Journal of the Society of Chemical Industry.*

To Correspondents.

*** We cannot undertake to return rejected communications.

W. H. G.—Such an apparatus is not very well adapted for treating an unmounted print, and we would advise you rather to enamel them with collodion. Warm a glass plate, and rub it over with a piece of crude and unadulterated bees' wax; after which polish off all excess by means of a flannel rubber. Now coat the plate with collodion and, when the film is set, soak in water till no appearance of greasiness is visible. Next immerse the coated plate in a warm solution of gelatine—one part in twenty of water—and bring the face of your print in contact with the collodion face. When the plate and print have been removed from the gelatine bath establish contact between them by the application of a squeegee to the back of the print. Clip the edges of the print to the glass by means of strips of reglet and American clips, and leave in a warm room to dry. The dry print is easily removed from the glass by applying a pen-knife to the edges; all this is very easy, and a considerable number of prints can be enamelled with great rapidity. Let us know how you succeed.

A. Read.—1. See the formulary. 2. We know of no method except making a reproduction by the camera. 3. It is better to use it moderately fresh, as it oxidizes to some extent by exposure to the air.

Emulsion.—1. Use a larger proportion of gelatine. 2. Add a trace of chrome alum to the emulsion.

An Assistant.—1. Our impression is that it is sold by Messrs. Houghton and Co., of Holborn. 2. We have sent it by post.

E. W.—1. Ordinary re-crystallized nitrate. 2. The "A. B. C. of Photography," published by Piper and Carter, 5, Castle Street, Holborn.

R. O.—We quite agree with you; send it back.

Darwen.—Not so good a chance as in this country.

X. X. X.—1. If not worth a sovereign or more, you may regard it as absolutely valueless. 2. All you can do is to communicate with the principal photographic publishers.

3988.—See Mr. Ashman's article on page 466 of the present volume. We expect to receive the results of his recent experiments before long.

J. Berrynan.—1. You can obtain the apparatus from Griffin and Co., Long Acre. 2. A light of ten candles would efficiently light up one picture or a show-case, but not a window. Try this first, as the manipulation of a very large number of batteries is troublesome.

F. D.—1. The price would no doubt be the same as that of bromide plates, supposing a demand for them to arise; but we have not heard of anyone making them commercially. 2. Hardly sensitive enough.

L. B.—We will write to you.

J. J. M.—See Mr. Jenning's article in our issue of Sept. 15th.

David Banstead.—1. Because the paper has not been sufficiently dried. 2. A substratum of albumen is to be preferred, unless you intend to modify the second preparation as proposed. 3. A simple solution of shellac in alcohol, say four ounces of shellac to each pint. 4. As far as our own experience goes, it is entirely a matter of indifference which is used.

S. Fleischer.—A reversed negative is required for the single transfer process, and there are several methods. If the negative is to be taken especially for the work, you had better set a reversing prism or a mirror in front of the lens; but in the case of an existing negative, the safest way is to make a reproduction. The best method, as regards results, is to strip the film; but this involves some risk.

S. B. C.—Go to a photographic material store and select one for yourself. The chief qualities to be considered are—lightness, rigidity, cheapness, portability, adaptability to sloping or uneven ground, and the absence of a multiplicity of separate parts. No stand can possess all these qualities in a high degree.

Phosphor.—Yes, as a waste product in the alkali manufacture; but this form is not phosphorescent.

THE EVERY-DAY FORMULARY.

The Gelatino-Bromide Process.

Emulsion.—A—Nit. silver 100 grains, dist. water 2 oz. B—Bromide potassium 85 grains, Nelson's No. 1 gelatine 20 grains, dist. water $1\frac{1}{2}$ oz., a one per cent. mixture of hydrochloric acid and water 50 minims. C—Iodide potassium 8 grains, dist. water $\frac{1}{2}$ oz. D—Hard gelatine 120 grains, water several oz. When the gelatine is thoroughly soaked, let all possible water be poured off D. A and B are now heated to about 120° Fahr., after which B is gradually added to A with constant agitation; C is then added. Heat in water bath for half an hour, and stir in D. After washing add $\frac{3}{4}$ oz. alcohol.

Pyro. Developer.—No. 1—Strong liq. ammonia $1\frac{3}{4}$ oz., bromide potassium 240 grains, water 80 oz. No. 2—Pyro. 30 grains, water 10 oz. In case of an ordinary exposure mix equal vol.

Iron Developer.—Potassium oxalate sol. (1 and 4) 80 parts, ferrous sulphate sol. (1 and 4) 20 parts, dist. water 20 parts. To each 4 oz. of the mixed developer add from 5 to 30 drops ten per cent. sol. potassium bromide, and 30 drops sol. sodium hyposulphite (1 and 200).

Substratum or Preliminary Preparation.—Soluble silicate of soda 1 part, white of egg 5 parts, water 60 parts. Beat to froth and filter.

Fixing.—Sat. sol. of sod. hypo. 1 pint, sat. sol. of alum 2 pints, mixed.

Cowell's Clearing Solution.—Alum 2 parts, citric acid 1 part, water 10 parts. Edwards makes this sherry coloured with perchloride iron.

Eder's Method of Intensification.—The negative is whitened by soaking in sat. sol. of mercuric chloride, and after thorough rinsing immersed in potass. cyan. 10 parts, potass. iod. 5 parts, mercuric chloride 5 parts, water 2,000 parts. As film becomes dark brown, the actinic opacity is increased; but prolonged action causes brown tint to become lighter, until at last the negative is no denser than at first.

Fol's Backing Sheets.—A chromographic paste is prepared with gelatine 1 part, water 2 parts, glycerine 1 part, and a very small addition of Indian ink. Strong paper or shirting is coated, and the sheets are laid, face downward, on waxed glass to set. Press to back of glass plate.

The Wet Collodion Process.

The Nitrate Bath.—Water 14 oz., nit. silver 1 oz., nitric acid 1 drop. Before using coat a small plate, and immerse it for 20 minutes.

Cleaning Preparation for New Plates.—Alcohol 4 oz., Jeweller's rouge $\frac{1}{4}$-oz., liquid ammonia $\frac{1}{2}$-oz.

Film-removing Pickle for Old Plates.—Water 1 pint, sulphuric acid 4 fluid oz., bichromate potassium 4 oz.

Substratum.—Whites of 2 eggs well beaten, 6 pints of water, and 1 dr. liq. ammon.

Negative Collodion for Iron Development.—Alcohol 1 pint, pyroxyline of suitable quality 250 grains, shake well and add ether 2 pints. *Iodize this by mixing with* one-third of its volume of alcohol $\frac{1}{2}$ pint, iod. ammon. 80 grains, iod. cadm. 80 grains, brom. ammon. 40 grains.

Normal Iron Developer.—Water 10 oz., proto-sulphate iron $\frac{1}{2}$ oz., glacial acetic acid $\frac{1}{2}$ oz., alcohol $\frac{3}{4}$ oz. The amount of proto-sulphate iron may be diminished to $\frac{1}{4}$ oz. when full contrasts are desired, or increased to 1 oz. when contrasts are unduly marked. With new bath quantity of alcohol may be reduced to $\frac{1}{4}$ oz.; but when bath is old more is wanted.

Intensifying Solution.—Water 6 oz., citric acid 75 grains, pyro. 30 grains. When used, add a few drops of the silver bath to each ounce.

Lead Intensification.—After neg. washing, immerse in dist. water 100 parts, red pruss. potash 6 parts, and nit. lead 4 parts. When it is yellowish white wash and immerse in liquid sulphide ammon. 1 part, water 4 parts.

Fixing Solution.—1. Potass. cyanide 200 grains, water 10 oz. 2. Sat. sol. of sod. hypo.

Varnish.—Shellac 2 oz., sandarac 2 oz., Canada balsam 1 dr., oil of lavender 1 oz., alcohol 16 oz.

Printing Processes.

Albumen Mixture for Paper.—White of egg 18 oz., 500 grs. ammon. chlor. in 2 oz. of water. Beat to a froth, stand, and filter.

Sensitizing Solution.—Nit. silver 50 grs., water 1 oz., sod. carb. $\frac{1}{2}$ gr.

Acetate Toning Bath.—Chl. gold 1 gr., acet. soda 20 grs., water 8 oz.

Lime do.—Chl. gold 1 gr., whiting 30 grs., boiling water 8 oz., sat. sol. chl. lime 1 drop. Filter cold.

Bicarbonate do.—Chl. gold 1 gr., bicarb. soda 3 grs., water 8 oz.

Fixing Bath.—Sodium hypo. 4 oz., water 1 pint, liq. ammon. 30 drops.

Reducer for Deep Prints.—Cyan. potass. 5 grs., liq. ammon. 5 drops, water 1 pint.

Encaustic Paste.—Best white wax 1 oz., oil of turpentine 5 oz.

Sensitizing Bath for Carbon Tissue.—Bichromate potash $1\frac{1}{4}$ oz., water 30 oz., ammonia 1 dr., methylated spirit 4 oz.

Enamel Collodion.—Tough pyroxyline 120 grs., methylated alcohol 10 oz., ether 10 oz., castor oil 20 drops.

Mountant.—1. Fresh solution of best white gum. 2. Fresh starch.

Collotypic Substratum.—Soluble glass 3 parts, white of egg 7 parts, water 10 parts.

Collotypic Sensitive Coating.—Bichromate potash $\frac{1}{2}$ oz., gelatine $2\frac{1}{2}$ oz., water 22 oz.

Collotypic Etching Fluid.—Glycerine 150 parts, ammonia 50 parts, saltpetre 5 parts, water 25 parts.

Printing on Fabric.—Remove all dressing from fabric by boiling in water containing a little potash, dry, and albumenize with ammonium chloride 2 grammes, water 250 cubic cents., and the white of 2 eggs, all being well beaten together. A 70-grain silver bath is used, and the remaining operations are as for paper.

Cyanotype Printing.—Water 1 oz., red prussiate of potash (ferricyanide) 1 dr., ammonio citrate of iron 1 dr. Prepare and preserve in the dark. Float the paper and dry. Fixation by mere soaking in water.

Various.

Luckardt's Retouching Varnish.—Alcohol 300 parts, sandarac 50 parts. camphor 5 parts, castor oil 10 parts, Venice turpentine 5 parts.

Matt Varnish.—Sandarac 18 parts, mastic 4 parts, ether 200 parts, benzole 80 to 100 parts.

Encaustic Paste.—Best white wax, in shreds, 1 oz., turpentine 5 oz.; dissolve in gentle heat, and apply cold with piece of flannel.

Ferrotypes.

Collodion.—Ammonium iodide 35 grains, cadmium iodide 25 grains, cadmium bromide 20 grains, pyroxyline 70 grains, alcohol 5 oz., ether 5 oz.

Bath.—Silver nitrate 1 oz., water 10 oz., nitric acid 1 drop.

Developer.—Ferrous sulphate 1 oz., glac. acetic acid 1 oz., water 16 oz.

Fixing and Varnish.—Same as wet collodion process.

THE PHOTOGRAPHIC NEWS.

Vol. XXVI. No. 1261.—November 3, 1882.

CONTENTS.

SOME NOTES ON ALKALINE DEVELOPMENT.

"Was the development forced?" is a question which we very often hear asked iu connection with effects produced with dry plates. The replies that are made to such questions, and the general remarks of photographers on the subject, show that there is considerable misconceptiou as to what really constitutes forcing. There would appear to be a general impression that the use of a developer which contains a certain percentage of ammonia means forcing without regard to the nature of the plates with which it is used.

We remember to have witnessed a competition between two rival plate makers. The two makes of plates were both excellent, but of totally different natures. The plates of one came up dense and brilliant with two minims of ammonia, and would fog with four; those of the other stood easily anything up to twenty miuims, although doubtless, with sufficient exposure, they would have come up dense enough with two. Now, as the competition was intended to discover which plate was the most rapid, each competitor naturally used as strong a developer as he thought safe, and each got excellent results, and that with about equal exposures; but there was a complaint from one of the rivals that the other was *forcing* development, inasmuch as he was using a greater percentage of ammonia. This complaint we consider to have been totally uncalled for, aud about as unreasonable as if a wet-plate man were to complain that a dry-plate worker was taking an unfair advantage iu that he was not using the acid iron developer for his plates.

We hold that forcing is not reached until there is danger of fog, however strong a developer may be used. We have had experiences of plates which differed far beyond the limits of ordinary developers in the quautity of ammonia which they would stand, or even which they required. At a recent photographic meeting, Mr. A. Cowan showed us a plate which had been developed by a solution containing but one minim of ammonia to the ounce, and that after but very short exposure had been given. Mr. Cowan did not mention what quantity of bromide was in the developer, nor did he say whether the plate would have stood more ammonia. The negative had the appearance of being fully exposed, and was certainly dense enough to give a most brilliant print. Now, it is quite conceivable that the plate in question would not stand two minims of ammonia; yet, inasmuch as it was capable of giving an excellent negative with a short exposure, it could uot be called other than a good plate.

During some recent experiments in emulsion, we made some plates which, with an ordinary developer, required a very long exposure, yet which were of so hardy a nature that a developer containing fifty minims of ammonia to each ounce would not cause fog when there was but one grain of bromide of ammonia to the ounce of developer.

Besides pointing out that whether a plate is forced or not depends ou the uature of the plate rather than on the strength of the developer, we wish to indicate the folly of using a "test-developer" to discover whether a plate is good or not, and also the mistake of using a "standard developer" wheu it is desired to ascertain the rapidity of plates.

A good plate is not oue that will stand a certain developer without fog; but it is one which will give a good negative with a short exposure, whatever developer suits it best being used. For example, the plate which we have supposed would fog with two minims of ammonia is a better one than that which would uot fog with fifty, inasmuch as it would give as good a negative with one minim as the latter would with twenty-five, and that with a shorter exposure; yet, had a "test-developer" been applied to the two, certainly the first would have been rejected. Agaiu, in the very first case which we described, where plates were tried against each other, one set of which would fog with four minims of ammonia, whilst the others would stand twenty, how unfair it would have been to test the two for sensitiveness with the same standard developer

The correct developer for any plate is the strongest which it will stand without any danger of producing fog in such parts as have had no exposure to light. It is worth while making a trial of any batch of plates from which it is proposed to use a large number, so as to ascertaiu what the proportions for the developer really should be. This is very easily done in the following manner. Let a developer be made up containing (say) one graiu of pyrogallic aud one grain of bromide of ammonia to each ounce; let a plate be exposed under a negative, under a sensitometer plate, or in the camera, care being taken in any case to have a certain proportion of the film totally protected from light; now let the solution described above be poured over the plate, and let ammonia be added very slowly till perceptible fog is produced, the quantity of ammonia being observed. We shall suppose that two ouuces of developer were taken, and half-an-ounce of a ten per cent. solutiou of ammonia added to this before fog made its appearance. It will be seen that, to produce fog, a developer containiug twenty-four minims of ammonia to two and a-half ounces of solution, or about ten minims per ounce, was required. Now, to give a margin for safety, aud for the forcing of a somewhat under-exposed negative, it is necessary to limit ourselves to the use, in uormal cases, of only about a third of the quantity of ammonia which will produce fog; that is to say, the quantity of ammonia to form a normal developer for the plates in question will be about three—or, at the most, three and a-half—miuims to the ounce.

We have now to determine the quantity of pyrogallic necessary to give a sufficient density. Let a plate be exposed in the camera, and a trial be made with one grain of pyrogallic, one of bromide, and three or three and a-half minims of ammonia to each ounce of the developing solution; it will be easy to discover from the appearance of the resulting negative whether the quantity of pyrogallic is too great or too small. If the negative be too dense, the pyrogallic must be reduced; if it be not dense enough, it must be increased. When we have found out the quantity which gives the correct density, we may congratulate ourselves that we have discovered the very best developer for the particular plates which we are working, and we should only depart from it when an abnormity, either in the exposure or in the nature of the subject, calls for an abnormal developer.

SILVER IODIDE IN EMULSION.

The iodide question is by no means properly understood at the present time in all its bearings; but the recent experiments of Schumann not only serve to throw some new light on the matter, but will doubtless lead to a further and closer experimental study of the subject. Fresh exposures made on some of Herr Schumann's plates, about nine months old, proved that with bromo-iodide films the action extends notably beyond that visible in the case of bromide plates, and that this difference becomes increasingly great as the light is richer in the rays corresponding to low rates of vibration. A difference was clearly noticeable in the case of pictures taken at various hours of the day, in some of these instances the bromo-iodide and pure bromide plates being simultaneously exposed with twin lenses; a rough estimate being that the iodide plates are double as sensitive as corresponding pure bromide films. This relative sensitiveness, however, appears to be very widely departed from in the case of exposures made by petroleum light; as when twenty to thirty minutes was required to impress a mere trace of an image on a bromide film, a similar exposure of a bromo-iodide plate gave a negative which, if not fully exposed, was at least capable of serving as a makeshift. A study of these results leads to the conclusion that when the light is specially rich in yellow and red rays, the bromo-iodide plate is not merely twice as sensitive as the bromide plate, but rather six or eight times as sensitive.

Schumann's spectrographic experiments are equally surprising; as not only did an attempt with the light reflected from a greyish evening sky serve to impress a tolerably extended spectrum on a bromo-iodide plate, while a similar exposure would scarcely affect the bromide film; but with the highly actinic light of burning magnesium a striking difference was noticeable. About two grains and a-half of magnesium wire, burned an inch from the slit of the spectroscope, served to impress a vigorous spetrum on the iodide plate, the characteristic band in the green being notably well defined; while a similar experiment made with a bromide plate resulted in the production of a weak image in which above-mentioned band was altogether absent.

It is curious to note that the remarkable difference between bromo-iodide emulsion and pure bromide emulsion appears to be greater in proportion to the extent to which the former has been treated with ammonia; at least, one would gather from Herr Schumann's experiments that this holds good up to a certain point, and the circumstance is of special interest when it is remembered that silver iodide is practically insoluble in ammonia.

Unless there is some notable and unobserved source of error in connection with Schumann's experiments, we may expect them to lead to an important advance in the struggle for extreme sensitiveness; a quality of special importance when feebly actinic lights are alone available.

THE PHOTOGRAPHIC EXHIBITION.

Fourth Notice.

Professor W. F. Donkin, M.A., of St. George's Hospital, a well-known member of the Alpine Club, contributes this year a magnificent series of pictures from the Higher Alps. Look at the "Bietschhorn" (236); from the massive mountain towers aloft a sharp snowy spire reaching to the heavens; while, to add further to the romance of the situation, one cannot see to the bottom of the dark valley—it is so deep—out of which the mighty giant rises. The "Dent de Géant" (1) is a scarcely less marvellous picture; and in the "Jungfrau" (235) the snow slopes in the sunlight have that glossy satin-like sheen, to view which is alone worth a fatiguing day's climb over moraine and glacier. Professor Donkin very skilfully avoids the chalky glare that detracts from most Alpine pictures, and herein lies the chief point of success; never have the soft snow-fields of the Higher Alps been more successfully painted. A fine head of a dog (232), well pourtrayed, is sent by Mr. Henry Dixon, who also forwards some of his familiar "Relics of London" (501). Mr. G. Selwyn Edwards forwards three frames, the sedgy banks of "Oulton Broad" (225), with its growing reeds and trim craft, being most successful work. Messrs. Heath and Bullingham are represented by a frame of good cabinet portraits (204), and by three studies (223), the centre one a charming work; it is that of a lady gracefully draped in a soft woollen shawl—one of the most successful of photographic draperies—the face and features being very delicately modelled. The pose and lighting are also exceptionally good, and altogether it is one of the most delightful portraits in the Exhibition. Mr. Silvester Parry, who has acquired a reputation for cathedral interiors, sends the stall work of Chester Cathedral (219), a very successful work; the absence of unequal lighting is here most marked, and those who would know to what perfection interior-photography may be brought, have here a useful lesson before them. The best contribution of Mr. J. W. Robinson, Jun., is an old street in Newcastle (73), an exceedingly quaint architectural study.

Mr Edward Brightman sends some sunny sketches from the south of England, all of them bright and pleasing. "On the East Lynn" (209), a mountain pathway leading among flowerets and ferns, is a rare study; there is plenty of shadow among the fern tufts, and yet it is so clear that every detail of the delicate stems is seen. "Cottages at Lynmouth" (210), again, is one of those sweet homely scenes in Old England that lose nothing of their charm at the hands of a master in the art like Mr. Brightman, of whose good taste and high skill there is evidence in every contribution. Mr. Charles F. Wing contributes a frame of good portraits (206); and Messrs. Adams and Stilliard are also represented by portraiture (205), their frame, among other excellent pictures, containing a capital likeness of Dr. Siemens, and another of Captain Abney. Mr. George Tuohy shows two frames of portraits taken by artificial light, which are certainly highly successful, together with a group of Chertsey grandees welcoming the Duke and Duchess of Albany (140), a picture remarkable for the singular fact that not one of the group is looking at the camera. Messrs. Lombardi and Co. contribute three frames of portraits (198, 197, 189), which include much high-class work. Mr. Clive F. Pritchard shows a picture of "Lausanne Cathedral" (195), in which the quaint flying buttresses of this ancient pile are shown to particular advantage, the point of view as well as the lighting indicating both tact and judgment. Mr. Lyddell Sawyer contributes two pictures of considerable merit—"Shadows" (186), and "Sunbeams" (187); if the same lady-model has served for both—and we fancy this is the case—the pictures, besides indicating much artistic culture and exceeding good taste, are also wonderful examples of "expression."

Mr. Robert Faulkner's exhibits are marked with the same refinement and delicacy that have hitherto characterised his studies of infant life. The most delightful of his pictures is "Lady Sybil" (185), a tiny maid, rarely limned in red pigment; the pose and draping of this little creature are perfect, reminding one of Miss Kate Greenaway at her best. "Katherine and Mary Hart Davis," a quaint little pair of coquettes, also in red pigment, are no less successful. Mr. Faulkner also sends a large frame of baby faces, conveying every phase of humour in the changeable Kingdom of Lilliput. A frame of Mr. F. Downer (190) escaped our attention when we before mentioned that gentleman's name, and, therefore, we here refer to his work once more; this series embraces several examples of grouping that denote study and earnestness of purpose to instil fine art into photography.

The Luxograph Company exhibits some good portraits taken by artificial light (171). Mr. H. Stanley's contribution of portraits (170) deserved better mounting and framing, for it contains some work decidedly above average merit. Of Mr. Thurston's "At-Home Pictures" (167) we like best the little family group on the steps, which has been arranged with much care. Mr. John M. Thomson forwards a frame that will interest many, containing, as it does, studies of clouds for meteorological purposes (166). It was only the shape and nature of the cloud masses that Mr. Thomson desired to secure, and necessarily the landscape, where shown, is under-exposed; but for all that he has succeeded in securing some beautiful pictures, as well as some beautiful effects. Mr. H. E. White's "Golden Eagle" (165) is a fine fellow; but he is perched on too high a pinnacle to study closely.

Mr. H. Trueman Wood sends four pictures, of which the "Avenue in Tewin Water Park" (93)—the quaint fantastic forms of the gnarled trunks laid bare in wintry weather—and "Tintern Abbey" (94) are the best; the ivy-grown ruins of Tintern, with its broken columns, being, indeed, a most complete little sketch. Mr. J. Maclanachan shows three fine twenty-inch portraits, that deserve high praise, both by reason of the facile posing, as also for their deep rich tones. Mr. Maclanachan has mastered that obstinate difficulty of securing full details and rich shadow at the margin of his portraits while duly preserving the balance of light and shade in the features of his model. The graceful folds of the drapery, the delicate work on lace and embroidery, are perfectly rendered, and yet not at the expense of the face and bust. Colonel Stuart Wortley's name is not in the list of exhibitors; but a frame of five collotype pictures of Tahiti, printed by the Autotype Company (147), shows us that the Colonel still handles the camera with taste and skill. "Hiliaa Lake," beside which rises a clump of tall palms, their elegant stems bending towards the water, the foreground a mass of big tropical leaves, and in the distance a wealth of soft foliage, make up together a delightful picture; to mention another photograph, of merit of a different stamp, "Our Family of Servants" may be cited.

Mr. J. A. Langton exhibits two frames, both of which are hung too high for critical inspection; the portraits on porcelain (113), however, seem to denote good work. Mr. H. N. King has several examples of his "royal" interiors, enlargements from the series he has before exhibited; one of the most successful is the "Green Drawing Room at Windsor" (120), and another, scarcely less fine, is the "Grand Reception Room" (144). Mr. Mure's untouched portrait, taken in a sitting-room (126), is too far off to examine; and the same may be said of Mr. John Nesbit's platinotype print (123), representing an original drawing by W. R. Woods. Mr. P. H. Emerson forwards several pictures printed in platinotype, most of them a little too dark, we think; "On the Granta" (106), and "Near Inverarnan" (43), are the most successful. Of Dr. Plaister's studies, the best by far is the "Bridge at Wastdale Head" (20), which is quite a little gem, the hill-side scenery clear and soft, as many a tourist has seen it in the cold grey light of morning; we compliment Dr. Plaister no less upon his capital emulsion with which he has secured his pictures. Mr. Simeons Norman's "Burgess Hill Wood" (87), with its wood-cutters, is a delightful picture, very soft in its detail and distance, and altogether an artistic composition. "Hassock's Gate," a wintry picture, with leafless trees and steely brook, is no less praiseworthy; his frame of sketches is indeed a very creditable one.

Mr. William Muller has three fine series of pictures. In the middle frame (86), "The Herdsman, Staffa," is admirably rendered; the step-like mountain is shown at its full height, and its peculiar formation capitally pourtrayed; in "Shiel Village," the rendering of the distance is perfect, and altogether it is one of the best landscapes in the Exhibition. We like also "Glen Shiel," in the same frame, very much; Mr. Muller does not permit his camera to depress the horizon as many photographers do, and the grandeur of his pictures is in a great measure due to the fact that he figures the mountains by the roadside at their full height. Mr. A. Johnson sends some studies of "Fishing Boats at Wick" (80), which have a good deal of character about them. The livid green colour of the mounts of Mr. W. Trenemen's pictures detracts somewhat from their excellence. Mr. Trenemen sends two frames containing many delightful views; "Magpie Island," with its old willow and cattle, and "Wargrave Church," muffled in ivy (65), are most pleasing little sketches; and so, too, are "Cromford Bridge," and "At Lynmouth" (26). Let Mr. Trenemen try the effect of a black mount with gilt bevels for his little pictures, and he will find them vastly improved. Mr. C. J. Palmer sends but one picture, taken in mid-ocean (64); the swelling sea in the foreground is wonderful, and would please many of our marine painters. Mr. Peter Mawdsley shows a fine collection of views, some of them taken with drop-shutter exposure; No. 6, in which we see a limpid pool, the surface patched with duck-weed, and above, the trailing branches of a lofty ash, is the most pleasing.

Mr. Matthew Whiting sends a large contribution. Mr. Whiting is one of the distinguished few who make good emulsion and good pictures. A view of "Midhurst," a stately elm on the highway beside the stone bridge, and beyond, a cottage nestling among the trees (59), is one of the prettiest of Mr. Whiting's collection. "Portsmouth," in which we see a towering three-decker, in grey and white, riding proudly at anchor among the tiny black fishing craft, is also a capital picture, and one, too, that will be valued in years to come when line-of-battle ships are as dead as the Dodo. In a second frame (47) we have another delightful marine sketch, in which the waves are flecked with silver sunlight. Mr. David Green sends "Thunder Clouds" (41), an effective sky picture. Mr. Edward Dunmore's pictures look like summer pictures, and that is a pleasant quality that photographs do not frequently show. In "Which Way," and "Country Lane" (27), there are the warmth and luxuriance of summer-time; the pathway is dappled with sunshine, and among the leaves and the branches there is a glow that cannot be mistaken. Mr. A. Bisset Thom sends a picture of the Memorial Fountain in Hyde Park (15); and Mr. Robert Harris forwards a frame of pictures taken on board s.s. "Arab," while going at full speed (14); the latter are full of life and character. From the School of Military Engineering, at Chatham, come half-a-dozen brilliant landscape pictures, the work of the clever Sappers attached to that establishment. Whether the peculiar brilliancy of the prints is due to collodion or not, certain it is that they afford a contrast to many pictures in the room. "On the Lynn" (10, 12, 13) are the best; considerable artistic ability is manifest in the way in which the dark tree trunks are made to contrast with the feathery foliage in these leafy pictures. Monotony is, in this way, most happily avoided, and justice done to the Devonian Paradise. Finally, we have to mention a bold and characteristic portrait of the President of the Society on the table, from the studio of Mr. J. A. Melhuish.

By-the-Bye.

PHOTOGRAPHIC NEWSPAPERS AND JOURNALS.

One matter for surprise among photographers abroad is, the abundance of photographic literature in this country. Not only are they astonished at the vitality and energy of photographic authors in Great Britain, but the readable matter placed before those who peruse the English papers week after week appears to them overwhelming. Our friends abroad—used for the most part to the appearance of a thin monthly journal, or, perhaps, a fortnightly one—marvel at the fecundity of English photographers; and although there are examples at this moment on the Continent of weekly newspapers devoted to photography, these are but of recent origin and scant proportions.

England has not only taken the lead in photographic literature, but its follower in the race is but a bad second. Dr. Hornig, the worthy editor of the Viennese journal—the *Photographische Correspondenz*—has recently written on this subject, and, we think, suggests the true cause of British supremacy. It is because in this country there are so many skilful and intelligent amateurs in photography, as there are with us in other callings and occupations. It is in British blood, seemingly, to take readily as an amateur to science, art, technics, athletics, and a hundred other things besides; and it is no less in the blood to undertake thoroughly what is undertaken at all. What holds good in rowing, cricketing, volunteering, and the rest, holds good also in scientific occupation, and it is no rarity in this country to find an amateur riding his hobby so well, that he distances those who are professional racers; so that in the end he takes his place with the best of them. Of the poet, it is said that he is born, and not made; but of Grace, the cricketer, who is a doctor; of Whymper, the mountaineer, who is an engraver; of Spottiswoode, the President of the Royal Society, who is a printer, and others who have distinguished themselves out of their original calling, the same may be said with equal truth.

It is because of the thoroughness of British amateurs that the cultivation of our sports and pastimes, and of science and art, is undertaken with such genuine success. There is no such hard-worker in a particular sphere than he who works out of sheer love and liking. We probably work harder—that is to say, do more work in a given time—than our brethren elsewhere, and in like manner our recreations are conducted in the same vigorous spirit. The amateur photographer is no exception, and he takes, if anything, more interest than the professional photographer in the occupation. He contributes his full share towards photographic research and to the progress of photography both as an art and as a science; he is no less energetic in his support of photographic literature. The leisure he devotes to experiment or to research is never lost; he jots down what he thinks may be useful to brethren of the craft, and freely places it at their disposal through the public press. Uncertainties to be cleared up, and obstacles to be overcome, have a peculiar attraction to him, and he is never happier than when a problem presents itself to be solved. The professional, every-day photographer cannot give up his time, for the reason that his bread, and that of his family, depends upon his securing so many certain results within a given time; and even when his experiences are valuable, he may neither have the time nor the inclination to make them public. It is, then, mainly, as Dr. Hornig has pointed out, because we have in this country a legion of amateur photographers—ladies and gentleman who work intelligently and steadfastly with the camera—that our literature happens to be so well represented.

We have said that there are weekly photographic journals besides those in this country. At this moment two such papers exist, both of them published in Germany. One is the *Photographen Zeitung*, published in Thuringia, at Weimar. Weimar is classic ground for literature, since Schiller and Goethe are buried within its walls; Kotzebue, the author of the "Stranger," was born there; and our own Thackeray lived in the town for some years; indeed Thackeray has painted Weimar pretty truly in *Vanity Fair* under the name of Pumpernickel. Being in mid-Germany, the little town is well-suited for the publication of a central organ, and though the *Zeitung* is still small, its energetic editor, Herr K. Schwier, has shown himself equal to the task of conducting a periodical journal of the kind. The other weekly paper is the *Wochenblatt*, which is printed in Berlin under the able editorship of Dr. Stolze; this paper gives subscribers a good deal to read comparatively, for the weekly issue consists of sixteen columns; but, taken altogether, its contents are but a quarter that of the Photographic News.

Of fortnightly journals there are two on the Continent. The *Moniteur de la Photographie*, of which our esteemed Paris correspondent, M. Léon Vidal, is chief editor, is well known to most of our readers. The *Moniteur* is better off than its German contemporaries, because it has fewer opponents; in Paris, and the larger French cities, it is the principal organ of photographers, and since its able editorship by M. Vidal, the dimensions of the paper have considerably increased. Another fortnightly in the highest rank is Dr. Vogel's *Mittheilungen*, which is often quoted in these columns, and which, if its pages are limited, rarely contains any matter of unimportance. Dr. Vogel's paper is the official organ of the Berlin Society for Advancement of Photography, one of the busiest of the Continental societies.

The *Photographisches Archiv* can scarcely be called a fortnightly journal, and yet it appears more frequently than once a month. Twenty numbers in the year is, we believe, its allotted appearance, and in Dr. Liesegang's experienced hands it enjoys great popularity throughout the Fatherland. The *Archiv* is published in Berlin and in Düsseldorf.

Coming next to monthly periodicals, we find the number much increased. America here steps in, and adds her quota, one of the most spirited periodicals of our cousins being Mr. Fitzgibbon's *Practical Photographer*, a becoming volume, neatly bound, with elegant letter-press, printed on good paper. The *Practical Photographer* issues from St. Louis,* while from Philadelphia comes Mr. Wilson's *Philadelphia Photographer*, another comely pamphlet, printed in a style and upon paper that put our own journals to shame. *Anthony's Bulletin* is a third well-known photographic newspaper, hailing from New York, a compact and well-printed little volume; and the *Photographic Times*, a fourth, also published in New York, is remarkable for an improvement during the past twelvemonth, both in substance and form, which will assuredly be lasting, so long as our esteemed colleague, Mr. J. T. Taylor, fills the editorial chair. We do not mean to flatter our American contemporaries when we say that their columns are filled with sound and readable matter, for the simple reason that much of the literature they publish comes from this country in the first instance. Like the much-advertised "Waverley Pen," indeed, our own photographic literature comes "as a boon and a blessing" to brother-editors in America and on the Continent.

Of the Continental monthlies, the palm must be given to the *Correspondenz*, the able journal of the Vienna Society, edited by Dr. Hornig, and the *Bulletin de la Société Française*, which emanates from Paris. Two Belgian societies issue journals which are occasionally very good; these are the *Bulletin Belge* and the *Bulletin de l'Association Belge*. Unfortunately, whether it is that their contributors are not constant, or the societies they represent do not bestir themselves, the contents are at times disappointing, for the simple reason that some of the numbers are of high excellence. A second paper is also published at Vienna, the

* News comes to us this week that the *Practical Photographer* has ceased with the death of its talented editor.—Ed. P.N.

Notizen, which is remarkable if only for the readable little papers that Dr. Vogel is wont to contribute to its pages.

Besides the *Bulletin*, Paris publishes the *Revue Photographique*, dealing with historical and monumental subjects in connection with photography; as also another monthly newspaper issued under the auspices of the Chambre Syndicale. The monthly journals of Frankfort and Munich, which appeared some months ago, are, we believe, temporarily suspended; but Holland boasts two papers, the *Tidschrift* and the *Navorscher*, devoted to photography. Signor Borlinetto edits the *Rivista*, from Brindisi, the only Italian town represented by a photographic journal. Russia has enjoyed the benefit of a journal for a twelvemonth and more; and Denmark has a monthly termed the *Meddelser*, which is printed in Copenhagen. Spain is without a photographic journal, albeit there has recently been published one in the Spanish language, printed at Havannah, called the *Boletin Fotografico*. Altogether the number of journals devoted exclusively to photography, published on the Continent and in America, may be summarised as follows:—Weekly, 2; fortnightly, 3; monthly, 16.

The "By-the-Bye" next week will be "The Photographic Copyright Defence Association."

PHOTO-LITHOGRAPHY AND PHOTO-ZINCOGRAPHY.*

BY MAJOR J. WATERHOUSE, B.S.C.,
Assistant Surveyor-General of India.

At the Imperial Geographical Institute at Vienna the following solution is used to darken the film after treatment with saturated solution of bichloride of mercury—

Chloride of gold aud sodium	... 4·37	parts
Water	350	,,

added drop by drop with constant stirring to a solution of—

Hyposulphite of soda	13	parts
Water	350	,,

The mixture is allowed to stand for an hour or so, till it is free from colour, and may be used over and over again if kept in the dark. This seemed to give good intense images at the Institute, but I have not been very successful with it myself.

Another intensifier, containing uranium, is also used at the Institute:—

A.—Nitrate of uranium	17·5	parts
White sugar	17·5	,,
Distilled water	700	,,
B.—Red prussiate of potash... ...	17·5	,,
White sugar	17·5	,,
Water	700	,,

This is used after fixing, first applying A, and then B, and washing thoroughly afterwards.

At the same Institute, negatives from unsuitable originals, in which the lines are liable to choke up, are dried after the first intensification with iron, or pyrogallic and silver, and treated in a peculiar manner so as to prevent the lines being fogged in the after strengthening with mercury, &c. A solution of—

Gum-arabic	175	parts
White sugar	175	,,
Bichromate of potash	58	,,
Glycerine	18	,,
Water	350	,,

with a little ammonia added, is poured over the negative, and when it is dry the plate is exposed to light on the glass side to about 13° or 14° of Vogel's photometer, then soaked for about a quarter of an hour in cold, and then in tepid water, until the relief appears. The plate is then dried, and may be strengthened with mercury and gold until the ground is perfectly opaque, the transparent gummy relief in the lines preventing their clogging up.

From the method of intensification above given, the operator will be able to select that which may seem to suit him best; but for regular work on large plates, the treatment with bichloride of mercury and hydrosulphate of ammonia or cyanide of silver seems to be the most certain and effective.

Varnishing and Finishing.—After intensifying, the negative is dried, and varnished with a good strong varnish; or, if not required to produce many copies or to be kept, it will be sufficient to flow the plate over while wet with a solution of gelatine, about one part to thirty of water, to which a little chrome alum may be added.

After the negative is dry, transparent spots and other defects should be touched out with indian ink or black varnish. In touching out on the film side, care must be taken to keep the varnish on thin and free from any grit or lumps, which would prevent the close contact of paper and negative in printing, and spoil the sharpness of the result. This is especially important with reversed negatives for printing direct on stone or zinc. A good deal may be done to clear up broken and fine lines, by cutting them in on the varnished negative with a sharp steel point or cutting edge.

The negative is now ready for printing. Difficulties of climate being against the employment of gelatine dry plates in India, I have not sufficient experience of their use for copying purposes to lay down any rules for guidance. There is no doubt that they will come largely into use for this class of work. They have the advantage over the wet collodion process of greater sensitiveness, and, with suitable emulsion, the required intensity can be secured by the imple application of the ferrous oxalate developer restrained with bromide to preserve the clearness of the lines.

(To be continued.)

* Continued from page 652.

MR. J. COMYNS CARR ON PHOTO-ENGRAVING.*

Having traced the progress of wood engraving in its latest and most extreme development, it becomes our task to consider those various mechanical processes that now place themselves in competition with the engraver's art. That these processes should already occupy an important place as a means of book illustration is scarcely remarkable, seeing that they can be employed at a cost very much lower than is required even for the commonest and coarsest wood-blocks. That they do not yet display an equal refinement and perfection in the rendering of an artist's work must indeed be allowed, and there is still a certain superiority possessed by the wood block which has not been attained by any of the mechanical processes; but that this superiority will be preserved, it would, I think, be rash to assert. Within the last few years nearly all these different processes have been developed with remarkable rapidity and success, and I believe it probable that, before long, results will be obtained such as even the most delicate wood-block cannot rival. All these processes, as you are doubtless aware, have been the outcome of the invention of photography. For some time there was a disposition to use direct photography for book illustration, never, I think, with very fortunate effect. The appearance of a photograph has absolutely nothing in common with that of printed text, and it is impossible to combine the two so as to produce a satisfactory or harmonious result. Direct photography, then, as a means of book illustration, scarcely deserves consideration; but although a volume adorned with photographs can never be a very lovely object, the attempt to make use of photography for this purpose has led to valuable discoveries, which have been fruitful in other directions. Perhaps the most important of all the discoveries was that by which the photographer was enabled to obtain from the negative a print which should be permanent and indestructible.

The carbon print never exhibits all the refinement and delicacy which belong to the silver print; but the fact that it is indestructible, and that it may be produced in any tint or

* Being an extract from his recent Cantor Lectures.

colour that is desired, gives it a special value of its own. You are no doubt familiar with the marvellous reproductions of drawings by the old masters which have been made by Mr. Braun, of Dornach, and which are printed by the carbon processes. When you have no original at hand, it is difficult sometimes to believe that the photograph itself is not the drawing, and it would certainly be impossible to find any means more suitable for the reproduction of this particular class of work. This carbon process is constantly employed in the illustration of books under less advantageous conditions. A way has been discovered of multiplying the carbon prints mechanically, and, in certain instances, the results obtained are sufficiently good; but, as a rule, this process gives but a poor and lifeless copy of any work of real art. If the original drawing be in line, the lines as they re-appear in the print lose much of their force and vigour, and in all cases the surface of the print has a dull and lifeless appearance, and much of the refinement of tone which may be secured in the original negative is altogether lost.

I shall not, however, attempt to compare or to discuss the different modes of producing these photographic prints. I have referred to the carbon process because it really forms the basis of one of the most interesting and admirable of the many modes of photographic engraving. Hitherto, in speaking of book illustration, I have limited myself to the art of the wood engraver, but as these mechanical processes are equally applicable either to printing in relief or intaglio, I shall bring to your notice specimens in both kinds, and briefly explain the means by which they are produced. Perhaps the very finest examples of mechanical engraving are those which bear the name of Mons. Amand-Durand, of Paris. The reproductions which he has published of the works of Dürer and Mantegna, and of other of the earlier masters of engraving, are of unapproachable beauty and excellence. I have heard Mr. Reid, the accomplished and learned keeper of prints and drawings at the British Museum, declare that it is almost impossible, in some instances, to distinguish between the copy and the original, and certainly to those who cannot possess the originals these plates of Mons. Amand-Durand offer a delightful substitute. Of the manner in which they are produced I cannot speak with any authority. That it is based upon photography is of course certain, and it is mainly, though not wholly, mechanical in its operation. Mons. Amand-Durand is a skilful engraver on metal, as well as the inventor of this wonderful process, and there is no doubt that he supplies, with his own hand, any deficiency that may exist in the plate as first produced. But although these plates are certainly the most perfect of their kind, they deal for the most part with only a special class of work. As a general rule, Mons. Amand-Durand limits himself to the imitation of engravings in line, and he has not, save in a few instances, tried to reproduce the effect of a chalk drawing or of a drawing in wash. In this sense, therefore, the process employed by M. Goupil has a wider scope, and this has its English counterpart in the invention of a similar kind made by Henry Dawson. One of the very first set of plates produced by Mr. Dawson, after his invention had been perfected, consisted of a series of copies from drawings by the old masters, which are published in the catalogue of the Grosvenor Gallery. I have brought them with me to-night, and although I do not doubt that Mr. Dawson can now do much better than this, I think you will admit that they are, in certain respects, astonishing examples of imitative skill. Mr. Dawson makes no great secret of the principle on which his process is founded, and I may therefore briefly explain to you the ingenious mode in which this admirable result is obtained. You will observe, in the first place, that these are impressions from metal plates, printed in the same manner, and by the same press, as a copper or steel engraving, but instead of the picture being engraved upon the plate, as one might expect, the plates are themselves, so to speak, produced upon the picture. It is the picture in Mr. Dawson's process which really creates the plate; and the way in which this is accomplished is so remarkable, that perhaps you will allow me to give a few words of explanation. The first thing that Mr. Dawson does, after having photographed his subject, is to take from his negative a carbon print; this print is taken, not on paper, but on glass; and as the principle of a carbon print consists in the deposit of solid pigment, the picture so taken upon the glass represents a very delicate work in relief; that is to say, the surface of the picture is very slightly raised upon the smooth surface of the glass. This impression is then covered with a thin coating of gold, which acts as a powerful conductor of copper, and the glass is now placed in a galvanic bath, where the copper is gradually deposited over the whole of the plate. When the deposited copper has attained a sufficient thickness, it is taken from the bath, and the glass is removed. We then have a copper plate with the picture cut upon its surface, exactly corresponding to the carbon print; that is to say, those portions which in the print were in relief, are now in intaglio, and every delicate gradation is exactly reproduced as in the original negative. The copper-plate now resembles, in every respect, the work produced by the engraver. According to the character of the original, it partakes of the nature either of an engraving in line, or of a mezzotint engraving, and it is this quality of mezzotint surface which Mr. Dawson rightly regards as constituting the special claim of his invention. The difficulty here with which he had to contend was to give such a surface as would hold the ink, and this he has now accomplished in a very remarkable degree. A certain amount of hand-work must occasionally be added, in order to correct the defects of the photograph, which sometimes gives undue force to the delicate portions of the original drawing; but, broadly speaking, the process is purely and wholly mechanical, and the copper-plate, as we have seen, is absolutely grown upon the raised print.

There is scarcely any kind of original work to which this process may not be applied with success. In the reproduction of a drawing in pen and ink, the result resembles a strongly bitten etching. It is equally successful in imitating the effect of a drawing washed with a brush, or of a drawing in chalk; but as deposited copper is always more or less soft in substance, the plate, before it is used by the printer, is covered with a thin film of steel, and we have then a surface which is practically indestructible, and from which any number of impressions can be taken, for so soon as this thin film of steel shows signs of wear, the printer stops his labour, and the steeling is renewed. This process of steeling a plate is now very generally applied to engraved work on copper, and its effect is practically to abolish the distinction which once existed between proofs and prints. The value of a proof in former times consisted in the fact that it gave an impression of the plate in its full strength, before it had become worn by successive printings; but now there is in reality no limit to the number of impressions which can be taken from the steel plate, nor is there, as is sometimes supposed, any loss of the most delicate workmanship by the process of steeling. Indeed, Mr. Rajon, the well-known etcher, told me once that, for his own part, he almost preferred an impression taken after the plate had been steeled. Mr. Dawson's invention, which I have been describing, cannot, of course, rank among the more economical modes of book illustration. Copper-plate printing must always be costly, and by its nature it is unfitted for incorporation in printed text, but for the more expensive and luxurious sorts of book illustration it offers remarkable advantages, and it is especially valuable as a mode of reproducing, with absolute fidelity, the earlier forms of art. A process similar in kind, and evidently based upon the same principles, has been perfected in Paris by Mons. Dujardin; and in the *Gazette des Beaux Arts*, for the present month, may be seen some very remarkable specimens of the work he produces. In certain cases, the process enables us to do away altogether with the intermediate services of the draughtsman. Furniture, armour, or objects of vertu, may be reproduced directly, and with absolute fidelity and refinement; indeed, the result is, in some respects, more subtle than can be shown even by the most minute and careful engraving. No handiwork could preserve, with equal success, the appearance and surface of an embossed shield, or of a carved cabinet.

But the processes hitherto described, although they serve to illustrate the successful advance of mechanical invention, have only an indirect bearing upon our subject. They suggest comparison, not with the wood-block, but with the various modes of engraving on copper and steel; and although the initial outlay needed to produce one of these plates is infinitely below what would be demanded by a skilled artist, who had to etch or grave the design upon the plate, the means of multiplying impressions still effectually hinders the general application of such processes to the purposes of book illustration. All pictures taken from a copper-plate press must rank as what the French style *planches à part*. They can be inserted in the pages of a printed volume, and may powerfully add to the attractiveness, but they cannot be printed with the same facility or by the same means as are employed for producing impressions from movable type. If, therefore, the genius of modern scientific discovery had gone no further, its influence upon the practice of book illustrations would not have been considerable. These processes, indeed, are highly valuable in the enlarged opportunities they offer for the reproduction of works of art. M. Goupil's invention, as you are aware has in a measure superseded engraving as a mode of multiplying copies of a picture in oil or water colour. The photograph is taken direct from the original painting, and transferred to the copper without the intermediate aid of any skilled handicraft; and however much opinions may differ as to the beauty of the results so obtained, it is impossible to deny that they carry an astonishing effect of illusion and resemblance. For it is to be observed that the impressions from Messrs. Goupil's plates do not merely compete with the older processes of engraving, but, in some respects, may be said to supersede them. Engraving on copper or steel, even in the hands of the most skilful exponents, does not aim at any minute imitation of the painter's handling. It has always been regarded rather as a translation than a reproduction, and its exercise has been determined by special laws and traditions, which may be said to constitute a recognized convention of style. In the first place, it is to be noted that, save in the case of mezzotint, all engraving is executed by means of line, and this fact serves, in itself, to distinguish the reproduction from the original, and to make the spectator sensible that the artist's invention has been translated into another language. And even in the finest examples of mezzotint, which so successfully preserved for us the masterpieces of Reynolds and Gainsborough, there is no attempt to suggest the actual appearances of the picture. The necessities of translation are still frankly and clearly acknowledged, and although the subtle modulation of tone comes nearer to the effect of painting than anything that can be produced in line, the result nevertheless ranks as the product of a separate art, which leaves room for the assertion of the engraver's individual style. But with these mechanical processes, based upon photography, this is no longer the case. It is the picture itself that is transferred to the plate, shorn only of the grace and attraction of colour. Something is necessarily lost by the way, for colour still offers certain hindrances to the photographer which modern science has not yet entirely removed. But, on the other hand, the mechanical process is able to afford a degree of realism in regard to the details of execution such as no engraver would have thought of attempting. In the most successful of these plates the actual impasto of the paint is successfully reproduced. The varying relief upon the canvas, which results from a vigorous handling, tells as a relief upon the carbon print, and is transferred again to the metal from which the printed impression is finally taken. Every touch of the brush is faithfully preserved, even where it is not exaggerated, and where colour is added, the effect of illusion is sometimes positively startling. This use of colour is, of course, only applicable to reproduction of water-colour drawings, and is, in fact, only a revival of a mode of copper-plate printing that was practised in England a century ago. It is impossible to get from a metal plate either the solidity or the gradation of a finished painting in oil, but, on the other hand, transparent tones of colour may be so distributed over the surface of the metal as to give the effect of a washed drawing in water-colour. You have, no doubt, seen in the printseller's shops some marvellous imitations, by Messrs. Goupil, of water-colour drawings by artists of the Continental schools. The more elaborate methods employed by our own water-colour artists would not so readily lend themselves to the process; but where the technical means are simple, and where the tints are laid on in a broad style, the resemblance is striking and remarkable. As we are treating of colour printing, I may be allowed to point out that the means here employed are essentially different from those which are used for wood blocks. The preparation of a copper-plate, from which a coloured impression is required, is in itself an artistic process. The printer paints upon the metal as though he were painting upon paper. Each separate space must be supplied with its appropriate tint, which again must be cleaned in such a way as to yield varying strength of tone; and when this has been done, the impression is taken at once, and by a single printing.

(To be continued.)

QUALITY OF PHOTOGRAPHIC LIGHT NECESSARY TO BEST RESULTS.

BY J. F. COONLEY.*

As to the quality of light best adapted to produce perfect photographic results there are various opinions. For a long time efforts have been made in the direction of accelerators to shorten the time of exposure, with the view of taking pictures in any, or almost any, kind of light, on cloudy or rainy days, early in the morning and late in the afternoon; and at this late day it is no unusual thing to see displayed in conspicuous places in front of various photographic establishments a legend like the following:—"Equally as good pictures taken in cloudy as in clear weather." And many people, both in and out of the photographic profession, are to-day labouring under the impression, and honestly believe, as good pictures can be taken on cloudy, rainy, overcast days, when the atmosphere is devoid of actinic rays to a very great extent, as when the opposite conditions prevail, providing they can be successful in keeping the sitter quiet long enough to overcome the difference in the strength of the light.

This is thought by them to be the only requisite—that if the subject is properly timed, or sufficient to bring out the shadows under development, it is all that is necessary or possible to do in that direction; and, working with this idea, the fraternity have been imposed on and swindled periodically by a few sharpers with some secret or patent process for making pictures in any kind of light, or no light at all, in an infinitesimal period of time, or "quick as a wink," thereby sacrificing everything that is artistic or beautiful in nature to the ridiculous notion or idea that any kind of light is good enough to make pictures, providing you use Professor Humbug's Extra Rapid Double Distilled Lightning Catcher to produce them. With this idea of rapidity of exposure constantly in their minds, they have entirely ignored the quality of their work, or left that to take care of itself.

I have always thought, and still think, that great rapidity or rapid action below a certain point is not possible in conjunction with fine results, and in portraiture is not desirable. We all know that light is of various qualities, from the very brilliant to extreme weakness, and that neither extreme is best for producing pictures; but a happy medium between the two will always give the best productions, other conditions being equal

The quality of light is greatly changed by the size, height and position of the sky and side lights, by the kind of glass used in the lights, and again, by the age or time it has been in use, and the condition in which it is kept as to cleanliness, &c.

All those things must be taken into consideration in estimating the quality of a light. Plate glass is, without doubt, much the best for a light. We got a purer and better light through plate glass than we possibly can through the ordinary glass in use for most sky and side lights. But if it were possible to make pictures at all times of the year without glass of any kind between the sitter and the sky, I am positive that much more rapidity could be attained. From some results I have produced in making portraits without the aid of a glass light, I believe that one-half the strength of light is absorbed or wasted by passing through the glass sky-light. Of course, I mean the ordinary light used in most galleries for portrait work. I believe it possible to build a light very low down, with a fine quality of plate glass, that can be worked very rapidly, but with the loss of certain effects necessary to maintain that balance of light and shadow, and harmony between them, so essential to have in a picture, and without which they are open to criticism.

The theory of the quality of light is a subject worthy of our best thoughts; and the more thoroughly we investigate this subject, the better we will be prepared to take advantage of all the ideas that practice or accident may develop, and create that harmony and beauty in our work so much sought after by every true lover of the photographic art.

The foregoing remarks and conclusions apply to portrait work exclusively; but the same principle, in a modified form, must govern the production of the landscape artist. A bright clear atmosphere, free from fog, mist, and smoke, with the sun in the right direction to light the subject to the greatest advantage and impart the best effects, are the conditions most favourable. With these conditions, a fine subject and all the brilliant effects that a bright sunlight alone can impart, we secure the lights and shades, the half-tints, the brilliant, glistening lights on the foliage, the beautiful reflections mirrored in the water, the gradual fading away in atmosphere and perspective of the distance and middle distance—in fact, we have before us the motive for a most effective and brilliant picture; but wait until the sun is obscured—the light has changed, and the day is cloudy and devoid of those principles of light and effects described in the preceding description. Then what do we see? We have the same subject before us, but how changed! The wand of the magician has passed over it, and its beauty has departed, to be restored only when the proper

* *Photographic Times.*

light is brought to bear upon it again. Reverse these opposite conditions. Take the two pictures, and, when finished, put them side by side, and observe what the quality of the light does for us. It will require no other argument to convince the most sceptical that it is not only light, but the quality of that light, which determines whether we have a picture or a map of the subject before us. There is no method in photography that will reproduce what the light does not first produce for us. If this is deficient or of an indifferent quality, the resulting pictures will show it, no matter how or by whom produced, or by what process; and the sooner this principle is recognized and acted upon, the sooner we will have more pictures that are entitled to be called art productions.

This principle *is* recognized by a few, and their pictures show that they are aware of what is essential as to quality in light to produce the work they are doing. It requires close study and correct observation to master this problem; but once have it firmly placed, and we will avoid untold annoyance if we are ambitious to produce fine pictures by the photographic process in combination with what artistic knowledge we, or some one else working with us, may possess.

Notes.

The Exhibition in Pall Mall remains open but a fortnight longer; its closing is definitely fixed for Thursday, the 16th inst.

The Year-Book of Photography—now in its twenty-fourth year—will be published on the 20th prox.

Those of our friends who would honour us with a communication—and we trust that any having practical experiences or new ideas likely to be of value to their fellow-workers will send them—will increase the favour many fold if they forward their contribution early this month, and set forth as *briefly* as possible. The space available grows year by year more limited, notwithstanding the circumstance that the number of pages in the Year-Book have been much increased.

For the last time, the Arctic yacht, *Kara*, finds a place in our "Notes." A fortnight since we announced its safe arrival home from its perilous voyage in the Polar seas; but, making its way from Hartlepool to Wivenhoe, the little craft foundered, and was completely lost. All hands, however, were saved, so that there is happily no cause to regret the loss of any of the brave crew who went to the rescue of the missing *Eira*.

"A photograph of yourself, endorsed on the back by the minister of some registered place of worship, will be the most satisfactory proof of identity you can bring." So said the Patent Office authorities, when a patentee, who had omitted to retain a copy of his provisional specification, applied for leave to refer to that document.

Photography plays an important part in the every-day routine of the Patent Office, as all drawings which accompany specifications are reproduced by photo-lithography, and the original sketches must consist of clean black lines on white paper (no colouring being allowed), so that reproduction may be easy. The Patent Department has had under consideration a scheme for reproducing the original manuscript of each specification in a similar way, as notable mistakes often occur in the printed specifications as at present issued. A manuscript reduced to one-sixth of the original linear measurement, or one thirty-sixth of the area, is generally quite legible.

The Penny Science Lectures at the Royal Victoria Music Hall are reported a success; but the lectures, it appears, must have sustained interest, otherwise the thirst for knowledge of a Waterloo Road audience gets quickly quenched. In the words of one of the committee: "Any breakdown of the apparatus, however temporary, places the success of the lecture in serious danger; there are stamps and whistles of impatience at any pause," when an experiment fails, or a pre-arranged explosion does not go off. For this reason lantern lectures, our committee-man thinks, are best adapted to the frequenters of the well-beloved "Vic." We would suggest the exhibition of photographic transparencies, which, from the size of the hall, might be projected most successfully by a powerful lantern; they would afford an advantageous means of instructing and interesting an audience of this kind.

The stereoscope is again under discussion. It is a long time since the memorable controversy between Sir Charles Wheatstone and Sir David Brewster anent its invention took place, a combat that resulted in a draw. Mr. W. le C. Stevens, who publishes his remarks on the subject in the Journal of the Franklin Institute, has now been engaged in investigating the theory of the stereoscope and binocular vision in general, and has set out the results of his research in a very interesting form.

The *Comptes Rendus*, the official organ of the French Academy, contained last month two photographic illustrations by Marey, reproduced by means of the similigravure process of M. Charles Petit. The pictures illustrate the recent research into animal mechanics undertaken by M. Marey with the aid of the camera.

The photographer, like the engineer, should always have a rule in his pocket; and if he carries the Chesterman coiled steel tape measure, he will be able to measure curves as easily as straight lines. He may also, like our friend Mr. W. K. Burton, use it as a seconds pendulum; it being merely necessary to draw the tape out to one metre, or a trifle over 39 inches, and hold the ring while the case is allowed to swing.

"The best pictures I ever produced were taken with a home-made camera, unsteady at every joint, and requiring three focussing cloths to keep light out." So writes one of the Pall Mall medallists in reference to our recent statement that care and judgment are more important than the possession of a first-class camera.

The *Practical Photographer*, published at St. Louis, has ceased to appear with the death of its editor, the late Mr.

Fitzgibbon. The number of photographic journals published in the United States is thus reduced to three—viz., *Anthony's Bulletin* and the *Photographic Times*, published in New York, and the well-known *Philadelphia Photographer*

The Edinburgh Photographic Society is trying an interesting experiment. The Society has decided on spending its money upon a presentation print to its members, and, as our readers are aware, photographers from all parts have been invited to send contributions to an exhibition in the Scotch capital which is now open. Certain awards will be made to the photographers whose pictures are chosen; but the choice will not rest with a judge or a jury. All members of the Society are to vote; they are asked to examine the pictures carefully and critically, and set down their verdict on a voting paper. The ultimate choice will then be determined by these papers. The experiment is a bold and novel one, and we shall be interested to hear how it succeeds.

Rumour tells us—with what truth we know not—that one of the prints selected by the Edinburgh Society is "Brambling," by Mr. Slingsby, of Lincoln, a picture now hanging on the walls at Pall Mall.

Mr. Muybridge has printed his clever "animals in motion" on paper strips for the Zoetrope, so that it is now within the power of any one interested in the subject to test the truthfulness of the quaint attitudes by looking at them as a whole. A Zoetrope is a most simple instrument to construct—indeed, Mr. Muybridge gives explicit directions on the strips in question—and if his pictures in motion appear therein as interesting and amusing as in the lantern, there is little doubt about them becoming popular.

"How to Photograph Groups on the Stoop," is the title of a recent paper by Mr. J. T. Taylor. He does not instruct the photographer, however, how he may "stoop to conquer," nor does he advocate the photographing of models grouped in a bowed posture; the "stoop" Mr. Taylor refers to is the front door-step of New York houses, where it is the fashion to congregate on summer evenings, something after the manner of a "five o'clock tea" in the old country. Mr. Taylor aptly suggests the making of "stoop" pictures.

Alphonse Karr, in his charming book entitled *Promenades hors de mon Jardin*, makes the suggestion that coins of the country should bear upon their face other likenesses than that of the Sovereign. It is very well, no doubt, that the date of reign of king or queen should be perpetuated by this means, but it would be possible, argues Alphonse Karr, to employ our money to perpetuate the memory of other great people as well. For example, he says, if during the present century coins had been produced with images upon them of Daguerre, Balzac, and Victor Hugo, there would be evidence in time to come of the date when these great men lived.

The suggestion is well worth repeating, and if at any subsequent period the advice of Alphonse Karr is taken, it is within the bounds of possibility that the image on the coins in question will be a photographic likeness. By making use of the Woodbury or gelatino-relief process, a portrait in bas-relief is obtainable without much difficulty, especially if the portrait happens to be a profile. Coins of this stamp, bearing photographic portraits in relief, would indeed be valuable.

Ruskin was referred to, not long ago, to decide upon the talent of a photographer. Our friend had heard it stated that the great art critic expressed himself in high terms of approbation over certain photographs emanating from the former's studio, declaring, indeed, that our friend was the best photographer in the world. Accordingly, Mr. Ruskin was written to, to ask if he really had said so, and whether he would object to repeating the opinion upon paper; whereon came a reply to the effect that Mr. Ruskin had no recollection of having said such a thing, but if he did, he would have no objection to repeating his opinion as soon as he had seen the work of the remaining photographers in the universe.

There is a reaction setting in in favour of slow plates and slow development. It is so rare that a very rapid exposure is necessary in every-day photography, that there is no call for "lightning" plates, in nine cases out of ten; the latter are, indeed, a positive disadvantage, several capable landscape photographers avow, and without arguing the question, point to their results, which are more successful with slow plates than with quick ones. There is no doubt about the advantages of slow development in landscape work—Russell Manners Gordon, Berkeley, Conway, Ireland, and other skilful landscapists, all uphold this teaching.

A Continental contemporary suggests the employment of whiting and water for rubbing over machinery that is to be photographed. Some treatment is necessary, of course, to obviate the glare of polished bearings, and to deaden the bright reflections, which become "solarised" long before the shadowed portions of a machine have been properly exposed. In Leeds and Manchester the photographing of machinery is now performed with excellent effect, and manufacturing engineers have their new machines depicted with the camera, in preference to sending round wood-cuts or engravings.

Under any circumstances, it is a difficult business to photograph a machine smoothly and effectively, and little success is likely to ensue unless the whole is first covered with a grey paint or wash. One of the best in use by photographers is the following :—

Dry white lead	5 pounds
Lamp black	2 to 5 ounces
Gold size	1 pint
Turpentine	$1\frac{1}{2}$,,

The amount of lamp black is varied according as a light grey or dark grey is best suited to the machine, or the lighting. The paint is quite harmless, and is easily removed with turpentine rubbed on with a handful of cotton waste.

Patent Intelligence.

Application for Letters Patent.

5086. Richard Brown and Robert William Barnes and Joseph Bell, all of the city of Liverpool, in the county of Lancaster, Photographers, for an invention of "Improvements in and relating to the production of printing surfaces from gelatine reliefs."—Dated 25th October, 1882.

Grants of Provisional Protection.

4747. Francis Joseph Emery, of Burslem, Staffordshire, Earthenware Manufacturer, for an invention of "Improvements in photographic engraving."—Dated 5th October, 1882.

Patents Granted in France.

148,215. Roosevelt, for "A direct process of obtaining photographs on zinc, copper, &c."—Dated 1st April, 1882. Class 17.

148,298. Lapre, of Paris, for "A pocket photographic match-case."—Dated 6th April, 1882. Class 17.

148,309. Hutinet, for an "Insulator for separating negatives obtained by the gelatinous bromo-silver process."—Dated 7th April, 1882. Class 17.

148,364. Magne, for "An autographic process and producing impressions with fat ink, whereby the original is converted into a matrix."—Dated 11th April, 1882. Class 17.

Patent Grantod in Belgium.

59,109. L. H. Phillippi, of Hamburg, for "Reproduction of drawings, wood-cuts, &c., on metal by photography."—Dated 25th September, 1882. Original Patent, 10th January, 1882.

Patents Granted in Germany.

23,160. H. Mikowetz and Co., of Vienna, for "A process for copying printed matter."—Dated 12th February, 1882. Class 15.

20,182. G. S. Street, of Moncton (Canada), for "A copying frame for photographs, prints, calking, and other processes."—Dated 21st May, 1882. Class 57.

20,183. O. Siepmann and O. Pustet, of Iserlohn, for "A photographic process for obtaining pictures of metal objects with their metallic lustre."—Dated 11th June, 1882. Class 57.

Patent Granted in America.

265,669. Hannibal Goodwin, of Newark, N.J., for "Phototypography."—Application filed 30th November, 1881. No specimens.

PHOTOGRAPHY IN AND OUT OF THE STUDIO.

A New Sensitizing Agent—Photography and the Suppression of Vice—Photographs in Natural Colours—Exhibition of the Manchester Society.

A New Sensitizing Agent.—The list of edible substances used in photography has recently been augmented. Beer, coffee, tea, hops, sugar, have all in their turn been pressed into service, while gelatine threatens to attain to a huge monopoly. The latest addition is somewhat of a novelty: it is nothing less than white pepper, of which use is made as a sensitizer. The advocate of the new pepper developer is Mr. R. T. Wall, of Longfleet, Poole, who has taken out a patent for his invention. According to the specification, we learn that the way to make the sensitizer is to take one pound weight of freshly-ground white pepper, and macerate it in one to two pints of ether or alcohol for some days, then press the tincture through one or more filtering media. In using, a little mastic varnish or oil of turpentine is added to the resultant solution if ether is employed, while spirit varnish is used when alcohol is the vehicle; and the resultant solution is spread over the surface to be sensitized and exposed in the usual way. This pepper sensitizer is also recommended for powdered pigments, which, cold or warm, may be brushed or dusted over the surface for the purpose of developing the image. Mr. Wall also makes an elastic medium for printing on uneven surfaces for gelatine, sugar, glycerine, chrome-alum, spirit, thymol, or boracic acid, or any preservative agent. A glass plate is prepared by gluing a strip of paper round the edge of the plate so as to form it into a dish; the mixture is poured into this dish, and left to set; a negative tissue is put over it, and it is placed on a dried pepper-sensitized surface, the developing being effected with the following solution:—

Water	4 ounces
Sugar	1 ounce
Gelatine	1 ,,
Glycerine	6 ounces
Thymol	some drops
Alcohol	½ ounce
Saturated chrome alum	some drops

We must confess that this pepper sensitizer stimulates our curiosity. It is, of course, impossible to say what substances are and are not sensitive to light; but no one would have suspected that so powerful an agent existed in the domestic cruet.

Photography and the Suppression of Vice.—It is not pleasant to find the following in the annual report just issued of the Society for the Suppression of Vice:—"There is, however, one phase of the traffic still existing, over which your Committee, unhappily, have ceased to have any control—namely, the exhibition in shop windows of nude photographic figures, and what purport to be reproductions of persons in theatrical costumes. Cases have been brought before the magistrates, but they have refused to interfere. The result has been construed into a license, so that it is now difficult to discriminate to what the alleged license extends. To risk a seizure and a prosecution is dangerous; a failure is fatal, as success on the part of the dealer would be quoted as a precedent, and advantage taken to exaggerate that license by still more indecent exhibitions." While there are many photographs exhibited in certain shops (happily few) which are coarse and vulgar, it is to be feared that the Society for the Suppression of Vice, in its extreme anxiety to protect public morals, cannot always be considered the best judge of what is really indecent. The report says: "Cases have been brought before the magistrates, but they have refused to interfere." Why? The report does not tell us, and we are therefore led to only one conclusion—that the magistrates did not agree with the Society in its estimate of the photographs seized. The whole matter can be reduced into a very small compass. Either the photographs were indecent and obscene, or they were not. If the magistrates considered they could be so characterised, then most certainly Lord Campbell's Act would apply; and why the Society should raise a false issue by remarking that the magistrates "refused to interfere," we fail to understand. Unfortunately, prudish people are the quickest to discover indecency where it does not exist; and they cannot recognise the fact that a nude figure artistic in conception may be absolutely pure, and a draped figure in its suggestiveness absolutely indecent. There are, it is sad to confess, some photographs so hideous that one shudders at the depth of depravity which can initiate such foulness; but these are quite outside the argument, and the more of such monstrosities the Society can destroy the better. But in respect to simply nude figures, we would prefer that they should be judged by an artist rather than by the well-meaning Society for the Suppression of Vice.

Photographs in Natural Colours.—The problem is solved—or, at least, nearly so. Mr. E. Berliner, of Boston, U.S., is the happy individual who has volunteered to put everybody on the right track. Mr. Berliner has found out that, after exposing a sensitive gelatine plate to several glass plates of different colours, each colour-strip, after washing, is distinguished by a certain thickness of remaining gelatine, We have no doubt that Mr. Woodbury has occasionally noticed this phenomenon, and possibly two, if not three, other photographers; but it has been left for Mr. Berliner to turn this important fact to account in the search for photographs in natural colours. Mr. Berliner says:— "Under the above facts the problem would be to compound or produce a substance which combines the power of a strongly-refracting crystal with the sensitiveness of a chrome gelatine plate. By exposing such a plate to coloured light, and afterwards washing it, the remainder, when viewed through a Nicol's prism or other polariser, should show certain colours which stand in certain relations to the original colours which acted on the plate." There it is—the whole secret in a nutshell! Here is a chance for anybody who wants to make a sensation during the ensuing season! Mr. Warnerke is generally ready to investigate any idea and improve upon it: will he kindly tackle the combination of a strongly-refracting crystallised sensitive chrome gelatine plate?

Exhibition of the Manchester Society.—It is gratifying to see the success which has attended the Exhibition of the Manchester Photographic Society. Though without the prestige of the annual Exhibition in Pall Mall, its receipts were two-thirds of the receipts of the latter last year. In proportion to the relative population of London and Manchester, this result must be considered exceedingly good, and indeed would go to show that more interest in photography is taken by the general public in the country than in London. It was certainly a bold step to incur expenses to the amount of £200 on the exhibition alone; but it cannot be said that the Society were deceived in the support which they received from the outside public. It is true there is a balance on the wrong side; but this, we presume, will be covered by the subscriptions. For many years the Exhibition of the Photographic Society of Great Britain was a terrible drag on the general funds; but lately its prospects have improved. Manchester, therefore, may well take courage, and hope that its next exhibition will more than pay its expenses

FRENCH CORRESPONDENCE.

LIEBERT VERSUS PIERRE PETIT—POCKET CAMERA—PROGRESS MADE IN ELECTRICITY.

Liebert versus *Petit.*—The action entered against Pierre Petit by M. Liebert has just been heard at the district court. It was a case of infringement of patent, which had been under discussion in the PHOTOGRAPHIC NEWS about two years ago. Pierre Petit had set up an electric light apparatus copied from Mr. Vander Weyde's, which is based on an effect of double reflection. The court decided that Liebert's demand was well founded, and fined Pierre Petit three thousand francs damages, forbidding him the use of this apparatus patented by Mr. Vander Weyde, and of which M. Liebert is proprietor for France. It was not, as was well put in the verdict, a question of monopolising the use of electric light, but employing, during the existence of the patent, an instrument constructed on the principle invented by Mr. Vander Weyde. We do not know whether an appeal will be made from this sentence.

New Pocket Camera.—We have had the opportunity of seeing at M. Marion's, in Paris, a small apparatus ingeniously constructed, known by the name of the Academy camera. Although it has several slight imperfections, the maker might easily remedy them to render it most conveniently portable. The plates are only four centimetres square, rather small to be of the highest value. Why are apparatus of this kind not always fitted with automatic action? It seems to us that it would answer the purpose better, and it has been adopted by M. Enjalbert in the construction of his photo-revolver, still unfinished.

Progress made in Electricity.—News has reached us from Munich that M. Marcel Déprez has made new progress in the transmission of motive power through iron wire. It is said that he has transmitted a force of forty-horse power through telegraph wires. If such is the case, we shall not be long before our streets will be traversed underground by an electric channel bringing us motive power and light. We hope that the photographic art will gain much by this great progress. LEON VIDAL.

SIMPLE METHOD OF MIXING SOLUTIONS FOR ALKALINE PYROGALLIC DEVELOPMENT.

BY J. KAY.

I TAKE a bottle of pyrogallic containing one ounce of the acid, and add 14 drams of methylated spirit, which gives a concentrated solution, and may be labelled "Stock Solution," and one, I find, that keeps much better than a solution I used for many months, which was made the proper strength in the first instance. For ordinary use I take 2 drams of stock solution and dilute with 6 drams of methylated spirit, and keep in a wide-mouth 3-ounce stoppered bottle. I find 1 ounce of this quite sufficient to have mixed at a time. I now have a solution which contains:—

Pyrogallic acid	1 ounce
Methylated spirit	7 ounces

or rather it would read thus if the whole bulk were so mixed.

If about to develop a half-plate, I take $\frac{1}{4}$ dram of this dilute solution and put into an ounce measure; or, rather, I have a $\frac{1}{4}$ dram marked on my ounce measure, and pour the pyrogallic direct in, as pouring a $\frac{1}{4}$ dram from one measure to another would not be a very profitable proceeding; I then add common water to make up 6 drams. The reason I use so small a quantity as $\frac{1}{4}$ dram of pyrogallic solution is, that it is advisable, in saving time and water, to employ as small a quantity of spirit as possible. The strength of this pyrogallic solution when diluted with water as above mentioned is $2\frac{2}{3}$ grains to the ounce, which I find to be very suitable for studio work. For the ammonia solution I take:—

Common water	80 ounces
Liquid ammonia ·880 s. g. ...	1 ounce
Bromide ammonium	6 drams

6 drams of this solution added to 6 drams of the pyrogallic solution is ample for developing a half-plate. I would strongly insist upon using a good proportion of bromide in the developer. It is a good preventive of green fog, beside giving clearness to the shadows of the picture, and brilliancy to the negative. In cases where plates have a decided tendency to fog, I use double the amount already stated. I am aware that rapidity is to some extent sacrificed by a free use of bromide, but with me rapidity is only a means to an end. The great end in view is a good negative; everything else must be subordinate to that.

Just a word, in conclusion, relative to the complaints which have lately appeared in the NEWS. Some of the writers have appeared annoyed by the misleading doctrines which are printed on the lables sent out with dry plates, by which photographers are led to expect dry plates ten, twenty, and even thirty times quicker than wet collodion. For my part I think their complaints are just. All that I can say about the doctrines themselves is, that they are misleading. The plates may be as described, but I take it the collodion must be about the colour of the ruby glass we are so familiar with now. To say that a dry plate is twenty times quicker than a good wet collodion plate is—well, I do not suppose anybody has found one yet in the market fifteen times quicker; as I told a dealer the other day, who was speaking about the twenties and the thirties of a well-known firm as innocently as you please, I had been seeking for the last eighteen months or more to find a plate that I could dub a tenner. I believe the most rapid plate in the market might be safely labelled six times quicker than a good wet collodion plate, and that, too, when developed with the smallest proportion of bromide possible; at any rate, if any of the numerous readers of the News have found anything more rapid, the Editor, as a personal friend, I am sure would oblige me with any particulars forwarded to him likely to put me on the right track to become possessed of such a boon. I am now using a batch of plates marked twenty times quicker than wet collodion, and I find that the maker would have been much nearer the mark had he omitted the cypher.

LABORATORY NOTES FOR THE PHOTOGRAPHER.

M. Campo publishes, in the *Bulletin* of the Belgian Association, a condensation of simple and practical methods furnished by chemistry for the examination of bodies, a work that may be of use to some of our readers.

All unknown substances whose nature is to be ascertained should be dissolved in water, or else brought to that soluble condition, generally by the help of some acid. A small portion of the solution, which is divided into three or four parts, is taken, diluted with water, and treated with a few drops of one or other reagent. These last ought also to be in the form of aqueous solutions. The acid or alkaline character of the solution, the odour, flavour, and density of the body to be examined, are important indications, the observation of which must not be neglected. The substances in use in photography are rarely of complex composition, and therefore the mode of operation is much simplified.

Sulphuric acid (and the sulphates in general) give, in solutions of chloride of calcium, a white precipitate soluble in hydrochloric acid; with acetate of lead, a white precipitate soluble in caustic potash; with all the barium salts, and notably the chloride, a white precipitate (work with a solution slightly acidulated with one drop of hydrochloric acid).

Hydrochloric acid (and the chlorides) give, with nitrate of silver, a white precipitate of chloride of silver insoluble in nitric acid.

Nitric acid stains the skin, wool, and silk, yellow. It colours (as do the nitrates) reddish-brown a mixture of sulphuric acid and sulphate of iron.

Hydrobromic acid (and the bromides) form a pale yellow precipitate in solutions of nitrate of silver; by adding a little chlorine water, and shaking it up with ether, this precipitate becomes reddish brown.

Hydriodic acid (and the iodides) form, with solutions of nitrate of silver, a rich yellow precipitate.

Acetic acid is easily recognisable from its characteristic odour.

Oxalic acid gives, in solutions of chloride of calcium, a white precipitate insoluble in acetic acid.

Tannin (tannic acid) gives, with the ferric salts, a black precipitate (common ink).

Pyrogallic acid may be known by its characteristic odour.

Salicylic acid gives, in solutions of oxides of iron, a deep violet precipitate.

Citric acid, boiled with an excess of lime water, gives a white precipitate. Upon the addition of nitrate of silver and ammonia it furnishes a white precipitate, which becomes re-dissolved in an excess of ammonia.

Tartaric acid gives, with chloride of calcium, a white precipitate in chloride of ammonium; with acetate of lead, a crystalline precipitate soluble in ammonia and nitric acid.

Potassium Salts.—Carbonate of potash, with an acid, causes a violent disengagement of carbonic acid, and in a solution of nitrate of silver a pale yellow precipitate of carbonate of silver, without giving off carbonic acid.

Bicarbonate of potash gives the same reactions as the preceding, only it disengages carbonic acid in nitrate of silver solutions.

Neutral oxalate of potash (neutral reaction) gives, in solutions of chloride of calcium, a white precipitate of oxalate of lime soluble in nitric acid.

Chlorate of potash gives, in solutions of nitrate of silver, a white precipitate, soluble in ammonia. Chlorates detonate when mixed with concentrated sulphuric acid.

Bromide of potassium. See hydrobromic acid.

Iodide of potassium. See hydriodic acid.

Cyanide of potassium may be recognized by its odour; it is very soluble in water, but slightly in alcohol, which precipitates it.

All potassium salts dissolved in water form a yellow precipitate in bichloride of platinum, and white in tartaric acid. They colour an alcohol flame lavender.

Sodium Salts give an intense yellow colour to an alcohol flame. They are very soluble, and precipitate white in potassium antimoniate.

Borax shows a feeble alkaline reaction; a bead of it heated in the presence of metallic oxides partakes of their respective colours.

Chloride of sodium (see hydrochloric acid). It decrepitates on the fire. Insoluble in pure alcohol.

Phosphate of soda is soluble in four times its bulk of water; forms with nitrate of silver a yellow precipitate, soluble in nitric acid.

Acetate of soda, when heated, gives off a strong odour of vinegar.

Ammoniacal Salts.—Fixed alkalies—such as potash, soda, and lime—evolve, even when cold, a gas which turns red litmus paper blue.

Barium salts colour a lamp flame green, and form yellow precipitates with chromate of potash.

Calcium salts (lime) form, with oxalic acid, insoluble white precipitates.

Magnesium salts give, with phosphate of soda, ammonia, carbonate of potash, or soda, white precipitates.

Iron Salts.—A. Ferrous salts—Chloride, oxide, sulphide, sulphate, and carbonate.

B. Ferric salts—Perchloride of iron, oxide, and sulphate.

A. The ferrous salts in solution are of a bluish green colour. Their taste is sweet, afterwards astringent, resembling that of ink. They form a blue precipitate by the ferricyanide of potassium (red prussiate).

B. The ferric salts are reddish yellow in solution, rough, and astringent. They form a deep blue precipitate with ferrocyanide of potassium (yellow prussiate), and red with sulphocyanide.

Silver Salts.—The chloride becomes violet in the light, and may be dissolved in ammonia and cyanide of potassium.

The bromide turns greenish yellow in the light, and is less soluble in ammonia.

The iodide is of a pale yellow colour; ammonia and cyanide render it quite white.

These three insoluble salts may be reduced to metallic silver in the presence of hydrochloric or sulphuric acid, and zinc or iron.

Nitrate of silver. See nitric acid.

Salts of Mercury.—Bichloride of mercury gives, with iodide of potassium, a red precipitate, highly soluble in an excess of iodide.

Salts of Gold.—Chloride of gold forms a purple precipitate in solutions of chloride of tin; also with sulphate of iron.

Salts of Copper.—Sulphate of copper shows a deep blue colour with ammonia, and gives a chestnut brown precipitate with ferrocyanide of potassium (yellow prussiate).

THE FOCUSSING OF COPYING LENSES.

When a lens is to be employed for copying purposes, a common custom prevails to secure the sharpest possible focus in the centre of the picture with the full aperture of the lens, and then to insert a small diaphragm with which to do the work required

With lenses of short focus it is immaterial in what way sharpness is obtained; but when the solar focus of the objective is of fifteen, twenty, or twenty-five inches, it is of consequence that special precautions be taken to obtain from the lens the best class of work it is capable of giving, and this cannot be done by the means indicated in the previous sentence.

Let a lens of large aperture and long focus be mounted on a camera having a ground glass so fine as to permit of a magnifying glass of a considerable degree of power being employed to aid in securing the utmost sharpness. It will, in many cases, be found that, after focussing very sharply, if a small diaphragm is then inserted, the image on the ground glass will not be so crisp as it is possible under the altered circumstances to make it; that, in order to give the image at its best, it will have to be racked out a little way—from an eighth to a quarter, or even a half inch—according to circumstances. It will also be found that when the sharpest focus when using the small diaphragm has been secured, if the diaphragm be then withdrawn, the image shown upon the ground glass will be out of focus in a very serious degree.

The foregoing represents the case as observed when focussing a view in nature. But this difference between sharpness with a diaphragm and sharpness without one is doubled when the lens is used for its legitimate purpose, that of copying; because a lens having a solar focus of twenty inches has that focus increased to forty inches when used in making a copy the same size as the original, and the distance between the two planes of greatest sharpness must be multiplied by two to show what it amounts to.

We could have given a diagram showing the optical reason for this discrepancy, and indicating the path traversed by a ray upon entering and passing through a lens, but we do not judge it to be necessary at present, preferring to confine our remarks to a simple answering of the question, "How should the focus be obtained?"

Let all the arrangements and general adjustments be made with the full aperture of the lens, on account of the facility afforded by the greater amount of light for doing so. Then insert the diaphragm by which the work is to be done, and complete the focussing by the aid of a magnifying glass. Should the amount of light transmitted by the small or working diaphragm prove to be too little to enable the focussing to be easily effected, then make use of a diaphragm one size larger for this purpose, because the difference effected in locating the precise position of the focussing plane by the substitution of a small diaphragm for one that is but one size larger is practically nothing.—*Photographic Times*.

Correspondence.

FOG IN GELATINE PLATES.

Sir,—Having read the discussion in your columns about fog, I venture, although quite a beginner, to trouble you with a few remarks on the subject. I have noticed in emulsion prepared by myself that, besides appearing when there is excess of nitrate, or when the nitrate of silver is brought too suddenly in contact with the solution of gelatine or bromide, plates freshly made gave fog in those places which were not thoroughly dry before exposure.

I have lately made an emulsion, carefully following the formula recently published by Mr. Henderson, which gives very good results quite free from fog. All my experiments have been made with the same gelatine, so I have reason to think that the cause of fog is more likely to be found in the mode of preparation and in want of care in developing and fixing than in the gelatine itself. Prevention is better than cure, and I believe that, in using care in the preparation of the emulsion or developing, and fixing with the least light possible, fog may, in nine cases out of ten, be avoided.

A propos of Mr. Henderson's formula, how would it answer if, instead of stirring the alcohol into the emulsion, the emulsion were gently filtered into the alcohol? It seems to me that by the latter system the precipitated emulsion would be much more finely divided, and washing thus rendered more perfect and easy.

As regards Pyrogallic *v.* Iron development, are your readers acquainted with M. Chardon's formula?—

Water	... 100 c. c.
Oxalate of potass. ...	... 20 grammes
Lactate of iron	... 10 ,,
Bromide potass. ...	... 0.10 ,,

which I find excellent.—I remain, sir, yours respectfully,
C. H. Goodall.

DEFENCE ASSOCIATION.

Dear Sir,—Allow me, through the medium of your columns, to thank the several gentlemen who have communicated with me upon the above subject. It certainly appears that such an institution is both required and desired. I hope to be able to arrange a meeting at an early date after the issue of next week's News, at which I shall be glad to see any gentleman interested in the subject. It would, perhaps, be better to defer any proposal as to future action till such meeting assemble. Meanwhile I have written to a gentleman well known in photographic circles asking him to preside.—Faithfully yours,
W. E. Downey.

PHOTOGRAPHIC NUISANCES.

Sir,—I have read with interest the letters on "Photographic Nuisances" in your journal. As I am residing abroad I have not received your paper for some days, or I should have sent some remarks on this subject earlier. Since I came to Italy I have had plates from several well-known English makers. Some have been good, others quite useless from thin or spotty films. With two of these makers I have remonstrated. Their cry is that the fault must be in my wrong development of their plates; and this after I have been using many of their plates successfully for several years past, and they have been advertising my name in your paper as testifying to the value of their plates. A year ago I was speaking on this subject to a former member of Council of the Parent Society, and he said, "Oh! the dry-plate makers will be sure to say you do not know how to develop their plates." It is a good idea to use the name of an experienced dry-plate worker as a testimony to the value of commercial plates, and then, when he says some of the plates sent him are bad, to turn round and say he knows nothing about their development. I have a letter now by me from a well-known member of the present Council, and he writes as follows:—"I have many samples of plates constantly sent me to try, but (for obvious reasons) I never have any bad ones sent me." He also says that he is aware that bad plates are at times sent out, even by makers with the best reputation; that when they have made a name they often get careless. A professional photographer from Wales lately wrote me his belief that the amateurs and smaller professionals get the bad and doubtful plates, and the larger professionals get the good ones. This is probably true to a great extent. I have been, however, able this year to get very good plates for iron development made in Italy; I have found all I have used (several dozen) excellent.—
Yours, &c., A Dry-Plate Photographer.

Proceedings of Societies.

London and Provincial Photographic Association.

At the meeting of the above Association, held at the Masons' Hall Tavern on Thursday, October 26th, Mr. C. H. Searle in the chair,

Mr. C. G. Collins presented a very handsome ballot-box to the Association, for which a hearty vote of thanks was passed to him, and it was resolved that a tablet should be engraved and fastened in the box, recording the gift and the date thereof.

Mr. Henderson passed round two tubes containing portions of a 20-grain solution of gelatine, containing in the one case silver, and in the other the bromide, to which their respective equivalents of silver and bromide had been added on the top; after 24 hours, in the tube containing the silver in solution above the gelatine, scarcely any bromide was formed, while in the other tube a layer of bromide ¼-inch thick had formed; but after two days the action in the first tube increased in rapidity till it passed the other, and at the end of three days about half the bromide was converted. The gelatine containing the silver remained perfectly colourless till it began to set, when it became opaque, and almost like an emulsion. This he attributed to impurities in the gelatine, possibly a carbonate, and suggested that it would be interesting to know if the bottom portion would again become clear on heating; this was tried, and it was found it did not clear.

Mr. Prestwich enquired what advantage was expected from this method.

Mr. Henderson said that much more silver could be got into a given quantity of gelatine than by the usual methods.

Mr. Prestwich had tried a somewhat similar method, but had not been quite successful; he had made his experiments in a flat dish, and after 1½ days the silver was not all converted; the following was the formula used:—

No. 1.—Ammonia nitrate of silver	...	100 grains
Alcohol	...	2 ounces
Water	...	1 ounce
No. 2.—Gelatine	...	120 grains
Water	...	3 ounces
No. 3.—Bromide ammonium	...	66 grains
Iodide "	...	1 grain
Chloride of ammonia	...	2 grains
Water	...	2 ounces

This would have succeeded better with a softer gelatine.

Mr. Prestwich said it had been suggested to him by Mr. Drosser that it would be advantageous to treat pyro. developed negatives with a solution of 1 ounce sulphuric acid to 1 quart of water; he had tested and found it removed all pyro stains, leaving the negative with all the qualities of a ferrous oxalate developed plate, and much like a collodion negative.

Mr. Coles showed two negatives, both supposed to have received the same exposure; one was developed with caustic potash, the other with ammonia, the first appearing much more exposed than the other. He also showed a series of transparencies from one negative, each receiving the same exposure, and intensified according to various formulas, viz., Wilkinson's platinum and mercury; Dr. Eder's carried to stage, where it commenced to reduce; Edwards' with hypo.; Edwards' followed by Schlippe's salt; and the formula given by Mr. Hart at the last meeting. The result was in favour of the Schlippe's salt, or Mr. Hart's method.

Mr. Henderson said a large plate manufacturer had attributed green fog to impurities in the bromide, and he had experimented with a sample of bromide known to give green fog, samples of which he now passed to several members, and asked them to report thereon.

Liverpool Amateur Photographic Association.

The usual monthly meeting of this Association was held on Thursday evening, the 27th ult., the President, Mr. E. Roberts, in the chair. The minutes of the September meeting having been read and confirmed, Mr. H. Williams was elected a member of the Society.

The Hon. Secretary laid upon the table a copy of the report of the Geological Society's Proceedings for the past year, which had been obligingly sent by the Hon. Secretary of that society.

A letter from Mr. E. Cocking was then read, enclosing a number of tickets for the Photographic Exhibition in London. When these had been distributed among the members, the Chairman proposed a cordial vote of thanks to the President and officers of the Photographic Society of Great Britain for their kindness and courtesy.

Mr. J. Y. McLellan then exhibited the new "eclipse" light. The apparatus is very compact and ingenious, and enables a small coil of magnesium wire to be burnt in oxygen. The result is an intense light, which permits of a portrait or group being taken in a single second. Mr. McLellan first showed the effect of burning the wire in a mixture of half air and half oxygen, and then in oxygen alone. The brilliancy of the latter light was exceedingly great, and it was noticed that there were no unpleasantly strong contrasts of light and shade upon the faces in the room, but that the half-tones were present to a satisfactory extent. Mr. McLellan answered fully all questions put to him, and gave an account of the simple apparatus for producing his supplies of oxygen.

The Chairman cordially thanked Mr. McLellan for his very interesting demonstration, and made an amusing reference to the last display of a similar kind in that room, when the Hon. Secretary burnt a pyrotechnic compound in a lantern of his invention, and endeavoured to get rid of the smoke evolved by means of a huge chamber constructed of piled-up band-boxes.

Mr. W. Atkins passed round a number of very beautiful calotype negatives by the late Mr. J. Cooke, taken by him some twenty-five years ago. The negatives were exceedingly fine specimens of the process, and were greatly admired.

Mr. J. T. Corkhill said that recently he had found a number of valuable negatives, which were unvarnished, much stained by silver markings caused in the printing, and asked for information as to the best way of remedying the evil.

The Rev. H. J. Palmer recommended a strong solution of hyposulphite as the only means of removing such stains.

Mr. H. N. Atkins gave a demonstration of the platinotype process, explaining fully the very simple operations of developing and fixing the prints. Mr. Atkins' prints were beautiful specimens of photographic art, and his demonstration was as successful as it was instructive.

The Chairman expressed, on behalf of the members present, the great pleasure with which he had watched Mr. Atkins develop these beautiful little pictures by the platinotype process, and the hearty thanks of the Society for his very useful and interesting demonstration.

Mr. H. N. Atkins exhibited a new instantaneous exposure of his own invention and manufacture.

Mr. Schenkenhofer exhibited and explained his clever and useful apparatus for toning and fixing silver prints.

The Chairman, in proposing a vote of thanks to Mr. Schenkenhofer, said that he was quite sure every member present had been greatly interested and instructed at the sight of this apparatus.

The Chairman announced that Mr. Ellerbeck's "at homes," at No. 7, The Elms, Peel Street, The Dingle, would be held on the second and fourth Tuesdays in each month until further notice.

The Hon. Secretary suggested that an annual report of the proceedings of the Society should be published, to contain the rules, full report of proceedings, papers, and demonstrations of the past year, together with the list of the names and addresses of the members of the Association.

Mr. Twigge advised that an estimate of the expense should first be obtained.

Mr. Macindoe thought that the experiment should be made for one year, at all events, and embodied the Hon. Secretary's suggestion in a formal resolution, which was seconded by Mr. R. Crowe.

Mr. W. H. Kirkby proposed, as an amendment, that a report be published annually, but that it should simply contain the annual report, the rules, and the list of members.

Mr. Ellerbeck seconded the amendment.

After some discussion, it was agreed to postpone the discussion till the next meeting, and both resolution and amendment were withdrawn.

Mr. Ellerbeck thought it would be very desirable that all exhibits at the coming Associated Soirée should be notified to the Secretary in time to be inserted in the catalogue of the contents of St. George's Hall.

Dr. Kenyon exhibited a micro-photograph of a section of rock, taken by polarised light. He had used a common paraffine lamp, and the exposure had been only twenty minutes. He thought this method of obtaining micro-photographs preferable to that by sunlight, since the latter involved danger to the lenses employed. He added that he had used a condenser and also a mirror to produce the picture in question. The rock was a specimen of felspathic porphyry, and the plate used was one of Rouch's.

Mr. Kirkby exhibited some fine prints in platinotype; Mr. Ellerbeck, some equally good specimens of his work at Wells and Glastonbury, in silver; Mr. Corkhill some good instantaneous river scenes; and Mr. Boan a new portable lamp for the dark room.

The meeting was then adjourned.

Talk in the Studio.

A Course of Thirty Lectures in London on Photography.—We are pleased to be able to inform our readers that Mr. E. H. Farmer, of the Chemical Department in Dulwich College, will shortly commence a comprehensive course of lectures on photography at the Polytechnic, it being arranged for the first to be delivered on the evening of Nov. 11th. As assistants, and those connected professionally with photography, will be admitted to the course of lectures for the nominal fee of 6s., it is expected that there will be a large attendance. We gather the following particulars from a preliminary notice which has just been issued:—A course of thirty evening lectures on photography (in connection with the City and Guilds Institute) will be delivered by Mr. E. Howard Farmer (Demonstrator of Chemistry, Dulwich College, and Demonstrator of Natural Philosophy, St. Mark's College) at the Polytechnic Institute, 309, Regent Street, W. The lectures will be of a thoroughly practical character, and such as to enable students to obtain technological certificates of efficiency from the Guilds Institute. The City Guilds also offer the following prizes:—Honours Grade—1st prize, £5 and a silver medal; 2nd prize, £5 and a bronze medal. Pass Grade—1st prize, £3 and a silver medal; 2nd prize, £3 and a bronze medal; 3rd prize, £2 and a bronze medal; 4th prize, £1 and a bronze medal; 5th prize, a bronze medal. Fee to persons connected with the profession, 6s. per session of seven months; fee to amateurs and others, one guinea per half session. The following is a rough syllabus of Mr. Farmer's course:—"Preparation and Properties of Pyroxyline and Collodion"; "The Principles and Practice of Daguerreotype, Calotype, and Wet Collodion Work"; "The Gelatine and Collodion Emulsion Processes"; "The Theory and Practice of Development by Various Methods"; "Printing in Silver, and other Metals"; "Printing in Carbon, Woodburytype, and Photo-Engraving"; "Applications of Photography to Typography, Lithography, &c."; "Application of Photography to Scientific Purposes"; "Principles Involved in the Construction of Portrait and Landscape Lenses, Cameras, and other Apparatus in ordinary use by photographers." Application for tickets should be made at once to Mr. Robert Mitchell, at the Polytechnic Institute, and of whom all particulars can be obtained.

Liverpool Science and Art Classes.—On the occasion of the distribution of prizes on the 19th ult. by Professor Abel, C.B., F.R.S., a report was made of the students who had studied photography, among other subjects. Eighteen students, it appeared, had received instruction in photography, of whom seven went up for examination. Of these, one passed first-class (Mr. Harry Hinchcliffe), who took the President's prize, and four passed in the second-class, viz., Mr. Arthur John Banks (who took a full technological certificate), Francis Caldwell, William Seldon Ramsou, and Augustus Rainger. The class for photography meets on Tuesdays, at 8 p.m., at 9, Hackin's Hey, Liverpool, and is conducted by Mr. Edwin Banks. It is intended for those engaged in photographic establishments, and for amateurs. The instruction comprises a description of the chemicals employed, their manipulation, impurities, modes of preparing them for use, and manner of employing them in photography. The construction and use of cameras and other apparatus are explained, as well as the theory and practice of photographic work generally, not forgetting the application of photography to astronomical and microscopic purposes. The students are afforded opportunity for practical work.

Lost Property.—A correspondent asks us to find a corner for the under-mentioned information, which may lead to the owner getting his own again. On October 1st, there was found in Ashtead Churchyard a set of Waterhouse diaphragms for a large Ross' lens, either 10 by 12, or whole-plate, with Ross' name on inside of case; some of the stops had been re-varnished. May be obtained of Mr. Lisney, blacksmith, Leatherhead.

Royalty at Leicester.—On the occasion of the visit of the Prince and Princess of Wales to Leicester, on the 29th of May last, Mr. F. W. Broadhead, photographic artist, Welford Road, forwarded for their Royal Highnesses' acceptance a very handsome album, containing eight panoramic views of Leicester (forming a complete set) taken from the tower of the municipal buildings, and twenty-four other photographic views of the town. The views were mounted on blue silk, and bound in blue morocco, forming a very handsome volume. By some mischance the acknowledgment of the present was delayed until last week, when Mr. Broadhead received a letter from General Knollys, apologising for the delay, and stating that their Royal Highnesses had been very happy to accept the album.

Salicylic Acid for Preserving Eggs.—Referring to a recent article on the preservation of eggs, our correspondent Mr. M. P. Baumann, of Pittsburg, Pa., gives the following method which in his hands works to perfection. Having filled a clean keg or barrel with fresh eggs, he covers the eggs with cold salicylic water. The eggs must be kept down by a few small boards floating on the water, and the whole covered with cloth to keep out dust. If set in a cool place, the eggs so packed will keep fresh for months, but they must be used as soon as they are taken out of the brine. To make the salicylic solution, dissolve salicylic acid (which costs about 3.00 dols. a pound) in boiling water, one tablespoonful of acid to the gallon. It is not necessary to boil all the water, as the acid will dissolve in a less quantity, and the rest may be added to the solution cold. The solution or brine should at no time come in contact with any metal. In a clean, airy cellar, one brine is sufficient for three months or more, otherwise it should be renewed oftener. For that purpose the kegs, &c., should be provided with a wooden spigot to draw off the liquid and replenish the vessel. Butter kneaded in the same solution, and packed tight in clean stone jars, will keep fresh the whole winter, but must be covered with muslin saturated in the water, renewing it sometimes. Cover the jars with blotting-paper saturated with glycerine. Salicylic acid is harmless, and yet one of the best and certainly most pleasant disinfectants in existence, with no colour, smell, or taste. The water is an excellent toothwash, and the best gargle to prevent diphtheritic contagion.—*Scientific American.*

A New Photo-Electric Battery.—A new battery, which gives a current on exposure to the action of light, has been devised by M. Saur. It consists of a square glass vessel, containing a solution of 15 parts common salt and 7 parts sulphate of copper in 106 of water. A porous vessel of mercury is placed in the solution. An electrode of platinum is in the mercury, and another of sulphuret of silver in the saline solution. The electrodes are connected by means of a galvanometer, and the battery is fixed in a box sheltered from light. The closing of the circuit displaces the needle of the galvanometer, and it is seen that the sulphuret of silver is the negative pole. When the needle has come to rest, if the battery is exposed to the light of the sun the deviation increases. If the light is suppressed, the needle returns to its original position; if a cloud passes before the sun while the battery is exposed to the light, the variations of the needle indicate the fluctuations of the electric current. The effect of the battery is due to the action on the mercury of the bichloride of copper formed by the mixture of common salt and sulphate of copper. The protochloride of copper which is formed reduces the sulphuret of silver; but this reduction requires the intervention of the solar light, which determines the production of the photo-electric current.—*Les Mondes.*

To Correspondents.

⁂ We cannot undertake to return rejected communications.

Henry Spink.—1. Between five and six ounces. 2. The full heat obtainable when the water boils; perhaps it might be between 94° and 96° centigrade. 3. Sometimes from minute projections on the glass plates.

J. H.—Certainly; but only after a second treatment with nitric acid.

C. J. Hyne.—Perhaps twopence may be taken as a minimum, but in the case of a highly-salted paper, as much as threepence worth of silver may be taken up by each sheet. Only by stretching every sheet; but this would probably be out of the question.

W. E. E.—You can obtain provisional protection for six months at a cost of £5 for the stamp, and about 10s. for stationery, &c. Notice to proceed must be given within four months from time of lodging the Provisional Specification. If you employ a London agent to arrange the business for you, the expense will be a little greater.

J. L. Sanford.—We cannot tell you the cost, but you will no doubt obtain full particulars by writing to Messrs. Marion and Co., of 22, Soho Square.

Carte.—1. A trace of the encaustic paste referred to in the Formulary. 2. We do not know which number you refer to. 3. All depends on the hardness of the film and its thickness; but, in ordinary cases, half-an-hour with (say) six changes. Set the plate on its edge in the water.

E. A. Maxwell.—1.—You should obtain a good light provided that the battery is satisfactorily put together, and in good working trim. One principal difficulty with the bichromate battery is maintaining the connections with the carbon plates in good order, as chrome alum tends to crystallise between the carbon and the metal. Why not convert your bichromate cells into Bunsen's? 2. From what we have seen, we are inclined to think that it will prove of real practical value; but we have not made an actual trial ourselves. You could probably obtain one on trial, and should you do so, we would be obliged by your letting us know the result.

Enquirer.—1. The paper or film being damp, nitrate of silver diffuses into the collodion, and causes the dark stain. Always varnish your negatives, and print on dry paper. 2. No alteration is required; but cameras specially constructed for out-door work as ordinarily made as light as possible, and are usually provided with several dark slides. In order to economise space, these slides are made double, or like two usual dark slides joined back to back. 3. In the present state of affairs, it is difficult to say; but we think the latter will require less after-treatment. 4. Only by carefully watching the operation, and removing them at the right time—experience and observation alone help here. 5. It is, as you suppose, merely trade puff, and you will be able to do the same with ordinary gelatine plates. Obtain a couple of dozen from any recognized maker, and work with your present apparatus, letting us know if any difficulty arises. 6. You will probably meet with one for about £15 by advertising in the News; but to erect one yourself would cost about double. You will find several sketches in Pritchard's "Studies of Europe," should you possess a copy. The first edition is, however, exhausted, and the work will not be reprinted till next year.

Hypo.—Hard places or knots in the paper.

J. H. F.—We wish you every success, and shall be glad to hear how you get on.

Hobgoblin.—Notwithstanding your conviction to the contrary, we have but little doubt that the particles arise from the presence of hyposulphite. Review all your operations carefully; keeping a good look-out for any manipulation capable of carrying traces of hyposulphate to the prints during the earlier stages of the work.

M. Hughes.—1. Considering that parts are given throughout, there should neither be doubt nor confusion. You may work with grains, drachams, ounces, or any other weight as the unit. 2. Probably about 8 or 9 degrees higher. 3. A spirit lamp should answer very well.

Enquirer (Sunderland).—1. The former contains oxygen, while the latter does not. Chloride of lime is what you require. 2. Boil it with water in a glass flask.

W. M. P.—You evidently require a comprehensive treatise on the reduction of gold and silver residues; but all of the information you require is to be found in the Year-Books and volumes of the News.

J. H.—1. From any dealer in scientific apparatus. 2. Rather for the show-case, or for lighting up special pictures, than for lighting up windows and reception room. If you wish to go in for it on a larger scale, you had better use a small gas engine, and a dynamo machine. To provide for twelve fifteen-candle lamps would involve an outlay of about £120.

Enquirer (Henley-on-Thames).—1. Its principal use is to remove sulphates. 2. You had better make a fresh bath, as the existing one has failed.

T. Biddle.—They appear to us like silver stains, such as result from the use of damp sensitive paper.

W. W. R. and Co.—We have carefully re-read our notice, and we cannot agree with you. Which statement is incorrect? Only one feature was alluded to; if this is not common to both instruments, we will willingly afford opportunity for explanation.

E. Williams.—A letter awaits you at this office, if you will forward your address.

Captain Turton.—See above. We have not a copy of "rules" nor list of members; Mr. Cocking (the Assistant Secretary), 57, Queen's Road, Peckham, would send them on application. Our Publishers have noted your address.

Lydia.—1. By all means begin with the gelatino-bromide process, and we would recommend you to make your first experiments with the ferrous oxalate developer. 2. A cheap quarter-plate camera and French-view lens will answer very well to begin with, but you are likely to shortly outgrow this apparatus, or to give up photography altogether.

*** Authors may have Reprints of their Articles at 3s. per page per hundred copies; but the order must be given when the proof is returned.

PHOTOGRAPHS REGISTERED.

Mr. Biggs (Enfield)—Photo. of St. Magdalen Church, Enfield.
Messrs. Adams and Stilliard (Southampton)—Group of Members of British Association.
Mr. W. Wardell (Bradford)—Photo. of Lister Park Arch.
Mr. W. G. Honey (Devizes)—Two Photos. of Donkeys. One of Boy and a Turkey. One of Girl and a Turkey.

THE EVERY-DAY FORMULARY.

The Gelatino-Bromide Process.

Emulsion.—A—Nit. silver 100 grains, dist. water 2 oz. B—Bromide potassium 85 grains, Nelson's No. 1 gelatine 20 grains, dist. water 1½ oz., a one per cent. mixture of hydrochloric acid and water 50 minims. C—Iodide potassium 8 grains, dist. water ½ oz. D—Hard gelatine 120 grains, water several oz. When the gelatine is thoroughly soaked, let all possible water be poured off D. A and B are now heated to about 120° Fahr., after which B is gradually added to A with constant agitation; C is then added. Heat in water bath for half an hour, and stir in D. After washing add ¾ oz. alcohol.

Pyro. Developer.—No. 1—Strong liq. ammonia 1½ oz., bromide potassium 240 grains, water 80 oz. No. 2—Pyro. 30 grains, water 10 oz. In case of an ordinary exposure mix equal vol.

Iron Developer.—Potassium oxalate sol. (1 and 4) 80 parts, ferrous sulphate sol. (1 and 4) 20 parts, dist. water 20 parts. To each 4 oz. of the mixed developer add from 5 to 30 drops ten per cent. sol. potassium bromide, and 30 drops sol. sodium hyposulphite (1 and 200).

Substratum or Preliminary Preparation.—Soluble silicate of soda 1 part, white of egg 5 parts, water 60 parts. Beat to froth and filter.

Fixing.—Sat. sol. of sod. hypo. 1 pint, sat. sol. of alum 2 pints, mixed.

Cowell's Clearing Solution.—Alum 2 parts, citric acid 1 part, water 10 parts. Edwards makes this sherry coloured with perchloride iron.

Eder's Method of Intensification.—The negative is whitened by soaking in sat. sol. of mercuric chloride, and after thorough rinsing immersed in potass. cyan. 10 parts, potass. iod. 5 parts, mercuric chloride 5 parts, water 2,000 parts. As film becomes dark brown, the actinic opacity is increased; but prolonged action causes brown tint to become lighter, until at last the negative is no denser than at first.

Fol's Backing Sheets.—A chromographic paste is prepared with gelatine 1 part, water 2 parts, glycerine 1 part, and a very small addition of Indian ink. Strong paper or shirting is coated, and the sheets are laid, face downward, on waxed glass to set. Press to back of glass plate.

The Wet Collodion Process.

The Nitrate Bath.—Water 14 oz., nit. silver 1 oz., nitric acid 1 drop. Before using coat a small plate, and immerse it for 20 minutes.

Cleaning Preparation for New Plates.—Alcohol 4 oz., Jeweller's rouge ¼-oz., liquid ammonia ½-oz.

Film-removing Pickle for Old Plates.—Water 1 pint, sulphuric acid 4 fluid oz., bichromate potassium 4 oz.

Substratum.—Whites of 2 eggs well beaten, 6 pints of water, and 1 dr. liq. ammon.

Negative Collodion for Iron Development.—Alcohol 1 pint, pyroxyline of suitable quality 250 grains, shake well and add ether 2 pints. *Iodize this by mixing with* one-third of its volume of alcohol ½ pint, iod. ammon. 80 grains, iod. cadm. 80 grains, brom. ammon. 40 grains.

Normal Iron Developer.—Water 10 oz., proto-sulphate iron ½ oz., glacial acetic acid ½ oz., alcohol ¾ oz. The amount of proto-sulphate iron may be diminished to ¼ oz. when full contrasts are desired, or increased to 1 oz. when contrasts are unduly marked. With new bath quantity of alcohol may be reduced to ¼ oz.; but when bath is old more is wanted.

Intensifying Solution.—Water 6 oz., citric acid 75 grains, pyro. 30 grains. When used, add a few drops of the silver bath to each ounce.

Lead Intensification.—After neg. washing, immerse in dist. water 100 parts, red pruss. potash 6 parts, and nit. lead 4 parts. When it is yellowish white wash and immerse in liquid sulphide ammon. 1 part, water 4 parts.

Fixing Solution.—1. Potass. cyanide 200 grains, water 10 oz. 2. Sat. sol. of sod. hypo.

Varnish.—Shellac 2 oz., sandarac 2 oz., Canada balsam 1 dr., oil of lavender 1 oz., alcohol 16 oz.

Printing Processes.

Albumen Mixture for Paper.—White of egg 18 oz., 500 grs. ammon. chlor. in 2 oz. of water. Beat to a froth, stand, and filter.

Sensitizing Solution.—Nit. silver 50 grs., water 1 oz., sod. carb. ½ gr.

Acetate Toning Bath.—Chl. gold 1 gr., acet. soda 20 grs., water 8 oz.

Lime do.—Chl. gold 1 gr., whiting 30 grs., boiling water 8 oz., sat. sol. chl. lime 1 drop. Filter cold.

Bicarbonate do.—Chl. gold 1 gr., bicarb. soda 3 grs., water 8 oz.

Fixing Bath.—Sodium hypo. 4 oz., water 1 pint, liq. ammon. 30 drops.

Reducer for Deep Prints.—Cyan. potass. 5 grs., liq. ammon. 5 drops, water 1 pint.

Encaustic Paste.—Best white wax 1 oz., oil of turpentine 5 oz.

Sensitizing Bath for Carbon Tissue.—Bichromate potash 1½ oz., water 30 oz., ammonia 1 dr., methylated spirit 4 oz.

Enamel Collodion.—Tough pyroxyline 120 grs., methylated alcohol 10 oz., ether 10 oz., castor oil 20 drops.

Mountant.—1. Fresh solution of best white gum. 2. Fresh starch.

Collotypic Substratum.—Soluble glass 3 parts, white of egg 7 parts, water 10 parts.

Collotypic Sensitive Coating.—Bichromate potash ½ oz., gelatine 2½ oz., water 22 oz.

Collotypic Etching Fluid.—Glycerine 150 parts, ammonia 50 parts, saltpetre 5 parts, water 25 parts.

Printing on Fabric.—Remove all dressing from fabric by boiling in water containing a little potash, dry, and albumenize with ammonium chloride 2 grammes, water 250 cubic cents., and the white of 2 eggs, all being well beaten together. A 70-grain silver bath is used, and the remaining operations are as for paper.

Cyanotype Printing.—Water 1 oz., red prussiate of potash (ferricyanide) 1 dr., ammonio citrate of iron 1 dr. Prepare and preserve in the dark. Float the paper and dry. Fixation by mere soaking in water.

Various.

Luckardt's Retouching Varnish.—Alcohol 300 parts, sandarac 50 parts, camphor 5 parts, castor oil 10 parts, Venice turpentine 5 parts.

Matt Varnish.—Sandarac 18 parts, mastic 4 parts, ether 200 parts, benzole 80 to 100 parts.

Encaustic Paste.—Best white wax, in shreds, 1 oz., turpentine 5 oz.; dissolve in gentle heat, and apply cold with piece of flannel.

Ferrotypes.

Collodion.—Ammonium iodide 35 grains, cadmium iodide 25 grains, cadmium bromide 20 grains, pyroxyline 70 grains, alcohol 5 oz., ether 5 oz.

Bath.—Silver nitrate 1 oz., water 10 oz., nitric acid 1 drop.

Developer.—Ferrous sulphate 1 oz., glac. acetic acid 1 oz., water 16 oz.

Fixing and Varnish.—Same as wet collodion process.

THE PHOTOGRAPHIC NEWS.

Vol. XXVI. No. 1262.—*November* 10, 1882.

CONTENTS.

EDINBURGH PHOTOGRAPHIC COMPETITION.

The Edinburgh Photographic Society is to be heartily congratulated on the success which has attended their recent competition. Our readers are aware that some months ago the Society decided upon instituting an exhibition which should serve the two-fold purpose of bringing together in Edinburgh the works of the best photographers from various parts of the world, and of placing the Society in a position to choose for themselves a presentation print from among the collection. Accordingly invitations were sent not only to all parts of Great Britain, but to France and Germany, and, to induce co-operation on the part of photographers, a series of medals and money prizes were offered.

There was no novelty in the matter so far, but for the purpose of judging the pictures as fairly as may be, the Edinburgh Society proceeded on a plan which, for its originality, no less than for its impartiality, is much to be commended. As the principal reason for the exhibition was to provide a presentation print for the members of the Society, it was left entirely to the members to choose for themselves. The names of the exhibitors were maintained a secret, as much as possible, by a select company of hangers, who merely designated the frames with numbers; each member of the Society was then provided with a ballot-paper, and invited to inspect and examine the pictures for himself, the instruction being to set down which picture or pictures he preferred. The ballot paper had five spaces, specified as 1, 2, 3, 4, 5, and as five awards were to be made, every member put down five pictures in his ballot-paper in the order of merit. The exhibit, or rather its number, he liked best was filled into space No. 1, the second best into space No. 2, and so on; and the papers being collected, the votes were counted, and the awards duly given in accordance with them.

The members of the Society appear to have taken great interest in the matter, for no less than 461 voted. And now comes a very interesting fact. As many as 332 of these gentlemen voted for the pictures mentioned in the first space, or, in other words, only 129 votes in all went to pictures other than those selected as of first rank. There was consequently a singular amount of unanimity, and ample proof that the members went about the voting with much care and discrimination. Again, the picture that secured the highest award, viz., the gold medal, did not win by a narrow majority, but by an almost universal vote. One of our Edinburgh friends is kind enough to send us an analysis of the voting, of which the fortunate gold medallist ought indeed to be proud.

The winning picture is No. 104, and the statement of the scrutineers shows

Highest number of votes in space 1 given to No. 104
Ditto, ditto, in spaces 1 and 2 ,, ,,
Ditto, ditto, in spaces 1, 2, and 3 ,, ,,
Ditto, ditto, in spaces 1, 2, 3, and 4 ,, ,,
Ditto, ditto, in spaces 1, 2, 3, 4, and 5 ,, ,,

"Could anything be more emphatic?" writes our Edinburgh correspondent, radiantly.

The picture No. 104, we have much pleasure in announcing, is by Mr. H. P. Robinson, of Tunbridge Wells, with the title "Will They Never Come?" who thus adds one more to the many gold medals he has already gained. Says our correspondent: "Now although a few of us were pretty sure as to the author of the picture, yet, in a Society composed as ours is, *only* a few would be able to distinguish it, and even those few were most amusingly deceived by crediting Mr. Robinson with three others." Thus Mr. Robinson wins the gold medal with the only picture he sent.

The second name on the roll is one who is indeed deserving of honour—Mr. Robert Faulkner. Mr. Faulkner secures the silver medal with, says our correspondent, "'Phyllis Frere,' a charming full-length study of a child." Mr. Robert Slingsby's 'Brambling' comes in also for an award, as we hinted last week. Mr. Pellat is another fortunate competitor; and last, but not least, Mr. Adam Diston secures a prize with his picture of 'Gloamin.'"

We hope the example set by the Edinburgh Photographic Society will be followed, if not in its entirety, at any rate in principle. The mode of adjudging the awards seems to have given exceeding satisfaction to our friends north of the Tweed, and it is certainly, from the members' point of view, one of the most satisfactory and impartial modes of proceeding. No doubt, after their experience, the committee of the Edinburgh Society will be able to suggest further improvements of the plan; and we hope that, in any case, they will give the photographic public the benefit of any teachings which the recent competition may have afforded.

CHEMIGRAPHIC ENGRAVING.

It has often been remarked that when the photographer attempts to work photo-mechanical methods, he generally fails, and his failures arise more on the side of those special operations which rather belong to the printer than to the photographer. Let us take, for example, the case of photography; satisfactory success being generally attained as far as the production of the negative, and the fatty transfer are concerned, but when the transfer is laid on the stone, the troubles commence. As a matter of fact, printers have hitherto been more successful in adding photography to their resources than photographers in adding printing, and the reason of this is perhaps to be found in the circumstance that photographers generally under-estimate the amount of care, thought, and judgment which are absolutely necessary for success in such certain printing operations, as, for example, the inking of a lithographic image or a similar fatty device when transferred to a zinc plate.

As having a special bearing on this question, as bearing on certain processes of chemical engraving, we have much pleasure in welcoming the advent of a small manual on the subject of chemigraphy, or chemical engraving, this work being from the pen of Herr W. J. Toifel, a recognised authority in Germany.*

The primary idea of the chemigraphic process is the production of relief printing-blocks by dissolving away the bare metal round about a fatty impression on a zinc or metal plate, the fatty impression being produced by photographic or other means; but the term chemigraphy, or chemical engraving, may be, and is, used in a more comprehensive sense, as indicating chemico-mechanical methods of printing in general.

The various chemigraphic processes have often been referred to in the Photographic News, and certain details have been given from time to time, when we have had occasion to describe the various phototypic processes (most of which include chemigraphic engraving); but we now propose to gather from Herr Toifel's work such details as should enable any photographer who may give careful attention to the subject, to succeed in those branches of the work which differ most widely from his every-day practice.

Let us suppose that the photographer has obtained a photo-lithographic transfer by any one of the processes which have been fully described in the Photographic News from time to time, and that he desires to transfer the fatty image to a zinc plate, and etch this so as to leave the lines in sufficient relief to produce a printing block suitable for the ordinary typographic press. We may safely assume that unless the photographer is also a printer, careful study will be required to enable him to successfully deal with materials widely different in their nature from those used in his ordinary photographic practice, and to take cognisance of the varying circumstances which necessitate divergence from the usual proceeding. Still a photographic training is an admirable preliminary to the study of chemigraphic engraving; and there is sufficient general analogy between the two classes of work to warrant one in coming to the conclusion that a person who has successfully overcome the difficulties of one may be sure to succeed with the other if the attempt be fairly made.

The first matter is to provide suitable zinc plates, and as these may be purchased already planished from the lithographic material dealers, the beginner need not of necessity go through the somewhat tedious routine of surfacing and preparing his own; but as it is very desirable that he should at least qualify himself to deal with the process from the commencement, we will give brief directions regarding the point in question.

Zinc plates about an eighth of an inch thick are adapted for the general run of work, and those that are entirely free from hollow places, scales, or vein-like markings or flaws of any kind should be selected. The plates can easily be cut to the required size by laying a steel straight-edge in the direction of the required cut, and ruling repeatedly in the same place with a pointed steel tool, so as to plough out a series of fine shaving. When the metal is cut nearly half-way through, the plate is turned over, and the operation is repeated on the other side until it becomes easy to break the plate by a slight bending to and fro. The edges and corners having now been smoothed down a little by means of a file, a small hole is drilled at each corner, and the plate is fastened down to the bench by four small wire nails, the best face being upwards. The next step is to scrape or planish the surface with a broad steel scraper, the cutting edge of which is ground to a right angle, care being taken that all the cuts are in the same direction, or parallel with each other. The best way is to planish by drawing the scraper towards onesself, and it should be inclined forwards at an angle of about 20° with the perpendicular. When a uniform surface of bright and clear metal has been laid bare, the plate is unfastened, turned round a quarter of a circle, and re-pinned to the bench, after which the planishing is repeated in a direction at right angles to the first operation. This having been done, the plate is polished with emery cloth; a rather coarse grade, say No. 1½ or No. 1 being suitable for use in the first instance, after which, No. 0 or 00 should be employed. The emery cloth should be wrapped over a cork rubber about three inches square, and fresh cloth should be taken as soon as the grain becomes clogged by fine particles of zinc. The final cleansing of the plate is effected by rubbing it with a mixture of whiting and spirit, and polishing off all traces of this by means of clean blotting-paper. All is now ready for impressing the photographic image on the prepared zinc plate, and for this purpose a lithographic press is required; those generally used in this country being scraper presses. A sufficiently large lithographic stone is laid on the bed of the press, and the scraper is so adjusted as to give a moderate pressure when the zinc plate, three or four thicknesses of blotting-paper, and a glaze-board are laid on the stone. The transfer, or fatty image on gelatinised paper, which is supposed to be already made, is now laid for a few minutes between sheets of damp blotting-paper, in order to so far moisten it as to make it just capable of adhering to the zinc plate when pressure is applied. The polished zinc plate is now laid face upwards on the lithographic stone, after which the transfer is laid face downwards on the polished metal, the blotting-paper and glaze-board are laid over, the tympan of the press is lowered, and a gentle pressure is applied. One corner of the covering is then cautiously turned up in order to ascertain if the transfer adheres well to the zinc plate, and if this is not the case, the pressure is renewed until a satisfactory adhesion is established; the utmost care being of course taken that the transfer does not shift its position on the zinc in the least. When the transfer fairly adheres, the over-lying glaze-board and the blotting-paper may be removed and turned round to a fresh position, after which pressure must again be applied several times. The amount of pressure should be increased each time the plate is passed through the press, and the relative positions of plate and packing should be changed at each pressure, in order to compensate for unequal thickness of the plate or want of accuracy in the construction of the press. It is well now to slightly moisten the back of the transfer with a sponge, and repeat the pressure a few times more, in order to thoroughly impress the fatty device on the zinc; and, at the same time, to loosen its hold on the paper basis of the original transfer. The back of the transfer is now thoroughly wetted, and, after the water has been allowed to soak into it for a few minutes, one corner is lifted, in order to ascertain if it will easily leave the metal plate, and should this not be the case, more time must be allowed. When the paper basis of the transfer has been stripped off, the fatty impression will be seen remaining on the metal plate, scarcely a trace of the printing ink being carried away with the wet paper. The zinc plate is next flooded with water, and its face is very gently rubbed with a soft sponge, in order to remove any trace of gelatinous matter from the spaces between the lines of the device, the plate being next rinsed, and placed in a warm place to dry.

The image having now been transferred to zinc, subsequent operations may be postponed for a few days without mischief ensuing; and we shall describe the following steps of the work in our next article.

* "Handbuch der Chemigraphie." W. F. Toifel. Published by A. Hartleben, Vienna.

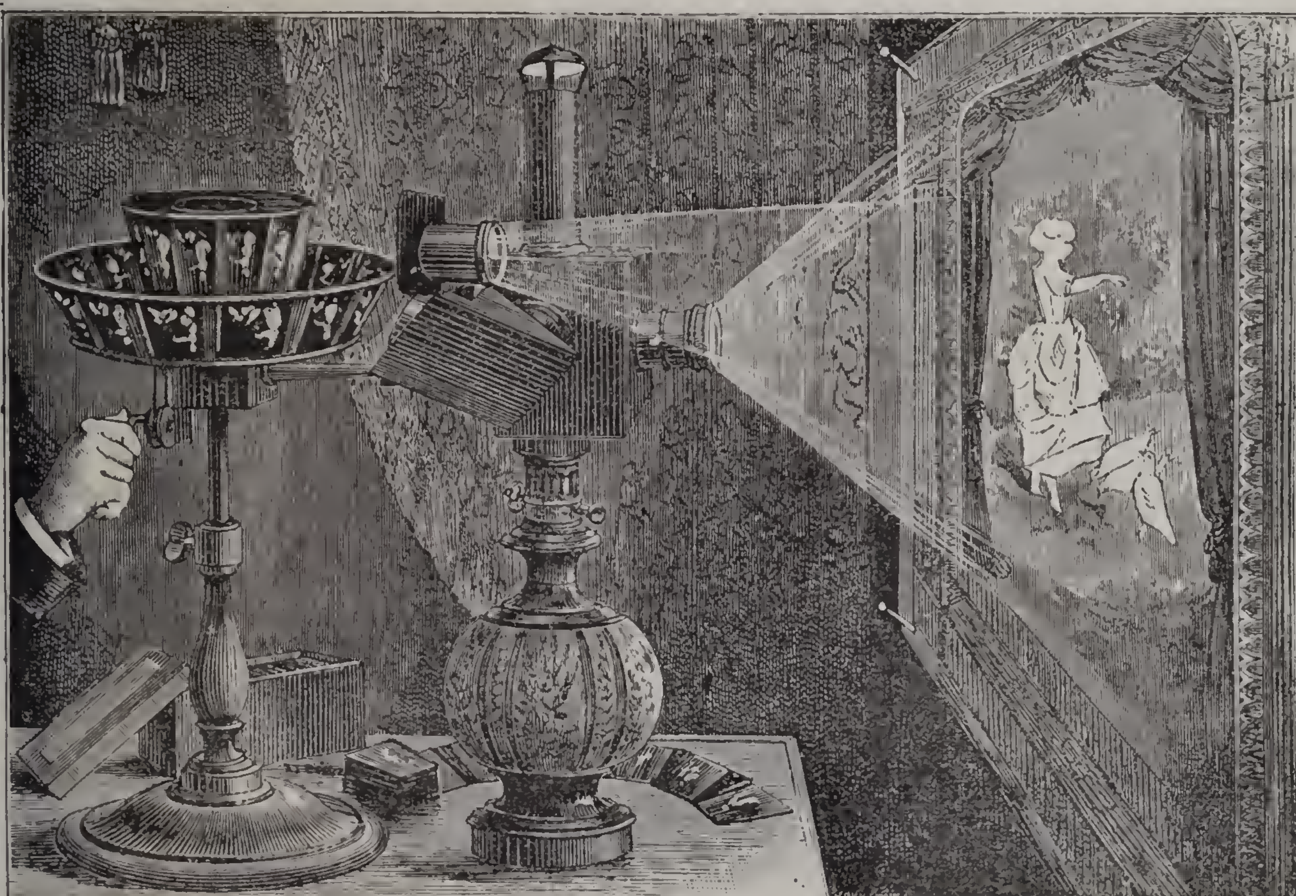
REYNAUD'S PRAXINOSCOPE FOR THE LANTERN.

The photographing of animals in motion has led to some ingenious improvements of the lantern. Many of our readers saw Mr. Muybridge's lantern when in this country, how he brought his pictures, by a sort of Zoetrope action, rapidly before an audience one after the other. The Reynaud praxinoscope does the same thing, and does something else besides: it projects a scene upon the wall, and then animates this scene with living characters.

M. Reynaud's apparatus is said to be capable of being worked by the aid of an ordinary lamp. In the picture here shown, which we take from our contemporary *La Nature*, the whole mechanism is displayed so that our readers will be able to understand the arrangement. There are two projections, although only one lamp is used; one lens projects a scene, the other—the upper lens shown—projects the moving figures.

With the scenic picture or photograph we have nothing to do; that is very simple. As regards the photographs "of motion" which are to follow one another, these are cemented together by joints of fabric, so as to make a band, such as is shown lying on the table. The slides may be coloured if desired, and made to harmonise in this way with the tinted scene on which they are to appear. The bands, which should be made flexible with rubber binding, are placed around the praxinoscope or zoetrope, whichever it may be termed, the instrument, as will be seen, having its sides or circumference distended; the praxinoscope is, moreover, pierced with openings, one corresponding to each picture, as in an ordinary zoetrope. The way in which the praxinoscope is revolved is also shown.

To understand how the luminous rays that form the images are made to fall properly, the reader must imagine a condensing lens which is placed close to the flame of the lamp, but which is not shown in our picture. There is, moreover, a mirror inclined at an angle of 45°, which reflects the luminous rays, and sends them through the pierced openings we have just spoken of. In this way



luminous figures of the moving praxinoscope are formed upon the facets of glass in the upper portions of the instrument, and are thence projected through the upper lens upon the screen.

By converging upon the screen the two lenses of the instrument, we get at once an animated scene.

GLASS.

First Article.

Notwithstanding the numerous attempts that have from time to time been made to supersede in its various forms, it is a matter of remark that probably at no period in the history of photography has there been so much glass employed as at the present. Glass and nitrate of silver appear to hold their own, despite all the efforts of enthusiastic inventors, and probably the more we know of the properties of these articles the less will photographers desire to abandon such tried and trusted friends. We will for the present confine our remarks to glass—glass as applied to the wants and requirements of the photographer in the form in which it daily passes through his hands in the shape of negative plates, whether for wet or dry work—and glance at opal and coloured glass of the sorts usually employed in photography. The aim of these remarks will be, not to write a technical treatise upon the theory and practice of glass making, but rather to familiarize the reader with some articles of common usage in their every-day relation to the art.

Glass itself is an article of great antiquity. We need not search up old books or records to ascertain the precise year when glass was invented—or we might, perhaps, say discovered—for there are stories extant that the first production of glass was by an accident, which happened when some shipwrecked mariners made a fire on the seashore from the materials at hand, and when the fire died out, the stones surrounding it were found to be partially melted, and adhering by a vitreous substance which, in its more refined condition, we now call glass. Whether there is any truth in this story of the origin of glass is not of much present importance; but the narrative serves to introduce us to the elementary form of glass in the shape of vitreous matter; and although various explanations have been forthcoming as to this discovery of glass, such as that the stones employed were natron, or rock salt, it is just as likely that they were limestone, and that the fuel was dried sea-weed, in which case we have in the presence of silica and fire the elements of a vitreous compound.

The art of glass-making is of great antiquity, as proved beyond all doubt by the specimens of really well-made glass dug up in Italy, Greece, and Egypt; but it must be borne in mind that the art then extended only to glassware—flattened glass, and glass for windows for domestic purposes, being, so to speak, a modern inventiou. Taking Italy, and Venice especially, as the birthplace of arts, we find that glass making extended thence throughout the Continent, being fostered in Frauce, and making its way across the Channel until it took up a strong abode in our country. At the end of the eighteenth ceutury window-glass was extensively made in England, principally in the form of *crown* glass—which more anon—and some attempts were made at the beginning of the present century to manufacture what is now called *sheet* glass; an invention the credit of which is entirely due to our esteemed neighbours the French. Up to a comparatively recent period, glass-making in England was under a severe ban by reason of the Excise duty levied upon every foot or pound produced. Until the abolition of this tax, the Exciseman visited the glass house just as he now does the brewery or distillery. It is clear that no trade could thrive under such conditions. By the removal of the duty the industry made a tremendous bound, and glass works in England increased and multiplied. Many of us will remember the window-tax and the enormous price of a pane of window-glass, aud how it became cheapened when the duty was repealed.

Borrowing from the system prevalent in France in the *Departement-du-Nord*, the English and the Belgians had for some time been carrying on the manufacture of what is now called *sheet* glass, and when the duty was removed the opportunity presented itself for the Belgians to pour their cheaply-produced goods into our market, to the unspeakable horror and disgust of our English manufacturers. Before the removal of the duty the Belgians had little or no chance to compete with our own home products; but just about the period of the abolition of the duty they had brought their methods and process of manufacture to such a pitch of excellence, combined with a cheap mode of production, that the tide set in in earnest, and has continued to flow without signs of ebbing, until now it is no exaggerato say that for every hundred feet of glass used in Great Britain, *ninety* feet are of Belgian make! This is a tremendous blow at a great national industry; but our own manufacturers are themselves largely to blame for the present state of affairs; they resolutely set their faces against every innovation; they tabooed the ingenuity of the foreigner; they ignored his inexpensive system of furnaces and appliances, and they refused to copy or imitate him in any way; they thought he would die out; but he knew how to satisfy the public, and he lives.

The *raison d'etre* of the Belgian glass industry is not at first sight very clear. With inferior coals, costlier chemicals, and worse means of transport for the raw material than we enjoy in this country, it is perfectly marvellous that the Belgians can produce goods in no whit inferior in quality to English manufacture, and at about two-thirds of our price. The only satisfactory explanations are found in the fact that the Belgians adopt a less expensive construction in their works, entailing less outlay of capital: the proprietors themselves are nearly all workers; they economise in the production at every point; they employ juvenile and female labour; they have cheap outward transit; and, above all, their workmen are really hard-working; in other words, their labour costs much less than ours. The Belgians are a very hard-working nation, in this respect a great contrast to Englishmen. If Great Britain ever goes to the bad, she will have to thank the British workmen for it.

The chief component of glass is sand. Sand surely is cheap enough, it may be said, and so it is; but it is not all sorts of saud that are suitable for glass-making. Sea sand has been used for many years, and is cheap enough, costing only the labour to carry it from the seashore or sand-banks to the glass works. But sea sand contains a minute quantity of iron, which carries a dull or greenish tint to the glass made from it. For bottles or coarse articles this is of no consequence, but the refined notions of the present age demand goods free from this disagreeable murky tone; especially does this apply to window or plate glass. It was observed that the Belgians made whiter glass than the English, and this, of course, gave rise to the enquiry as to how this happenen, and it was soon traced to the quality of the sand employed. The sand used in Belgium is found underlying the surface soil, is very white and fine, and there are enormous tracts or sand-fields, principally in the district intersected by the Canal de Herenthals, where it is dug out and loaded iuto boats or barges, and brought down to Antwerp, where it is then transhipped into colliers as ballast to return to England, and thus we derive our supplies of sand all the way from Belgium. It goes by the name of Antwerp sand; but this is a misnomer, and causes misapprehension, owing to the idea that, because we know Calais sand and Reigate sand as being actually obtained there, it is imagined that sand is also abundant at Antwerp. There is no sand at Antwerp—there is plenty of mud; but the misnomer is uo less a misnomer than Ostend rabbits, Epping sausages, or Wallsend coals.

There is a variety of inland sand dug in Belgium of a distiuct yellow colour; yet, strange to say, this yields a moderately pure-coloured glass. In England it was the custom to wash the sand before using it, but that was a very costly process; and it will at once be seen that as Belgian sand can be laid down ou the quay at any large seaport in England for about four or five shillings per ton, and needs no washing, an enormous saving is effected by the employment of a sand which not only gives a purer glass, but avoids the expense of washing and drying—items of vital consequence in an industry where cheapness of production is its very life.

DANGERS OF INSTANTANEOUS PHOTOGRAPHY.

The progress which has recently been made in technical knowledge is gradually proving fatal to anything like romance. The electric light banishes the cosy twilight once so precious to lovers, and now that horror called Instantaneous Photography is actually transferring the images of the harmless passers-by to the sensitive plate without the consent or even the knowledge of the victim. Copies of these pictures, which usually are views of the principal promenades, are in due course exhibited in the shop windows, when those who have happened to be thus gratuitously photographed can be only too easily recognised. Only a day or two ago a lady who happened to see one of these views exposed for sale recognized, to her intense amazement, the figure of her own daughter walking arm in arm and evidently talking very familiarly to a gentleman. The mother shakes her head, enters the shop, buys the picture, and half-an-hour afterwards the daughter has to undergo a painful questioning. Unaware of the damning evidence of the photograph, she stoutly denies the charge. The mother, with dire threatenings, says: "But I know it for certain!" Still the young lady denies, till the mother triumphantly produces the fatal photograph!

The young gentleman who was teaching the daughter the piauo does not do so any longer.—*Cologne Gazette.*

By-the-Bye.

A PHOTOGRAPHIC COPYRIGHT DEFENCE ASSOCIATION.

That it is high time photographers stirred in the matter of protecting their copyright is evident to all who have been watching the subject. Piracies have never been more frequent than at the present moment; and from day to day they grow more impudent. There are, roughly speaking, two classes of people who imagine that photographers are sent by providence to benefit them; an unthinking portion of humanity who can appreciate a bold or pretty photograph, but fail at the same time to understand that any skill or taste has been expended in producing it; and secondly, that class who know perfectly well the value of a good picture, and for this reason set about copying it with the least delay possible.

Our illustrated journals and newspapers furnish plenty of examples of the former class; while of the latter, we have simply to go into the poorer and busier districts of cities, or to watering places in the season, and market towns at fair time, in order to see them in countless number. Mr. Josiah Smith is said to have made £12,000 out of the little babies who made their first appearance in Europe at the Paris Exhibition in 1878, labelled "We come all the way from Chicago;" and if so, there is little doubt that had no piracies of the pictures existed, his profit would have amounted to twice the sum. "You Dirty Boy" brought in to the photographer who purchased the right to copy it probably not less than £20,000, but this sum, large as it was, would have been much more if none but authorised photographs had been sold. These are extraordinary examples, we admit, of the value of copyright, but still they show how well worth protecting photographic copyright is; while as a further illustration of how worthless unprotected rights are, we may quote a recent instance in the experience of Messrs. W. and D. Downey, where of the portrait of a popular actor only two dozen copies were ordered by the largest publisher in the trade, and yet on the barrow of a hawker at Hastings, three months afterwards, no less than one hundred and fifty spurious copies of the same photograph were counted.

Still, in presence of these strong facts, there will doubtless be some difficulty in forming a society to protect photographic copyright. It is so hard to get people with varying interests all of the same mind. In France there is a Chambre Syndicale, which occupies itself with the protection of copyright, and does more besides. The Chambre Syndicale considers all matters of a commercial character; and it might be worth while to consider whether, in this country, a similar institution could not be established which would take into consideration matters connected with trading, discounts, commercial integrity, &c., so that photographers who did not take an interest in one branch of the society's doings might take an interest in the other. But it is in the matter of protecting photographic copyright that interest is felt more particularly just now, and to this subject we therefore confine our remarks.

The cost of initiating an institution of this kind, and also of keeping it up, must naturally be somewhat great; but if those firms which are most closely interested in the matter were to set the ball rolling by putting down a substantial sum, there is no reason why the society should not be formed at once; and to such a mode of proceeding we believe several of our London firms are not averse. In this case it would be possible, probably, to put the general subscription at a guinea per annum for the majority of photographers, though the fee can hardly be less. Legal expenses are costly, and although many evil-doers would doubtless fall on their knees before a threat of law proceedings by a society of recognized standing, still, when it did come to an action, the litigation would draw deeply on the funds. In fact, to give our readers some idea of what may be swallowed up in legal expenses, we may cite the case of a fortnight ago at the Mansion House, when Messrs. Elliot and Fry and Messrs. W. and D. Downey prosecuted, the total cost of which prosecution was between £70 and £80. In a civil action, recently fought by one of the above firms, the costs were no less than £240, and this sum might have been double if the evidence had not been so clear.

It is, indeed, not want of evidence, but the disinclination to spend money in pursuing a pirate, that generally stands in the way of prosecution. These barrows full of pirated portraits and consignments of illegal photographs are not put before the public unknown to the leading firms. On the contrary, everything about them is perfectly well known to the detectives who have been employed in tracing the illicit traffic. Where the pictures are made in Germany, the vessel by which they are shipped, the Manchester house to which they are consigned, the dealers about the country to whom they are sold—every detail is on record. "We are advised of every consignment before it comes over," said a gentleman who was behind the scenes, to us last week. "We can watch its arrival in this country, and the distribution of the various parcels; it is only a question whether we think it is worth while to prosecute—whether the game is worth the candle."

But now comes the question to the photographer who is not a big producer, and who only publishes half-a-dozen portraits a year, whether it is worth his while to belong to the association. "It is all very well," he may say, "for your big London firms to start a society of this kind, and ask us to subscribe, but I do not see the force of helping them to get back their own. If they lose a lot of money sometimes, they earn more than I do, and it is no interest to me to put more into their pockets." This is a very good argument, of course; but naturally, at the very outset, some fair and equitable arrangements must be made to guide prosecutions. It is not likely that a man of small means will subscribe to help a neighbour who is better off. The only question that concerns him, and concerns everybody, is whether, by paying a guinea a year, he will be able to make more than that guinea by suppressing piracy.

Now let us turn to the other side of the question—the side of the big producer. We will assume that these are willing to put their hands in their pockets in order to give the association a start, and they hear the plaint of the small producer. What is their reply? It is a very cogent one, and deserves a good deal of attention. They say:—"The smaller producer will decidedly reap the most benefit; for, in the first place, we bring with us all our experience of pirates and piracies, which has cost us so many guineas already, and is such as very few photographers have dreamt of in their philosophy; and secondly, we are willing to share with the association any damages or indemnity that may be paid for pirating our pictures." And as these damages of late years have been very large, we may be sure that the big firms will be the first to acquiesce in that fair and equitable arrangement about prosecuting in which we have just said the small producer would be interested. One firm we wot of received only recently the sum of £700 from a Northern publication which had printed certain portraits without authority; another firm has received £150 and £75 on two occasions; while yet another looks to piracies as an established source of income. Again, in the law case we mentioned above, in which the legal expenses incurred amounted to £240, the damages found by the jury were £500; leaving, therefore, a handsome balance. But to claim and secure these damages a wide sweep of observation is obviously necessary, such as only a big firm or a society can exercise.

Hence, we see, that the small producer has not all to lose and nothing to gain, as at first sight may appear the case. Many a one believes he has not been pirated, for the simple reason that in his little circle of observation no such piracy has met his eye. For ourselves, we should think that any photographer who has secured half-a-dozen popular portraits in the year, and has taken the trouble to publish them, whether the pictures are of royalty, statesmen, celebrities, &c., could scarcely do better than spend a guinea in having these publications watched by a capable society. In any case, it would, we feel sure, be worth while paying a first guinea by way of experiment, and thus give the society a fair start. That it must be under the auspices of no particular clique or set is only a matter of course; but we cannot help thinking that, beyond its mere sphere of protecting copyright, it will do something also to make photographers and photographic publications more respected.

The "By-the-Bye" next week will be "Landscapes and Portraits."

FURTHER NOTES ABOUT COLOURED PHOTOGRAPHS ON GLASS.

BY W. M. ASHMAN.

No. I.

Since writing the last article on the above subject, several enquiries have been made for the working details of the process; therefore, with the Editor's permission, I will give a *resumé* of the method of working, together with some remarks on experiments made.

At the outset, I may say that rendering photographs transparent and colouring them from the back is by no means new, for at various times fees have found their way to the Patent Office and elsewhere. And, under different titles, we are able to discover our old friend again. As many will not care to follow me into the details of recent experiments, I will give the *modus operandi* that works well, leaving the experiments until the last.

Trim a deeply-printed silver print a little smaller than the size of the glass to be used; rub the albumen side gently with a piece of linen rag dipped in benzoline as supplied at the oilman's, plunge it into warm water, and after two changes blot it on a clean towel; place the albumen side upwards on a flat hard surface (a piece of plate-glass), and apply the mounting solution or paste all over it.

Mounting solution is composed of:—

French gelatine	20 grains
Water	1 ounce

to which is added an alcoholic solution of salicylic acid five drops; this requires warming up a little before using.

Mounting Paste.—French gelatine twenty grains, dissolved in water one ounce; to this add an equal volume of ordinary starch paste, and a similar quantity of Kingsford's oswego blancmange, and twenty drops of an alcoholic solution of salicylic acid as an antiseptic; heat the above ingredients over a water-bath for a few minutes, stirring the whole time; when cold it is ready for use. To a previously cleaned convex glass apply some of the same mountant as used on the print all over the inside surface, then lower the print, albumenized side down, gradually on to the inside of convex glass. It does not require any great amount of skill to do this without blisters or creases; but, if such should occur, it may be easily withdrawn and mounted afresh. Well squeegeeing, to remove excess of paste, is the next operation, after which it may be placed on end to dry spontaneously, which will take from six to twelve hours according to the temperature. To make a squeegee, procure a strip of rubber composition about one-eighth of an inch in thickness, cut one edge to fit the bevel of large plates, place a strip of wood on either side, and screw all together, leaving about one inch out on the bevelled side. No squeegee will be found necessary when small plates are used, any excess being more easily removed by the fingers.

When the photograph is quite dry, place it on a cushion, and rub the paper away with fine glass-paper, working gently in a circular direction, the object being to get the photograph as thin as possible, and thereby more easily permeated in the next operation; but care must be taken not to grind off all the paper.

There are several substances suitable for rendering the prints transparent, but I have found as good as any a mixture of

Canada balsam	5 ounces
Solid paraffin	2 ,,
White wax...	2 ,,

Melt at as low a temperature as possible, then place the picture therein, keeping the composition in a molten condition either in a slow oven or on a water bath. If a high temperature be maintained, the print will lose its whiteness, and, when painted, will appear somewhat bilious. At the end of an hour the picture should be examined, when, if it is quite trasparent, it may be removed, and when cool enough the excess wiped off. If, on the contrary, opaque patches are still visible, it should be allowed to get cold, then rubbed down a little more with glass paper, and again put it into the wax composition, allowing it to remain until the marks disappear. When cold, rub off all excess, and proceed with the painting.

A few days ago I was shown some pictures treated as above, but the painting was performed with a shilling box of water colours, and though so little had been done, it was really surprising what a pretty effect it had. To overcome the difficulty of putting water colour on such a repellent surface, my friend said he had used shellac dissolved in borax as a medium to mix the colours; he then found no difficulty in working in any way he pleased on the print, whilst, for the back glass, water answers equally as well as oil colours; but this class of picture seems to lend itself particularly to oil colours.

As I propose dividing this subject into two parts, viz., the preparation and the finishing operations, I see no better time to make a halt than the present. Weeks may elapse between the preparation and the painting without being detrimental to the final result, although it is not my intention to delay the second portion longer than next week if our good Editor can only squeeze enough room for it. In the meantime I would advise all who think seriously of trying a few studies—for such they really are, with ordinary care—to procure a stock of convex glasses from Messrs. J. Barnard and Son, 333, Oxford Street, W.; the sizes and prices are here annexed:—

C.D.V.	$3\frac{3}{4}$ by $2\frac{1}{2}$	per pair	6d.
Cabinet	$5\frac{1}{2}$,, $4\frac{1}{4}$	,,	1s.
Extra do.	$6\frac{1}{4}$,, $4\frac{1}{4}$	,,	2s.
Promenade	7 ,, $3\frac{1}{2}$	,,	2s. 6d.

Messrs. J. Barnard and Son supply mounting paste and other necessary articles if required, but, if I know anything about photographers as a body, they much prefer mixing their own.

MR. J. COMYNS CARR ON PHOTO-ENGRAVING.*

I have described the process of lithography, because it will enable you the better to understand the means by which a photo-engraving in relief is usually obtained. These relief blocks have now been in use for some years, but it is only recently that they have shown signs of sufficient excellence to render them worthy rivals of wood engraving. Their great merit, where they are successful, is that they give us the absolute autograph of the artist. The photographer here takes the place of the wood engraver, and allows the original draughtsman to speak for himself. Or, at least, it should rather be said that this is so in principle; in practice it must be acknowledged that photography cannot always claim the absolute veracity which is sometimes attributed to it. It

* Continued from page 663.

inevitably coarsens, to some extent, even the simple lines of a pen-and-ink drawing, and it takes no account of varying depth or strength of colour. The photographic engraver can distinguish between a broad line and a thin line, though he is apt to exaggerate both; but he is wholly powerless to effect any distinction between a dark line and a light line. In this respect it must be admitted that all these processes are still inferior in effect to the wood-block, in the treatment of which the engraver has at his command numerous devices for giving varieties and refinements of tone. But it must be allowed, nevertheless, that in dispensing with the services of the engraver there is an important gain of another kind. It is something to have the actual touch of the original artist, even though the interpretation is somewhat rough and clumsy; and when the artist has learned to adapt his work to the conditions of the process, results wil be obtained such as could not be secured even by the most painstaking and conscientious engraver. For it is to be observed that the process itself is capable of a vast amount of improvement, and the results now obtained already compare very favourably with the earlier and cruder experiments. Apart from the lack of variety in tone, which was a patent defect of those earlier essays, there was another and more serious disadvantage arising from a certain rottenness and insecurity in the lines themselves. This arose partly from the employment of paper unfitted for the purpose, and partly from an uneven biting of the metal. Photography not only exaggerates the actual work of the draughtsman, but it caricatures the surface of the paper, and if this surface be rough and uneven, the lines, when they are transferred to the metal, lose sharpness and consistency. Mr. Dawson, whose ingenious method of photo-mezzotint engraving I have already described, sought to overcome those defects by a process which he has described as typographic etching. Here the drawing, was actually made upon a prepared plate in a manner partly corresponding to real etching, and the black in relief was afterwards obtained by a cast. But this process had not, after all, the advantage of rendering in *facsimile* an original drawing, and I now, therefore, pass to the consideration of the various modes now adopted for obtaining relief blocks through the intervention of photography.

As the conductor of two artistic magazines, one of which is produced in France, I have had the opportunity of scrutinizing very closely the results produced by the different professors of this kind of engraving both in England and abroad. The principal firms in France at the present time are the Messrs. Gillot, Messrs. Yves and Barret, and M. Petit, and very favourable examples of their skill are to be seen in the pages of *L'Art* and the *Gazette des Beaux Arts*. The point in which they seem to me to surpass most of their rivals in this country, lies in the ability to interpret drawings in charcoal and chalk, as well as drawings in pen and ink. It certainly appears, at first sight, a very remarkable gain to the resources of illustration, to be able to print from a relief-block in such a way as to imitate the crumbling touch of a chalk drawing, and this has, in some instances, been very successfully accomplished. Very much, of course, depends upon the skill of the printer in handling these photographic blocks, as they undoubtedly demand more adroit handling than is bestowed upon the ordinary wood-block. The art of printing illustrated works is unquestionably more widely understood in France than with ourselves, and to this cause we must attribute some part of the superiority which the French processes would seem to possess. In London there are, by comparison, only a limited number of printing firms which devote special attention to this class of work, and although the results obtained in these isolated cases are highly satisfactory, the production is, as a general rule, far more costly. But even the best of these French processes, aided and supported as they are by the greater skill and resource of the French printer, are scarcely superior to a process to which I shall specially draw your attention to-night. This process is the invention of a German gentleman, Mr. Henschell, who is a resident in this country, and who has kindly afforded me every facility for explaining to you the peculiar methods of his work. There are many others of the same kind, and based mainly upon the same principles; but as there are considerable differences in detail, I have thought it best to-night to confine myself to the description of a single example. The faults common to nearly all the processes to which I have referred are, as I have said, of two kinds. In the first place, the line which was firm and steady in the original drawing is apt to exhibit a certain rottenness when it re-appears upon the block, and further, the block commonly fails to distinguish successfully between lines of varying strength. It may even be said that where the original drawing has passages of delicate execution, even though expressed in line, these delicate parts disappear altogether, and the printed impression from the block is, by comparison, crude and coarse in effect. In order to understand why this should be so, it will be necessary to explain the different stages in the production of one of these blocks. The first requisite, common to every process, consists in a good clear negative from the drawing which has to be reproduced; but the real difficulty begins when it is sought to transfer this negative on to the metal. Now, this has usually been accomplished by means of tranfer paper, such as has long been used by lithographers. This transfer paper is so treated as to be sensitive to the action of light, and an ordinary photographic print is then taken upon it, which is afterwards treated with lithographic printing ink and transferred to the smooth surface of the zinc plate. But the conditions which make it necessary to employ this transfer paper are unfavourable to the photographer. In order to secure detail, the light must act through the transfer substance, and fix the image to the paper itself, but unfortunately the exposure required to effect this result intensifies the darker parts of the picture to an exaggerated degree. The engraver has, therefore, to choose between two evils. Either the black parts of the picture will be too strong, or the lighter and more delicate portions will be lost altogether; for unless the light has penetrated the transfer substance and fixed the image to the paper, these delicate features will inevitably be washed away with the transfer material and never reach the metal at all. And this, in fact, is what unusually happens. If an ordinary process block is compared with an ordinary drawing of any subtlety or refinement, it will be found not merely that the lines are rotten, but that many finer lines which gave beauty to the drawing have no existence in the block at all. And there is yet a further disadvantage incidental to the usual mode of procedure. The transfer to the metal can only be effected by pressure, and the pressure has the inevitable result of destroying the delicate work, and rendering the lines indistinguishable. When the image, with whatever loss it has suffered by the way, has been transferred to the metal plate, it is treated very much in the manner already described in connection with lithography. The surface is covered with gum, so as to resist and repel the printer's ink, which is now applied by the lithographic roller, and which only adheres to those parts where the transfer ink has been impressed. The plate so inked and prepared is now ready for the acid bath. It might, if we chose, be treated as a lithograph, and impressions might be taken from it just as they are taken from the surface of the stone. But our object now is to produce a block in relief which shall be adapted for printing in an ordinary press with moveable type, and with this purpose in view, the next thing to be done is to bite away all those portions of the plate which are not occupied by the lines of the drawing. The zinc plate is therefore placed in the acid bath in the same manner as an etching, only that here the process is reversed, and instead of eating into the lines of the drawing, the acid eats away all those portions which surrounds these lines, which are themselves protected from chemical action by the ink which covers them. As the biting gets deeper, care is needed in order to protect the sides as well as the upper surface of these lines, otherwise they would be undermined, and would then fall away; and for this purpose the ink has to be applied again and again during successive stages of the biting.

The method I have been describing is the ordinary method of producing a process block. It may differ in detail, or according to the varying systems of different inventors, but the principle is the same in all, and it is subject in all to the peculiar disadvantages I have pointed out.

In the presence of modern improvements it would be rash to declare that photographic processes have even yet reached the point of full development. Every day brings some new element of refinement, and if the progress in the future is to be measured by that which has been acheived in the past, it is more than probable that the craft of the engraver will be almost entirely superseded. Nor even if this should be the ultimate result of the alliance between science and art, would there be any great cause for regret? As to wood engraving, it has been made sufficiently clear, by our brief examination of its history, that it has never ranked higher than an art of reproduction.

Notes.

The Photographic Exhibition closes definitely next Thursday.

Our friend, Dr. J. M. Eder, has been advanced from lecturer to the dignity of professor at the Technical Academy of Vienna.

Mr. Norman Macbeth, the well-known painter and academician of the Royal Scottish Academy, delivered a lecture on Wednesday in last week to the members of the Edinburgh Photographic Society.

An announcement in another column calls attention to a preliminary meeting of the Copyright Defence Association. Said a member of a firm of photographers to us the other day, "If photographers do not speedily protect their publishing trade, there will soon be no trade to protect. You can buy a copy of any two shilling photograph now in the streets for twopence, and the public will, therefore, soon be asking the question, 'Why give more?' I saw a lady only last week making quite a collection off a barrow in the King's Road, Chelsea."

We mentioned Mr. Ruskin's name last week as a photographic critic, and now bring it forward once more in the same connection. The great art writer tells us, what will be news to many, namely, that he thinks art in photographic portraiture will make no further progress. Perhaps he thinks we have attained to perfection already. However this may be, he says, referring to some portraits recently taken of him by Mr. Barraud, of Oxford Street, "They are the first photographs ever done of me that expressed what good or character there is in me for my own work; and, as pure photography, they seem to me to go as far as the art can at this day; and I do not believe it can ever do much better."

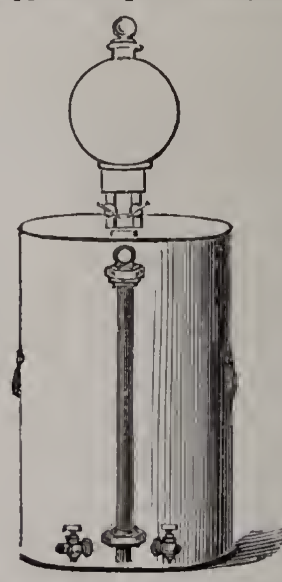
The members of the Berlin Society for the Advancement of Photography have been discussing Obernetter's new method of emulsion making. Herr Roloff and Herr Reichard, as well as two better-known authorities—Herrn Schaarwächter and Prümm—all speak with approval of the new films, the last-named having travelled to Munich to see the process for himself in the Obernetter laboratory. The general opinion goes to confirm that, Mr. Vero Driffield expressed in these pages, that the emulsion is not very rapid; but all agree as to the simplicity and excellence of the method.

Herr Obernetter stores all his negatives in the form of films, and there seems little doubt that years hence this will be the approved way of keeping photographic clichés. The system has many advantages. There is no chance of breakage, the store takes up little room, and no money is sunk in a stock of glass. In the event of fire, films are less likely to suffer, for these can be packed so tightly in packages as practically to be fire-proof.

"Placard him!" This is a method of revenge sometimes adopted by our French friends when they wish to punish a slanderer or other wrong-doer. The name of the victim is displayed in large letters upon the public hoardings, sometimes in badly-written characters, and badly spelt, with the word "cheat," or other obnoxious epithet, beside it. Now there is an idea of improving upon this method of pillory; some Parisians have recently suggested by way of punishment—"Photograph him!"

A certain Paris critic, named Mirbeau, has written in *Le Figaro* an article reflecting on actors in general and comedians in particular. The theatrical world of Paris are in consequence burning to revenge themselves. Some suggest a duel, others that the erring critic be sent to Coventry. But the most novel idea is to have several thousand copies of the photograph of M. Mirbeau struck off and distributed throughout the profession, with a request that any person meeting the original of the portrait should pull his nose. A singular application of photography, certainly!

The "Eclipse Light" apparatus of Mr. McLellan, for taking portraits by artificial light, is represented by the accompanying cut, and our readers will doubtless bear in mind our recent description. The globe is filled with water at the stoppered top, the stop-cocks which sepa-



rate the globe from the gas-holder being closed at the time. When these stop-cocks are opened the water flows out of the globe, while the oxygen enters. All is now ready for burning magnesium ribbon in the gas.

The elaborate work of Pflücker's highly-finished telescopic camera-stand contrasted strikingly with Mr. Harrison's holder. A brass telescopic stand made of tubes fitting closely in each other is all very well until one leg receives its first bruise; but from this time forward such stand becomes practically valueless.

Mr. Harrison generally comes forward with some simple and ingenious contrivance at the Technical Meetings of the South London Society, and the plate-holder he showed on Thursday is so obviously useful and inexpensive that we can only wonder it was not thought of before. A slip of tin-plate two inches wide is bent as shown in the figure,

and will take a single plate from a pile of glasses, or serve to hold one during the process of coating; while for lifting a negative from the developing dish it is just the thing. Thin ebonite would be a better material than tin-plate, having more elasticity, and being less likely to be acted on by chemicals. The strip should be immersed in boiling water, bent to the required shape, and chilled by a dip in cold water.

The Photographic Exhibition might, perhaps, be managed better. Since the present system of issuing tickets available for one only has existed, we have heard frequent complaints from members of the difficulty of obtaining a sufficient number for their friends; and it is decidedly annoying for a member to have to pay sixpence for a catalogue if he should happen to drop in for a few minutes, and wish to look up a picture. If reference catalogues were strung up on the walls at intervals of a few yards, it is possible that the sales might be reduced a trifle, but the true ends of the exhibition would be much more satisfactorily fulfilled.

Dr. Hermann Vogel's "Recent Progress in Photography," of which a favourable notice appeared in these columns two months ago, is to be translated into English by Mr. E. L. Wilson, of Philadelphia, who will also publish the work.

The death of Mr. William Sawyer, the genial Editor of *Funny Folks*, must not be passed over without a line of comment in these columns. Mr. Sawyer, a poet and *litterateur* of considerable mark, took considerable interest in photographic art, and has on several occasions contributed to the News and to the Year-Book. He was a member of the Solar Club, and has repeatedly penned criticisms on the yearly exhibition at Pall Mall. A word of his on the subject of backgrounds may be here repeated.

Mr. Sawyer used to protest against photographic portraits which showed people stuck against a flat background. "You couldn't walk round them if you tried your hardest," he said; "people in real life seldom sit with their backs flat against walls, any more than they sit on the mantelpiece, even when a broad mantelpiece affords facilities for so doing. Of course the photographer will tell me that he knows this as well as I can tell him, and that he is as painfully conscious of the retiring quality of his portraits as any one can be; but there must be a flat clear surface behind the sitter." Mr. Sawyer suggested whether, in order to get more "atmosphere" in rear of the sitter, it might not be possible to employ a hinged background, or other method of breaking up the surface at the back.

Money taken at the Pall Mall Exhibition on the evening of Thursday, the 16th inst., will benefit the Photographers' Benevolent Association; we sincerely hope to see a goodly assemblage on this occasion.

A fatal accident with collodion cotton is reported from Ardeer. For some time past, as our readers may remember, a new and very powerful explosive has been in course of manufacture by the Nobel Explosive Company, in which the terrible detonating qualities of nitro-glycerine and gun-cotton are combined. The gun-cotton is dissolved in nitro-glycerine—for nitro-glycerine is a solvent like a mixture of alcohol and ether—and a pasty mass is the result, which has received the name of blasting gelatine, albeit there is not a particle of gelatine in its composition. The soluble gun-cotton—or collodion cotton, as it is usually termed, in contradistinction to military gun-cotton, which is insoluble—is prepared in the state of fine fluff at Ardeer, and it was during the process of drying this finely-divided material that the accident happened. A Government enquiry is to be held, and we shall probably learn something of the process of manufacture adopted at Ardeer.

We have to call attention—rather tardily, it is true—to a little sixpenny volume which Messrs. Piper and Carter have published on "Recent Advances in Photography." The book contains the series of Cantor lectures delivered this summer by Captain Abney, which contained so much of interest, and were published in these columns.

The other day all the world was talking of an electric launch, a small craft which took on board some tons of secondary batteries in order to move half-a-dozen miles. Now we hear of a wonderful tricycle, which is also propelled by electricity, the driver simply having to direct the machine with a couple of handles. The motive power in this zephyr-like machine is also supplied by secondary batteries, and the weight of these is, we are told, "only one hundred-weight and a-half!" What would the ordinary tricyclist say if you asked permission to put a parcel on his fragile machine weighing "only one hundred-weight and a-half?"

Dr. W. Reissig, a name well known in photographic science, has, it is said, solved that most difficult of problems, the manufacture of a really indelible ink. It is compounded of boiled linseed oil sixteen parts; fine lamp-black six parts; and perchloride of iron from two to five parts. Diluted with a little boiled oil varnish, it can be used for stamping, only the stamp must be of rubber and not metal, since the composition would attack it. As the ink unites both with the gelatine and the paper material itself, traces of the ink can always be detected, even when the latter has been removed.

Patent Intelligence.

Patents Sealed.

2156. Frank Wirth, of the firm of Wirth and Company, Patent Solicitors, at Frankfort-on-the-Main, in the empire of Germany, for an invention of "Improvements in the preparation of photographic plates for subsequent typographic or other multiple reproduction of living or dead objects."—A communication from George Meisenbach, a person resident at Munich, in the empire of Germany.—Dated 8th May, 1882.

This invention consists of a novel method by which any object, dead or living, can be delineated direct by photographic means with stippled or hatched shading, without having to first make a drawing; and such delineation can he multiplied by printing, or engraved as a plate for the reproduction of copies. In order to produce a typographic block, the method to be employed is as follows:—A transparent plate is hatched or stippled in parallel lines. A transparent positive is made of the object. The two plates are joined, preferably face to face. From the combined plates a definite negative is photographed in the ordinary manner. In order to cross-hatch and break the lines of the shading for obtaining a more plastic appearance of the printing made from the typographic or other block, the hatched or stippled plate is shifted or moved once or twice during the production of the said definite negative. This negative is transferred in the usual manner on to a plate of suitable material, which is graved or etched in the usual manner to form a typographic block. For the engraving plates the negative is transformed into a positive, and the latter is transferred on to the etching plate in the usual manner. The negative produced from the combined plate may be used for the production of photographs on photo-lithographic plates. The only definite claim appears to be "the one or more times exerted in moving or shifting of the hatched plate on the photographic negative or positive plate during the production of the definite negative or positive from which afterwards the typographic or other printing block is made.

Grants of Provisional Protection.

4608. Joseph Mayer, of the firm of Mayer and Meltzer, of 71, Great Portland Street, in the county of Middlesex, Surgical Instrument Makers, for an invention of "Improvements in means or apparatus employed in obtaining artificial light."—Dated 28th September, 1882.

Notice to Proceed.

3491. Edward Gardner Colton, of Southampton Buildings, in the county of Middlesex, for an invention of "Improvements in the method of producing photographic images and in apparatus applicable therefor."—A communication to him from abroad by William Kurtz, of the city, county, and state of New York, United States of America.—Dated 22nd July, 1882.

Patents Granted in Canada.

14,883. Anthony C. Dunlevy and Frank M. Campbell, of St. Louis, Mo., U.S., for "Improvements on skylights."—5 years.—Dated 1st June, 1882.

14,934. The Newark Filtering Company, of Newark (Assignee of Patrick Clark, of Rahway), N.J. U.S., for "Improvements on methods of and apparatus for filtering water and cleaning filter beds."—5 years.—Dated 10th June, 1882.

14,935. The Newark Filtering Company (Assignee of John W. Hyatt), of Newark, N.J., U.S., for "Improvements on process and apparatus for the filtration of water."—5 years.—Dated 10th June, 1882.

Patents Granted in America.

265,980. G. Frank E. Pearsall, of Brooklyn, N Y., for "A screen for photographic cameras."—Application filed 31st July, 1882. No model.

266,035. Egerton R. Higgins, of San Francisco, Cal., for "A camera attachment."—Application filed 3rd July, 1882. No model.

Specification Published during the week.

1621. G. L. Addenbrooke, for "Adjustable photographic exposer."—*Provisional protection only*. Price 2d.

My invention is for the purpose of enabling photographers to obtain readily the exact exposure which they may deem proper to give photographic plates in the camera. Several forms of photographic shutters are now in use to which my invention may be rendered applicable. But I prefer a form of shutter made as follows:—A closed box, say 8 inches long, 4 inches broad, and 1½ inch thick (these measures being proportionate) through the lower part of which a hole is made (say three inches in diameter). This box should have inside it two grooves, in which work freely two slides of such size as to cover the aperture. These slides are attached by elastic or springs, one to the top and the other to the bottom of the box. When required to be set, one slide is drawn down to cover the aperture, and the other is drawn into the space above, both being retained by catches. I now proceed to describe my method of withdrawing the catches as in the shutter above described, so as to regulate exposures. I fix on the shutter in any convenient place a simple clockwork train almost exactly similar to the striking train of a clock, and consisting of a long spring, preferably with stopwork to prevent its being wound more than one turn. To the barrel of this spring is on one side geared a revolving fan, the gearing being such as to cause the fan to make, say, from 300 to 600 revolutions for one revolution of the spring barrel. The barrel of the spring is also geared into a cog wheel of rather smaller diameter than the barrel. The arbour of this cog wheel projects through the case of the clockwork, and to it is fixed a metal disc. This disc has on the underside a projection, and a lever working on a central pivot is placed so as to come in momentary contact with this projection as the disc revolves. This lever is connected by a simple metal rod or slip to the lower catch of the shutter, which is made with an arm projecting at right angles so as to receive it, so that whenever the projection on the disc moves the lever, the catch is withdrawn, and the slide it holds liberated. Again, the disc has a movable radial arm having another projection rather further from the centre than the first, and by any convenient means, such as a series of holes at graduated distances round the edge of the disc, this second projection may be set at any required interval from the first. This second projection acts on another lever similar to the first described, and connected in like manner with the upper catch of the shutter. It is thus clear that the disc being set to revolve in a certain number of seconds (say three), the two levers will be moved by the two projections at an interval which bears the same relation to the time taken for a whole revolution of the disc as the arc distance between the points does to the whole circle; the result being, that the operator having wound up the spring, set the radial arm to give a required exposure, and the slides of the shutter, on liberating the clockwork the slides rise and fall respectively at the interval fixed upon, so making the required exposure. Claims. I do not claim, as part of my invention, the use of the shutter above described, but I do claim as my invention,—(1) The use of a simple clockwork train governed by a fan to regulate photographic exposures, such clockwork train to release both shutters, or their equivalents in other forms of shutter, when the apparatus is wound up, the shutter set, and the fly released. (2) The use of a rotating disc with two projections or their equivalent for the purpose of regulating photographic exposures, as above described.

PASTORAL PHOTOGRAPHY.

BY ALEXANDER BULEY.

May! beautiful May! floral May! It is very delightful to dream of sunshine and flowers this cold and foggy weather, especially if you can dream of holiday-making into the bargain. And of all the months in the year in which the hardworked photographer should take his day out, and take it, too, (if he can) without a care, is the month of May.

Everything in nature seems so contented, so lazy and happy. The lilac, crowded with blossoms, like clusters of grapes on a vine, fills the air with its delicious scent, while its contemporary the laburnum more than makes up for its want of perfume in the beauty of its golden chain of blossom. Take as many days as you can in May, my friend; I regret that I can only write of one; but the lilac and the laburnum were very sweet.

A few years ago an extraordinary discovery was made, viz., that all the churches in the country were about to fall in or fall down, and the cry of "Restoration" went forth. In some cases it was no doubt necessary, in others it was carried too far, destroying or plastering over grand bits of ancient stonework, and doing that which some now alive will live to regret.

The cry reached Wedmore, and, funds being found, the parish church was forthwith restored. I did not know the church sufficiently well before its restoration to be able to say anything about the effect in its particular case, but I do know that a year or so ago, upon a beautiful day in May—one of those days when the lilac and the laburnum kept nodding to each other in the softest of soft winds—I packed up, with the assistance of Dan, my eldest son, the wherewithal to photograph Wedmore Church.

The re-opening ceremony was to take place some week or so hence, and I must confess that I conceived an idea of making business and pleasure meet. What else could warrant the pony and trap hired for the day, the lavish order for dinner that was given at the "Swan," together with the reckless tip to the ostler to give me the whole and sole use of his coach-house, in which to plant my tent? Of course the sale of the photographs would give me this grand day out, pay everything, and something over. That was what I thought; I don't think Dan thought much about it. Dan thought a lot of the tart covered with thick cream that the aforesaid lavish order brought about, and very little of the church.

Wedmore Church can be photographed very easily from that point of view from which nobody wants to photograph it. The front and best view, taking in the main entrance, is not so easy. In the churchyard you are much too close, and the churchyard is bounded by a wall over which you can drop (if you like) some ten feet to the road beneath, so that the only way to get a picture at all was to get it from the window of one of the houses opposite.

Dan being nearly ten years old, I of course took counsel with him, but was unable to get to the window he suggested—and which, by the way, was the best—owing to the owner being ill in bed. At the next house, however, we had permission to occupy the "first-floor-front," and, much to the astonishment and alarm of the youngsters in the passage, we made our way with camera and stand to the bedroom, the conditions being a mounted photograph of the church to the good lady of the house. But it was not yet taken; the window was of the old-fashioned lattice sort, very narrow, only half of which would open, and that half protected by a rod of iron running straight across, and, as I found, very much in the way of one of my negatives. After a lot of trouble, placing one end of the tripod upon the chest of drawers, and propping the other with a huge book ("Fox's Book of Martyrs," by the way), and by sundry other devices, the camera was got into position, and the grand old church looked just like a photographer likes a church, or anything else, to look, upon the ground glass—superb. At last! Look, Dan!—capital, isn't it? Now hand over the dark slide. By Jove! here was a go. There was the old-fashioned window, with one of Mr. Rouch's new-fashioned cameras built into it, and the fact that the dark slide goes in sideways, forgotten.

What was to be done? Why, to leave the camera where it was, and insert that dark slide, I must have demolished half the room! Dan laughed—laughed like a boy without a care can laugh. I did not; honestly, I did not laugh. All my trouble for no good! Everything had to come down; "Fox's Book of Martyrs," the tripod, and all the other dodges had to be put aside. Still the thing had to be done. The "first-floor-front" had been taken, a mounted photograph promised, and, above and beyond it all, my own determination to photograph Wedmore Church remained. It was done, after all, in a simple way, only simple ways do not always show to the front. After trying this way and that way, the simple *modus operandi* suggested itself to me to turn the whole thing upside down; that allowed me to draw out the shutter, and, as I was using dry plates, that did not much matter. One moment here, while I point out an advantage attached to dry plates (I think, never before noted) as compared with wet—*you can turn them upside down.* Of course you can, everybody knows that; but supposing I had been forced to photograph that church, as I was forced to photograph the last church I honoured, with a wet collodion plate—how would it have been then? Thanks to the dry plate—not forgetting the well-known "Book of Martyrs"—I overcame the difficulty, and Wedmore Church was mine. The counterfeit presentment of it was mine—not the church, that is worth £600 a-year, is in the gift of the bishop of the diocese, and pastorated by his (the bishop's) son—and photographed by me! The tent put up in the coach-house was originally meant to work wet plates—in a standing position. All I brought of it was the cover, which I put over the tripod, seating myself to develop. An empty hock bottle, with the bottom knocked out, makes a good shade for a candle; the negative or any other box to sit on, and a bucket turned up for the developing, are all you need to see for yourself what you have.

We gave our negatives a good washing in the yard of the "Swan." I held the negative, while Dan pumped, and the ostler looked on—he was a real Somersetshire youth, about nineteen or twenty, I should think. He watched the washing with great interest, and when I had finished, and held my negative up to the light that I might look through it, he delivered himself in the best of Zummerzet:—"If I could larn to do the like o' thic ther, I'd never not have to do with no hosses—not no more." I held a negative in my hand, but that was nothing to the *negatives* that fell upon my ear; he was quite *positive* in his manner, though.

The church being done, there was yet one to do of the "Swan," getting the landlord and landlady to give life to the hostelry by appearing in the front grouped about the round pillars in the porch. Barkis was willing, but nothing would induce the young hostess to pose anywhere in sight, the effect being that mine host appears in the picture where a host should, upon his front steps, while mine hostess can be faintly discerned peeping round one of the pillars.

I used 9 by 7 plates, and developed them in an ebonite dish, which dish was so economically made that after the plate was in, it was difficult to get it out: it was a regular tight fit. That annoyance vanished when I laid a piece of tea twine across the upper end of the dish before putting in the plate. I could raise it at will, look at it, lay it down again, and not once touch the solution with my fingers. A simple dodge—still worth knowing.

The re-opening ceremony took place, and copies were produced in good time, but the sale did not come up to much—nothing to warrant the luxuries of that day out. If the truth were told, the public-house paid far better than the church, and certainly the next church I have a shot at must needs be easier to do, or, sad as it may sound, I shall turn to the public-house.

"All's well that ends well." I had my day out, the landlady of the "first-floor front" had her picture, Dan drove the pony home, and the lilac and the laburnum were ver sweet.

PHOTOGRAPHIC COPYRIGHT DEFENCE ASSOCIATION.

We are requested to announce that a meeting will be held on Wednesday next, the 15th inst., at 7 p.m., in the Chapter Room, Anderton's Hotel, Fleet Street, with a view to forming an Association or Society, to protect the copyright of photographic publications. Mr. George Bishop has kindly consented to take the chair on that occasion, and photographers in the country who cannot conveniently attend are invited to forward any suggestion they may desire to make on the subject of forming the Society, to the Chairman. The attendance of photographers is earnestly requested.

CONSTRUCTION OF STUDIOS.

At the last meeting of the Society for the Advancement of Photography in Berlin, some interesting remarks were made on the construction of recent German studios. Dr. H. Vogel, who was in the chair, exhibited to the meeting a sketch of Hanfstängl's studio, Unter den Linden. It is of extraordinary construction. The roof is not even, but sinks in the middle, so that the side elevation of the studio is like the diagram Fig. 1.

Fig. 1.

The top light is partly changed into two front lights v v, acting powerfully on persons stationed at P P′. This circumstance perhaps accounts for the shortness of exposure necessary, but the lighting seems somewhat diffused. The studio is unusually lofty. The middle depressed part is ten feet high, and the ends are twenty feet.

Herr Bergmann described a studio of the firm of Beyrich, patented in Austria, which he praised highly. It was in many ways to be recommended, and constructed on somewhat the same principle as the preceding.

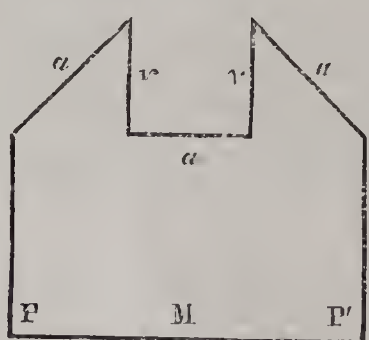


Fig. 2.

Referring to Fig. 2, side view of the studio, sides a a a of the roof are opaque, while v v are glazed. The camera is placed at M, and the sitter at P or P′.

Herr Reichard remarked that in both studios (at least by day-light) the sitter must be posed in the morning on the East, and in the afternoon on the West side, so that to a certain extent one is forced in the morning to work with light from the left, and later in the day from the right; it is self-evident that this cannot be practicable for every-one. He did not doubt that by a suitable arrangement of curtains this difficulty might be obviated, but then the light would be so weakened that there would not be more than in any other studio. The construction of Hanfstängl's studio seems to indicate that a change of lighting was aimed at during exposure, as in Kurtz's new researches. It was stated by Herr Haberland that he had once worked in a similarly constructed studio, and found it only tolerable on cloudy days, but succeeded very badly in sunshiny weather.

WORK IN THE INFRA-RED OF THE SPECTRUM.

BY CAPT. W. DE. W. ABNEY R.E. F.R.S.

It is with a certain amount of dread of boring the readers of *Nature*, that I have taken up my pen to write on the method of photographing with rays of very low refrangibility, since it ought to have passed the limits of novelty. And yet I suppose it has not altogether done so, since almost weekly I have inquiries made as to where the method is described, and am questioned as to how to succeed with it when my correspondents know where to find its description. The Editor also has asked me to write on the subject, so I propose to put as concisely as I can what plan to adopt. It is almost too well worn a scientific adage to repeat that unless you can obtain a sensitive salt which will absorb the rays to be used photographically, you cannot hope for success; and the method which I shall describe presently fully secures this desideratum. To photograph the red and dark rays, then, a sensitive salt must be procured which shall absorb the red and ultra-red rays. The colour of the salt to aim at, then, is a bluish green, which gives a continuous absorption at the least refrangible end of the spectrum. The salt employed is bromide of silver in a modified molecular state, a state, I may say, which is very easy to obtain when the formula below is strictly carried out, but very easily missed if the experimenter is self-inspired to make improvements in the method of procedure. I don't know whether it is something peculiar to photographic minds that there is in them such a large amount of self-assurance, but my frequent experience is that those who try a formula for a photographic preparation invariably try to improve on it before giving the original one a chance of success; and then when failure occurs they blame everything and everybody except their own conceptions. May I ask those who read this and endeavour to prepare the sensitive compound alluded to, to follow out strictly the directions as I described them in the Bakerian Lecture for 1880?

The following is the mode of preparation. A normal collodion is first made according to the formula below:—

Pyroxyline (any ordinary kind)... ...	16 grains
Ether (·725 sp.)	4 ounces
Alcohol (·820)	2 ounces

This is mixed some days before it is required for use, and any undissolved particles are allowed to settle, and the top portion is decanted off. 320 grains of pure zinc bromide are dissolved in ½ oz. to 1 oz. of alcohol (·820), together with 1 drachm of nitric acid. This is added to 3 ozs. of the above normal collodion, which is subsequently filtered. 500 grains of silver nitrate are next dissolved in the smallest quantity of hot distilled water, and one ounce of boiling alcohol ·820 added. This solution is gradually poured into the bromized collodion, stirring briskly while the addition is being made. Silver bromide is now partially suspended in a fine state of division in the collodion, and if a drop of the fluid be examined by transmitted light it will be found to be of an orange colour.

Besides the suspended silver bromide, the collodion contains zinc nitrate, a little silver nitrate, and nitric acid, and these have to be eliminated. The collodion emulsion is turned out into a glass flask, and the solvents carefully distilled over with the aid of a water bath, stopping the operation when the whole solids deposit at the bottom of the flask. Any liquid remaining is carefully drained off, and the flask filled with distilled water. After remaining a quarter-of-an-hour the contents of the flask are poured into a well-washed linen bag, and the solids squeezed as dry as possible. The bag with the solids is again immersed in water, all lumps being crushed previously, and after half-an-hour the squeezing is repeated. This operation is continued till the wash water contains no trace of acid when tested by litmus paper. The squeezed solids are then immersed in alcohol ·820 for half-an-hour to eliminate almost every trace of water, when after wringing out as as much of the alcohol as possible the contents of the bag are transferred to a bottle, and 2 ounces of ether (·720) and 2 ounces of alcohol (·805) are added. This dissolves the pyroxyline, and leaves an emulsion of silver bromide, which when viewed in a film is essentially green-blue by transmitted light.

All these operations must be conducted in a very weak red light—such a light, for instance, as is thrown by a candle shaded by ruby glass, at a distance of twenty feet. If a green light of the refrangibility of about half way between E and D could be obtained it would be better than the faint red light transmitted by ruby glass, since the bromide is less sensitive to it than to the latter. The light coming through green glass after being filtered through stained red glass is almost the best light to use. It is most important that the final washing should be conducted almost in darkness. It is also essential to eliminate all traces of nitric acid, as it retards the action of light on the bromide, and may destroy it if present in any appreciable quantities. To prepare the plate with this silver bromide emulsion all that is necessary is to pour it over a clean glass plate, as in ordinary photographic processes, and to allow it to dry in a dark cupboard.

It has been found advantageous to coat the plate in red light. and then to wash the plate and immerse it in a dilute solution of HCl, and again wash, and finally dry. These last operations can be done in dishes in absolute darkness; the hydrochloric acid renders innocuous any silver sub-bromide which may have been formed by the action of the red light, and which would otherwise cause a heated image.

Let me here give warning that the emulsion formed will be very grainy in appearance, and requires vigorous shaking to cause it to emulsify proper. If it requires a little plain pyroxyline, say about two grains to the fluid ounce should be added to give greater consistency. One thing is certain, if it be not coarse grained under the microscope it will not be sensitive to the required region, and moreover it will be found that on an average it should be about twice as coarse as the average form of bromide which is generally obtained in collodion emulsion. Here let me interpolate a remark. It has been assumed that because an emulsion in gelatine has a bluish colour after it has been boiled, that in this case we have the same form of bromide as that described above. It is a very different form: let me show how. Suppose we throw a spectrum on a gelatine plate, it will be found that G requires about ⅕ of a second with a very narrow slit, whereas to obtain B it will require the best part of a minute, and to obtain rays of lower refrangibility very much more; and that any amount of exposure will not make an impression much below A. With the blue-green bromide in collodion to obtain an impression about G will take some eight or ten seconds, and it will be found that at the same time we have an impression of B. A minute's exposure to the prismatic spectrum will under similar circumstances give an impression as much below A as D is above it, measured not in wave-lengths, but along the photograph. I point out this because a leading Continental photographic experimentalist has expressed himself satisfied as to the identity of the two forms of sensitive salt. They are totally distinct, as if he tried to work with a gelatine plate in the infra-red region he will soon own. Now in reference to the coarseness of grain it is right to call attention to its disadvantages. Its advantage we know. In spectrum work we often come across close pairs of lines. Now suppose each pair happened not to be separated by a larger interval than the grain of the sensitive salt, we shall be unable to resolve such a pair, for the action of either component of the pair, and much more both, if they fell on it, would be to cause, on development, a reduction to metallic silver of the whole grain. Thus evidently such a close pair would be unresolved.

(*To be continued.*)

Correspondence.

FOL'S REPEATING CAMERA.

Dear Sir,—I see you allude in your issue of a fortnight back to the repeating camera I have recently constructed. The way of using is correctly described, but there is an error in the size of the plates. My repeating gun camera carries eleven plates 4 inches by 5 inches, or, more exactly, 9 centimetres by 12 centimetres. Will you kindly note this in the next News?—Faithfully yours, Dr. H. Fol.

PHOTOGRAPHIC NUISANCES.

Sir,—As one among the number of photographers who have been greatly inconvenienced by the uncertainty of commercial dry plates, scarcely ever finding two dozen of the same quality, I would venture to suggest that manufacturers should put up one gross packets of plates of the same batch, so that the professional or amateur should at once know upon using the first dozen from the gross how to regulate development, &c. As the matter now stands, on sending an order to a dealer, one gets plates from many batches, scarcely any two boxes bearing the same number of batch. Some makers label the plates on the outside as to instructions for development; but on opening, one finds a notice "only for pyrogallic development." Your humble correspondent found this out to his delight when twenty miles from home, with only oxalate, &c., with him.—Yours, &c., Midland Counties.

Dear Sir,—I venture to think that the complaints which have lately appeared in the News as to the unreliability of commercial dry plates scarcely represent a tithe of the injustice done to photographers (especially amateurs and the smaller professionals) by the carelessness of certain makers of plates.

I could state some facts which would scarcely redound to the credit of at least one maker, but I forbear, as my present object is to give a suggestion for checking the abuses to which the users of commercial plates are now subjected.

The remedies I would suggest are as follows:—

First, that a committee be formed in connection with each of the photographic societies, to examine and report upon any plates which may be sent to them by the members of the societies; such reports to be published in the photographic journals, giving name of maker of plates, the defects found in such plates, &c.

Second, that such committees should occasionally purchase, or cause to be purchased, *in the open market*, plates by the various makers, and report upon them from time to time.

This course, while doing good to all reliable makers, would place a check upon the unreliable ones, and thus compel them to improve their goods, or drive them out of the market altogether.

This question is of greater importance than photographers in London and other large centres are aware of, and they can form but a faint idea of the inconvenience and loss experienced by those who reside in the small towns and country places at a distance.—I am, &c.,

Thos. Forrest.

PHOTOGRAPHIC JOURNALS.

Dear Sir,—You will oblige me by correcting the statement in your last number of the Photographic News concerning the *Photographisches Archiv;* this journal now appears fortnightly, on the 1st and 15th of each month regularly, and is no longer published in Berlin, but only in Düsseldorf by my firm.—Believe me, dear sir, yours faithfully, Ed. Liesegang.

Proceedings of Societies.

South London Photographic Society.

The Annual Technical Meeting of the above Society was held at he House of the Society of Arts, John Street, Adelphi, W.C., on Thursday evening, 2nd of November, the Rev. F. F. Statham, M.A., President of the Society, in the chair.

There was a good attendance of members, and many visitors also were present, the room being well filled.

The minutes of the previous meeting having been read and confirmed,

The Chairman reminded the members that this was the occasion upon which nominations must be given in for the election of officers for the present session, the ballot for which would take place at their next meeting on December 7th. The following gentlemen were then nominated:—

President—The Rev. F. F. Statham, M.A.

Vice-Presidents—Messrs. Jabez Hughes, Frank Howard, W. Brooks, Peter Mawdsley, and E. Cocking

Committee—Messrs. T. Bolas, W. B. Bolton, A. Cowan, W. Cobb, E. Dunmore, E. W. Foxlee, and G. F. Williams. of the retiring members, were nominated. Mr. E. W. Yorke having tendered his resignation, and Mr. Leon Warnerke being absent from England, Messrs. H. Wilmer and John Nesbit were nominated in their stead.

The Chairman said that with regard to the office of hon.

treasurer, he was sure the members would all agree with him that they would like to have the services of Mr. F. A. Bridge again, who was present this evening, though out of health, and had signified his willingness to undertake the duties of that office for another year. With respect to the hon. secretaryship, he said that Mr. H. G. Cocking having resigned that post, there had been some discussion about the matter at the committee meeting, and as Mr. Bridge had expressed himself willing to combine the duties of this office with those of treasurer, it had been proposed Mr. Bridge should fill the double office of hon. secretary and treasurer, and should have the option of appointing an asssistant secretary to help him with the clerical work, &c., as he could not devote the necessary time himself to these duties. The matter would be brought up again at their next committee meeting, and something definite arranged. He also announced that the annual dinner would take place on Friday, 15th December, provided arrangements could be made for that date. It was proposed to hold it at the Holborn Restaurant as usual: should any change be made in the arrangements, however, the members would be advised of it. He also intimated that the secretary of the Parent Society had kindly sent them a bundle of tickets of admission to the Exhibition in Pall Mall, and any members who desired to take any could obtain them upon application after the close of the meeting. Before commencing the technical meeting, it being necessary to have some one as demonstrator, he proposed that Mr. Brooks, who had acted in that capacity before, should be asked to assist the meeting; and that gentleman having signified his willingness,

Mr. A. G. Langton, of Euston Road, exhibited an improved glass developing dish, which he found to be better than ebonite, as, being transparent, it enabled the operator to watch the progress of the development. It had an india-rubber shield attached to the handle to protect the hands from being stained by the solution. He also exhibited an improved plate-box for the studio.

Mr. George Smith, of the Sciopticon Company, showed a portable tourist camera—half-plate, and very light. The body of the camera had a range of three to eleven inches; but by means of a bellows extension front, which packed inside the camera, the range could be increased to seventeen inches. The peculiar features of this camera are, however, the arrangements by which the motion of the swing-back and movable front are obtained. In the former case the back portion of the camera is attached to the base-board by a universal ball-and-socket joint, which allows it to be clamped firmly in any desired position, the horizontal and vertical swing being gained by the one motion. In the front the sliding portions are kept in position by hidden springs, which, while allowing the lens to slide, do away with the necessity for screws to retain it in position. He also exhibited his "brattice" stand, made of pine, and weighing only 1 lb. 5 ozs. When fixed up, the legs were always kept in a state of tension, and very steady, by means of an alternate pull-and-thrust arrangement of brass bolts. He also showed a lantern for changing plates when travelling, to be used with a night-light, and a dropping bottle for holding solutions.

Mr. E. White, of Forest Hill, showed a changing-box on the principle of a tent fitted on to the top of the plate-box, with sleeves at the sides to work through, and sufficiently large for 12 by 10 plates.

Mr. Shew, of Wardour Street, exhibited a developing-box fixed on a tripod, the inside of which was perfectly water-proof; also a fixing trough, to fix with a very small quantity of hyposulphite, and having a carrier to the plate which could be moved up and down to accelerate the fixing; the trough being made of glass, the operator could watch the progress of the fixing. This gentleman also showed some improvements in his instantaneous shutter.

Mr. Emery, of Burslem, who read a paper at the last meeting on the "Application of Photography to the Decoration of Pottery," sent some specimens in illustration of the process, printed respectively from Woodburytype blocks, ordinary copper plate engravings, and from copper plates reproduced by photography.

Mr. Brooks, by permission of Mr. Barnes, of Mile End Road, showed some early specimens by Scott Archer himself, including an albumen negative, two negatives taken in collodion of a statue in the 1851 Exhibition, a negative taken before the dipper came into use, and taken from the bath with the fingers, and a negative printed from with the iodide left in the film. Mr. Brooks also showed two of Dr. Huggins' small negatives of star spectra.

Messrs. Marion and Co., Soho Square, exhibited a half-plate "Enjalbert" camera and changing-box combined, carrying eight plates, and very compact, which could be used either horizontally or vertically, and with either long or short focus lenses; also a small camera and changing-box invented by Mr. Warwick Brooks, of Manchester, called the "Academy Camera"; also a telescopic tripod for small cameras, formed of brass tubes, the invention of M. Pflücker, an officer in the Belgian army.

Mr. Cowan (on behalf of Mr. George Hare) showed a camera which was claimed to be the lightest, for its size, ever made, with reversible back, focussing up to 17 inches, and swinging to any angle, and the front having swinging action to get side motion.

Mr. A Cowan showed a boiling-jar with wire jacket to protect the fingers; also a developing dish, designed so as to protect the fingers while developing. He also exhibited an improved cutting-board, and a packing-box for carrying small articles, which, when turned upside down, could, by an ingenious arrangement attached to a false bottom, be quickly converted into a dark-tent.

Mr. Harrison exhibited an extempore plate-holder made of tin, which could be constructed in a few minutes; also a method of packing dry plates, consisting of a box or frame made to same size as the rebate in plate box, in which the plates were placed, parted by strings laid alternately backwards and forwards in the frame across them, and finally secured by tying the ends over the last plate.

At the conclusion of the various exhibits, the Chairman thought all present would agree with him that the evening had not been wasted, if only for the sake of the evidence it had afforded them of the great amount of thought and energy which were continually being displayed by photographers, and he thought these technical meetings might be made even more useful than they had yet been. They were first suggested by Mr. W. Brooks in connection with the South London Society, with the object of affording to photographers in all parts of the country an opportunity of seeing what was being done in the photographic world, and of encouraging them to attempt improvements themselves. This was the tenth annual technical meeting since they were instituted, other societies having since taken up the idea; and he hoped the public at large would not forget that all photographers were invited to send in articles for exhibition at this meeting held annually in November. There was one thing he would like to remark, and that was, that photographers seemed to devote all their energies to improving the mechanical branches of photography; he must say he would like to see amongst the exhibits something tending towards improvement in the preparations and chemicals used. He thanked the visitors present for their attendance at the meeting, and more especially those gentlemen who had exhibited, and concluded by proposing a vote of thanks to them, which was heartily accorded.

London and Provincial Photographic Association.

At the meeting of the Association held on the 2nd inst. at the Mason's Hall Tavern, Mason's Avenue, Basinghall Street, Mr. R. Tanner in the chair,

Mr. Debenham said he had prepared a batch of emulsions from the sample of bromide handed him by Mr. Henderson at the last meeting, and also one from a sample of Howard's bromide, and could find no perceptible difference between the two emulsions.

Mr. Prestwich had coated some plates from the emulsion prepared as on Obernetter's plan described by him at the last meeting, but found them very slow.

Mr. W. Cobb showed a print from a negative by Mr. Bevan, of Lowestoft, showing a secondary image caused by a minute hole in the front of the camera; the picture was a river scene, and the effect produced was exceedingly curious and interesting.

Mr. W. M. Ashman mentioned that an amateur friend had placed some plates in a drying box and left them to dry in a fairly lighted room, and when exposed and developed, a picture of the room was found on them; this was traced to a minute hole in the drying-box.

Mr. Debenham said that he had a negative much green fogged, which was inadvertently splashed with some of the solution from a battery, and where the solution had splashed the fog was cleared.

Mr. R. Faulkner was elected a member of the Association.

Halifax Photographic Club.

At the usual monthly meeting of the Club at the *Courier* office, after the reading of the minutes of last meeting, and the same being confirmed, the President (Mr. J. B. Holroyde) called on Mr. Illingworth, a practical photographer in Halifax of many years' standing, and a successful emulsion maker and dry-plate worker, to open a discussion on testing and exposing dry plates, in which all the members took part.

It was afterwards suggested to spend an evening in intensifying weak negatives by different methods with a view to some practical results.

Mr. W. C. Williams is expected to give a practical demonstration on "Enlargements."

Bristol and West of England Amateur Photographic Association.

The ordinary monthly meeting was held as usual at the Association Studio, Portland Street, Kingsdown, on Wednesday, October 25th, Mr. E. Brightman (in the absence of both vice-presidents) in the chair.

Colonel Playfair and Mr. R. E. Strachan were elected ordinary members of the Association; after which,

The Hon. Secretary (Mr. H. A. Hood Daniel) read some notes communicated by the Rev. J. J. Strutt Bird on "The Effect of Light upon Certain Kinds of Ordinary Paper":—"Having observed that the paper upon which cheap newspapers are printed turns very yellow on exposure to light, as a matter of curiosity I procured a piece of plain paper of a similar character, and exposed it under a negative to ordinary daylight for three weeks. The result I produce for your inspection. You will observe a very distinct but faint image of the negative of a buff colour. Speculation on the material which promotes this image may be a pleasant subject for discussion. *Primâ facie*, it seems as if it would be easy to find some means of developing a perfect image, and an interesting series of experiments may result; at all events, the question of cause and effect is worthy of consideration. The paper is of a very common quality, costing 3s. or 4s. per ream." Some sheets of the paper in question were then laid upon the table for any members who cared to experiment with.

Mr. H. A. Hood Daniel said that the chief point of the very interesting experiment Mr. Bird had conducted seemed to be that of turning attention to the possibility of the *paper* of a print decolourising separately, and apart from any change in the chemical picture itself; although, of course, in the latter case, the paper would undergo a considerably different bleaching operation to that which might be performed upon a piece of ordinary paper.

The Chairman remarked that he considered the atmosphere had a great effect upon paper in changing its colour; although, in the present case, of course, the experiment carried out by Mr. Bird was conclusive as to its being solely the effect of light in the case in question.

Mr. Daniel then exhibited one of Messrs. Newton's 4-wick lamps for the optical lantern, which was tested against one of the same firm's 3-wick lanterns. The same oil was used, and exactly similar condensers, lenses, and lanterns; a slide was carefully focussed in each lantern, the disc in each case being of identical size. The comparison as to evenness of illumination, quality and quantity of light, was made in various ways, most clearly proving that Messrs. Newton's new 4-wick lamp was in every way superior to their 3-wick and last previous lamp.

Mr. Phillips remarked upon the great increase in light, and drew attention to the fact of the additional length of iron chimney.

Mr. Goss inquired the reason for making the front glass of the lamp curved instead of straight as in the 3-wick lamp.

Mr. Daniel was unable to reply to the question, but presumed it was in accordance with some idea as to optics which Messrs. Newton had.

Mr. Brightman said that if it were on that score, he should have expected to see the glass curved exactly the reverse way.

The Hon. Secretary much regretted to have to announce that not a single picture had been sent in (except one by himself) in competition for the four medals offered.

A vote of thanks to the Rev. J. J. Strutt Bird and Mr. H. A. Hood Daniel closed the proceedings.

Talk in the Studio.

Photographic Society of Great Britain.—The first meeting of this Society for the ensuing session will take place at the Gallery, 5a, Pall Mall East, on Tuesday next, November 14th, at 8 p.m., when the medals awarded will be presented, and a paper will be read by Mr. W. K. Burton on "A Modified Gelatine Emulsion Process."

Presentation to Mr. F. A. Bridge.—Mr. F. A. Bridge, who has just relinquished his appointment as choir-master of St. Martin-in-the-Fields, was, at a meeting recently held at the Vestry Hall of the parish, presented with a framed testimonial, expressing the regret felt by all at his resignation. The testimonial was handed to Mr. Bridge from the clergy, churchwardens, overseers, and parishioners by Mr. Churchwarden James (in the absence of the Vicar), accompanied by a handsome drawing-room clock, and pair of ornaments *en suite*. This was then followed by an electro-silver reading-lamp from the gentlemen of the choir, and a pair of antique two-handled Dresden cups, covers, and stands from the choir-boys.

A Photographic Reunion.—The annual dinner given by the employées engaged in the London studio of Messrs. W. and D. Downey was held on Friday evening, in the Duke's Saloon, Holborn Restaurant, London. Mr. and Mrs. W. Downey and Mr. and Mrs. W. E. Downey, and a few other friends, were present as guests. For the first time in the history of this annual social gathering the ladies of the establishment, as well as the wives of the artists, were present, the occasion being taken advantage of to bid farewell and God-speed to Mr. Herzog, one of Messrs. Downey's chief assistants, who is returning shortly to his native land—Switzerland—to commence business on his own responsibility. In addition to several valuable presents given to him by the ladies and gentlemen of the firm respectively, as tokens of their good-will, he was, during the course of the evening's proceedings, the recipient from Mr. W. Downey of a very handsome silver-mounted salad dish and biscuit-box. The company numbered forty, the chair being occupied by Mr. W. E. Downey, and the vice-chair by Mr. E. A. Cade. Among the toasts *apropos* to the occasion were: "Success to Photography," by the chairman, which was followed by the appropriate song "In Shadow Land," by Miss Litton. Messrs. Johnson and Bennetto replied. "Prosperity to the Firm" was proposed by Mr. Cade, who dwelt on the world-wide fame of the firm, and to the spirit of family-like affection and regard which pervaded all the departments, and linked them all together—masters and workers—in the strong tie of friendship and mutual esteem. Mr. W. Downey responded, and then proposed the health of Mr. Herzog, wishing, on behalf of himself and the company, success in his future professional career in his native land. Mr. Herzog replied, and concluded by heartily wishing continued and increased prosperity to the firm. Other toasts followed. The vocal and instrumental music supplied by the company was of a very high order of merit, and greatly enhanced the evening's enjoyment.—*Newcastle Daily Chronicle.*

"A Misty Morning."—Mr. W. McLiesh writes:—"I have heard that it is generally considered in professional circles that my picture now in the Exhibition is a combination print. I shall be obliged if you will kindly allow me to assure my professional brethren that it is a direct picture, taken at one exposure, and printed from only one negative."

The Photographic Money Dispute.—At Clerkenwell Captain Herbert Kerr appeared to answer an adjourned summons taken out by Lieutenant Arthur Henry Loring, for that he did unlawfully, by certain false and fraudulent pretences and representations, obtain of and from the said Arthur Henry Loring divers sums of money, of the value of £2,070, with intent to defraud. The allegation was that the defendant had induced Lieutenant Loring to invest money in the Photographic Artists' Supply Association, the affairs of which Company are in liquidation. Mr. Besley prosecuted, as before, and Mr. Grain was for the defence. Mr. Hosack, after some further evidence had been taken, said that this case appeared to have been taken before a civil court. Up to the present there had been no evidence of fraud before him. Mr. Besley said that when his Worship had heard more evidence his mind would no doubt be altered. Mr. Hosack then again adjourned the case for a week.

Reversed Negatives by Exposure through the Glass.—Mr. R. V. Harman writes:—"I have contributed three pictures to the Pall Mall Exhibition, and I think their principal feature has been overlooked. They are 15 by 12 landscapes taken on the reverse side of dry plates in the camera, and printed in single transfer carbon; and not having heard of such a method before, I thought the idea a new one, and that it was worth the attention of those who could turn it to account in the profession, as I always find it a difficulty to get anything done by double transfer even by leading firms. I have little experience in carbon printing, so sent the first impressions on ready sensitized Autotype tissue; but they make beautiful impressions on silver paper, though of course the picture is incorrect." Mr. Harman's idea of exposing gelatino-bromide plates through the glass is not altogether new, but many of our readers will be glad to have an opportunity of actually seeing what good results can be obtained by this simple and convenient method.

A Moonlight View of an Inundation.—Mr. H. Evans, of Chippenham, sends us a picture of the recent overflow of the Avon. He writes :—" The plate had an exposure of three hours and ten minutes, viz., from 9·10 p.m. until 12·20, and the lens used was a single view lens. It was desirable that a photograph should be secured if possible when the flood was at its highest, hence the necessity of a night exposure. The nearest buttress of the bridge you will observe is almost submerged, and I should have forwarded you a copy earlier, but the demand has been very great." Not only are the main features of the view clearly defined and well modelled, but the reflections in the broad expanse of water almost duplicate the principal features of the picture.

The late W. K. Sawyer.—The remains of a ripe scholar and able journalist—one of those read by hundreds of thousands in the daily Press who, may-be, never heard his name—were yesterday conveyed to their last resting-place at Brighton. William Kingston Sawyer, graceful poet and lover of Nature by choice—leader-writer, essayist, and editor by profession—literally died in harness last Thursday morning, being struck down by illness while busily preparing the material to fill the pages of a well-known comic annual. It was a strange irony of Fate that the last efforts of his pen should be to produce "copy" for the readers of a humorous sheet, and suggest ideas to his artists for its comic cuts; but in the strange jumble of work-a-day life merit does not always secure its place. A man of refined tastes, an antiquarian of deep research, a firm friend, and a thoughtful, genial companion, his absent place will be seen with sorrow by many who had the pleasure to call him friend. Mr. Sawyer was for many years a leader-writer on the *Morning Advertiser* and the *South London Press*, and was editor of *Funny Folks* from its commencement to the day of his death. His sketches, poems, and essays might be numbered by the thousand.—*Echo.*

Colour Blindness.—A series of researches having been undertaken by several Russian physicians as to colour blindness, Dr. Kolbe has just published in the newspaper *Vrach* (*The Physician*) the results. Out of 10,828 railway servants examined, no less than 251 were colour-blind, and 32 proved to have an imperfect capacity for distinguishing colours. Three other doctors have made experiments on sailors and pupils in naval schools, and have found 6·08 per cent. of colour-blind, and 8·5 with imperfect vision. Women are subject to a far smaller extent to colour-blindness. Thus, Dr. Kolbe, who has experimented both on men and women, discovered among the men 2·5 per cent. of colour-blind and 7·5 with imperfect vision, whilst among women he has discovered only 0·16 per cent. of colour-blind and 3 per cent. with imperfect colour vision.

Society of Arts.—The following arrangements have been made for the ensuing session :—November 22nd, J. Hopkinson, D.Sc., F.R.S., "Refrigeration by Evaporation of Water in Vacuo." November 29th, P. L. Simmonds, "The Utilisation of Waste : A Retrospect of Recent Progress." December 6th, W. A. Gibbs, "The Artificial Drying of Crops." December 13th, W. H. Preece, F.R.S., "Electrical Exhibitions." December 20th, W. K. Burton, "The Sanitary Inspection of Houses." For Meetings after Christmas :—J. H. Evans, "The Modern Lathe." Captain J. H. Colomb, R.N., "Collisions at Sea." A. J. Hipkins, "The History of the Pianoforte." J. Donaldson, "The Construction of Torpedo Boats." C. F. Cross, F.C.S., "Technical Aspects of Liguification." W. N. Hartley, F.R.S.E., "Self-purification of River Waters." James J. Dobbie, D.Sc., and John Hutchinson, "On the Application of Electrolysis to Bleaching and Printing." There will be three courses of Cantor Lectures; the first will be on "Dynamo-Electric Machinery," by Professor Silvanus P. Thompson, D.Sc. Lecture I.—"The Dynamo in Theory." Lecture II.—"The Dynamo in Practice." Lecture III.—"The Dynamo as a Motor." The Second will be on "Solid and Liquid Illuminating Agents," by Leopold Field. The Third will be on "The Decorative Treatment of Metal in Architecture," by George H. Birch. The Fourth will be on "The Transmission of Energy," by Osborne Reynolds, M.A., F.R.S., Professor of Engineering at Owens College, Manchester. The Fifth will be on "Secondary Batteries," by Prof. Oliver J. Lodge, M.A., D.Sc. The two Juvenile Lectures will be by Prof. Henry Nottidge Moseley, M.A., F.R.S., on "The Inhabitants of the Ocean." The dates for these are Wednesday evenings, the 3rd and 10th January.

To Correspondents.

*** We cannot undertake to return rejected communications.

*** The Year-Book of Photography and Photographic News Almanac for 1883.—Those of our readers who kindly intend favouring us with contributions are earnestly requested to forward their communications forthwith.

W. H. G.—1. You will find the best way is to dry your prints in a folio built up of blotting-paper. As regards rolling the thin unmounted prints, the commercial rolling machines are frequently not made exactly enough to do justice to such a thin material, as one part may escape with but little pressure, while another is thoroughly crushed. This state of things can be remedied to some extent by passing a piece of thinnish card-board through the rollers along with each print. The so-called encaustic paste is much the same thing as the old-fashioned turpentine and bees-wax furniture polish. See the Formulary in last week's News. Rolling-presses can be obtained from any of the dealers in photographic materials, and most stock houses keep encaustic paste ready made.

J. S.—We are sorry that you have failed, but imagine there must have been some mistake. Enquire again.

John Bitford.—The nitrate is best, because it dissolves so readily in alcohol.

Novelty.—Quite the contrary, as the Hoeschotype process was fully described in the News many weeks ago.

Perplexed.—1. You will probably find McLellan's apparatus, as figured in the News this week, to be as convenient as anything. 2. Not unless a very prolonged exposure is given. 3. You had better work by daylight if it is possible.

C. H. Stephenson.—We have no recollection of the matter. When was it?

Novice.—1. Yes; but we prefer to use the alum bath afterwards. 2. Write to Dr. Edward Liesegang, Dusseldorf.

A. L. Dresser.—Thanks.

F. Warner.—Directions cannot be given in a few words. See what Major Waterhouse says in his articles on photo-lithography.

H. Cushing.—1. Thanks for the suggestion, which seems to be valuable. 2. An article on the subject will appear before long.

M. S. (Clapton).—1. They may be all you say; indeed, we hope they are. 2. It would surprise us considerably to hear of such a registration being effected.

Studio.—You do well to determine on following the design of Mr. Wane, and we would advise you to reduce the scale of the dark room and enlarging apparatus as little as practicable. Abundance of room is far more important now than it was in the old wet-plate days. A length of 25 feet for the studio will be abundance.

E. Williams.—We have found it excellent, but at the same time do not find sufficient inducement to abandon the use of ammonia.

W. Barry.—A note awaits you at our office.

J. H.—Probably between £150 and £200.

J. Northam.—Write to Mr. J. J. Atkinson, Photographic Material Dealer, Liverpool.

J. Jolly.—We will devote a leader to the subject before long.

J. Downes.—We have found your ideas to be excellent, and you will find that these applications of the lamp have been fully described in the News during the present and past year.

W. J. Ankorn.—As it is an obvious infringement of copyright, we imagine you will have but little trouble. If the Publisher refuses to give you substantial compensation, instruct your solicitor to take proceedings at once. The law provides for a penalty for each copy of the pirated production, so that your claim will be considerable.

A Subscriber.—One drachm or a drachm and a half. Do not add any water.

A. T. Newington.—See answer to J. Northam.

Silver.—As regards the action of silver, it is much the same as if it were a film of gelatine, but the difficulty of keeping the image fairly on the surface will perhaps prove insurmountable.

Chemicus.—Just as you suppose, a curious case of the large proportion in which a reagent is present serving to reverse the usual order of affinity.

*** Authors may have Reprints of their Articles at 3s. per page per hundred copies; but the order must be given when the proof is returned.

PHOTOGRAPHS REGISTERED.

Mr. F. Downer (Watford)—5 Photos. of Lord and Lady Clarend.

THE PHOTOGRAPHIC NEWS.

Vol. XXVI. No. 1263.—November 17, 1882.

CONTENTS.

BURTON'S METHOD OF MAKING EMULSION.

At the meeting of the Photographic Society of Great Britain on Tuesday last, Mr. W. K. Burton described a modification iu gelatine emulsion work which seems likely to be of some importance. By his process he brings about without special apparatus or appliance the same result as Mr. Plener does by centrifugal force in the method which we described some time ago; that is to say, he eliminates from an emulsion which has been rendered sensitive by boiling the gelatine and soluble salts, and washes the bromide of silver. This is then ready, either for storing, or for mixing at once with more gelatine to make an emulsion. The method by which this is brought about is briefly as follows:—An emulsion is mixed by any of the formulas suitable for the boiling process—we should think that given in our Formulary would do. The only peculiarity at this part of the operation is that an unusually large quantity of water is used. This is not objectionable, as the water is afterwards to be poured away; and Mr. Burton claims that by the use of it there is greater facility in getting a fine state of division iu the bromide of silver. He emulsified by droping the nitrate of silver in crystals into the bromide solution, and shaking. After boiling in the usual manner for an hour, more or less, the emulsion is allowed to cool gradually to about 120° Fah., when three or four per cent. of strong ammonia and five per cent. of alcohol are added. Again the emulsion is left to cool, and at the end of forty-eight hours the bromide of silver will, we are told, be formed in the form of a precipitate at the bottom of the vessel. It may then be washed by decantation in the manner of a precipitate. The writer of the paper considers it sufficient to pour off the first water which contains the decomposed gelatine, to mix the silver bromide up with one more quantity water, and once more to allow it to settle.

After the operations described have been gone through, nothing remains but to mix the bromide of silver with a sufficiency of gelatine. Mr. Burton states that he has tried the use of various different proportions of gelatine to the silver bromide, and has found very little difference in the results. He has mixed one part of bromide of silver with two of gelatine, aud two of bromide of silver with one of gelatine, without finding any material difference between plates coated with these very different emulsions, so long only as the plates were coated with enough of the preparations to ensure a sufficiently opaque film. In this particular process which we are describing, he lays considerable stress on the method of mixing the bromide of silver with the gelatine.

The former is apt, it seems, to stick somewhat tenaciously to the bottom of the vessel. He places the correct amount of hard gelatine, previously well soaked in water over the silver bromide, in the jar or beaker in which all the processes have up till now been performed. He collects the gelatine in a sort of mop on the end of a glass rod, and, whilst water warm enough to slowly melt the gelatine is being poured into the vessel, mops up the bromide of silver.

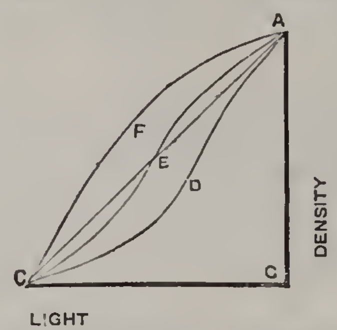
The emulsion which we saw made in this manner at the meeting above referred to was of excellent colour, and showed the bromide of silver to be in a very fine state of division. Of course we have not as yet had an opportunity of trying plates made by the method described, but we understand that, although the emulsion, if used immediately after it is finished, is liable to give somewhat thin images and slow plates, it increases in sensitiveness to an unusual degree by keeping, and eventually gives plates of the extremest sensitiveness, and of very good quality.

From the fact that this emulsion increases in sensitiveness to an extent so much greater thau is usual, the author of the paper argues that there may be some combinatiou between the bromide of silver and the gelatine which requires time, aud which accounts for the superior sensitiveness of bromide of silver when gelatine is the vehicle in which it is suspended. In the ordinary processes the bromide of silver is never freed from the gelatine, and the process of combinatiou, if such there be, may be going on from the beginning.

Mr. Burton judges entirely by colour as to how long the boiling process is to be continued. He boils till there is only a trace of red left in the emulsion. We know from practical experience that it is most difficult under ordinary circumstances to tell when the whole of the silver haloid in an emulsion is reduced to the blue variety, and would remind our readers of a very simple and useful "dodge," which we published some time ago, to facilitate judgment in this matter. This consists simply in placing a drop of emulsion on a piece of glass, spreading it very thinly, and gently warming it over the gas or otherwise. When it is dry, the bromide will be found divided into distinctly defined rings or patches of the two varieties, one intensely blue, the other intensely red. On commencing boiling, the red predominates, and there is very little blue. Boiling may be continued either till the blue predominates, or until there is no red at all. This method is only suitable for emulsions with a few grains of gelatine to the ounce, such as are usually prepared for the boiling method.

The effect which ammonia has on the bromide of silver, besides its effect in rendering the gelatine soluble in cold water, and allowing the haloid to subside, was gone into in considerable detail. It was shown that although ammonia, when added to a boiled emulsion, does not make the emulsion give a higher sensitometer figure, yet it certainly causes it to require a much shorter camera exposure. This is due to a fact which may be stated in a rough manner as follows. If plates be coated with a boiled emulsion before and after this emulsion is treated with ammonia, and these plates be exposed side by side in the camera, those that are coated with emulsion before treatment with ammonia will have the same *amount* of detail as the other, but the finer detail will be of less printing density. To get "well exposed" negatives with each may require periods of time varying as four to one.

The above-mentioned state of things is admirably illustrated by the diagram which Mr. Burton showed on Tues-



day evening. The horizontal line represents light, and the vertical line represents density, each starting from an imaginary zero at the right angle G. The progressive density arising from varying degrees of exposure to light would correspond to the straight line A C, in the case of any emulsion capable of truly representing all variations of light and shade; but such an emulsion has never yet been prepared.

An ordinary ammonia-nitrate emulsion gives a curve corresponding to C F A, and the result is a disproportionately great density of the weaker shades.

The curve C D A represents the result obtained with the usual boiled emulsion; and in this case the weaker shades, such as the deeper tints of foliage, are not represented with their true force. An emulsion made according to Mr. Burton's present directions gives a result nearly corresponding to the serpentine curve C E A, and is calculated to yield results very near the actual truth.

We cannot, of course, speak positively as to the merits of the process till we have had time to make trial of it, but, to judge from the specimens which were shown, there can at least be no doubt that plates of high quality can be made from emulsion prepared with it.

As regards convenience, it is not, as its author points out, adapted to experimental work when it is desired to finish an emulsion in the shortest possible space of time. It will prove, however, we think, useful for those who work in a systematic manner from day to day, and who can have one batch of emulsions going through each of the different processes; one being prepared each day, and put aside, whilst one which has been prepared some time ago will be ready for coating plates..

The process is by no means so expeditious as Plener's, which we described some time ago, nor is it possible by Burton's, as by Plener's process, to get rid of the coarser grains of silver bromide in an emulsion which is fogged, and thereby cure it. On the other hand, Burton's process has the advantage of requiring no special apparatus.

We need scarcely point out that in either of the processes under consideration, the great advantage which is gained lies in the fact that the gelatine which has gone through whatever process is used to gain sensitiveness, and which is sure to have suffered thereby, is eliminated. This is especially desirable when ammonia has been used, as this, by its action on the gelatine in the presence of silver bromide, is liable to produce green, red, and other fogs.

CHEMIGRAPHIC ENGRAVING.

Second Article.

If the zinc plate to which the fatty image has been transferred were immediately placed in the etching bath, there would be a considerable probability of the image becoming cleared off at once, owing to the fact of the lines being so far discontinuous or broken as to allow the acid to permeate through them. In order to render the fatty image capable of resisting the action of the etching fluid, it is necessary to reinforce the lines to such an extent as to convert them into ridges of printer's ink, so far piled up as to preclude the possibility of any trace of acid acting except fairly beyond the area covered by the lines. Before this can be done, however, the general ground of the plate must be so far charged with gum as to enable it to repel the ink. For this purpose, a soft sponge is thoroughly saturated with a strong mucilage of gum-arabic, and after the greater part of the gum has been expelled by gentle pressure, the plate is repeatedly dabbed with the sponge until the gum fairly takes on all parts of the zinc plate which are bare as regards printer's ink. The plate is now allowed to dry without the application of artificial heat. An ordinary lithographic inking roller must be well charged with rather thin printing colour—that is to say, a usual lithographic printing colour slightly thinned with middle lithographic varnish—but before rolling the zinc plate with this mixture it is necessary to once more work it over with the sponge, so as to thoroughly re-dissolve the desiccated film of gum, after which the gum is wiped off with a second sponge moistened with clean water, the zinc plate being thus left uniformly moist, except where the lines of the device exist. The inking roller is now brought into requisition, the still moist plate being thoroughly rolled in all directions, when it will be found that the ink will adhere to the existing ink lines, and will be repelled by the moist metal groundwork. Should any tendency for the ink to soil the ground be noticed, the damp sponge must be immediately passed over the plate a few times with moderate pressure, when it will be found that the previous clearness of the ground will be at once restored. A second gumming should follow, after which the excess of gum must be once more removed by the damp sponge, and the inking operation is repeated until the lines are seen to stand up in distinct relief. In inking the plate it must be remembered that a slow motion and a heavy pressure tend towards the deposition of a large quantity of ink, while a quick motion and a light pressure tend towards the deposition of a thin layer; or these conditions of rolling may even remove ink—that is to say, may reduce a heavy deposit. The same kind of thing holds good as regards the inking slab, quick rolling and light pressure tending to increase the amount taken by the roller, while the quantity on the slab is reduced; and slow rolling combined with heavy pressure serve to reduce the charge on the roller, and increase the amount left on the inking slab. The operations of gumming and inking may often be repeated with advantage five or six times, and care should be taken to pile up as much ink as the lines will hold without any risk being run of any spreading or widening taking place.

A little difficulty may arise from the absorbtion of water by the leather roller, and this hydrated condition may be recognised by a tendency of the roller rather to slide over the zinc plate, than fairly to bite or hold on it. In such a case, the only way is to take a fresh roller, and allow the first to remain exposed to the air until the moisture evaporates.

The inking or reinforcement of the lines having been sufficiently performed, the plate is well rinsed under a rose, wiped with a sponge, and fanned dry. The plate is next dusted over with finely-powdered asphalt powder, an ordinary broad camel's hair pencil being used for its application, and all excess being then removed by means of a soft powder-puff. Instead of asphalt merely powdered, it is advantageous to use a preparation obtained by melting 15 parts of bitumen of Judea with 1 part of ordinary resin and 1 part of beeswax; the mixture being next powdered into cold water, and, after having been dried, it is very finely powdered.

The lines on the dusted plate now appear reddish brown, from the presence of the loosely adherent powder; and in order to cause this powder to thoroughly unite with the printing ink, a very gentle heat must be applied by means of a spirit lamp or gas flame—never more heat than can be borne easily by the back of the hand, and not more than will just suffice to so far cause the asphalt powder and the ink to unite as to make the surface of the lines shining and glassy, rather than dull brown. When the plate has once more become cold, the edges and back are varnished with an alcoholic solution of shellac, and the varnish applied to the borders should not come nearer to the device than one-third of an inch. The varnish being quite dry, a scratch is made through it near one corner of the plate, the action of the acid on the metal thus laid bare serving as a guide to the progress of the general etching; and all is now ready for the immersion of the zinc plate in the first etching bath, which consists of a mixture of one part of strong nitric acid and 40 parts of water. The dish used for containing the acid should be so mounted on rollers as to render it easy to keep up a constant rocking motion while the acid is acting on the metal, this being necessary in order to prevent unequal action of the acid arising from the accumulation of the black impurites which always remain when commercial zinc is dissolved in an acid. As a rule, the first etching bath ought to be allowed to act for about forty seconds in the case of very fine work, or about eighty seconds in the case of coarse work; but perhaps one minute may be taken as an average. But time certainly ought not to be taken as a guide in the case of important work, it being much better to regulate the duration of the etching by an examination of the test line or stroke made through the shellac varnish used to protect the edges of the plate. For this purpose the shellac is scraped away from the sides of a portion of the line, and the depth of the etching is judged of by feeling with a needle point. A good rule is never to carry the first etching farther than to give a depth corresponding to the thickness of a sheet of thin note-paper, and in the case of fine work one-half or one-third of this thickness should not be exceeded. The first etching having been finished, the plate is then well rinsed with water, and is either allowed to dry spontaneously, or is fanned until all traces of moisture are removed.

The lines now stand in relief on the zinc plate, and the subsequent operations are intended to deepen the interspaces so as to fit the block for the printing press.

Review.

Instruction in Photography. By Captain Abney, R.E., F.R.S. Fifth Edition. (*Piper and Carter*).

Captain Abney's "Instruction in Photography" has been so often spoken of in favourable terms in these columns, that it is difficult to add anything now that a fifth edition of the work has appeared. The general introduction of gelatino-bromide into the photographic studio has naturally led the author to devote especial notice to the process in this his new edition, and we find not only details as to the best and most practical methods of preparing emulsion, but also the most approved plans of applying it to glass and paper.

Captain Abney wisely pays a good deal of attention to the mechanical printing processes, which are every day growing in importance, devoting a chapter to the new Stannotype method of Mr. Woodbury. The photo-zincographic, photo-lithographic, and collotypic processes generally, are explained, and, in many cases, working details are given. In a word, the new edition of Captain Abney's work is quite on a par with any of its predecessors.

"TEN TIMES AS RAPID."

BY S. BOTTONE.

I have just noticed a letter in last week's issue, in which the writer feels himself much aggrieved that makers of gelatino-bromide plates should so mislead their customers as to label their productions as being ten times and thirty times as sensitive as collodion; and then goes on to state that, according to *his* experience, a plate six times as rapid as collodion would appear to be the limit of sensibility reached by those self-vaunting deceivers known as "gelatine plate makers." Now, my experience of collodion and its capabilities extends over nearly thirty years, and I still desire to speak well of the bridge which has carried me happily over so many adventures. I confess to a very great admiration of an instantaneous collodion positive on glass, and I know that such a picture may often be obtained within a very small fraction of the time required to secure a good printing negative. But to attempt to compare collodion with gelatine in point of sensibility is like comparing an *arc* light with an *incandescent* in point of brilliancy.

I was working, towards the middle of last month, at getting up a series of slides for a lantern entertainment. Some of the subjects required, from their nature, very rapid exposures, so I had gelatine as well as collodion plates in requisition. I had some of the cheapest gelatine plates in the market, none costing more than 1s. 6d. per dozen. Some of these were marked "ten times rapid," others "thirty times rapid." On Wednesday, the 18th October, the light failed me rather rapidly in the afternoon, and my friend Mr. Gann, who was working with me, proposed that since our last negative had required a hundred seconds' exposure (and this with a neutral bath and fresh pale Mawson's collodion), we should try a "ten times rapid" gelatine plate on the same subject, with an exposure of only ten seconds. The resulting negative, developed with ferrous oxalate, was almost indistinguishable from the hundred seconds' collodion.

I have repeatedly tested the commercial plates of almost all makers, and I have come to the conclusion that it is easier to find plates that are *more* than ten times as sensitive as collodion, than less. So that no misconception should arise, I may mentiont hat the work in hand consisted in copying and enlarging microscopic objects, a work that necessitates the cleanest working, and perfect freedom from fog, and is, therefore, the severest test for any plate laying claim to sensitiveness conjoined to cleanness of working.

WORK IN THE INFRA-RED OF THE SPECTRUM.

BY CAPT. W. DE. W. ABNEY R.E. F.R.S.*

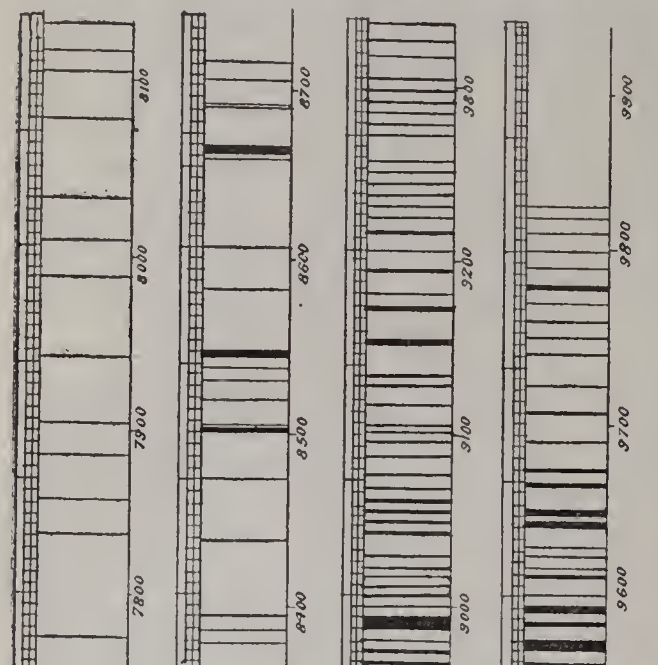
When a photograph of the spectrum on the finest grained plate is examined under the microscope it will be found that the metallic image is composed of grains of silver and nothing else; and that instead of the lines having sharp edges as seen by the eye that they shade. Part of this shading is due to the grain, though the greater part is due to proper absorption, which the eye is incapable of distinguishing. The fineness of grain given by the different processes we may class as follows, in the order of coarseness, the coarsest grain being first:—

1. Wet plate developed by iron.
2. Special bromide emulsion, as before described.
3. { Ordinary collodion emulsion. Wet plate developed by pyrogallic acid.
4. Gelatino-bromide plates.

It will thus be seen that for delicate work the dispersion with the wet plate process and the special bromide emulsion must be larger than when using a gelatine plate if equal resolving power be wished for. The above plate is an instance of this. In it we have the solar spectrum in approximate wave-lengths from Aλ (7,6000) to about λ 10,500. The general impression to the eye is the extraordinary width of the lines compared with those in the visible spectrum. No doubt they are as a rule broader, but their breadth is also to be accounted for in other ways. First, the slit used was not quite as fine as might have been when the

* Continued from page 685.

photographs were taken. Secondly, the dispersion used was the first order of a Rutherford grating 17,200 lines (about) to the inch, and a camera lens of a focus of about fifteen inches. In later photographs nearly all the broad lines have been resolved into pairs or triplets, as have also some of the lines of medium breadth. There are lines, however, like the three broad lines between 8,500 and 8,700 which remain unchanged whatever dispersion was used. This resolution was effected by using a finer



slit and dispersion of the second order; the fine slit alone will not give it. If we take an example in the visible spectrum, and examine the B line with the eye, it will be found to be made up of a series of doublet flutings, each component being apparently of equal intensity. These pairs it is impossible to secure on the photographic plate, unless the second order of the grating spectrum is used; but when secured it will be found that the more refrangible component is more intense, as is the case in certain hydro-carbon flutings. The sole reason why the first order is useless to cause resolution is that the pairs are so close they can both fall on the diameter of the grain of the sensitive compound. On the other hand, with a gelatine plate I have been able to see on one inch and a half every line and more than given in Angström's map from G to F. In this case the grain is almost invisible.

The development of the plate is greatly more difficult than the preparation of the emulsion. A strong developer it will not stand, and I may say also that a very new one is also inadmissible when using the ferrous oxalate development. To make the developer, a saturated solution of neutral oxalate of potash is saturated in the cold, with ferrous oxalate; and then the deep red solution decanted off. When freshly prepared it is useless to attempt to develop a plate with it unless the precaution be taken of adding to it an equal part of a saturated solution of ferric oxalate in the oxalate of potash. Such a mixture may be employed by adding to it immediately before all an equal volume of a solution of potassium bromide (twenty grains of the salt to thirteen of water). The plate may then develop without fog, or it may not; if it does fog, the developer must have more bromide solution added to it, and another trial made. On some days a clean picture seems an impossibility, whilst on others, every one will be perfect. It is not the emulsion that is in fault, since, on a "clear day" and on a "foggy day" the identical emulsion may be used, showing that the developer is at fault. This year this trouble seems to have increased, and I can only lay it down to the different preparations of the oxalates. Of one thing care should be taken, viz., that the developer never shows alkalinity; a drop of dilute sulphuric acid or nitric acid may be added to the developing cup just before development with advantage.

With prisms the photography with the rays of low refrangibility is simple, with one great drawback, and that is the difficulty of obtaining a true focus for the plate. This must all be done by guess-work, and plates exposed till the focus is obtained. When once obtained it is a good plan to mark the camera to show the focus, and at the same time accurately to mark the table on which it stands, so that the *same portion of the lens receives the same rays*. This is more particularly necessary to attend to when using an achromatic lens. I believe it to be easier to use the uncorrected lens than a corrected one, provided always that the camera has a proper horizontal swing-back, which can be shifted through a very large angle at least 30° when using three prisms. If a spherical mirror be used in the collimator and in the camera instead of the lenses, the same difficulties of focussing do not present themselves. The disadvantage of this method is that the edges of the spectrum based are diffused and not straight, and this is awkward when making comparison of different spectra. With a grating nearly the same difficulty arises when using lenses, but not quite to such a degree. If "a" and A be got in focus at the end of the plate, the swing-back being used till this results, and if the lens be placed close to the grating, the whole of the infra-red region will be fairly in focus. This of course only applies to my own grating, which may have a slight curvature. In using the grating we must not forget that the second order overlaps the first order, and the third order the second order, and so on; and if a plate were exposed without any artifice being adopted to get rid of this over-lap, the plate would show two or three spectra. There are several methods of accomplishing this separation, the simplest being to use the absorbing medium in front of the slit. At first I used stained red glass, which cuts off all radiation above the green, leaving thus the tails of the different spectra intact. At present, when wishing to go no further down the scale than λ 10,000, I have found that a deep coloured solution of iodine of potassium in water, about one-tenth of an inch in thickness, is very excellent. The objection to the red glass is that it exercises a certain amount of general absorption in the infra-red region, but with the white glass of the cell holding the solution, and the solution itself, this general absorption is minimized. To get down still further, very thin stratum of a blue dye in tetrachloride of carbon is efficacious in conjunction with the iodine solution. With the above solutions λ 13,000 can be reached. Beyond this limit it is necessary to use other means of eliminating the higher orders of the spectrum. The simplest plan is to place behind the collimator a couple of prisms, and some two feet from the prisms, the grating, so that it only receives those rays which it may be desired to impress. Thus one side of the grating may catch the limit of the red, whilst the rest will be filled with the dark rays The most difficult plan is to place a prism according (as Frauenhöfer did) in front of the grating, in such a way that the axis of the prism is at right angles to the ruling, and parallel to the plane of the grating; this causes a complete separation of all the different orders of spectra. But the resulting photographs are inconvenient to measure, since they are curved, and the position of the camera is also awkward. Another plan is to use a prism in front of the slit; but this, too, I have found inconvenient, for the same reasons as given above. For ordinary work the absorption method is decidedly the most elegant; but then it limits the operations with the spectrum. It was from photographs obtained in this manner that the above map of the solar spectrum was obtained, and as it is before us, it may be well to make a few remarks on it. As to what the lines are due to we are at present absolutely uninformed, except as to some very few. A notable exception to this is the line lettered about 8,600, which is one of the strongest lines in this part of the spectrum. Colonel Festing and myself found that this line coincided absolutely in position with what we call the radical absorption band of benzene, that is to say that by diminishing a thin layer of benzene placed between the slit of the spectroscope and a source of light giving a continuous spectrum, this absorption-band, amongst many others, was the last to disappear, and that it also was the key-note as it were of the absorptions of all benzene derivatives.

A coincidence of this kind would not be fortuitous any more than that the vapour of sodium gives lines coincident with the D lines; and hence we were forced to ascribe this line to benzene or some of its derivations. When first we made this announcement it was facetiously remarked that we had been photographing London smoke; and no doubt, had not other localities for photographing the spectrum been chosen, the reproach (for such it was) might have been just. My visit last June to the Riffel, 8,500 feet high, showed that not only was this said line present, but that it was more intense even than at the level of the sea. There was more unfolding of the spectrum at that high altitude, and lines faint indeed, which had almost escaped registration below, were well marked on the photographs obtained there. The brilliancy of this infra-red spectrum can scarcely be surpassed. When examined at an elevation of 10,000 feet, the general absorption due to water almost vanishes, and with the exception of two congeries of lines which lie beyond those given in the diagram, the whole of the lines shown are stronger than I have ever had them before.

Colonel Festing and myself have also shown the presence of some alcohol derivative, somewhere between ourselves and the sun, and the presence of the absorption lines at a high altitude place it outside our atmosphere. This I was not wholly prepared for, since lately we have been told that alcohol exists in rain water, and rain water can only derive it from the air. The fact, however, remains that it probably exists beyond the limits of our atmosphere. The region disclosed by photography has by no means been exhausted; beyond the region given in the diagram lies one in which we can have a breadth of continuous spectrum, and beyond that, again, beautiful groups of lines, all of which require and deserve careful study. Of one thing we may be fairly certain, that none of them are due to metallic vapours, but are probably due to vapours of non-metallic compounds in some form or another, and these at a comparatively low temperature. It is not unlikely that amongst these will be found oxygen compounds, and, if so, it would be interesting in more ways than one.

AN EARLY TASTE FOR ART—ITS TRAINING.

The Importance of this to the Beginner in Photography, also to those more Advanced, and to the Interests of Art in General.

BY NORMAN MACBETH, S.R.A.*

Art is the representation to the eye or ear of the beautiful in form, light and shade, and colour, and that manifesting more or less the individuality of the mind which originated and wrought it out. The primary condition of art must therefore be the inward perception of the beautiful, and he who has both the faculty to perceive, and the skill to represent the beautiful as he has individually felt it, is the only one entitled to the name of artist. To look back on the first dawnings of our admiration of the beautiful in nature which arrested us, we could not tell why, is one of the most delightful day-dreams of our life. One of the earliest recollections I have of being attracted in this way, is when, as a child in the nurse's arms, I carried home a bunch of rowans (mountain ash) which had greatly charmed me. There was a period, very early in life of all who have made art their profession, when certain aspects of things unconsciously drew them by their peculiar attractiveness; for instance, when spring came round, what endless variety of tint was discoverable in the young leaves; and throughout all the seasons, each month in its course manifesting such wealth of beauty and perfect consistency.

Again, who has not been delighted with the fascinating appearances of metals, such as are seen in steel armour, copper, gold, and silver vessels; or of birds, fish, and shells; or of manufactured fabrics, such as velvets, satin, silk, &c.; all these and other innumerable appearances have been, as it were, the nursery books of artists, through which a craving after art was awakened.

Now what is that subtle quality which is apprehended in nature, or in a work of art, which rivets and charms us, which draws us close to the object from which the pleasure came, then disappears, but which, on our retiring, reappears, and, according to the distance which we stand from the object, assumes various aspects, though never losing its individuality? This is the æsthetic aspect of the object: to catch such appearances, and apply them for the conveyance of thought and pleasurable emotion, is the purpose of art.* Now does the æsthetic aspect of the object lie in itself or in its being viewed at a certain distance; or is there over and above the object so much that is suggested or lent to it by the artist's mind? These three aspects of the question have given rise to different kinds of professed art, which have been more or less presented in past times, are even now from different sources pretty well defined, and it is well for us that they be now clearly understood.

The first—that is, the copying slavishly the object close at hand, and regarding fulness of detail, aye, even to deception, as the perfection of art—this, after all, is but the exercise of the imitative faculty. The second—viewing the object at a distance, rendering it absolutely as it appears—is merely realistic resemblance. But the third—that is, viewing the object also at a certain distance, lending to it what is suggested for good, or taking from it what is not beautiful, treating it by the impulses of the mind; in a word, giving it the impress of the artist's individuality—this is the best and the only art which can properly be said to be worthy of the name.

The first, the merely imitative, attempts, as I have said, to deceive if possible. True art never pretends to be anything but what it is—a representation.

The second, the merely realistic production of appearances, without any special design, resembles very much what the camera produces without any special direction. A lens and good chemistry realise in black and white the details of natural appearances, even atmospheric (or what is properly speaking called aerial perspective), better than any human hand or eye can do; yet there is no art in their productions; they are merely photographic transcripts. And unless there be some design in a drawing, painting, or photograph, in which the artist's individuality is unquestionably manifest, and in which it is worthily presented, it has no claim to be a work of genuine contrivance.

The third aspect of the question which I have described is truly art, because it is that which invests the subject with qualities which express the artist's own feeling and thought upon it.

What I have already said necessarily implies that this fine perception which leads one to choose or reject certain aspects of things must be a faculty. While, to a certain extent, one may be taught to apprehend and make use of æsthetic effects, yet to have such a fine sense or taste for them as will lead the possessor to be unconsciously enjoying them—making them the main part of his thinking and craving after their manifestation or reproduction, is a sure sign of a thorough artistic nature, and deserves to be fostered and encouraged.

It is wonderful to see how, under the most adverse circumstances, such a mind succeeds; and if there be any passion, more than another, difficult to repress, it is the passion for art, if it be of the character I have now described.

We can scarcely conceive of any one being entirely insensible to some æsthetic pleasure, more especially regarding some aspects and representations of nature. For instance, an expansive scene, on a bright sunny day, on land or sea, or a picture which appeals to the affections, and represents every-day life; but in the case of subjects of high art, treated in an ideal manner, it is not to be expected that any but those so constituted or far advanced in art by culture should be able fully to appreciate them.

In the very lowest stages of sensibility to certain æsthetic pleasure, it is simply the nervous fibres that are excited. We see this in the lower animals. On the one hand, musical sounds charm the serpent; and on the other, we hear of dogs howling at music, even at the very best of it; but the faculty of a very fine taste in art, enabling us to feel æsthetic pleasure in the highest degree, can only be the result of a finely-constituted organization, enabling us to apprehend very subtle qualities, and all the more when the mind has been well trained. In like manner no one can be a connoisseur or critic in art, unless he be gifted with this æsthetic faculty, and has a sympathetic admiration for all such genius and talent.

It is not uncommon to hear of some beginners ignoring all literature connected with art, and treating with contempt the

* Read before the Edinburgh Photographic Society.

* Here Mr. Macbeth showed an illustration.

old recognised principles and rules which havo hitherto been adopted. Some have such a strong belief in the mere natural impulses of the æsthetic faculty that they wilfully set at defiance the opinions of others. Certainly if there be an exercise of tho human mind, having a wido domain for freedom of opinion aud independence of law, it is art. Still I would despise nothing; for however keen this æsthotic faculty may be, no great or well-ordered results can bo expected without some system, and that under tho direction of a well cultivated mind and careful study.

Every department of art, poetry, the drama, music, painting, sculpture, and architecture, has its theories and conditions by which it is regulated, and no work can be regarded as successful which has not a sound basis, and most thoroughly fulfils its dssign or purposo.

Wo have need to be ever on our guard against all extravagances, and the production of any art which is either not true to nature, or not in accordance with the conditions of the department to which it belongs. It is long beforo we master the difficulties of ordinary manipulation, and the different ways and manners of going about the treatment of a work of art. Till then we must be patient, and watch the progress of others; but when we have attained by experience a thorough knowledge and acquaintauce with all sorts of theories in art, then we may invent and advance a treatment of art peculiar to ourselves, which becomes very apparent to every one as our individual style.

There is a capital illustration given of this in the life of Haydn. The story is as follows:—A connoisseur once asked Haydn, according to what rule a certain bold progression, which was contrary to the canons of music as then known, was introduced in ono of his works. "Oh, sir," said the composer, with a smile, "the rules are all my very obedient humblo servants." So you see great masters make their own laws, and nobody knew better than Haydn when to break the traditions of the schools.

Unfortunately, however, such is the dosire to acquire a style in art, that those who begin early to feel after this are unconsciously drawn to look more at art in itself than at nature, or the objects by which thought and idea are suggested; hence tho elementary department becomes neglected, and tho work done, though it may have more or less the look of genius in it, being devoid of culture, it is not understood.

It is to the cultivation and training necessary in the elementary department that I would now shortly draw your attention. For a boy at school, education proper (that is to say for every-day life) must not on any account be neglected; and if classics be impossible, French and German should be acquired, especially the former. As to art, no youth should be forced to draw against his inclination; it is only when the desire comes spontaneously that he should be gratified with this pleasure. He should, on the first manifestation of this taste, have his attention at home called not so much to the dry elementary examples of drawing specimen books common to schools, but to good illustrations from books, the work of good designers, clever draftsmen whose style is well matured. Having everything that is bad in art kept out of his sight, he should be left very much to his own taste in subjects and copying them as far as he can to please himself. As soon as there is decided evidence of being able to catch the principal points of a picture, he should be indulged with humorous books, which are very instructive in setting forth the salient points of expression, such as the etchings of Cruickshank, and the illustrations of Punch by Leech, Tenniel, and others, or in some of the more recent simply coloured productions designed by that very clever draughtswoman, Kate Greenaway, or the illustrations of the story of John Gilpin, by Caldecot.

We are living in a time of wonderful richness of design, and no one can tell how much we are educated in art by simply looking at the *Weekly Graphic* or *Illustrated London News*. All such works are worthy of being copied. They afford much pleasure in themselves, and that pleasure is greatly increased when one is able, to some extent, to reproduce the fun or humour that is in them. After the pupil can do these tolerable well, he should be asked next to look at and copy well drawn outlines and details of human character, such as heads, hands, and feet, by the old masters; heads in profile gathered by Lavator in his excellent work on physiognomy; drawings in outline by Sir Noel Paton, such as his illustrations to Coleridge's "Ancient Mariner;" to good photographs, having pointed out to him some of the more subtle qualities of a landscape, such as aerial perspective, the relationship between foreground, middle distance, and extreme distance, the varieties of surface or texture common to every individual object. He should be warned against all exaggerations of perspective, created by attempting to bring into view objects beyond the radius of the eye, or too near in the foreground. He should be taught the importance of viewing an object rightly—the boundary lines of a picture, how much to take in and how much to cut off, all being involved in the distance from the point of sight and the base line of object. An intimate acquaintance with the good and bad treatments of photography becomes most useful in teaching one how to look at, and a direct use of nature itself.

After such an acquaintance with pictorial illustration as I have now indicated, which may be got at home, the pupil may be said to be ready for entering some school of design. Here he will be trained to most careful habits of work. The use of lines and the endeavour to obtain facility in their execution, although uninteresting and irksome at first, amply reward afterwards the pains and labour bestowed upon them.

So much am I impressed with the importance of this, that I would have every pupil very frequently reproduce his outlines at home, large, on a black board with white chalk; this enables the hand to pass freely, and errors and defects of drawing become much more apparent. No education of the eye is better, and no practice for the size of life can excel it.

As soon as facility in this is acquired, ho should enter on the study of the antique, and in place of acquiring great neatness of execution in shading—spending months in mere hatching, as it is called—I would have him at once enter upon painting in monochrome, that is, in one uniform colour from the cast, beginning at first only with a head, and labouring hard to copy all its first appearances most minutely. He should have pointed out to him from the cast the different compartments of light and shade, and their causes, also the colours aud how to use them in monochrome. When this is thoroughly understood, he should be asked to apply this knowledge at home to different coloured objects, such as fruit and flowers. This practice should be kept up for a considerable time, his object being chiefly to acquire a thoroughly trained eyo and the power of reproducing realistic appearances of every kind of object. Such practice trains to great carefulness, and a complete command of materials employed.

Such is the preparation which I humbly consider every beginner in art should make, previous to entering an academy for the study of the living model; and I would have him, as often as he can secure time, keep up his practice in drawing and painting from the antique. I need not point out the importance of this, especially for acquiring a complete knowledge of details, and being familiar with the normal forms of the more exposed parts of the body, particularly the head and hands. Such knowledge purifies, refines, and preserves one against all vulgarity and excess in character.

Having thus studied from the antique, the student should now prepare for entering an academy. In the Royal Scottish Academy it is required of everyone making application for admission that he send in a drawing in full relief from the round, in chalk, also other two drawings of the same, put in the form of skeleton and muscles. If passed, he has all the privileges of a student for four years, during which time he draws by gas-light in the evening, and paints by natural light in the morning. He is daily visited by appointed visitors—members of the Academy—and also superintended by a curator, who has a special care and charge both of models and the students. There is a variety of ways exercised in practice, such as memory sketches of the subject; but the principal occupation is the careful study of the relative proportions of parts of the figure, and correct anatomy. Various prizes aro awarded for the year's work, according to certain conditions.

During his studentship he is expected to exhibit annually at the Academy's Exhibition. His work there is specially looked after by the council of each year; and one of the prizes, the Keith Prize, awarded to the student of greatest general merit in any department of art for that year.

After the term as a student is over, and a year or two gone in actual practice, he is open to put down his name as a candidate for associateship with the Academy. On being balloted for, and accepted, he receives a bronze medal and diploma, and becomes a candidate for academicianship, and is again balloted for (but no election takes place till a vacancy occurs by death, making the admission rare and much valued). On admission he receives a diploma and silver medal, in acknowledgment of which he contributes a diploma picture to the gallery of the Academy. No higher honour awaits him, unless it be that he is eligible to the presidentship of the Academy, and, according to use and wont with his predecessors, in due time receives the honour of knighthood.

Having thus glanced over the different steps in an artist's career, from the first dawnings of taste, through his training, up till its full consummation, I have been led so to treat my subject by way of interesting any who may be seriously thinking of following, in some form or other, an artistic life. What I have alluded to relates chiefly to the painter; it only remains for me now to point out the importance of a good deal of this to the beginner in photography, to those more advanced in it, and to the interest of art in general.

Much of what I have stated in the outset of this paper, regarding a taste for art implying the necessity of an artistic nature and its culture, must have been during my reading applied by the photographer to himself. It does not follow, that, although good at the chemical department, able to produce most perfect impressions of the object photographed, he is also equally good at the arrangement of the subject. The chemical department, seeing it is purely allied to science, knowledge arranged under general truths and principles, that which refers to abstract principles as distinguished from art, may, by strict attention in the course of time, be completely mastered.

Æsthetics, again, called by some the science of beauty in perception, but, properly speaking, the science which manifests the genius of art, is so much the result of personal forthputting, the emanation of an individual mind, that at times it ceases to be a science—like Haydn it lets go the reins, and makes laws for itself. In these circumstances, without the æsthetic faculty and culture, the photographer will never apprehend images, far less produce them. The facts of science, when produced, are very apparent, but not so ideas conveyed by art; there is such a subtlety about them that they only exist by reason of a certain fine organization, which enables those gifted with this perception, either mentally or externally, at once to apprehend forms, and take the greatest pleasure in still formulating, or converting them into an object or subject of some meaning, conveying some sentiment. An artistic nature, when it does exist, very rapidly apprehends in the most trifling material—such as is often seen in an old broken plaster wall, or the half-consumed embers of a fire—that which becomes very suggestive.

Now, this is what I wish particularly to be impressed upon all connected with this Society, who are seeking after art—an essential qualification for their success is, that they must be conscious of an artistic nature going out in the spirit, which I have described. It is not essential that the photographer be a draughtsman, but he should be a thorough artist in feeling, well read in all books relating to art, and especially familiar with such a work from the library of contemporary science as that by Engène Véron on "Æsthetics," which gives, perhaps, the most advanced notions concerning art of the present day. As to the beginner, I would recommend him to study the writings of Burnet (the celebrated engraver of Sir David Wilkie's works), especially three of his volumes—viz., those on the "Education of the Eye," "Composition," and "Light and Shade." They are only to be had in libraries now. Then there is Rowbotham, on the "Art of Sketching"; and also Howard's "Sketcher's Manual." The latter contains very excellent examples, which would be very beneficial in the way of arrangement and general treatment of a subject.

(*To be continued.*)

COLD EMULSIFICATION WITH UNIFORMITY.

BY ALFRED J. BROWN.*

Mr. Henderson has read before you two short papers upon cold emulsification, claiming for what he called his method great sensitiveness and uniformity. I shall endeavour to show you to-night that there is nothing whatever in this method as it stands, more than in any other, to warrant this assertion.

In the first place, I think there is little that he can claim as his own in this method. It is well known that Mr. Cowan has for some time used ammonia in making his emulsions, and allows them to ripen cold—cold in this case being a rather elastic term. The alcohol also was recommended by a gentleman—whose name I forget—long ago, but with this difference, that he gave the true reason for its employment.

I have lately made a few experiments upon these lines, and now give you the conclusions at which I have arrived. After expressing as my opinion that no method is at present really good wherein ammonia is used,† I proceed to my remarks.

It has been known, since its introduction by Dr. Monckhoven, that ammonia so hastens the formation of the silver bromide into the most sensitive state, that, unless it be used at a low temperature, you cannot have it under control. The silver bromide will pass the critical point, and so deteriorate. It is from the inability to stop this continual ripening, this want of control, even if the gelatine be set, that ammonia has probably been condemned by many—unfairly condemned, I think, for were it not for the abominable green fog, it would be the best of all methods, as it is the easiest, because the whole of the silver bromide is acted upon equally, and if the particles are formed in the first place of equal size, will continue so throughout. Of course this does not apply to the ammonio-nitrate process, wherein the silver bromide is formed in a continually-increasing quantity of ammonia, the resulting particles of bromide being of various sizes.*

This—the ammonia—is, as in all such cases, the accelerator; not, as "one of the largest professional plate makers in this country" has "expressed his opinion," "the alcohol." I here protest against capital being made in this way out of what another may say without giving his name, and putting us in a position to judge of the value of his opinion, for I have yet to learn that professional plate makers as a body are infallible. Such remarks may do a deal of harm to a beginner, who might suspect himself, when the method, not he, is at fault, and become discouraged.

The alcohol, however, possibly has a future. It is the greatest restrainer I know. Silver bromide formed in its presence is finer than if it be not used, other conditions being the same. This is even so if no gelatine be used, but not to so marked an extent. It appears to me to possess somewhat different properties, but I may be wrong.

A very fine-particled emulsion may be prepared with less care, and no waste to filter out when it is present; but it also prevents to a remarkable degree the most sensitive state being attained. I have made some emulsions this way without ammonia; the cooking they require is surprising—more, indeed, than I care to submit any gelatine to. This is the reason why some have succeeded with alcohol and ammonia, who have failed with ammonia alone;† with more care they would have done better without it. So great is this restraining power that one almost must use ammonia, and I believe you may even boil in its presence without hurt; but have not tried. I have, however, submitted it to considerable heat. I have not got a rapid plate by this process.

From the foregoing it will probably occur to some that alcohol stopping, or almost stopping, the ripening of an emulsion, the proper time to add it is when a sufficient degree of sensitiveness is attained.

In order to take advantage of the fine and uniform state of the silver bromide when formed in the presence of alcohol, I drew up this scheme:—Place in a bottle 2 ozs. of water and 120 grs. of ammonium bromide, add 240 grs. of Nelson's No. 1 gelatine, and shake well; when it has taken up all the water, and is quite soft, add 2 ozs. of alcohol, and shake again; then put in 180 grs. of silver nitrate (dry), and shake till the whole is converted. The heat given off during this operation is sufficient to quite liquefy the gelatine; keep it in this state for about half-an-hour, then precipitate by pouring into alcohol to get rid of the nitrates, &c., and rinse, to free it from alcohol; dissolve the pellicle in 5 ozs. of water, adding a few grains of ammonium bromide, and cook; pour out to set, and wash in the usual way. The result was a slow plate with cooking, that, with plain gelatine, would have given a rapid one; alcohol was present. I prepared another the same way, divided the pellicle into pieces the size of small peas, washed in running water fourteen hours; result—same as the last, alcohol still present; I could distinctly smell it when melted. Made a third, divided the pellicle as before, placed it upon blotting-board in my drying cupboard till it was quite hard and apparently dry; result—as before, could still smell the alcohol; with a deal of cooking it arrived at the green stage only (transmitted light test).

Further than this I have not as yet had time to go. It would seem that pellicle requires more than ordinary heat to drive off the alcohol, and that a small quantity present in an emulsion prevents the attainment of great sensibility; or, that bromide of silver prepared in this way is physically different. Which is it?

* Read before the London a Provincial Photographic Association.

† It is impossible to make a he thy plate with gelatine that has been in contact with ammonia; it is sure suffer from green fog.

* In most cooking processes also—there being a lack of sufficient agitation—the particles are unequally developed, more especially in this case if the high temperature and short period method be employed.

† I remember well when I was very new that I failed and failed till I was almost weary, making emulsions that were fogged from over-cooking, my first good plate being one that I intended to be very slow. I advise all beginners to make slow plates at first.

Notes.

The Council of the Royal Society have awarded the Rumford medal to Captain Abney, F.R.S., "for his photographic researches, and his discovery of the method of photographing the less refrangible part of the spectrum, especially the infra-red region."

Mr. Malcolm G. Dobbie, the spirited honorary secretary of the Edinburgh Society, is, we are sorry to hear, seriously ill.

Our readers will also regret to learn that the recently-elected honorary secretary of the Photographic Society of Great Britain, Mr. F. Maxwell Lyte, is likewise an invalid.

Mr. Charles Pearce, the official reporter of the Photographic Society, and a well-known contributor to these columns, has been appointed editor of *Funny Folks*.

The medals awarded at the Pall Mall Exhibition this year were presented by the President of the Society on Tuesday evening. We congratulate the president, no less than the recipients, on the occasion, for the former was very happy in the little speeches he made to each medallist, and in his graceful allusion to the pictures which had brought good fortune to their authors.

"By-the-bye, Mr. Burton, I don't see that curious serpentine curve on the plates you have just handed round," said an unmathematical emulsionist on Tuesday evening; "and yet you say that this is the principal advantage and peculiarity of your method." Mr. Burton tried hard to explain all about ordinates and co-ordinates; but he didn't succeed.

Many readers who have found bichromate to be ineffectual in removing the tendency of an emulsion to give fogged images will be interested to know what Mr. Cowan says on the subject: "This characteristic example of dichroic fog well illustrates the original character of the sample, but after it had been squeezed through canvas into a one per cent. solution of bichromate, and allowed to remain one hour, I washed for about twelve hours, and the cure was complete; but the cured emulsion had only half the original sensitiveness. Next time, however, I will try the effect of washing more thoroughly."

An aqueous solution of pyrogallic acid rapidly decomposes, and an alcoholic solution undergoes change more slowly; but a solution of pyrogallol in pure and undiluted glycerine appears to be capable of being kept without change for an unlimited period. Pyrogallic acid dissolved in a mixture of glycerine and water keeps much better than the mixture of alcohol and glycerine as recommended by Mr. Edwards. The presence of glycerine in the developer certainly does no harm, and it is believed by many to be highly advantageous.

One of the surest tests of popularity is undoubtedly the public demand for portraits. Just as at the present moment, in this country Sir Garnet Wolseley's portrait figures by the hundred on the hawker's barrows—it is a piracy of one of Mr. Fradelle's photographs, we believe, that is everywhere—so in America, the sale at this moment of pictures of Mrs. Langtry surpasses all demand ever made for Sarah-Bernhardts, Pattis, Nilssons, &c.

After having repeatedly stated his opinion that the charge against Captain Kerr was altogether based on misapprehension, Mr. Hosack dismissed the case without calling on the Captain to make any defence.

Sir Charles Wheatstone and Sir David Brewster were never very good friends; for one reason, because they were always working upon the same branch of science, and were for ever coming into violent contact. The battle of the stereoscope will still be remembered, in which Wheatstone and Brewster were opposing knights, each claiming its discovery; but there were several other scarcely less notable instances in which the eminent philosophers came to loggerheads. With it all, there was not much ill-will between them, however, as we are in a position to show.

At a *soirée*, on one occasion, when both gentlemen were present, there happened to be a son of Sir David's—a little boy—who very naturally was walked round the room to say how-do-you-do, to the principal visitors. After a while, the boy came to Wheatstone, and was presented to him; but scarcely had the little lad shaken hands, than Sir David called out lustily, "For Goodness' sake, take the child away from Wheatstone—he'll claim him!"

We take this opportunity, by the bye, of informing our readers that a portrait of the late Sir Charles Wheatstone will form the frontispiece of our coming Year-Book, a very fine negative of our native philosopher having been lent us for the purpose by Mr. J. E. Mayall, of New Bond Street.

A photograph of the comet has been secured by Mr. Ferneyhough, of Natal, the picture being spoken of by the *Natal Witness* as reflecting "high credit" upon the photographer. Of course the photograph has been secured at night, but our contemporary, in criticising the result, seems a little surprised at the "surroundings" being so dark. "The comet is seen brilliantly sweeping down in the darkness," it tells us, "while the foreground is composed of jet-black house-tops."

In the *Bazaar* of last week, under the heading "Scientific," a "very powerful pair of field and marine glasses by Jumelle" is advertised. The announcement is similar to the one to which we recently called attention, where a photographic lens by "Breveté" was offered for sale. "Breveté," however, manufactures all sorts of goods in France, pawnbrokers tell us, while "Jumelle" confines himself to *twin* glasses. MM. Breveté et Jumelle are ike the rich man "Kanitverstan," the German journey-man used to talk about. Travelling in Holland the latter asked the name of the owner of a fine dwelling, and the reply was "Kanitverstan," the same anwer being given when he asked for information about a beautiful garden ; and finally when, sad to relate, he met a funeral, the reply given him was as before. It was "Kanitverstan" who owned the fine house and the beautiful garden, and was now dead. The traveller never knew till after his return home that the good Dutch people only meant to say that they did not understand his questions when they uttered "Kanitverstan."

Here is a matter for the Copyright Defence Association to look into, when it is set going. A gentleman enters a studio hesitatingly, with a portrait taken long ago ; he says he fears he has come to the wrong house, as the name of the firm is not the same as that upon the mount ; but he wants some more copies. The attendant in the reception room examines the pictures, and, after referring to a book, tells the customer it is all right, and that the negative was taken there ; how many copies are wanted ? The number is specified, the order booked, and away goes the enquirer. In a few days, however, the latter receives a communication to the effect that the negative cannot be found, but that a supply of copies quite equal to the original will be forwarded without delay. So here we have the case of B copying A's photograph, and with the permission of the unsuspecting model.

We mentioned last week the fact of one firm of photographers having recovered £700 from a periodical for pirating a series of portraits. The photographic studies of Rejlander—from Ginx's Baby downwards—were pirated not by one, but by hundreds of journals, and yet poor O. G. R. never received a penny from any publishing house.

A draughtsman correspondent, writing on the subject of photography on wood, asks when we may expect the wood-engraver to be superseded by the photographer, so that the artist's work may go straight to the printing-press untouched by any intermediary. "That is what we want," our friend adds, a little dictatorially. Our reply may be expressed in quite the same tone, for we answer, in perfect truth, "You have got such a process already." Photography has done its part, but the draughtsman has not done his ; if the artist only made his drawing as he desires to see it in the illustrated journal in which it appears in public, photography would at once save him from that middle man, the wood-engraver.

Unfortunately, the draughtsman will not draw his picture as it is finally to appear in public. In the illustrated journal his picture is composed of black lines more or less thick, and more or less close together, and if the artist would only produce it so, there would be no difficulty about dispensing with the wood-cutter. But draughtsmen, for the most part, do not draw with a black point at all ; their lines are generally grey, and a large number work with a paint brush and washes of different tints. They then leave it to the wood-engraver to translate the tints into lines, and the final result in black and white is therefore the joint work of draughtsman and graver. It is the draughtsman's privilege to grumble at the graver, and if the sketch does not turn out well, it is always the graver's fault. Perhaps it is because there would be no graver to grumble at that the draughtsman is in no hurry to produce his picture straightway in black and white.

But the main reason, no doubt, is that the draughtsman has not been trained to make his picture with black lines. He paints with his pencil rather than draws. Still, it is only a question of time, and the next generation of Tenniels and Proctors will produce their cartoons on Bristol board in black and white, just as we buy them in *Punch* and in *Moonshine*. The sketch will then be photographed, etched upon metal, and printed off in the press with all the delicate bloom of the artist's touch upon it. If zinc etching is not good enough, copper plate may be used ; but in any case, photography now-a-days can reproduce the lines of the artist in their full vigour and delicacy.

Patent Intelligence.

Application for Letters Patent.

5395. Adolph Tuck, of 72 and 73, Coleman Street, in the city of London, Fine Art Publisher, for an invention of "Improvements in ornamenting terra-cotta plaques."—Dated 13th November, 1882.

Grants of Provisional Protection.

5086. Richard Brown and Robert William Barnes and Joseph Bell, all of the city of Liverpool, in the county of Lancaster, Photographers, for an invention of "Improvements in and relating to the production of printing surfaces from gelatine reliefs."—Dated 25th October, 1882.

5131. Henry Harris Lake, of the firm of Haseltine, Lake, and Co., Patent Agents, Southampton Buildings, London, for an invention of "An improved method or process of and apparatus for producing coloured photographs."—A communication to him from abroad by Joseph Chaine, Arthur Durand, and Sallonier de Chaligny, all of Lyons, France, Engineers.—Dated 27th October, 1882.

ON THE PREPARATION OF GELATINE PLATES.

BY E. HOWARD FARMER, F.C.S.*

Since the first announcement of these lectures, our Secretary has asked me to give a free introductory lecture, so that all who are interested in the subject may come and gather a better idea as to them than they can possibly do by simply reading a prospectus. This evening, therefore, I propose to give first a typical lecture of the course, and secondly, at its conclusion, to say a few words as to our principal object. As the subject for this evening's lecture I have chosen "The Preparation of Gelatine Plates," as it is probably one of very general interest to photographers.

Before preparing our emulsion, we must first decide upon the particular materials we are going to use, and of these the first requisite is nitrate of silver. Nitrate of silver is supplied by chemists in three principal conditions:—

1st. The ordinary crystallized salt, prepared by dissolving silver in nitric acid, and evaporating the solution until the salt crystallizes out. This sample usually presents the appearance of imperfect crystals, having a faint yellowish

* Being an abstract of the Introductory Lecture to a course on Photography at the Polytechnic Institute, November 11th.

tinge, and a strong odour of nitrous fumes, and contains, as might be expected, a considerable amount of free acid.

2nd. Fused nitrate or "lunar caustic," prepared by fusing the crystallized salt and casting it into sticks. Lunar caustic is usually alkaline to test paper.

3rd. Re-crystallized silver nitrate, prepared by redissolving the ordinary salt in distilled water, and again evaporating to the crystallizing point. By this means the impurities and free acid are removed.

I have a specimen of this on the table, and it consists, as you observe, of fine crystals which are perfectly colourless and transparent; it is also perfectly neutral to test-paper. No doubt either of these samples can be used with success in preparing emulsions, but to those who are inexperienced, I recommend that the re-crystallized salt be employed. We make, then, a solution of re-crystallized silver nitrate in distilled water, containing in every 12 ounces of solution $1\frac{1}{4}$ ounces of the salt.

The next material we require is a soluble bromide. I have here specimens of various bromides which can be employed, such as ammonium, potassium, barium, and zinc bromides; as a rule, however, either the ammonium or potassium salt is used, and I should like to say a few words respecting the relative efficiency of these two salts.

1st, as to ammonium bromide. This substance is a highly unstable salt. A sample of ammonium bromide which is perfectly neutral when first prepared will, on keeping, be found to become decidedly acid in character. Moreover, during this decomposition, the percentage of bromine does not remain constant; as a rule, it will be found to contain more than the theoretical amount of bromine. Finally, all ammonium salts have a most destructive action on gelatine; if gelatine, which has been boiled for a short time with either ammonium bromide or ammonium nitrate, be added to an emulsion, it will be found to produce pink fog—and probably frilling—on plates prepared with the emulsion. For these reasons, I venture to say that ammonium bromide, which figures so largely in formulæ for gelatine emulsions, is one of the worst bromides that can be employed for that purpose, and is, indeed, a frequent source of pink fog and frilling.

2nd, as to potassium bromide. This is a perfectly stable substance, can be readily obtained pure, and is constant in composition; neither has it (nor the nitrate) any appreciable destructive action on gelatine. We prepare, then, a solution of potassium bromide in water containing in every 12 ounces of solution 1 ounce of the salt. On testing it with litmus paper, the solution may be either slightly alkaline or neutral; in either case, it should be faintly acidified with hydrochloric acid.

The last material we require is the gelatine, one of the most important, and, at the same time, the most difficult substance to obtain of good quality. I have various samples here—notably Nelson's No. 1 and "X opaque"; Coignet's gold medal; Heinrich's; the Autotype Company's; and Russian isinglass.

The only method I know of securing a uniform quality of gelatine is to purchase several small samples, make a trial emulsion with each, and buy a stock of the sample which gives the best results. To those who do not care to go to this trouble, equal quantities of Nelson's No. 1 and X opaque, as recommended by Captain Abney, can be employed. Having selected the gelatine, $1\frac{1}{4}$ ounces should be allowed to soak in water, and then melted, when it will be found to have a bulk of about 6 ounces.

In order to prepare our emulsion, I take equal bulks of the silver nitrate and potassium bromide solutions in beakers, and place them in the water bath to get hot. I also take an equal bulk of hot water in a larger beaker, and add to it $\frac{1}{4}$ an ounce of the gelatine solution to every 12 ounces of water. Having raised all these to about 180° F., I add (as you observe) to the large beaker containing the dilute gelatine a little of the bromide, then, through a funnel having a fine orifice, a little of the silver, swirling the liquid round during the operation; then again some bromide and silver, and so on until all is added.

When this is completed, a little of the emulsion is poured on a glass plate, and examined by transmitted light; if the mixing be efficient the light will appear—as it does here—of an orange or orange-red colour.

It will be observed that we keep the bromide in excess while mixing. I must not forget to mention that to those experienced in mixing, by far the best method is that described by Captain Abney in his Cantor lectures, of keeping the silver in excess.

The emulsion, being properly mixed, has now to be placed in the water bath, and kept at the boiling point for 45 minutes. As, obviously, I cannot keep you waiting while this is done, I propose to divide our emulsion into two portions, allowing one portion to stew, and to proceed with the next operation with the remainder.

Supposing, then, this emulsion has been boiled, it is placed in cold water to cool. While it is cooling, let us consider for a moment what takes place during the boiling. It is found that during this time the emulsion undergoes two remarkable changes:—

1st. The molecules of silver bromide gradually aggregate together, forming larger and larger particles.

2nd. The emulsion increases rapidly in sensitiveness. Now what is the cause, in the first place, of this aggregation of molecules; and, in the second place, of the increase of sensitiveness? We know that the two invariably go together, so that we are right in concluding that the same cause produces both.

It might be thought that heat is the cause, but the same changes take place more slowly in the cold, so we can only say that heat accelerates the action, and hence must conclude that the prime cause is one of the materials in the emulsion itself.

Now, besides the silver bromide, we have in the emulsion water, gelatine, potassium nitrate, and a small excess of potassium bromide; and in order to find which of these is the cause, we must make different emulsions, omitting in succession each of these materials. Suppose we take an emulsion which has just been mixed, and, instead of boiling it, we precipitate the gelatine and silver bromide with alcohol; on re-dissolving the pellicle in the same quantity of water, we have an emulsion the same as previously, with the exception that the nitre and excess of potassium bromide are absent. If such an emulsion be boiled, we shall find the remarkable fact that, however long it be boiled, the silver bromide undergoes no change, neither does the emulsion become any more sensitive. We therefore conclude, that either the nitre, or the small excess of potassium bromide, or both together, produce the change.

Now take portions of a similarly washed emulsion, and add to one portion some nitre, and to another some potassium bromide; on boiling these we find that the one containing nitre does not change, while that containing the potassium bromide rapidly undergoes the changes mentioned.

Here, then, by a direct appeal to experiment, we prove that to all appearance comparatively useless excess of potassium bromide is really one of the most important constituents of the emulsion.

The following table gives some interesting results respecting this action of potassium bromide:—

Excess of Potash Bromide.	Time to Acquire Maximum Sensitiveness.
·2 grains per oz. ...	... no increase after 6 hours
2.0 grains per oz. ...	about $\frac{1}{2}$ hour
20·0 grains per oz. ...	... 7 minutes

I must here leave the rationale of the process for the present, and proceed with the next operation.

Our emulsion being cold, I add to it, for every 6 ounces of mixed emulsion, 1 ounce of a saturated cold solution of potassium bichromate; then, gently swirling the mixture round, a few drops of a dilute (1 to 8) solution of hydrochloric acid, and place it on one side for a minute or two.

When hydrochloric acid is added to bichromate of potash, chromic acid is liberated. Now, chromic acid has the property of precipitating gelatine, so that what I hope to have done is to have precipitated the gelatine in this emulsion, and which will carry down the silver bromide as well. You see here I can pour off the supernatant liquid clear, leaving our silver and gelatine as a clot at the bottom of the vessel.

Another action of chromic acid is, that it destroys the action of light on silver bromide, so that up to this point operations can be carried on in broad daylight.

The precipitated emulsion is now taken into the dark-room and washed until the wash water shows no trace of colour; if there be a large quantity, this is best done on a fine muslin filter; if a small quantity, by decantation.

Having been thoroughly washed, I dissolve the pellicle in water by immersing the beaker containing it in the water bath. I then add the remaining gelatine, and make up the whole with 3 ounces of alcohol and water to 30 ounces for the quantities given. I pass the emulsion through a funnel containing a pellet of cotton-wool in order to filter it, and it is ready for coating the plates.

To coat a plate, I place it on this small block of levelled wood, and pour on, down a glass rod, a small quantity of the emulsion, and by means of the rod held horizontally, spread it over the plate. I then transfer the plate to this levelled slab of plate glass, in order that the emulsion on it may set. As soon as set, it is placed in the drying-box.

This process, as here described, does not give plates of the highest degree of sensitiveness, to attain which, a further operation is necessary; they are, however, of exceedingly good quality, and very suitable for landscape work.

THE PHOTOGRAPHIC COPYRIGHT QUESTION.

On Wednesday evening, a numerously attended meeting of members of the photographic profession was held in Anderton's Hotel, Fleet Street, to consider the question of photographic piracy, and the best means of adopting combined action for the detection and prosecution of those persons who produce and vend, in defiance of the law, piratical copies of photographs duly registered in accordance with the provisions of the Act of Parliament. The chair was occupied by Mr. George Bishop.

The Chairman said the object for which the meeting was convened must be so patent to everybody in the room, that very little explanation would be required from him. If they succeeded in forming a Photographic Copyright Defence Association, it would be beneficial, not only to photographers and publishers, but to everybody directly or indirectly connected with photography. There were other societies that took upon themselves to direct and advise photographers in the scientific and technical parts of the profession; and he felt certain that if it were possible to form a society that would take under its care the material—the monetary and commercial interests—of photography, a great deal of good might come out of it. Of course this meeting must necessarily be of a preliminary nature; but the future action to be taken would nevertheless depend greatly upon what took place in that room. The special object of the meeting was to open a discussion as to the necessity for a society, and hear the opinion of the gentlemen present with a view to future action. He presumed that before the meeting adjourned a committee would be nominated for the purpose of considering what rules it might be advisable to draw up with the view to the formation of an association. One thing very evident was, that no society was ever founded without funds, and no society ever existed without an income. These matters were of primary importance; and another matter, which might well be discussed, was the extent to which those who would be most interested in this movement should contribute towards the formation and sup- of the society. A number of letters had been received expressive of sympathy and support with the movement; among others from the Stereoscopic Company, Messrs. Brown, Barnes, and Bell, Herbert Barrow, Fradelle, Gillard, Robinson, Hughes, Norman May, Mayo, Wilson, Bradley, La Fosse, Weston and Son, Slingsby, and Mawson and Swan. The Chairman proceeded to add that, as a matter of course, it was impossible to form such a society as this in a day. The mere matter of the rules would necessarily take a good deal of time and thought to draw up, because it would not do that any of them should subscribe to rules which might render them liable to a responsibility which they did not intend to undertake. He concluded by calling upon Mr. Downey, Jun., who was, he thought, the originator of the correspondence on the subject, to address the meeting.

Mr. Downey, Jun., observed that, as was well known, the law gave ample power for redress to those photographers who registered their works, and whose rights had been infringed by unscrupulous dealers, after the fashion of the hundreds of thousands of piracies that could be obtained everywhere. A remedy might be obtained in the law courts, but it was so costly a process that few were willing to risk a trial of their grievances. He urged the necessity of their uniting to resist piracies, and remarked that a society, if formed, would be able to act on behalf of its members in defence of their right. The subject was of universal interest to the profession. No photographer, even if he were not at present a publisher, could say how long it might be before he was called upon to take a valuable negative, which might be of untold value to him. In any case its value would be dependant upon the claim he could exercise over it, and he ventured to say, that to the smallest publisher a society would be both a protection and a support. To the agents also—he alluded to the print-sellers—there must be an accruing advantage. When the price they paid for originals was considered, it was possible to estimate their loss, to say nothing of the vexation and annoyance they suffered, when they saw copies sold outside their shop doors at a nominal figure. It ought to be remembered that there were many people who, merely desiring to possess the photograph, regarded the hawked copies as of the same value as those marked in the shops at six times the price. Mr. Downey proposed that the society should consist of what he described as "foundation members" and general members, the subscription to be fixed upon hereafter; and he suggested that a committee of seven or nine gentlemen should be appointed to take the necessary steps for forming the society. He moved, "That this meeting, recognising the necessity of putting an end to the present illegal pirating photographic copyright, thinks it desirable that a society be formed of members of the photographic profession in order to protect such interests."

Mr. S. Walker seconded the motion, which was carried unanimously.

The Chairman then invited suggestions from the meeting as to the best means of promoting the end in view. He added that he had received a letter from Mr. Bird, of the Autotype Company, in which that gentleman stated that copyright gave ample protection in all ordinary cases. "The property of photographs and portraits of celebrities," he went on to say, "is subject to invasion from rascals who are not worth powder and shot, from whom damages cannot be obtained, and who boldly hawk their pirated wares in defiance of the Act of Parliament. By persevering action this nuisance can, no doubt, be put down." Mr. Bird's suggestion was that this end might be obtained if the persons more or less interested combined together. He added that anything less than an annual subscription of one guinea would be useless, and that would require to be supplemented by a guarantee fund, to which the parties interested should subscribe in proportion to the extent of their interest. The Chairman stated that in his opinion anything less than a guinea subscription would be scarcely worthy of consideration. As to the question of a guarantee fund he had to say, on behalf of his own firm, that if nineteen other gentlemen would subscribe ten guineas each, they would be happy to put down ten guineas. There ought to be a sum of 200 guineas to start with, and it would require between £400 and £500 annually to maintain the operations of the society. In his opinion it would be highly desirable to retain the services of a solicitor. It was beyond doubt that the Society would have a good deal of work to do, and it would be also necessary to have the services of a paid secretary. It was not intended that the Society should be, so to speak, the scavenger of the profession, for each gentleman would require to protect his own interests as far as he could, and obtain compensation for piracies if he could. In the event of proceedings being necessary, the Society would doubtless be the best body to conduct them.

The Chairman's conditional promise, on behalf of his firm, of a subscription of ten guineas, was followed by the promise of a similar amount from Mr. Walker and Mr. Luks, and five guineas from Mr. Fradelle.

In reply to Mr. Cobb, the Chairman said he had not the slightest knowledge of the number of photographs registered during the year. It was certainly not half the number that ought to be registered.

The Chairman subsequently put it to the meeting whether the subscription should be one guinea annually or half-a-guinea, with the result that the prevailing opinion was in favour of the larger amount.

After considerable discussion upon matters of detail, it was proposed by Mr. Cobb and seconded by Mr. Luks, that a fund of £200 be raised as a starting fund by voluntary contributions.

This, it was understood, was agreed to.

It was also agreed, on the motion of Mr. Cowan, seconded by Mr. Cobb, that a provisional committee be appointed to go into the question of the constitution of the Society, investigate all the necessary details, and report to a subsequent meeting.

The meeting then adjourned.

Correspondence.

AMATEURS AND THEIR WORK.

Dear Sir,—It has been intimated that amateur photographers are in the habit of exposing their own plates, and then sending them off to the makers or others to have them developed and prints taken from them.

Since no amateur has denied this, it looks very much like truth, and in order that such a statement may not mislead, I beg to raise my voice against it.

I know several amateurs who never get any professional assistance of any kind—men who would scorn to get their work done for them, and then dishonestly call it their own. What should we say to a man who got another to write a book for him, and then prefixed his own name? Yet the cases are parallel.

The question may be asked where the line should be drawn. It seems to me that it is perfectly fair to buy prepared plates and paper. A doctor can buy ready prepared drugs; but it is his knowledge which directs them. So it should be with the amateur photographer. An exposing machine is not an amateur photographer.—I am, &c., An Amateur.

THE GRAPHIC REPRESENTATION OF SENSITIVENESS.

Sir,—On Tuesday evening, at the meeting of the Photographic Society of Great Britain, Mr. Burton used a diagram to illustrate his paper. Various curves were drawn, and were said to represent the gradations of density given by various emulsions. The graphic method so applied is excellent if there be any ready way of investigating the matter so as to get the curves even approximately correct. To my mind, however, there appears to be great difficulty in the way of doing so.—I am, sir, &c., Robert Belton.

PHOTOGRAPHIC NUISANCES.

Dear Sir,—I see by your issue of last week that the complaints of the unreliability of commercial gelatine plates still continue to crop up, and in fact these complaints are becoming pretty frequent, "especially by amateur and small professionals." May I ask, is it not rather the amateur or small professional that is faulty, rather than the poor plate maker?—for, with all due respect for the profession, there is scarcely one operator in fifty who knows how to treat that wonderful agent, a gelatine dry plate.

The great desire for extremely rapid plates has increased the difficulty, especially when extreme cheapness is demanded at the same time. With regard to rapidity, a plate that gives but little latitude in the exposure is unfit to put into the hands of the amateur or ordinary operator, especially the latter, and the want of appreciation of the character of the light, the kind of subject, and future treatment in the dark room, may cause the finest plate to be condemned as worthless, and I have no doubt that in nine cases out of ten the fault lies in the plate-user, rather than in the plate itself.

Cheapness does not tend to secure quality in anything, certainly not in gelatine, and the wonder is that the commercial plates are generally so good when the prices at which the consumer can obtain them is considered, and how miserably small must be the prices obtained by the actual maker. That commercial plates do vary, and that in the same parcel, I am willing to admit, and that this variation is avoidable, I fearlessly assert; but until the plate maker can obtain and afford to pay work-people who can be relied upon to take that extreme care in every detail which alone can secure regularity and perfection in so delicate an article as the gelatine plate, no one, amateur or professionsl, must expect every plate perfect; nor must any plate maker, however excellent and perfect his plates may be, expect to escape the condemnation of his plates from numberless causes over which he has no control, and which are due to the treatment, and not the plate.

During the last three and a-half years I have made and used some thousands of plates, from ¼ to 15 by 12, and have had a very few, indeed remarkably few to discard from any fault in the plates themselves; but this may be due to the fact that I make them entirely myself, unassisted in any part of the work. But this fact proves to me that perfect uniformity can be obtained, for although I make my emulsion in small quantities (about forty ounces), and consequently have to make it frequently, I find my plates perfectly uniform in quality and speed, so far as the general work is concerned (and this is the principal thing), although a slight variation might be detected by a delicate actinometer. I do not aim at great rapidity; I consider a plate that gives a good negative (C.D.V.) in a couple of seconds on an ordinary day, and that will not spoil in more than double that time of exposure, is a generally safe and useful plate for the studio, and may also be used for general and out-door work; and such a plate can be made with certainty, every plate giving practically the same result if properly treated; but though having the most conclusive proof of this, I have little doubt were I to send such plates into the market, they would share the fate of all commercial plates, and some of them be condemned as worthless.

What I wish to establish is, first, that, there is no difficulty in obtaining plates of practically uniform quality in every respect—and, indeed, I am much inclined to think many of the commercial plates are practically uniform—but that the treatment they are subjected to is anything but uniform, or, rather, I might say, is not such that uniform results can be expected.

I write generally, and I trust that none of your correspondents who have had cause to complain of the irregularity of commercial plates (an irregularity which I know exists to an extent) will think for a moment that I accuse them, personally, of inability. I do not doubt the justness of their complaints, but at the same time, until amateurs and operators are better acquainted with the powers of gelatine plates and the treatment they require under varying circumstances, the poor plate maker must content himself to bear undeserved blame. C. J. Dobbs.

Proceedings of Societies.

Photographic Society of Great Btitain.

The first meeting of the above Society for the session 1882-3 was held at the Gallery of the Society of Painters in Water-Colours, 5a, Pall Mall East, on Tuesday evening, 14th November, Mr. James Glaisher, F.R.S, President, in the chair.

The minutes of the last meeting having been read and confirmed, twenty-five new members were elected.

The Chairman said that in the minutes read it was stated that Mr. Maxwell Lyte had been elected hon. secretary in place of Lieut. L. Darwin, R.E. It was his painful duty to inform the meeting that Mr. Lyte had been, and was now, seriously ill, and that the council were not yet free from anxiety on his behalf. Before proceeding to the presentation of the medals awarded at the Exhibition, he said he was quite sure many persons had derived much pleasure from visiting it. The weather had been very bad since the opening, more rain having fallen than in any previous October he remembered; still the Exhibition had been visited by more than 6,000 persons, and they had taken more than £30 in excess of last year's receipts. Proceeding to the presentation of the medals gained, he remarked, with respect to Mr. Grant (who was not present), that, taking into consideration the very great difficulties incident upon the production of photographs in the Arctic regions, that gentleman was to be congratulated upon the success of his efforts. In handing the medal to Mr. Horsey, the Chairman expressed the hope that it might not be the last occasion in which he would have the pleasure of presenting him with one. In the absence of Mr. Sutcliffe, the next gentleman on the list of awards, the Chairman asked Mr. Bird to convey the wishes of the Society for his continued success. To Mr. Robinson, who was received with applause, the Chairman remarked that any exhibition containing his pictures, and not followed by his receiving a medal, would indeed be a novelty. He added that both with portraits and landscapes Mr. Robinson had been most successful, and he only hoped he might long remain with them to gain further honours. Of Mr. Byrne's pictures, Mr. Glaisher said it was a pleasure to look upon them. Mr. Abel Lewis's name had long been familiar to the Society, and he (the Chairman) would never forget the pleasure it gave him to hand him the medal awarded. To Mr. Slingsby the Chairman said: "Though you have not received a medal hitherto, your name has never been absent from the list of those mentioned by the judges as deserving of recognition." Speaking of Mr. Chaffin, who was not present, the Chairman said that he had the pleasure of presenting that gentleman with a medal many years ago, when awards were given for heads, natural size. Mr. Gale and Mr. Henry Stevens were among the absentees, the latter gentleman having written, regretting his inability to be present. The last on the list was Mr. Adam Diston, whose fine examples richly deserved recognition.

The Chairman said there were many other pictures in the Exhibition which had been very near to obtaining medals. He proposed a vote of thanks to the judges and hanging committee.

Mr. W. K. Burton, who was then called upon to read a paper on "A Modified Gelatine Process," remarked that he would not venture to describe it as a new process, as it was only a modification of old methods, though it possessed certain features of novelty. He utilised the property possessed by boiled gelatine emulsion of precipitating its bromide of silver during and after boiling. This was not a new observation, but it had not hitherto been possible to secure complete precipitation with any certainty, but by a subsequent addition of ammonia to the boiled emulsion he not only enchanced its sensitiveness, but also caused the bromide to precipitate with certainty. He then proceeded to describe the details of his method of working, giving practical demonstrations of some portions of the process. A three-grain solution of gelatine was made, to which the bromide was added; to this he next added the requisite quantity of silver nitrate in crystals, agitating until the crystals were dissolved. The thin emulsion was then transferred to a suitable vessel, and boiled in the ordinary manner; after which it was allowed to cool slowly to about 100° Fahr. A mixture of alcohol and ammonia is next stirred in, and the vessel set aside to allow the bromide to subside. The time required for this operation may vary from twelve to forty-eight hours, and when the subsidence is complete, the clear liquid is poured off closely, and replaced by clean water, the precipitated bromide being well stirred, and placed aside to settle a second time. In practice, he found this sufficed to eliminate the whole of the decomposition salts, as well as the gelatine first used. The water having been again poured off, a fresh quantity of gelatine, previously soaked, is placed in the beaker, together with a little warm water. By means of a glass rod, and using the softened gelatine as a "mop," the precipitated bromide can be scraped from the bottom and thoroughly incorporated, forming a fine smooth emulsion, which should then be made up to the proper consistency for use. Even at this stage the emulsion will not have reached its maximum sensitiveness; he therefore advocated its being kept for some days before use, a small trace of salicylic acid, dissolved in alcohol, being added for the purpose of preventing decomposition. Captain Abney had been the first, he believed, to point out the fact that an emulsion improved in sensitiveness by keeping; but in this respect he (Mr. Burton) had found great irregularity when working in the ordinary way, as some emulsions show no improvement whatever, whilst others actually become slower. By his method he had never found an emulsion fail to improve in sensitiveness, if kept for ten days, sometimes to the extent of four or five times, when the maximum appears to be reached. The advantages he claimed for his plan were the following. First, he not only eliminated the whole of the decomposition salts, but also of the gelatine which had been submitted to the combined action of heat and ammonia, which was, in ordinary processes, too often the cause of green fog, yellow fog, brown fog, and numerous other defects so common with gelatine plates. Captain Abney had stated, in connection with Dr. Eder's formula, in which a boiled emulsion was afterwards treated with ammonia, that he found no benefit to accrue from the action of the ammonia. The extra sensitiveness which may be shown by the sensitometer in an emulsion so treated with ammonia would not be exhibited in camera exposures. Mr. Burton then proceeded to explain, by means of a diagram of the curves of sensitiveness and density, how the advantages both of the boiling and ammonia processes were combined in his formula; and concluded by remarking that though, in consequence of the time occupied in completing the emulsion, it might not be much used by amateurs, it would prove extremely useful for day-to-day working, as the actual time occupied was much less than would be the case if the ordinary method of washing were adopted, though it might be necessary to have several emulsions, in different stages, proceeding simultaneously.

A vote of thanks was passed to Mr. Burton for his paper, and as the Chairman remarked that it would be the last evening on which members would have an opportunity of inspecting the pictures, the discussion was postponed till the next ordinary meeting on December 12th.

The next social gathering will be held on Tuesday, November 28th.

Edinburgh Photographic Society.

The twenty-third annual meeting was held in 5, St. Andrew Square, on Wednesday evening, 1st November, Mr. John Lessels, president, in the chair.

Mr. Wm. Dougal (interim secretary during the illness of Mr. Dobbie) read the minutes of the last annual and ordinary meetings, which were approved, and the following gentlemen were unanimously elected ordinary members of the Society:—Messrs. Andrew Gibson, D. Mackenzie, A. Archibald, A. Morrison, C. Fraser, George Dods, William Wyllie, William Morrison, and Mr. James Pursell.

The Secretary submitted the following report for the year ending October, 1882:—

The Council, in presenting the twenty-third annual report, has pleasure in congratulating the members on the continued prosperity of the Society. During the past session the Society has lost four members by death, and twenty-nine by removal and resignation—total thirty-three; whilst forty-eight new members have been enrolled. The total number on the roll at present is three hundred and eighty-seven, and thirteen honorary and corresponding members.

Twenty-five meetings have been held during the past session—nine ordinary, two popular, twelve council and committee, the annual excursion, and the annual dinner. The ordinary meetings have been very well attended, the papers and subjects brought under consideration being practical and instructive. The "popular" meetings still continue to be a very pleasing element of the Society's operations. There were two such meetings, the subjects being:—"A Tour in the Isle of Man," illustrated by pictures lent by Mr. Chadwick, descriptive lecture by Mr. Davies; and "Scenery of the Highlands and Islands of Scotland," pictures lent by Messrs. Valentine, descriptive lecture by Mr. Davies. About seventeen hundred persons were present at these meetings.

The annual excursion was on 6th July. The place selected was Dirleton. The company numbered about seventy. Numerous groups were taken, and a very pleasant day spent. The annual dinner took place on Friday, 18th November.

The following papers were read before the Society during the session:—"Mercury Intensifiers," by Cosmo I. Burton and Arthur P. Laurie; "Manipulation of Argentic Gelatino-Bromide Paper," practically demonstrated, by Messrs. J. M. Turnbull, and William Crooke; "Gelatine Emulsion," by Andrew Pringle; "Symbolism of Nature in Landscapes," by W. Neilson; "Some

Photographic Experiences, including Enamelling, and a recent discovery for the Fixing of Silver Prints," by Alexander Ayton; "Some Experiences in Animal Photography," by Mr. Charles Reid; "A New Theory of the Sun," by Dr. Siemens, F.R.S.; "On Photography as a Handmaid to Medical, Surgical, and other Sciences," by Mr. William Dougall, illustrated with a series of pictures; "The Modern Photographer, his Power and Appliances," by Mr. John M'Kean, with practical illustrations; "A few Practical Hints to Beginners," by Mr. William Crooke, with practical illustrations.

The following were also exhibited and explained:—A simple apparatus for corrugating zinc, an automatic washing apparatus, an adjustable plate box, racks wholly made of zinc, and a hot ventilator and studio roof cooler, by Mr. James Jameson; a folding pocket lantern made of talc stained with chrysoidine, by Mr. Bashford; an album of views taken on coffee plates, by Mr. Robert Murray; an immense number of very large calotype photographs taken in Burmah, by Dr. Hunter; a batch of silver prints, by the Hon. A. U. Erskine; camera and tripod, by Mr. Wane.

A large display of work produced by members during the past year formed an interesting feature of the October meeting.

The question-box has provided matter for discussion of a varied and instructive character. To meet the difficulty of providing the annual presentation print, an international prize competition has been held, one gold, two silver, and two bronze medals, together with £11 in money, being offered. There were thirty-three competitors who sent in one hundred and fifty pictures. The five awards were decided by ballot, in which every member was invited to indicate in their order of desirability the five pictures he considered most acceptable. Each picture was hung anonymously without frame or glass, and no one knew with absolute certainty (excepting the red chalks of Mr. Faulkner) who the pictures were produced by, till after the scrutiny of the voting papers was complete, and the five favourite pictures had thus been indicated. The result of the voting showed that the distinctly greatest favourite was numbered 104, and entitled "Will they never come?" next in order No. 146, "Phyllis Frere;" third, No. 22, "Brambling;" fourth, No. 46, "A Quiet Morning;" and a fifth, No 9, "Gloamin'." On opening the sealed envelopes the fortunate competitors were found to be:—Gold medal, H. P. Robinson, Tunbridge Wells (No. 104); silver medal and £5, Robert Faulkner, Baker Street, London (No. 146); silver medal and £3, R. Slingsby, Lincoln (No. 22); bronze medal and £2, Alfred G. Pettit, Keswick (No. 46); bronze medal and £1, Adam Diston, Leven (No 9). It is gratifying to know that the decision was very pronouncedly in favour of the five selected pictures. As indicating the weight of votes going to the most appreciated pictures, it may be mentioned that more than seventy-two per cent. of the total votes recorded were allotted to the pictures voted on in the first space of the ballot paper. Besides the ordinary members of the Society, a large number of their friends availed themselves of complimentary tickets, and visited the exhibition. The thanks of the Society are due to Mr. Andrew Elliot for his kindness in allowing the use of his room for the exhibition, and to Mr. J. M. Turnbull, who has provided the metal for the silver medals.

Mr. H. H. Pillans read the financial statement, which showed a balance in the treasurer's hands of £5 2s. 8d.

The office-bearers were then elected for the current year.

Mr. Norman Macbeth, R.S.A., after alluding in sympathetic terms to the serious illness of Mr. Dobbie, read a paper entitled "An Early Taste for Art and its Training," &c. (see page 693). The paper was illustrated by diagrams, and pure and hand-modified photographs.

Mr. W. Neilson, in proposing a vote of thanks, remarked that he would begin the training in art as soon as the infant could see, by surrounding the nursery with objects of beauty.

Mr. Lessels spoke of the difficulty he had experienced in getting information, when, as a youth, he came to Edinburgh to purchase books and get the aid of a teacher; but, being unsuccessful in his search, had to return home with his money in his pocket: and pointed out the great advantages possessed by the rising generation, who could get books and teachers not only without difficulty, but cheaply. He specially recommended the use of the black-board as employed in the schools of art on the Continent, where he had seen as many as sixty students in one room, each working before a black-board.

The usual vote of thanks terminated the proceedings.

Dundee and East of Scotland Photographic Association.

The second general meeting of the Association for the winter session was held in Lamb's Hotel on Thursday, November 9th, Mr. David Ireland, vice-president in, the chair.

The minutes having been confirmed, the following gentlemen were elected members of the Association:—Messrs. R. Wilson, James Thomson, Robert B. Thomson, and John K. Thomson. Four other gentlemen were then proposed for election at next meeting.

The Vice-President (Mr. Ireland) then gave the inaugural address in the unavoidable absence of the President. He congratulated the Society, in the first place, upon its strength and rapidly increasing membership. The past year had been a memorable and successful one, and they must look forward to another exhibition at a not distant date. Meantime, let every member strive to higher perfection, and study to keep pace with the rapid progress of the art. The Vice-President then alluded to the dry-plate process and its superiority over former modes for producing transparencies for the lantern, and, in connection with this, said he hoped members would prepare slides for exhibition, and as last year's lantern entertainments had proved of so much interest, the first of the kind for this winter was fixed for an early date. Mr. Ireland concluded by kindly promising to show at one of the meetings a series of slides which he and his son were busy preparing from views, being the results of a summer trip in Norway.

The question-box was then opened, and found to contain two queries—one relative to the most effective mode of keeping pyrogallic in solution, and the other inquiring into the cause of spots on sensitized paper. Both questions gave rise to interesting discussion, and gave ample proof that the question-box will cause some lively sittings. Young members will doubtless resort to its aid to be helped out of their technical difficulties.

Thanks were voted to J. Glaisher, Esq., F.R.S., President of the Photographic Society of London, for his courtesy in forwarding tickets of admission for the Photographic Exhibition in Pall Mall.

A vote of thanks to the Chairman brought the meeting to a close.

London and Provincial Photographic Association.

Mr. W. M. Ashman occupied the chair on the 9th inst., when Mr. Cowan said he had experimented successfully with Captain Abney's formula for clearing green fog negatives by the use of bichromate of potash.

Mr. Cobb having had a batch of emulsion which gave very bad green fog, had added bichromate and allowed it to remain about a hour, then washed for another hour, and coated some plates, and failed to obtain an image even with half an-hour's development; he then washed the emulsion for about eighteen hours, and obtained some of the most rapid plates he ever used; the bichromate seemed to have a hardening effect on the gelatine.

Mr. Henderson said he had some years ago experimented with the addition of bichromate to the emulsion, washing it out with the nitrates, but failed to obtain any good results.

Mr. Cobb enquired if it was considered a necessary consequence that by the use of bichromate the emulsion loses in sensitivenees.

Mr. Henderson found it required a great deal of washing.

Mr. F. W. Hart suggested that the emulsion should be warmed and precipitated in alcohol to eliminate all traces of bichromate.

Some lantern transparencies by Mr. Hepworth, of the *Graphic*, were passed round.

A question was found in the box asking for information as to what was a ten per cent. solution of any chemical.

Mr. Haddon said to make a 10 per cent. solution by weight, 10 parts of the chemical should be taken, and 90 parts of water by weight should be added; then any portion would be a 10 per cent. solution by weight.

Mr. F. W. Hart said a 10 per cent. solution by measure was obtained thus:—Take of the chemical 100 grains, and dissolve in a small quantity of water; place in a beaker, and make up to 100 grains measure with distilled water.

The Chairman showed a developing tray made by fastening strips of glass to a glass plate by means of Prout's glue.

Sheffield Photographic Society.

The usual monthly meeting of the above Society was held in the Masonic Hall, Surrey Street, on Tuesday evening, the 7th inst., Mr. J. H. Rawson, vice-president, in the chair.

The minutes of the last meeting were read and confirmed.

In relation to the question of a presentation print, it was resolved to advertise in the journals, for specimen prints, to be forwarded to the Secretary on approval before the next meeting.

The last year's accounts were then read over, and ordered to be audited and presented for approval at the next meeting.

Mrs. Stringfellow, widow of the late esteemed treasurer, sent an enlarged portrait (by the Autotype process) of her late husband, for the Society's acceptance.

An nanimous vote of thanks was given to Mrs. Stringfellow for her thoughtful gift.

Mr. Rawson brought some very nice stereoscopic views, taken by him during the past season, for the inspection of the members, and advocated the desirability of purchasing a few stereoscopes for the use of the Society at their meetings; and a resolution to that effect was eventually agreed to. He showed a very simple and effective adjustable stereoscope, sent to him from America, which met with general approval.

Mr. Seaman, of Chesterfield, showed a very fine instantaneous view of Chesterfield Market Place, on the market day, when crowded with cattle, farmers, &c. The picture was well defined to the edges, and taken with a Dallmeyer's whole-plate R R lens, on a gelatine whole-plate, and exposed with a shutter of a new construction, devised and made by the Secretary, and giving the foreground three times the exposure of the sky.

After some further discussion the meeting was adjourned.

Photographic Society of Ireland.

The annual meeting of this Society was held in the Royal College of Science, at 8 p.m. on Friday, the 10th inst., the vice-president, Mr. Howard Grubb, in the chair.

The minutes of the previous meeting having been read and confirmed, the hon. sec. (Mr. A. Conan) read the report of the council, from which the following is an extract:—

"In presenting to you the report for the past year, we have much pleasure in being able to announce the continued and increasing success of your Society. During the year, twenty-one new members have been elected, so that there are now, without counting those to be elected to-night, sixty-seven members. Your meetings have on the whole been well attended, and the success of the out-door meeting and of the lantern exhibition would in our opinion justify their repetition in the coming season. The following communications were brought before you:—'On the Gun Camera,' by Mr. John Russell; 'On Professor Stebbing's Gelatine Films,' and 'On the Adaptation of Optical Lantern Fronts to Portrait Lenses,' both by Mr. Thomas Mayne; 'On Mounting Prints on Thin Paper without Cockling,' by Mr. J. V. Robinson; 'On Enlargements on Gelatine Bromide Paper,' and 'On Various Printing Process,' by Mr. Herbert Bewley; 'Notes and Gleanings from a Season's Work,' by Mr. George Mansfield; and 'On Instantaneous Photography,' by Mr. T. H. Smith. Besides the above matter, a number of interesting and instructive exhibits of apparatus and of prints have also been from time to time laid before you, and we have to acknowledge our obligation to those members who have so successfully contributed to the instruction of their fellow-workers, and to express a hope that each member will contribute, as far as he can, his experiences, and the results of his individual researches. During the year a collection of lantern transparencies has been formed, which, as you are aware, are at all times at your disposal for the purposes of private exhibition; and recently we have been able to establish a system of interchange of prints through the medium of a set of albums, which it is intended will shortly represent a permanent exhibition of your work, and considerably enhance the attractions of your future meetings."

The balance-sheet showed the Society to be in a prosperous financial position, the balance in hand being £12 19s. 1d.

The report and balance-sheet having been adopted, the meeting proceeded to the election of officers, with the result that the president, vice-president, hon. secretary, and treasurer were re-elected, and the following gentlemen were chosen as new members of council:—Messrs. G. Mansfield, G. Pim, J. L. Robinson, J. E. Madden, and Thomas Mayne.

The new members of the Society declared elected were Messrs. T. G. Barlow, E. Barton, R. Heron, T. G. Haslam, jun., J. C. Langford, G. Symes, E. Hardman, J. A. Scott, E. Greer, and the Right Hon. Lord Louth.

Among other business transacted was the accord of the best thanks of the Society to the council of the Royal College of Science for the use of the premises, and to Professor Barrett for the use of his laboratory.

Mr. J. V. Robinson then read a paper on "A Reliable Method of Drying Gelatine Films," drawing attention to the avoidance of the danger of cracking or tearing away from the pins usually used, as also of every trace of distortion. He recommended the preparation of a solution of gelatine, such as often used for enamelling prints, and the coating with it of a large sheet of glass. The films, after washing and fixing, were squeegeed into contact with the glass, and left there to dry. They could then easily be removed by cutting round them with a knife, when the negative would come away from the glass without difficulty, and perfect in every respect.

Mr. C. W. Watson exhibited and explained Messrs. Marion's patent "Enjalbert camera," patent Academy camera, and patent "Plucker" stand, also Warnerke's patent actinometer, and patent sensitometer, all of which had been placed at the disposal of the Society for exhibition by Messrs. Marion.

Newcastle-on-Tyne and Northern Counties Photographic Association.

The ordinary monthly meeting was held on Tuesday evening, Nov. 14, at the Literary and Philosophical Institute, Dr. Berwick in the chair.

The minutes of the last meeting were read and passed. Messrs Swinton, Marten, Pae, Galloway, Templeton, and Prof. Bedson were elected members.

The Secretary gave formal notice of a special meeting to be held next month, for the purpose of making alterations in the rules.

The Chairman briefly opened the proceedings, and the Secretary then read the written report of the judges. This document was supplied by Mr. Way, who, on behalf of himself and his colleagues, Professor Herschell and Mr. Laws, reported that they could not speak too highly of many of the works sent for exhibition, all having more or less of merit as good examples of photography. They all remarked (and regretted) the small number of heads sent, there being but two shown, by the same exhibitor, and both being portraits of the same lady. The two selected exhibits were, "A Misty Morning on the Wear," and a view on the Tees, both by Mr. McLeish, of Darlington. The first was a very remarkable production, but as a picture would have been much improved had the black and unattached patches of foliage on the right been left out. The other was much the better picture, nothing being wanted to complete the composition. The report proceeded to speak of other pictures deserving mention.

Professor Herschell remarked that, as a whole, the pictures reached a high standard of excellence, and for some time the judges had difficulty in carrying out the wishes of the Association by selecting the two best. When that task had been performed they found that the two chosen were closely followed by a number of excellent pictures, and they therefore went in advance of their powers, and chose five for honourable mention. He wished they could have done a little more, for his memory recalled pictures which he would like to see again, and which any member of the Society would value. Another year—if Mr. Way's wish that the Exhibition should be a larger one came to pass—he hoped that a proposal might be made for the judges to select a greater number than two.

Votes of thanks were passed to the judges, the chairman, and the secretary.

Talk in the Studio.

Dr. Siemens on the Future of Electric Lighting.—On Wednesday last the introductory address of the session was delivered at the Society of Arts by the Chairman, Dr. C. W. Siemens, and his remarks were principally confined to the relative economy and advantages of electric and gas lighting. The dynamo machine will, when conditions are favourable, transform ninety per cent. of the motive force into electricity, and the apparatus itself is subject to but little depreciation, except that when currents of high potential are used, the copper wire slowly becomes brittle. One-fourth of a square mile appears to be the largest area which can be satisfactorily and economically lighted from one centre. Take, as an example, the proposed lighting of the parish of St. James, which would require no less than a motive force of 33,220 horse power to drive the necessary dynamo machines; and if even these were installed in a central position, the copper conductors would have to be about eight inches in diameter. The maintenance of each 16-candle incandescence light might be expected to cost about 21s. 9½d., against a cost of 29s. for the same light as produced by gas; but this estimate appears to make no allowance for leakage and loss of electricity, and such incidental expenses as collection of rates; while the gas estimate is founded on a clear selling price of the gas. If the cost of the gas were estimated on the same lines as Dr. Siemens adopted for his electrical estimate, the 29s. would be reduced to between 14s. and 16s. Dr. Siemens deprecated the prevalent system of rash electrical speculation, and paid a just tribute to Professor Pacinotti, as the inventor of the so-called Gramme-ring.

PHOTOGRAPHIC COPYRIGHT.—The case of William Smith, an importer of fancy goods in the Minories, who was summoned under the Copyright Act for pirating photographs, the property of Messrs. Elliot and Fry, and Mr. Downey, photographers, again came before Alderman Sir John Whittaker Ellis. Mr. Howard, who appeared for the complainants, said that since the last hearing he had been in communication with the solicitor for the defendant, who had advised him to give up to the prosecutors a much larger number of the pirated photographs than he did on the previous occasion, and the defendant had also paid £20 towards the costs. The prosecutors were perfectly satisfied, and if the arrangement met with the sanction of the court, they desired to withdraw the summons. Sir John Ellis observed that so long as the prosecutors were satisfied that the whole of the copies had been given up, he supposed the object of the prosecution had been attained. He hoped that the matter would not be repeated; but he should certainly advise that any other cases should be prosecuted to the end. The Alderman having given his consent to the arrangement, the summons was withdrawn.

THE PHOTOGRAPHIC MONEY DISPUTE.—At Clerkenwell, on Wednesday, Captain Herbert Kerr, of 22, Bushey Place, Clarendon Road, again appeared on an adjourned summons to answer a charge of having unlawfully obtained from Lieutenant Arthur Henry Loringe divers sums of money to the amount of £2,070, with intent to defraud. The allegation is that the prosecutor was induced, by means of incorrect statements of the assets and liabilities of the Association, to invest the amount mentioned in the Photographic Artists' Co-operative Supply Association. At each of the two previous hearings of the case, Mr. Hosack expressed the opinion that there was no sufficient evidence of fraud, and that the case should have been taken to a civil court. He was satisfied that a case had not been made out of fraudulently obtaining this money. The real point was as to the money that was due to Captain Kerr by the Company. He stated that the Company only owed him £200, whereas they really owed him £1,400. What the prosecution had to do was to show that he had made this statement with a deliberate intention to defraud. They had no evidence of this, but, on the contrary, they had evidence that Captain Kerr intended to waive that sum. Captain Kerr had invested a large sum in the Company, and, so far from the Company being bankrupt, it was still going on. He dismissed the case.

THE PHOTOGRAPHIC CLUB DINNER.—The annual dinner will take place on Wednesday, the 29th inst., at Ashley's Hotel, Henrietta Street, Covent Garden. Tickets, 5s. 6d. each, may be had from the secretary, Mr. Dunmore, 28, Oseney Crescent, Camden Road, and it is arranged for dinner to be on the table at 7 o'clock.

A PHOTOGRAPHIC PROOF.—A Longton farmer and his servant have been fined £5 and £3 respectively for working a horse to death. Photographs of the deceased animal were produced in court, and showed it to be in a fearfully emaciated condition.—*Lloyd's Weekly News*.

REDUCING ACTION OF GLYCEROL ON SILVER SALTS, AND ITS APPLICATION TO SILVERING GLASS.—By G. Palmieri.—After noticing the methods proposed for forming a silver mirror on glass, the author gives the results of his own experiments. If glycerol is added to an ammoniacal solution of silver nitrate, it becomes brown after a time, and gradually deposits a black substance; this action is greatly accelerated by heating the solution, a portion of the silver being deposited as a steel-grey mirror. If a few drops of potash solution are added to the mixture of glycerol and ammoniacal silver, a brilliant mirror is soon formed on the interior of the vessel. The phenomenon is even more striking if the ammoniacal silver solution be first mixed with potash, and glycerol then added: directly the glycerol comes in contact with the silver solution, reduction takes place with formation of a brilliant metallic mirror. If ether is added to the mixture of glycerol, potash, and ammoniacal silver nitrate, as soon as it touches the aqueous liquid a metallic ring is formed at the junction of the two liquids, and in a few seconds reduction is complete through the whole bulk of liquid. If alcohol is added to the glycerol silver mixture, reduction is somewhat accelerated, and the metallic mirror is always brilliant. The results of these experiments show that the reducing action of glycerol on silver salts may be applied technically with advantage to silvering mirrors, both from the facility with which the process may be conducted, and from its economy.—*Journal of the Chemical Society*.

To Correspondents.

*** We cannot undertake to return rejected communications.

THE YEAR-BOOK OF PHOTOGRAPHY AND PHOTOGRAPHIC NEWS ALMANAC for 1883.—Those of our readers who kindly intend favouring us with contributions are earnestly requested to forward their communications forthwith.

Several communications of considerable interest stand over on account of an unusual pressure on our space.

THE EDINBURGH COMPETITION—The name of Mr. A. G. Pettitt, of Keswick, was last week transformed into Pellat by a printer's error. The medal given to Mr. Pettitt was, we are told, the only award for landscape work.

W. SMYTH.—There is none in Melbourne.

LEODIENSIS.—Apply to Mr. J. J. Atkinson, of Liverpool.

HILLS AND SAUNDERS.—Thank you. The souvenir would certainly be considered miraculous by many.

MR. P. P. AVERY.—Will you kindly send your address for a correspondent?

P. L. (Whitehaven).—The method of breaking up the picture into a grain in the kind of way you refer to is difficult, and must be considerably improved before good work can be produced. It is probable that Waterhouse's method of using fine sand will prove better in actual practice, and we shall give full working details of this process before long.

HENRY SPINK.—Each spot is formed around a central nucleus, and the mischief probably arises from some chemically active dust which has alighted on the films while being dried.

VERNON DE VERE.—Both are correct, each being useful upon occasion. No hard and fast rule can be laid down, but you may safely assume that no commercial plates are sufficiently sensitive to yield fully exposed and sharp images of rapidly moving objects during the cloudy weather of the present season.

J. G.—If the spots are the kind which we suppose, they arise from the use of an unsuitable gelatine. Try another sample.

S. B. A.—Either filter the water, or replace the iron pipe by a leaden one.

COXTER.—A lump of chalk placed in the solution will soon render it neutral.

A. J. L.—Mr. Cowell's paper on the subject appeared in the NEWS during April in last year, and his original proportions were—

Citric acid	2 ounces
Alum	1 ounce
Water	10 ounces

The first modification to which you refer is equally useful in some cases; but the last, in which the citric acid is reduced to one-sixteenth of the original quantity, is of but little value.

THEODORE VULLIAMY.—The solution to be added is a saturated solution of oxalic acid; but the system you refer to is not worth resorting to in actual practice, as the extra labour, and the slight element of uncertainty as to the exact strength of the solution at any given time, serve to more than counterbalance any advantage derived from the economy of materials.

H. E. FITZ S.—You seem to have exhausted the list, and we are afraid the case is now hopeless.

ENQUIRER.—Doubtless due to pinholes in the varnish. These may arise if the film is not perfectly dry when the varnish is applied. Clean off by means of spirit, and re-varnish.

S. K.—1. We have not used them ourselves, but believe they are extremely good value for the money, and well adapted for a beginner who is uncertain how far he will go in for photography. 2. Single lenses in most cases.

T. BELSFIELD.—1. If the patent has become void, or expired, the article is no longer protected by patent. It would certainly be an indictable offence to obtain money for it by representing it as patented. 2. Yes, assuming the patent to be a valid one. 3. They are given just as we find them, and, as you say, the most ludicrous ignorance is often displayed.

L. BRENMER.—1. Hydrated sesquioxide of iron, but intermingled with a small proportion of organic matter derived from the vegetable kingdom. 2. When the neutralization is complete, the colour will darken considerably. 3. The decomposition takes place very readily in the presence of a small proportion—say 1 part in 300—of sulphuric acid. 4. A warm solution is best.

THE PHOTOGRAPHIC NEWS.

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CONTENTS.

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THE WHIPPLE-CASELLA SUNSHINE RECORDER.

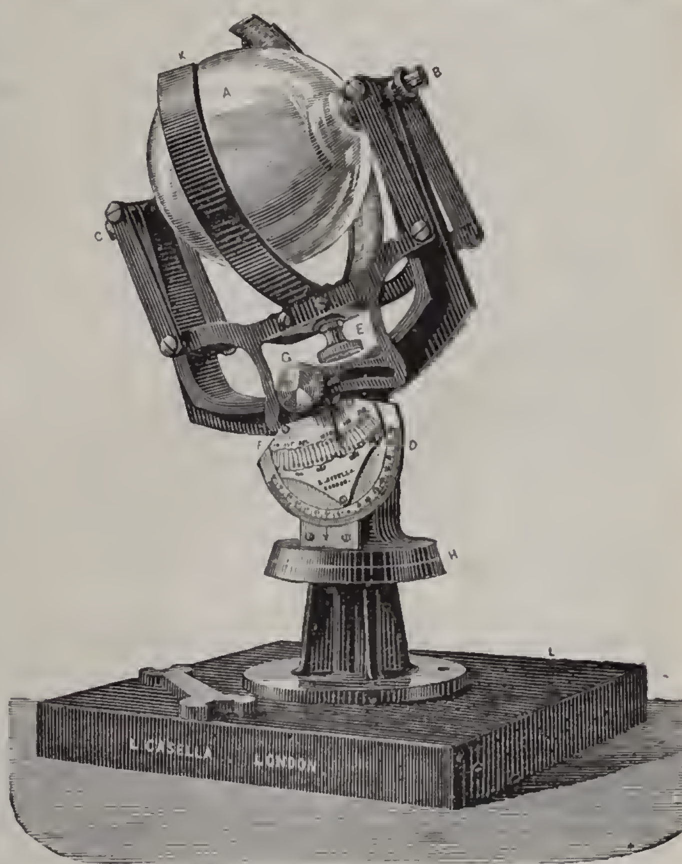
In April last we described in these columns* an apparatus for recording the duration of sunshine. No one is more interested than the photographer in the vigour and duration of the sun's rays that fall upon the earth, and hence we make no apology for bringing before our readers another and improved apparatus constructed upon a design of Mr. Whipple, the director of the Kew Observatory, and Mr. Casella, the well-known optician of Holborn Bars. The instrument, as our readers will see from the drawing, is an adaptation of the glass sphere which Mr. J. F. Campbell was the first to suggest as a ready means of recording the hours and minutes of sunshine. The sphere acts as a convex lens or burning glass, and is thus made to produce a charred line along a printed sheet or diagram that is placed suitably in the focus of the rays. The diagram is divided into spaces representing the hours of the day, and if at sunset it is found that a charred line exists throughout all these spaces, there is proof at hand that the sun has been shining all day. In the same way, if the charred line only appears at certain intervals on the printed sheet, then we know that during certain times of the day only has the sun shone, the actual periods of dull and bright weather being at once shown by the diagram.

About ninety per cent. of sunshine may be in this way recorded, for very feeble sunlight fails to exert any action; but we suggested in our former article that if a more sensitive recording material were necessary, this might probably be produced by treatment of the paper to be charred, with slightly sensitive chloride of silver or other similar medium.

There are, however, some slight defects in the Campbell recorder, which have led to the design of the present improved instrument, one of the shortcomings being the fact that it is necessary to construct the instrument especially for the latitude of the spot where it is to be used. It cannot be transferred from one place to another. The Whipple-Casella instrument, on the other hand, is universal; that is to say, it may be set to work in any part of the world on adjusting the polar axis (B C) of the glass sphere (A) to the height of the pole at the place of observation. When this, the latitude, is known, the adjustment of the instrument may be performed at once by means of a graduated circle (D) provided for the purpose.

Another defect of the Campbell instrument is the necessity of having the diagrams or cards cut to different curvations to fit round the sphere at different seasons of the year, as also the necessity of shifting them from day to day. The Whipple-Casella supporter is provided with several movable card-holders, K, all adapted to receive strips of card cut straight, and of uniform width, so that they are perfectly interchangeable one with another, and the same kind may be used all the year round.

The card-holders are held in their place by a clip, E, so



that when it is necessary to change the paper, one holder is slipped out and another in, an operation occupying but a second or two, leaving the observer at liberty to remove the cards from the holder at any time during the day when convenient, and allowing of his drying them before the fire, if wet, before withdrawing them from the grooves, thereby avoiding the risk of tearing or destroying them in the operation.

In order the assist the observer in placing his card in the proper position for receiving the sun's image, a graduated scale, F, is provided, engraved with divisions indicating the sun's place any day of the year. If, then, the pointer be set to the correct date, and the clamp, G, be screwed fast, the card will be in its correct place.

Owing to the smaller diameter of the circle described by the sun's image round the glass sphere at the solstices than

* Photographic News, 1882, p. 209.

at the equinoxes, it is found necessary to have card-holders to two different diameters, the larger ones to be used during the months of May, June, July, and August, whilst the smaller ones are employed the remainder of the year.

The relative scale value of the trace produced by the passage of the sun's image over the paper also varies to a corresponding extent; but by using a tapering glass scale the cards can be tabulated without any inconvenience.

The most convenient cards are cut from Bristol board, tinted with Prussian blue, and divided into slips 13 inches long, by ¾ inches wide. We cannot help thinking that firms which do much printing would find in the sunshine recorder an excellent check upon work done.

CHEMIGRAPHIC ENGRAVING.

Third Article.

The lines on zinc plate now stand in relief to a very slight extent indeed, but one might imagine at first sight that if the action of the acid had been allowed to continue very much longer, a much more considerable degree of relief would have been obtained: but as a matter of fact, the nearly vertical sides of the lines would have been so far dissolved by the continued action of the solvent, as to finally undermine and cut them off altogether, and this sideward action of the acid is prevented by the next step, which consists in so far warming the plate as to cause the accumulation of ink and asphaltic matter, which is now piled on the lines, to flow down and cover the vertical sides of the relief. The temperature required for this is rather higher than that which was necessary for causing the asphaltic powder to unite with the ink, as previously alluded to; but no precise directions can be given, as samples of asphalt and ink vary much in their physical characteristics. The most convenient method is to place the zinc plate, face upwards, on an iron trellis, and heat it by means of a Bunsen gas burner or a spirit lamp, kept in constant motion, underneath it; an arrangement which renders it easy to watch, with the help of a magnifying glass, the overflowing of the melted material. Over-heating should be guarded against, as certain constituents of the ink are liable to be lost by volatilisation, the remainder becoming brittle and ill-calculated to thoroughly resist the action of the acid. The heating operation having been satisfactorily performed, the plate is allowed to cool.

About equal parts of ordinary lithographic printing ink and middle lithographic varnish are next mixed on the inking slab, and are thoroughly distributed with a moderately soft lithographic roller. By this time the zinc plate will have cooled, and after it has been once more gummed and wiped with a damp sponge, just as previously directed, the moist plate is well rolled with the ink roller, care being taken not to exert too much pressure. The lines thus become charged with a fresh layer of ink; and if any should adhere to the bare zinc, it is probable that the gum has been too thoroughly removed by the damp sponge, that the plate has become too dry, that the ink is too thin, or that overmuch pressure has been exercised in inking. When the plate has been several times turned round and thoroughly inked in all directions, it is well washed, so as to free it from all traces of gum, once more dried, and again dusted with the asphalt powder; once more it is very gently warmed, so as just to cause a partial union to take place between the ink and the powder. When the plate is again cool, it is ready for immersion in the second etching bath; but, before this, a careful examination should be made, and any traces of printer's ink which may adhere between the lines must be scraped away, so as to lay bare a clean surface of metal. Prior to immersion in the second etching bath, a portion of the border must be laid bare, as explained when the first etching was described; and in ordinary cases the same bath as that previously used may be employed; but the action may be allowed to continue for about twice as long a time, as the bath would necessarily be somewhat weaker than before. It is not advisable, however, to etch a much deeper step than that of the first etching, as such a course might endanger the entirety of the finer strokes of the design, and lead to the failure of the whole work. After the second etching, the plate in once more well washed, drained, and fanned dry; after which it is again heated, so as to cause the resist to run down and to cover the vertical edges of the second step, and if the subject consists partly of lines separated by extremely narrow interspaces, it will be found that many of these will be blocked or filled with the resist at this stage, giving the design the appearance of a carelessly printed impression from a stone or block.

The gumming and re-inking of the plates are now repeated in the same fashion as already described, but as the tendency of the interspaces to become soiled with ink is now considerably reduced, an increased pressure may be exercised on the inking roller; but still this pressure must not be excessive. It is, however, of considerable importance not to neglect the precaution of turning the plate round, so as to bring each edge to the front successively, as if this is not done there is a high probability of inequalities occurring as regards the deposition of ink. Once more the plate is thoroughly washed, dried, and dusted with the asphalt powder, a sufficient degree of heat being then applied to cause the thorough fixation of the powder as before, but not heat enough to cause any flowing over of the resist on to the uncovered parts of the plate. A new test line is made, and the etching once more etched, the old bath being used, but as much strong nitric acid as was originally used should be added. A considerably greater depth may now be ventured on, generally rather more than that resulting from both the previous etchings taken together. The whole cycle of operations is again repeated, but instead of dusting with asphalt powder it is better to employ finely-powdered resin, this substance being more fusible and running more readily down the sides of the deeper steps which may now be ventured upon. The number of etchings required may vary from six to twelve, but as the work progresses every care should be taken to at once clean off any trace of ink which may become deposited on the blanks, and during the action of the acid a gentle rocking motion of the tray should be invariably kept up. A more fluid ink and a softer roller are also desirable, as the depth of the etched parts becomes greater, in order that the sides of the relief may become fairly inked; while resin, rather than asphalt, ought to be used for dusting. It is often convenient to continue the etchings until the plate is actually perforated in parts; but this will depend on circumstances, as many will prefer to cut or rout out metal, rather than to dissolve it by chemical means; in fact, the fortunate possessor of such a routing machine as that manufactured by Messrs. Hoe and Co., of New York, would perhaps not etch more than four or five times. The back of the plate should be examined from time to time, in order to see if there is any imperfection in the protecting layer of varnish; as if this is not done the chemigrapher may be gratified by seeing a patch of his work suddenly disappear without warning.

Let us now suppose that the etchings have been carried out to a sufficient extent, and the chemical engraver is anxious to examine the result of his labour. The plate is warmed, and oil of turpentine is poured over it, gentle friction with a brush being employed in order to expedite the removal of the tolerably deep incrustation of resinous and fatty matters; and when the plate has been thoroughly cleaned by successive applications of turpentine, a final scrub with a warm solution of washing soda—one part in twenty of water—is desirable, and, after a good rinse, the plate may be dried.

The success or failure of the work may now be fairly judged of, but some further operations are required before the plate is ready for the press, and these will be detailed in our next article.

THE GRAPHIC REPRESENTATION OF SENSITIVENESS.

BY W. K. BURTON.

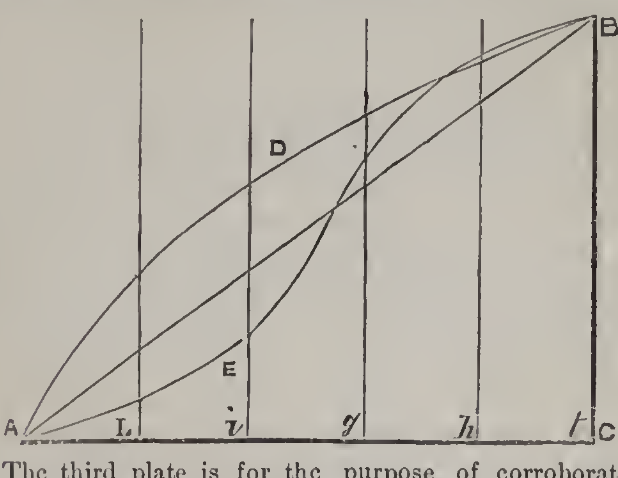
The point which Mr. Robert Belton brings up in a letter in your last issue is one of considerable importance. He asks how the curves which were used at the meeting of the Photographic Society of Great Britain to illustrate the sensitiveness of plates prepared by different processes were arrived at. The question is one which I should have wished to go into at the meeting, but feared that it would take up too much time. Moreover, although the method which I use is simple, it is somewhat difficult to explain in words. In the first place, I may say that, although the method is capable, at least theoretically, of giving results of great accuracy, I have worked it so as to get results which are merely approximate in the widest sense of the word.

The first thing requisite is some method of obtaining an absolutely even gradation of light commencing at zero, and rising to an intensity which will give, when allowed to act on the plates, about the full density which they are capable of. The gradation may either be uniform, or may rise in a succession of steps, each step giving a certain definite amount more light than the one before. The first is, so far as I know, impossible to obtain; the latter may easily be had in the form of a special sensitometer—such a one as will give an arithmetic instead of a geometric ratio of increase of light. It is easy to make one on the principle enunciated by Mr. Cowan, the openings varying in area as 1, 2, 3, 4, &c.

When the sensitometer is constructed, the next step is to expose plates under it. It is necessary to have the plates very thickly coated, so that the density will be independent of the thickness of the film. An exposure is given which will secure almost the greatest density which the plates are capable of giving for the lowest figure or the one receiving most light. I may say here, that I have retained the arrangement of figures usual with sensitometers—that is, calling the portion of the plate which receives most light No. 1; although for the investigation we are considering, it would manifestly be more correct to call the portion which receives the *least* light No. 1. I shall now suppose that three plates of each batch which it is desired to investigate have been exposed, each for the same length of time, and developed.

Even by simple inspection and comparison by eye of the plates, the essential difference may be seen. Let us now suppose that two of the exposed plates of the same batch are taken, and suppose it possible by placing them back to back, or face to face, to superimpose figure 25 of one on figure 1 of another, and figure 24 of the first on figure 2 of the second, and so on. It will be seen that if the gradation of density were correct—that is, that if, throughout the gradations, each one advanced in density the same amount beyond the one before it as another did—all, on superposition, would appear of the same density. Were this the case, it is evident that the line of density would be either straight as A B, or would be a curve of the nature A E B, in one half as much above the straight line as in another below. Suppose, however, that the central figures 10 to 15 appeared less dense than those at either end of the scale, it is evident that this indicates a curve below the straight line. If, on the other hand, the centre figures appear denser, it indicates a curve *above* the straight line, as A D B.

It will be seen that the first example left us the possibility of either a straight line or a double curve. It is quite easy, however, to further investigate the matter, and discover which it is. Let us suppose the figures 1 to 13 superimposed so that 1 covered 13, 2 covered 12, and so on. We will now be able by again seeing whether the centre figures appear more dense, less dense, or of the same density, whether we have a curved line or a straight one; and if the latter, whether it passes above or below the straight line. This method may be carried out to any extent of subdivision, the observations being made to overlap each other. An observation taken between any two figures shows whether the curve comes above or below, a straight line joining these two figures.



The third plate is for the purpose of corroborating results. Thus, let us suppose a curve produced and the conclusion arrived at by measuring vertical lines from it to the horizontal line, that by the density of any two figures added together should equal the density of a third. It is only necessary to superimpose the two figures mentioned, and compare with the third figure on the third plate. Density can be judged with wonderful accuracy by the eye; but it would be possible, of course, to devise some means of investigating it accurately by the action of the light which passes through the portion to be tested on to a sensitive film. I have not done so, and I may say that as the construction of my sensitometer, or rather curve investigator, is such as to allow of nothing else, I have judged entirely by superimposing rows of five figures at a time.

It is evident that the investigation cannot be performed by a sensitometer of the Warnerke type, nor, in fact, by any instrument which is, properly speaking, a sensitometer, as in none is the progression arithmetical. Supposing a hypothetical plate giving equal increase of density, for equal increase of light, exposed under a sensitometer proper, the curve given would be somewhat of the nature of a parabola. Of course it is theoretically possible to compare the curve given by my plate with this, and note the difference; but practically it would not be possible.

I have failed to make my explanation as clear as I should like, but I think that anyone who really understands the nature and use of graphic methods of representation will understand the manner in which I investigate those which I used to illustrate the paper.

FRENCH CORRESPONDENCE.

Prize Winners at the Exhibition of Decorative Arts—Opening Meeting of the Photographic Society of France—Photographers' Copyright Defence Association—French Crystal Palace—New Sensitive Pellicle—Engraving Processes by M. de Lostolot—Rapidity of Shutters.

Prize Winners at the Exhibition of Decorative Arts.—The list of awards given in the photographic section of the exhibition has just been published. We cannot in this space enumerate all the winners, but will give those best known. MM. Berthaud frères take a gold medal for their phototypes, and M. Charles Pettit receives a similar award for his process of similigravure. Among the silver medallists we note MM. Arent of Paris (photo-engraving), Feilner of Bremen (artistic portraits), Gutekunst of Philadelphia (phototypes), Grassin of Boulogne-sur-Mer (for his remarkable instantanographs), Mdlle. Marguerite Relvas, M. Neurdein (instantaneous pictures), MM. Truchelut and Walkman (phototype portraits), and Lecadre, successor of Bingham (reproduction of pictures). This exhibition, as we have previously said, is not important in point of number of works shown, but nevertheless is very interesting.

Photographic Society of France.—The Society had its opening meeting on the 31st ult. It was not a busy one, as is usually the case at the beginning of a session, no communication of veritable interest being made. It will not be the same at the next meeting. It was announced that the amount of the Poitevin subscription is just over 6,000 francs. A small magnesium lamp was exhibited by M. Loiseau. An album for unmounted prints was shown by M. Bonnet; it contains double leaves, bound; where it is double, it is left uncut. The prints are inserted back to back through the spaces cut on each sheet corresponding to each corner of the print. It is simple and ingenious, as with the double leaves the back of the picture is hidden. Two old things have again come to light: a method of engraving on glass by help of a jet of sand, a carbon print having been developed on the glass. The process, which is only for giving outlines, has long since been described by M. Aimé Girard and ourselves. A non-actinic liquid made from a decoction of red cabbage in water acidulated with sulphuric acid, which Mr. Pearsall suggested some months ago, during the course of this year, was also shown.

Photographers' Copyright Defence Association.—We read in the English journals that an Association is about to be created for the purpose of defending the copyright of photographic works. It is certainly an excellent idea, but from this point of view it is not better than that which exists in France. The Chambre Syndicale represents the professional interests of photographers, and takes in hand all matters of the kind. What has been done in France, a special committee might work out in England; and we recommend the promoters of this good scheme to communicate with our Chambre Syndicale, because in both bodies there is a sort of parallel and symmetry, suitable to a perfect understanding as to the case where an action of claiming certain rights should be desirable. The Cercle de la Librarie has, moreover, created a syndic office for the copyright defence of the foreigner. This completes the office of the Chambre Syndicale, and we hope to give sound advice to our colleagues in England, advice based on practical experience, by telling them that they will do well to follow the example of what takes place here.

French Crystal Palace.—The question of a French Crystal Palace has made great progress. The agreement passed between the State and the concessionary company of the park of St. Cloud only awaits the sanction of the Chambre des Députés. The parliamentary commission is unanimously favourable to the approval of this convention. It is to be hoped that these administrative formalities will soon be terminated. It is thought of erecting in the park of St. Cloud a palace similar to that at Sydenham for the purpose of a permanent exhibition. Photography will not be forgotten, and our personal acquaintance with M. Nicole, the promoter of the idea, and who will be the director of the enterprise, will enable us to give many suggestions, whether for photographic exhibitions, or the numerous applications to be made of the art in an establishment of this kind. The cost of the work is estimated at not less than 25,000,000 francs.

Sensitive Pellicle.—M. Bratagne, photographer of Paris, manufactures a pellicular base for gelatino-bromide, of an indefinite length, and, therefore, suitable for taking series of panoramic views. This pellicle resists the action of water, is of great solidity, and as transparent as glass. There is no danger of rapid combustion to fear with it, as with pyroxyline.

Engraving Processes by M. Lostolot.—A work has just been published at Quantin's, entitled *Procédés de la Gravure.* It is written by M. Lostolot, who devotes much attention to photographic processes, and designed more for the public at large, than for the profession. Nevertheless, the book deserves approbation for rendering popular the knowledge of numerous applications generally unknown to the majority of people, even the best informed.

A few Words on the Rapidity of Shutters.—A great deal of time has been devoted of late to the invention of shutters, and this may easily be accounted for. Rapidity tends more and more to form an integral part of photographic work now that gelatine plates work so rapidly as to give good results in a fraction of a second. We only regret that many interesting questions bearing on this matter have not been more studied, together with determination of the necessary exposure regulated according to the conditions under which work is done. We will therefore call attention to a few observations on this subject, which will appear in our *Manuel de Touriste Photographie*, to be published shortly by Gauthier-Villars. Our fundamental position assumes that in the case of an object moving with any determinate speed, and in a direction transversal to the axial line of the lens, the angular variations arising from the movement are greater in proportion as the object is nearer to the lens. This is a fact so evident that it would be a waste of time to attempt its demonstration; but some deductions from it are of such a nature as to enable valuable indications as to the times required for exposure to be gathered; that is to say, the exposure which may be given when two objects are in motion at different distances from the lens. Up to the present time no rules have been available as guides in the matter, and very many manipulators never vary the quickness of the shutter, using one invariable speed on all occasions Indeed, they work without precise knowledge whether the moving object which it is desired to reproduce is at such a distance that it can be photographed with a sufficient sharpness, or not; still, let us hope a careful study of the matter from the points of view taken in our work just referred to will serve to bring about a more systematic and scientific method of timing the exposure.

Leon Vidal.

NOTES ON PHOTOGRAPHY.*

BY E. HOWARD FARMER.

Lecture I.—The Nature of Light.

Photography, in its etymological sense, means writing by means of light, and we must first make ourselves acquainted with the nature of this agent "light," on which we are dependent, in order that we may practically use it with judgment and success.

When we hold an opaque substance between us and an object, we do not see that object. A luminous point throws shadows of opaque substances situated between it and a screen; light, therefore, in a uniform (homogeneous) medium is communicated only in straight lines.

We cannot see on a clear night the light from the sun with which we know the sky above us is filled; neither can we see a beam of light which passes through a room in which the dust has been allowed to settle. Light is therefore invisible.

What, then, is the nature of this light, the nature of this communication, which not only enables us to see, but impresses our pictures, and that, too, after coming from the sun, and yet more distant stars? Is there any physical means of communication known to us by which we can analyse it, and give a rational explanation of the phenomenon it presents?

Yes, there is. A water wave produced in New York harbour may travel across the Atlantic, and break on the

* Being an abstract of a course of lectures delivered at the Polytechnic Institution.

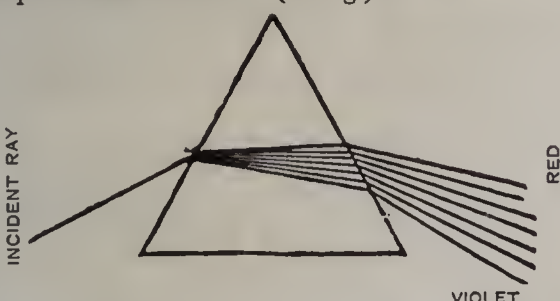
shore of England. A sound wave produced by the firing of a cannon at Calais may break on our ears at Dover. A ray of light produced on the sun travels across the intermediate space, and falls on our eye. We conclude by analogy that this also is wave motion.

In the first case, the medium in which the wave is propagated is water; in the second case, air. In the case of light it is an imponderable elastic fluid, which we suppose fills all space (including that occupied by ordinary matter), and which we call the luminiferous ether.

Both water waves and sound waves take time in travelling; so also does light. The velocity with which light travels is 186,000 miles per second. Therefore, in the falling of an ordinary drop shutter, a wave of light has time to go through the aperture, makes a journey round the earth, and goes again through the aperture before it is closed. The light of the sun (ordinary daylight) is what we call white; when, however, it passes through a blue or red glass, it conveys to the mind the sensation of these colours.

How do we explain this fact by our theory of wave motion? We have waves on water which we call ripples, which only measure a few inches from crest to crest, and waves on the ocean which may measure thirty feet from crest to crest. We may have sound waves in air measuring eight inches or eight feet across, the difference in wave length here constituting sounds of different pitch. Similarly, we suppose that the waves of light have different lengths, the eye interpreting them as different colours.

Let me show you the great Newton's experiment on this subject. He closed the shutters in a room, and made in one of them a small hole through which he reflected a beam of light from the sun into the room. He then placed in the path of the beam a three-cornered piece of glass (a prism). He found that in passing through the prism, the beam of white light was deflected out of its straight course, and split up into various colours (see fig.).



This band of colour obtained by passing a slice of light through a prism is called a spectrum; as you observe, the red light is deflected the least, or is the *least refrangible*, and the violet is deflected the most, or is the *most refrangible*; the other colours occupying intermediate positions. Newton also found that on re-combining the colours of the spectrum, white light was produced.

From these facts we know that white light is not of a simple nature, but is a mixture of waves of different sizes, corresponding with their different degrees of refrangibility.

To light of the same colour ever belongs the same degree of refrangibility, and to light of the same degree of refrangibility ever belongs the same colour (Newton).

The length of these light waves have been measured, a few of them being as follows:—

Extreme red	=	$\frac{1}{33866}$ of an inch.	
Yellow	=	$\frac{1}{43137}$ "	
Extreme violet	=	$\frac{1}{70555}$ "	(Herschel)

If we divide the velocity (in inches) per second by the length of the waves, we shall ascertain the number of waves which pass any point in a second, the result being as under:

Extreme red	399,101,000,000,000
Yellow	509,069,000,000,000
Extreme violet	831,479,000,000,000

So that in an exposure in the camera of one second of time, about eight hundred and thirty-one billions of violet waves break on the sensitive plate.

This fact should make us confident that we have not yet by any means arrived at the limit of sensitiveness with our sensitive plate. Besides differences of wave length, we may have waves of the same length, but of different widths, *i.e.*, the distance between the top of a crest and the bottom of a hollow; this is called the wave's amplitude. In our case, differences of amplitude constitute different intensities of light.

AN EARLY TASTE FOR ART—ITS TRAINING.

The Importance of this to the Beginner in Photography, also to those more Advanced, and to the Interests of Art in General.

BY NORMAN MACBETH, S.R.A.*

On the 18th of November, 1868, I read a paper at the Edinburgh Photographic Society, specially on the principles of art. As that paper was printed in the journals, I have no doubt reference could be made to it if wished. It was accompanied by several illustrations from Howard's "Manual" and others.

Judging from what appears in much of amateur effort, it is evident that there is a lack of knowledge in composition, and a few simple directions may greatly help the beginner.

It is the misfortune of photography, seeing it is more allied to science than to art, that much of what is difficult to acquire by the draughtsman, is never entered upon or thought of by the photographer; hence the eye is never trained, the relative proportions of things to each other are not cared for, and the different aspects in which the subject is made to appear according to the points from which it is viewed are not intelligently gone about, the importance of the principles involved being either not known or not sufficiently considered. Every tilt of the camera backwards or forwards alters the natural perspective. The photographer must bear in mind that, while it is not his hand or eye by which the lines are directed, yet it is only by the intelligence and judgment which he exercises in choosing a proper point of view for the instrument that the pictorial arrangement of lines is produced.

Among the things which I pointed out in the paper to which I have alluded, was that of a special size of picture, having reference to a certain proportion of a field for producing variety of composition. I desire to bring this again for a little before you, and show its import.

After deciding on the breadth of picture—whatever it be—find the square of it. A diagonal line drawn from one corner to the other metes out the size of the length of picture. This proportion of breadth to the length suits almost every subject requiring either a vertical or horizontal form. It so happens that the "half-plate" size used in the camera is as near as possible of the same relative proportions.

Now, as diversity in unity is one of the essential elements of good composition, the method of producing this lies in certain subdivisions of the field being made both vertically and horizontally; every intersection or crossing of the lines constitutes points, which, if anything were constructed on them, would prove expressive.

To divide the field into two equal parts both ways, the intersection would be at the centre; such a point, although some might think it to be conspicuous, is nevertheless not expressive, inasmuch as it is too finely balanced on either side. To subdivide again the two sides would not produce good or expressive intersections, for it would still tend to a too equal balancing of parts.

Now, in order to find expressive parts of a field, in place of dividing it into equal numbers, such as two, four, six, or eight—divide it into unequal or odd numbers—such as three, five, or seven—and you produce points at each intersection which easily compose, and are always expressive.

Bear in mind that the centre of the field is the weakest point in it. To put an object there, especially in a landscape, divides the subject, and raises a conflict of interest on both sides; so much so, that if there be objects of interest on either side, the eye is tortured or distracted. In order to avoid this, and make important parts of a scene or a figure expressive, I view them through a piece of glass—the "half-plate" size—divided into three parts each way, placing the intersections as much as possible over those parts in nature which are important. The

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same lines may be drawn on the focussing glass when it is of the proportions I have described. The "half-plate" size is, as I have said, of the right proportion. This would enable

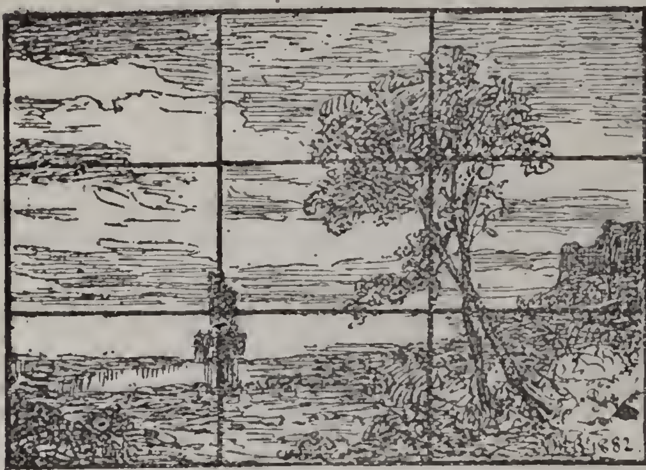

Fig. 1.

Fig. 1.—A land and sea view. A composition only. Is based on the simplest form of subdivisions of three. The centres of each space must be utilized necessarily in the continuity of subject; but they are not *forte* points. The more complicated the subject is with interesting matter, the more you must provide it with divisions in odd numbers to serve.

the photographer to place the intersections on special parts of a scene—such as a ruin, a tree, a river, a boat, groups of cattle, figures, important parts of architecture, and interiors generally.*

Fig. 2.

Fig. 2.—Taken from Mr. Macbeth's portrait of the late Dr. John Bruce, Edinburgh. Is based on the subdivisions of five odd numbers each way of the surface. As in landscape subjects, the more you provide the surface with *forte* point intersections, the more you can introduce matter; every intersection guides in the production of variety.

A larger number of odd-numbered subdivisions, similar to an example by Howard of the same (see fig. 1), may be applied to portraits and groups of figures or objects in a room (see figs. 2 and 3).

As it is only from one point of view that a subject can be treated by photography, it is of the greatest importance that the camera be as far back from the sitter as possible, so as to prevent any undue proportion of parts. The portrait painter in drawing from his subject, often (especially under very limited accommodation) has to look at the sitter from several points of view; first at the head, then towards the body, and lower still—viewing him towards the limbs and feet. This is the only way in which he can avoid the appearances of undue proportion and rapid perspective, common to the results of lenses when the camera has been placed too near the sitter.

Length of studio is of great importance, both for the painter and the photographer. To the painter, giving him ample range for placing his work close to the sitter, and then retiring to feel the comparisons; to the photographer, enabling him to

Fig. 3.

Fig. 3.—Taken from an engraving of Paul Delaroche's picture of Lord Strafford going to execution, receiving a blessing from another prisoner as he passes beneath the window of his cell. This picture has been subdivided into seven spaces each way. It is interesting to notice how much the principle has been realized, although it may not have been acted upon. Delaroche was one of the most accomplished designers which France has brought out.

take very remote views of his subject, so that when enlarged, if need be, the proportions are as perfect as distance and one point of view can render them. Length of range from the camera to the base of picture in a landscape is of equal importance. Generally, if it can be accomplished, the camera should be placed not nearer than twenty paces to the spot where you wish the subject to begin. In order to make sure of this, place there a white handkerchief, and then retire your twenty paces and adjust the camera. The boundaries of the picture are also important; but these determine themselves by the angle of lens, which should not be wide. Vision within the limits of the radius of the human eye—*i.e.*, what is seen by moving the pupils, but not the head—is as much as is desirable for a complete picture. Seldom is more attempted by the painter, unless his intention be for panoramic purposes.

I cannot bring this subject to a close without saying something as a conservator in the interests of right motives and legitimate methods of art. In the art of painting, there are fewer pretenders without training now than formerly, and very little but the best of art is purchased, seeing it is now regarded as a kind of property which, if the artist is rising, the owner is likely to make a profit by. So far the mercenary spirit is at the bottom of many of the purchases that are made, especially at sales. However, at our exhibitions, the sales of works exhibit purer and higher motives. Art is there purchased more for its own sake. Still it is to be feared that landscape work easily gone about, and readily securing a purchaser, from the cheapness of it when compared with figure subjects, which commonly involve more time and money, does not sufficiently promote the highest efforts of art. The desire for gain greatly increases by the ease with which it is secured, and thus, unhappily, retards the right aim of study. There need to be constantly kept before us the highest and purest motives. If this be not done, art soon becomes degraded.

No doubt, unless there be good remuneration for such labour, and the hope of eventually rising to some eminence, there is

* Here Mr. Macbeth showed a diagram illustrative of the method, similar to Howard (see fig. 1).

no calling in life wherein the spirit of a man gets more readily crushed than in the pursuit of the highest and purest art. When we see many making fortunes by photography, and retiring comparatively before the middle of life, what a contrast is presented when we think of several worthy painters only partially successful when age has crept in upon them! Surely it makes one feel the truth of Longfellow's saying, "Art is long, and time is fleeting." Among photographers, however, there have been heroes also, men such as Rejlander, who had his battles to fight, because he was a genuine artist; and even nearer home, in a little quiet town in the county of Fife, there lives one who is able, by his painstaking and plodding efforts, to manifest a thorough poetic spirit, producing such a perfect picture as that of "Gloamin," recently exhibited in the photographic competition collection. It is much to be regretted that so few, even among painters, exhibit the amount of thought in their works that there is in this, and unquestionably it shuts up the opinion that no fine art can be expressed by photography.

It is long since I predicted that the innovation of retouching negatives, especially in portraiture, would yet greatly degrade art. I admit the necessity of touching up spots which are merely incidental to the work; but beyond that, by other appliances on the subject, or further discoveries in development, all that was objectionable in the way of freckles, or undue marking of lines, could have been avoided. I do not see how it is that such an amount of serious labour can be undertaken when, by an application of dry pigment made up of certain density and tone, every brown stain on the face could be obliterated, the lines would be modified, and still the character retained.*

The powder, which is composed of several constituent parts, is put into a mortar and well ground. The parts are as follow, viz.:—1 of vermilion, 1 of French ultramarine, 2 of zinc white, 4 of yellow ochre. A small dabber made of chamois leather stuffed with wool is employed in conveying the powder over the parts requiring modification, and then equalised by the finger; this whole suggestion, however, is at its best but a make-shift. It will be noticed that yellow prevails; this is to assimilate with the freckles in surrounding parts—also to make it less actinic than a powder composed only of vermilion and zinc white alone. It must have been observed that persons of rather a sallow complexion always produce a more definite development; I trust this recommendation may be found practicable.

If photography had had leave to stand on its own merits, it would have been more advanced to-day—both chemically and artistically; and especially more valued for its genuine and authentic production than it is in its present condition—a condition chiefly ministering to the vanity of the more fashionable class of society, and, at its best, but nondescript in character, neither one art nor the other, the absence of homoegeneousness and individuality bringing it into disrespect by all who understand and can readily apprehend what is genuine honest work, be it either in a painting or a photograph.

We are told by those doing a good business in retouched photography that they would have to shut their saloons if they attempted to print an untouched negative. Well, that is very likely now that the innovation has been established and meets the public fancy; but what does it say for a pure photograph—well invented and arranged—being able to rank itself as a work of art, independent of any contrivance to make it pass, in which light it was regarded not so long ago? I am occasionally asked to paint posthumous portraits—indeed, more frequently than I care about, because they are exceedingly irksome, and it is very difficult to please the parties concerned—but, unless the photograph given me be one taken some years ago, I am under the necessity either of declining to enter upon the work, or of getting the photographer to wash off by spirit of wine all the retouched work.†

As I have said, an artist should despise nothing that is taken from life, and be always thankful when he can get a genuine photographic transcript. No artist, unless he cannot draw well, or be able to sustain the likeness, would ever resort to enlargements when he can get life; and it is only in extreme cases of infirmity of the subject that an artist should have recourse to a photograph. Even in posthumous portraiture, I have never in all my necessities used an enlargement by the lantern; I should feel the detail fully before me to be very enslaving. I simply draw it in the usual method, by squaring the surface, not keeping exactly to the rendering of the lens, as most frequently the limbs, hands, and feet are out of proportion.

Certainly there are few professions but what are in some way or other dependent on another. But surely it is to the honour of every profession when it is true to itself, and not appearing in the garb of others. That is the position of photographic portraiture generally, for by the excess of retouching the truth is covered, and the old story of "borrowed feathers" presents itself. It is much to be regretted that a pure, genuine photographic portrait is now so much despised, that it will not pass muster before the public gaze without donning the coat of another.

There is a very good story told of a boy who, having become a member of a certain total abstinence society, had the blue ribbon—a new badge—sewed on his jacket. One day his father came in evidently unwell, and the mother, having no spirits in the house, asked her son to go for some. The boy, true to his pledge, said: "But how, mother, can I be seen going into a public-house with this?" (turning up the lapelle of his jacket). "I say, Johnny, go for the whisky." "O, but, mother, do you not see *that?*" "I say, Johnny, will you not go when I tell you?" "But, mother, just take another look at that!" (the irrefragible blue ribbon). "I say, Johnny," and lifting her hand about to send him to the door, Johnny devises a way of escape, and cries out, "O yes! I'll gang, mother, if you only let me pit on Tammy's Sunday coat that has nae blue ribbon on't!"

Every effort should be made to introduce some other method of overcoming the obstacles which necessitate retouching to the extent to which it is done. The negatives of portraiture are invaluable as transcripts of character, and are more especially felt when the individual subject has ceased to exist. If all the pains bestowed on the negative by retouching were spent on the subject in careful preparation by artistic arrangement and skilful adjustment of camera, or in printing, insuperable difficulties would be overcome, and nobler work achieved. I am confident we are on the eve of great changes for the better in the way of art, as coming from photography. Certainly in the past it has proved, from its transcript character, to have been a great auxiliary to the purposes of art; but it is destined to become more so; by its instantaneous snatches of the movements of animate and inanimate action everything may be arrested and utilized as subjects or parts of a subject for the service of art.

I should have liked, had time permitted, to have descanted a little on a very important feature of photography now in vogue, and which I trust will continue—I mean that of photographs of individuals or groups of a family with the surrounding furniture common to their association, affording ample scope for artistic skill in arrangement. Few opportunities present themselves better for acquiring practice in composition than this. The art properties common to all studios are now very stale, and one is thankful for any demand which produces a change.

Very excellent specimens of this department have been done by the members of the Edinburgh Photographic Club. But the best compositions which I have seen of this kind of work are by Mr. Samuel Walker, of London, who is a photographer of no small artistic skill. These show that the most casual and unconscious expressions of home life may be most successfully secured.

But I must close, and the only thing to which I would allude before doing so is what is to me one of the most important applications of photography—I refer to reproductions of *stage expression during action.* I do not know whether it has ever been tried, but I should like extremely to see the application of instantaneous photography in the interests of the drama. I think, what with instantaneous plates and electric power of some kind, some of the best parts of a piece or parts of a character might be caught. What an interesting thing it would be to some of our leading actors to see their renderings of Shakespeare or other authors' works. How valuable would such impressions (caught in this way) also prove as expositions of arrangement, and as studies of composition to the painter or photographer. No class of artists are better acquainted with the arrangement of their art furniture and with positions of a figure or figures than actors are; and they produce great variety of design. None know also more thoroughly the importance of correct historical costume. All this makes the stage highly educational, and worthy of the closest attention.

These and similar appliances show how helpful one art may be to another, and that every effort in a legitimate and right direction should be encouraged, and so the interests of art in general be greatly promoted.

* Here Mr. Macbeth showed the powder.

† Here Mr. Macbeth showed a specimen of the two aspects of such a portrait.

Notes.

We deeply regret the death of the energetic Honorary Secretary of the Edinburgh Photographic Society, to whom is largely due the great success which has of late attended that body. Mr. Malcolm Gillies Dobbie died on Monday, the 20th inst., aged fifty-three.

The last photographic work of the late Professor Henry Draper was the photographed spectra of the nebula of Orion presented to the French Academy. An exposure of two hours with gelatine plates was necessary to produce some of them; but so marvellous was the delicacy of his apparatus, and the sensitiveness of the gelatino-bromide film, that he succeeded in getting the spectrum of a star of the tenth magnitude. Professor Draper pointed out that his Orion spectra show the hydrogen lines $H\gamma$ and $H\delta$, and traces, moreover, of other essential lines.

M. Flammarion, the well-known astronomer, tells us there is at this moment a quadruple spot on the sun's surface visible to the naked eye, and of far greater size than the earth. We had the pleasure of seeing this spot, or one of a similar character, in the fog on Saturday last, when the orb glared red through a veil of vapour. Assuming the apparent size of the sun to be equal to a cheese-plate, the black irregular-shaped speck appeared in the centre of the disc about as big as a small marble.

Anecdotes about photographic copyright reach us from all quarters. Here is one from the provinces. A buyer enters the premises of a photographer and admires some local views. He takes specimens, and intimates that if the photographer will quickly strike off a few gross, there will be a ready sale for them. The pictures are printed and packed off, and at the end of six months the photographer writes to know how the sale is getting on. "Very sorry, but they did not take at all. Only a couple of dozen sold," is the reply. And no wonder! For it afterwards transpires that the buyer has gone to another studio lower down, with the proofs in his hand, and given an order for 500 pirated copies.

Dr. Eder and Mr. Plener are continuing their interesting experiments in Vienna in the way of separating pure bromide of silver from gelatine emulsion by the simple expedient of centrifugal force. Dr. Eder reports that the bromide of silver thus separated presents several very interesting features. There are distinctly two kinds of silver bromide, he says; that precipitated by alcohol, and that precipitated by water. The former appears to be most sensitive to indigo rays, and the latter to the blue rays.

Dr. Hermann Vogel has been examining some dark brown or chocolate mounts, which a Berlin photographer found turned his pictures yellow. Dr. Vogel found that if he mounted with perfectly fresh paste the prints showed no sign of fading, but with acid paste (containing 5 per cent. of acetic acid), yellowness set in after a few hours. At the same time this acid paste, when employed on other card, did not turn the photographs, neither did the brown pigment when scraped off and mixed with fresh paste act detrimentally. Again, hyposulphite of soda did not bring about the reaction, and therefore Dr. Vogel surmises the fault may be in the presence of ultramarine, sometimes put into paper to counteract yellowness. In any case, as our colleague points out, a starch containing 5 per cent. of acetic acid constitutes a very good test for suspicious mounts.

The little Exhibition at Newcastle seems to have been very successful. Professor Alexander Herschel—an honoured name in photography—was one of the judges, and altogether the collection attracted much attention. "I had no idea Newcastle was the centre of such charming scenery," exclaimed one critic, when informed that most of the views were secured within a fifteen mile radius. "A Misty Morning on the Wear," by Mr. McLiesh; "A Stronghold of the Percies" (Prudhoe Castle), by Mr. J. P. Gibson; "Bywell Castle, on the Tyne," by Mr. Gould; "The Devil's Water," near Carbridge; "The Ivy Grown Mill" of Mr. P. M. Laws; the rustic scenes of Mr. L. Sawyer—to quote a few of the most important exhibits—all went to prove that the coal country is not so black as it is painted.

Mr. McLiesh's beautiful photograph, "A Misty Morning on the Wear," in which we see Durham Cathedral through a veil of silv'ry mist, has been unanimously chosen by the Newcastle Society as a presentation print. Our readers doubtless will feel little surprise at the fact, for the picture certainly excited more admiration at the late exhibition in Pall Mall than any other single work. How it escaped a medal is a marvel.

"Belt *versus* Lawes" has made one fact very plain: photographs are rapidly taking the place of drawings in the sculptor's studio, and nowadays a photographic portrait is well nigh indispensable in modelling a bust. Adam-Salomon was one of the first to learn this, and he learnt something else besides. If photography was useful in the sculptor's art, he found the sculptor's art no less useful in photography; for to his masterly knowledge of lighting and draping, the great French artist owed his magnificent success as a photographer.

The Copyright Defence Association seems in a fair way to be started. Two hundred pounds is the sum fixed as the minimum necessary to form the Association, and there should be no difficulty in getting this amount together from photographers who publish. Still the provisional committee should remember that few people contribute money spontaneously; they like to be asked.

It was very good of Dr. Siemens last week, at the close of his address, to tell the public to be chary about risking their money in electric inventions and electric companies. He had no doubt, he said, that in the end electric lighting would come to be general, but it was a great question whether the present shareholders of companies would see any adequate return for their money. Dr. Siemens' advice is, we suspect, very sound; only, seeing that during the past twelvemonth or so something like twenty millions of money have been subscribed by the public, and there is a lull at present among expectant shareholders, his warning words come a little late.

The boast of our Parisian contemporary, *Le Monde Illustré*, that it has just issued the largest wood-engraving ever known to illustrate journalism, is probably well founded, as its block of the battle of Champigny, by Detaille and Neuville, covers a surface about one-fifth greater than the area of our present number of the News.

We have had balloon photography discussed a great deal of late, some advocating the employment of a large balloon, like Nadar, and others, like Mr. Woodbury, suggesting the use of small balloons, to carry a camera, which is managed by an electric wire from below. But no one seems to have thought of trying a big kite for lifting the camera into the air. A half-pound camera might easily be carried aloft in this way, and, properly fastened to the ærial machine, there would be no risk of gyration, the great difficulty in balloons. With a long tube or cone depending from the lens to keep out extraneous light as much as possible, there should be no great difficulty in securing kite photographs.

Dr. Hermann Vogel sends us a brief but very interesting memoir, which he has just presented to the Royal Prussian Academy of Sciences, combating Norman Lockyer's dissociation theory. Lockyer has recently argued from the fact that certain iron lines in the spectrum of a sun's spot appear broadened, and, moreover, because certain lines appear in the spectrum of the sun's spot, and fail to appear in a spectrum of the protuberances, that there is no iron in the sun, but only its component parts. In a word, as Lockyer before desired to show that the element calcium could be dissociated, so now he wishes to put iron in the same category. Dr. Vogel, in reply to this, tells us that his photo-spectrum researches go to prove that, if the iron lines do show a broadening, this is due not to movement, but to an admixture of a foreign gas having a powerful dispersing action, which acts upon the lines in question. All the lines should be broadened if Lockyer's theory were correct; but they do not so appear in the spectrum.

Look at this picture of an elegant young lady in a well-fitting costume of black, who stands with her arms dropped at full length, holding her umbrella across her horizontally, in a coquettish fashion. See how smart she is, and how neatly gloved! What is her name, we wonder? and wonder still more, when we hear how ten thousand copies of the sprightly damsel are being printed as fast as possible. It is simply a glove advertisement, destined to bring before the public something novel in black kid manufacture.

After this, we may expect to see the large drapery establishments exhibiting photographs of flowing silk robes upon the most dainty figures, milliners showing their distracting headgear framing the comeliest of features, and boot-makers presenting their wares in fascinating style upon short-petticoated damsels, who, permitting, perhaps, a peep at the whitest of stockings, will assume the well-known pose of Serpolette in the *Cloches*, as she sings "Look at this, and look at that."

We said last week that the Year-Book of Photography for 1883 would contain a portrait of the late Sir Charles Wheatstone. Wheatstone, as everybody knows, made a reputation by his researches in light and electricity—with Cooke, he may be said to have invented the electric telegraph—and he was one of the first to estimate the speed of lightning, or, rather, the electric spark. His stereoscope, he invented, strange to say, before the advent of photography, namely in the year 1838, so that stereoscopes preceded photographs, albeit the latter enjoyed early popularity through the former. Sir Charles was for many years on the Council of the Photographic Society, and the earliest stereoscope constructed by him was exhibited at their exhibition is 1873, when the Prince and Princess of Wales honoured the Society with a visit. Sir Charles showed at the same time a series of photographs of a "steam engine in motion" in a stereoscopic zoetrope, a spectacle that excited a good deal of attention at the time.

Luminous and water-proof cardboard is one of the last productions of the paper trade. As photographs suffer more from damp than any other cause, damp-proof card mounts might be useful to photographers; in any case they would like to know how this luminous card is made. According to the *Journal of Chemical Insdustry* the water-proofing is brought about by producing an insoluble compound with bichromated gelatine, so that the material is actually "fixed" by light. Here are the proportions for making the cardboard:—

Water	10 parts
Paper pulp...	40 „
Phosphorescent powder (slaked for 24 hours)	20 parts
Gelatine	1 part
Saturated solution of bichromate of potash	1 „

The proportion of gelatine and bichromate of potash employed is very small, but doubtless quite sufficient to render the card damp-proof. It is possible that a dilute solution of bichromated gelatine such as this might be employed with success for sizing ordinary mounts. The yellowish colour would not be conspicuous if only a weak solution were employed, and the card had a tinted surface.

Said an unwilling maid-servant, the other day, after much persuasion by her mistress to come out on the lawn to be grouped with the family, "Well m'm, I'll come out to be photographed; but I don't like being focussed."

Patent Intelligence.

Notice to Proceed.

3726. Thomas Hargreaves Taylor, of the city of Manchester, in the county of Lancaster, for an invention of "Improvements in apparatus for producing facsimile copies of writings, drawings, figures, and accounts."—Dated 4th August, 1882.

Patent Sealed.

2277. Herbert John Haddan, of Kensington, Middlesex, for an invention of "A new or improved process for producing pictures on glass, stone, metal, and other materials."—A communication to him from abroad by Edouard Godard, of Paris, France.—Dated 15th May, 1882.

Patent Granted in Germany.

20,487. O. Weidemann, of Berlin, for "Reproduction of coloured impressions by means of thin zinc plates."—Dated 22nd April, 1882 Class 15.

TWELVE ELEMENTARY LESSONS IN PHOTOGRAPHIC CHEMISTRY.

No. X.—Estimation of Acids, Ammonia, and Protosulphate of Iron.

For estimating acid and alkaline solutions, a standard solution of both sodium carbonate and sulphuric acid is required.

To prepare the first-named solution, place about two ounces of pure dried sodium carbonate in a porcelain crucible and heat it over a Bunsen burner for about ten minutes, to drive off any trace of adherent moisture. When cold, powder the substance in a dry mortar, and transfer the powdered salt to a dry, well-stoppered bottle. Weigh out exactly 53 grams of the above dried salt, place it in a litre flask with a small quantity of water, and, when dissolved, dilute with distilled water to exactly a litre. The solution must be preserved in a stoppered bottle, and should be labelled—

Standard Solution.—Sodium Carbonate.

1 c.c.	= ·053	grams	sodium carbonate
,,	= ·017	,,	ammonia
,,	= ·049	,,	sulphuric acid
,,	= ·0365	,,	hydrochloric acid
,,	= ·063	,,	nitric acid

To prepare the acid solution, place 28 c.c. of pure strong sulphuric acid in a litre flask containing about 300 c.c. of distilled water, and, when the solution is cool, dilute it to a litre. After preparing the solution it is necessary to ascertain the exact strength of it by means of the standard solution of sodium carbonate, for it is impossible to weigh out the exact amount of acids, as it varies in strength. Fill a burette with the solution of sulphuric acid to be tested, place in a small flask 10 c.c. of standard sodium carbonate solution with about 100 c.c. of distilled water, and a sufficient quantity of solution of litmus to give the liquid a light blue colour. Allow the acid to slowly drip out of the burette into the flask until its contents has acquired a red tint; then boil the solution till the blue colour returns, and again run the acid out of the burette as before. This operation must be repeated till a permanent red tint remains even after boiling for several minutes.

The red tint first formed is produced by the carbonic acid set free in the decomposition of sodium carbonate by the sulphuric acid, but on boiling, the gas is insoluble, and consequently escapes, allowing the remaining undecomposed sodium carbonate to colour the litmus blue. When sufficient acid is added to produce a permanent red tint, the whole of the sodium carbonate is decomposed, and the slight excess of sulphuric acid preserves the red tint, although, on boiling, all the carbonic acid gas is driven off. It will be noticed that the red colour produced by the carbonic acid is of a light claret tint, whilst with sulphuric acid an onion red colour is produced. An experienced analyst can work without boiling the solution by running in the acid till the claret tint first produced gives way to the onion red colour; but as it is rather difficult to determine when the exact point is reached, we should certainly not advise the student to perform the operation without boiling.

In order to calculate the strength of the acid solution, multiply the amount of acid which is equal to 1 c.c. of the standard sodium carbonate by the number of c.c. of standard sodium carbonate used, and divide the product by the number of c.c. of sulphuric acid solution run out of the burette; the quotient is the amount of acid contained in 1 c.c. of the solution.

For example: 10 c.c. of standard sodium carbonate was used (1 c.c. = ·049 sulphuric acid), and 9 c.c. of sulphuric acid was required to produce the permanent red colour; therefore 10 multiplied by ·049 equals ·49, and ·49 divided by 9 equals ·0,544, the amount of sulphuric contained in 1 c.c. of the solution. The amount of ammonia equal to 1 c.c. of the sulphuric acid can be calculated in the same way, substituting ·017 (the amount of ammonia which corresponds to 1 c.c. of the sodium carbonate solution) for ·049 in the above example. The sulphuric acid should be labelled—

Standard Solution.—Sulphuric Acid.

1 c.c. $=$ x sulphuric acid
,, $=$ y ammonia

Of course x and y must be determined for every solution made up, but in the above example it equals ·0,544, and y equals ·019. In order to determine the amount of ammonia in a solution, fill a burette with the standard solution of sulphuric acid, and place 10 c.c. of the solution of ammonia in a flask with a little litmus solution, and run the acid from the burette into the ammonia, shaking the flask gently, till a red colour is produced. In this process the solution is not boiled, because there is no carbonic acid to interfere with the reaction, and also heating the solution would drive off the ammonia.

To calculate the result, multiply the number of c.c. of standard acid solution by the amount of ammonia which is equal to 1 c.c. of the standard acid, and divide the product by the number of c.c. of solution of ammonia used in the analysis; the quotient is the amount of ammonia contained in 1 c.c. of the solution tested.

For example: 10 c.c. of an ammonia solution, used for pyrogallic development, was taken, and 20 c.c. of standard acid (1 c.c.=·019 grm. ammonia) required to produce a red colour; therefore ·019 multiplied by 20 equals ·38, and ·38 divided by 10 equals ·038 grms., the amount of ammonia contained in 1 c.c. of the ammoniacal solution tested, which is equivalent to 3·8 per cent. Strong ammonia, sp. gr. 880, contains 33 per cent. of ammonia, therefore the ammoniacal solution contains rather more than 11 per cent. of strong ammonia.

There are several methods for estimating the amount of ferrous sulphate contained in commercial protosulphate of iron, but the bichromate process is the most accurate.

It is necessary to have a standard solution of potassium bichromate, and a dilute solution of ferricyanide of potassium. To prepare the first-named solution, place about 12 grms. of recrystallized potassium bichromate in a porcelain crucible, and heat gently to fusion. When cold, powder the salt, and preserve it in a stoppered bottle. Weigh out exactly 9·834 grm. of the above dried salt, dissolve it in a small quantity of water in a litre flask, and fill up to the litre graduation with distilled water. Transfer the solution to a stoppered bottle and label thus—

Standard Solution.—Potassium Bichromate.

1 c.c. = ·009834 grm. potassium bichromate
1 c.c. = ·0488 grm. crystal ferrous sulphate.

To determine the amount of ferrous sulphate in a commercial samp'e, weigh out exactly 2·44 grms. of the salt, dissolve it in a beaker in about 300 c.c. of boiled cold distilled water, and add to the solution about 10 c.c. of dilute solution of sulphuric acid (1 : 4). Fill a burette with the standard solution of potassium bichromate, sprinkle over a white plate a one-grain solution of potassium ferricyanide (red prussiate of potash) by means of a glass rod. Run the bichromate solution out of burette into the solution of ferrous sulphate, testing the solution from time to time by taking a drop out with a glass rod, and touching one of the drops of ferricyanide on the plate; at first, a blue precipitate will be produced, but when sufficient bichromate has been run in, instead of a blue precipitate being produced, a brown colour will form on touching the ferricyanide. To calculate the result, all that is necessary is to multiply the number of c.c. run of the burette by ·0188 (the amount of ferrous sulphate which is equivalent to 1 c.c. of bichromate solution); the product represents the amount of pure ferrous sulphate contained in 2·44 grm. of the sample.

PHOTO-LITHOGRAPHY AND PHOTO-ZINCOGRAPHY.

BY MAJOR J. WATERHOUSE, B.S.C.,
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Chapter IV.—Reversed Negatives.

In some of the photo-lithographic processes hereafter to be described, in which the photographic image is impressed directly upon the stone or zinc plate by placing the negative in immediate contact with the printing surface, it is necessary that this negative should be a reversed one; that is to say, one in which the image, for example, of a printed paper when looked at on the film side shall read correctly, and not appear reversed as in an ordinary negative. The image produced on the stone from such a negative will appear reversed, just as it would if produced from a transfer, but the printed copy will read correctly.

There are several methods of obtaining these reversed negatives, and they fall within five distinct categories.

1. Methods for taking reversed negative in the camera directly from the object.

2. Methods in which direct negatives are taken, and then stripped from their supporting glass, and either turned over on to the same glass or another, or before stripping the film may be strengthened with collodion or gelatine, so that it may be used independently of any rigid support, for producing either direct or reversed images.

3. Methods for reproducing a reversed negative from a direct one by contact printing.

4. Methods for obtaining reversed negatives in the copying camera from transparencies, and, if desired, on a larger or smaller scale than the originals.

5. Coating glass plates with an opaque varnish, and etching the design thereon with a point.

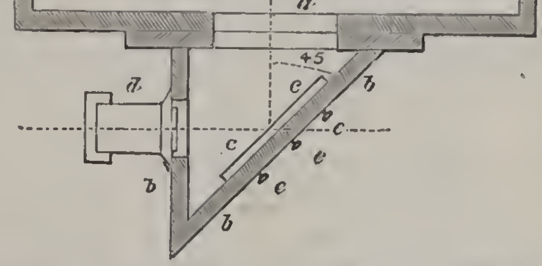
We shall briefly consider each of these methods, referring the reader for fuller details to the text-books and journals.

1. *Reversed Negatives taken in the Camera.*—Of the methods for taking reversed negatives in the camera, the simplest, and in some cases a very efficient way, is to turn the sensitive plate in the camera so that the rays forming the image may act through the glass on the back surface of the film. The method can be used with wet or dry plates, but is perhaps most suitable for the latter. In any case, care is required in the selection of glass of even thickness, free from bubbles, scratching, and other markings and defects which would show on the film. The back of the plate must also be very carefully wiped and cleaned from patches of film, &c. Allowance must be made for the thickness of the glass in focussing, or, if a great deal of this work is done, it will be convenient to alter and adjust the dark slide and focussing glass, so that the back surface of the sensitive plate shall occupy the same position as the ground glass.

In using this method with collodion plates the springs inside the dark slide must be removed, and the plate fixed in its place either with small silver clips at the corners, or with strips of blotting-paper. With gelatine dry plates it will be sufficient to put a thickness or two of paper over the plate to prevent the spring from rubbing the film.

I have not used this method much myself, as I have found a tendency to want of sharpness towards the edges of large wet collodion plates, and very fine lines do not seem to come up so sharply and clearly as when taken direct. The method is, however, largely used for reproduction of maps, with wet plates, at the Military Geographical Institute, Vienna, and with dry plates at the War Depot, Brussels.

The most usual, and perhaps the best, method of taking reversed negatives in the camera, is to use a reversing mirror, which may be placed either before or behind the lens, or between its components, if the lens is of a suitable description. Hitherto the usual position has been in front of the lens, but Herr Romain Talbot, of Berlin, has lately introduced a reversing arrangement in which the mirror is placed behind the lens, as shown in the plan in the figure,



a, camera; *b*, mirror mount; *c*, mirror; *d*, lens; *e e e*, adjusting screws.

and this I have found to work very satisfactorily. A smaller mirror can be used, and it is better protected from injury and from extraneous light. The mounting may be stronger and more solid than when it is fixed on the lens, and it is preferable that the mirror mounting should support the lens, rather than the lens the mirror mounting; though this may, of course, be obviated by putting the mirror in front of the lens on a special mounting attached to the camera independently of the lens. Further, it would appear obviously less likely to cause any interference with the working of the lens to allow it to do its work before the rays are reflected and reversed, rather than afterwards.

The reflecting surface of the mirror used for reversing must be as nearly as possible a true plane, and be coated with a bright highly polished film of silver, in the same manner as the specula of reflecting telescopes. A description of the methods of silvering these mirrors will be found in Captain Abney's "Instruction in Photography;" and Mr. Commin's method as described in the News, Vol. XXVI., page 315, is to be recommended as simple and effective. Other good formulæ will also be found in the Year-Book and journals.

The plane of the mirror must be vertical, and placed so that a line passing through the axis of the lens, and prolonging it, shall pass through the centre of the mirror, and be cut at an angle of 45° (see preceding figure).

The mirror must be kept in a dry place free from fumes which might tarnish it; and with an occasional polishing with a tuft of soft cotton and a little rouge, will keep in good order for a long time. The silver film can be easily renewed at any time.

Instead of a mirror, a right-angled reflecting prism may be used, mounted in a similar manner. With large lenses, such as are generally used for copying maps, the use of a prism becomes almost impracticable, on account of the expense and difficulty of getting blocks of glass of the size required free from defects. There is also a greater loss of light in using a prism than there is with a mirror, and it can only be used with lenses having an angle of view less than 50°.

M. Derogy, the well-known optician of Paris, has proposed a plan of overcoming the difficulties connected with large prisms by placing a small prism between the components of the lens in about the usual position of the stops, the mounting of the lens being altered, so that the axis of the front component is at right angles to that of the back component. Some trials with an apparatus of this kind fitted under my own superintendeuce were promising, and with proper adjustment the arrangement would doubtless answer well. A prism placed behind the lens would probably give very satisfactory results, but on the whole the use of the mirror in preference to a prism is to be recommended.

When using a reversing prism or mirror, arrangements must be made for placing the front of the camera and the sensitive plate accurately at right angles to the original, instead of parallel to it; and for work of moderate size, it is sometimes an advantage to place the original in a horizontal position below the lens.

In other respects the working is exactly the same as with direct negatives, and if the mirror or prism is properly adjusted, and the lens a suitable one for copying, the resulting negative should be perfectly sharp, true to scale, and free from distortion.

2. *Reversed Film Negatives.*—The methods for producing reversed negatives by coating the original unreversed negative with a thick transfer collodion, or with a solution of gelatine, and when dry stripping off the film, and either laying it down again on another sheet of glass in a reversed position, or using it as a film negative, are in many cases most convenient, and even desirable, when strong pressure has to be applied. They have, however, the great defect, especially for map and plan work, where accuracy of scale is indispensable, of more or less altering the dimensions of the image by the contraction of the compound film after leaving its glass support.

There is also a difficulty in keeping film negatives flat, and in India, at least, I have found that collodion films soon become yellow and brittle, while in a damp hot climate gelatine films readily become spotty and mouldy.

If it is desired to retain the rigid support given by the glass, the collodion film may be turned over without much difficulty, if a suitable tough collodion be used. A simple and efficient mode of doing this was shown to me some years ago by Herr Korn, of Berlin. The finished negative, while still wet, is treated for a few minutes with dilute sulphuric acid at 4 per cent.; this has the effect of loosening, and at the same time toughening the film; it is then poured off, and the edges of the film are taken off with the finger nail to a distance of about a quarter of an inch; the plate is then well washed, and the film is brought down so as to extend a little beyond the other side of the glass. A glass plate, previously covered with a solutiou of gelatine at 1 per cent., and dried, is then laid face upwards in a dish of water; the negative is held, film side downwards, above it, and the film being gently drawn away, the upper glass is lifted up while the film is arranged in its place on the gelatinized glass below. The moisture is removed at one end of the plate with a piece of blotting-paper, in order to prevent the film slipping, as it sometimes does. The plate is then carefully drained, dried, and varnished.

Another method, originally proposed by Mr. Woodbury, and which I have found to answer very well, is to coat the dry unvarnished negative with a solution of india-rubber in benzole, about the thickness of collodion. When this is dry the plate is coated with a transfer collodion, made of—

Ether...	20 parts
Alcohol sp. g. ·805	40 ,,
Castor oil	1 part
Pyroxyline	1 ,,

This is allowed to dry thoroughly, and the plate is then laid in cold water for a short time until the film becomes loose; a little sulphuric acid added to the water, about one ounce to the gallon, will facilitate the loosening. The film should be cut with a pen-knife round the edges, and stripped off gently while in the water. It is then turned over, and laid on a clean or slightly gelatinized plate whilst still floating. The film is then gently squeegeed down to its new support, and when dry can be varnished and used as an ordinary negative.

Sometimes a coating of gum, to which a little chrome alum may be added, is recommended, instead of the india-rubber solution; but I prefer the latter.

Negatives thus stripped with collodion may also be used as film negatives, and are thinner than gelatine films; but they have the disadvantage before noticed of becoming brittle, and yellow with age.

For producing film negatives by means of gelatine, a great many formulæ have been given, from which the following, given by Herr Allgeyer in his very practical work on "Lichtdruck," may be taken as a sample.

The fixed and washed negative is flowed over with a filtered solution of gum-arabic at 5 per cent., containing a few drops of a solution of chrome alum at 1 to 60. The plate is then dried, and retouched, if necessary, with black lead, colour not being admissible. Before applying the coating of gelatine, the plate is gently warmed and levelled. If it be of large size, it is desirable to support it on a thick plate of glass.

The solutiou of gelatine is composed as follows:—

White gelatine	100 parts
Water	400 ,,
Alcohol	100 ,,
Glycerine	15 ,,

with a few drops of carbolic acid to prevent decomposition.

Before use, it must be warmed, filtered, and free from bubbles. It is poured on in the middle of the plate, and spread outwards with a piece of paper. The thickness of the coating of solution should be, according to the size of the negative, from 1 to 1½ millimeters (from $\frac{1}{25}$ to $\frac{1}{16}$ of an inch). To prevent the solution from flowing over, the edges of the plate may be rubbed with a little tallow.

When the film has set, the plate is reared up to dry in an airy place free from dust; and, when dry, it is coated with thin plain collodion, or varnished.

(*To be continued.*)

FURTHER NOTES ABOUT COLOURED PHOTOGRAPHS ON GLASS.

BY W. M. ASHMAN.

No. II.

Having prepared the photograph as directed on page 678 of the present volume, the next thing will be to describe the operation of colouring as concisely as possible. The glass supporting the photograph should be laid on the retouching desk, concave side upwards, and the most important points noted. These comprise such things as the eyes, lips, high-lights, hair, flowers, jewellery, and small details, &c., for they must be all coloured on the back of the photograph. I would recommend the beginner to paint in the hair, flowers, and jewellery before attempting the eyes, for they will be found more difficult than any other part of the process. Mix a little each of Naples yellow, Indian yellow, and poppy oil for very light golden hair; burnt sienna and poppy oil for brown hair; and black, Vandyke-brown, and poppy oil for very dark hair. Linseed and boiled oil may be used for the purpose instead of poppy oil; but the latter will be found to answer every purpose.

Having applied the paint to the hair, turn the glass round to see the effect; also whether the whole surface has been covered or not. Should it have been satisfactorily performed, the lips and cheeks may be done next.

They should be painted with a mixture of vermilion and carmine in the following manner. Run a line of colour along the surface with a brush well charged with colour, softening it off with a dry brush. While working with this colour, put a spot in each nostril, to warm up the heavy shadows in the photograph; also in the corner of the eyes, and any other part of the picture requiring that mixture. It will be well to again examine the picture from the front.

All being satisfactory, the eyes may be next attempted. Paint the pupil with pure black, and the light spot in the iris with Chinese white. Mix a little blue with the Chinese white for the white of the eye. When quite dry, paint the iris with a mixture of ultramarine and poppy oil for deep blue eyes; mix black, white, and ultramarine for grey eyes; and for dark brown eyes use Vandyke-brown with black, using poppy oil in each case. If the colours are not strong enough, they may be strengthened; but the first must be allowed to get quite dry before the second application, otherwise a muddy effect will be produced.

Eye-brows, moustachios, and whiskers are coloured by laying on the colour sparingly, and softening off with a dry brush. There should be just enough colour laid on to do this nicely, because too much will look harsh, and not enough tends to flatten the picture.

Paint the jewellery in solid colour, using for gold Indian yellow, Naples yellow, and vermilion; for silver, use Chinese white and black.

Lace should be touched up, the lights with Chinese white laid on thickly, and the shadows with grey composed of black and white. When the colours are dry, attach the second glass by means of gummed paper. Mix Chinese white with all the colours to render them opaque, and apply them roughly over the surface, no part of which should be left uncovered. The flesh colour is composed of Naples yellow, vermilion, carmine, and Chinese white, thickly laid over the flesh parts, deepening the cheeks, if necessary, with vermilion, the shadows with a slight admixture of ultramarine, according to the subject. Dresses will in many cases be left to the taste of the operator; and in painting them it must be borne in mind the sort of background that is intended, for harmony must prevail where large surfaces—such as backgrounds and dresses—are treated. Otherwise, however nicely the flesh and other details may have been executed, if the larger surfaces do not agree, the result must be considered a failure (loud, in fact). Any work put on, if found afterwards to be unsatisfactory, may be easily removed with rectified spirits of turpentine on a piece of linen rag, and the same substance will be found useful for cleaning the brushes, finishing them in a little methylated spirit.

The principal tubes of colour required will be Chinese white, black, Vandyke brown, chrome No. 1, burnt sienna, Naples yellow, ultramarine, Indian yellow, carmine, vermilion, also a bottle of poppy oil; brushes and palette, turpentine and methylated spirit.

As I have detailed the process of colouring at much greater length than I intended, I will say as little as possible about experiments.

The first experiment commenced with the first operation, viz, the print, and I am in favour of using, where practicable, the ready sensitized paper, it being as a rule thin and more easily permeated with the clearing medium than a heavy paper freshly silvered. Then comes the mounting medium; I have used several substances for this purpose, and after repeated trials have decided on a mixture of gelatine, starch, and cornflour pastes in equal quantities; they should be made separately, and afterwards all boiled up together, stirring the whole time. When cold, a beautiful paste results, which is not only useful for mounting photographs on glass, but will be found excellent for ordinary mounting on cardboard. I found that pictures mounted with gelatine alone adhered very firmly to the plate, but the tone became much warmer, and however desirable that may be for plain photographs, it is not advantageous for those which are to be painted. The compound above stated does not produce a change in tone, adheres perfectly, and when dry there is an entire absence of air-bells and surface markings such as seen where starch or cornflour alone had been used.

A preliminary wash in benzoline shows a marked advantage over prints not so treated in preventing the formation of air-bells, and the paper leaving the glass in small patches during the process of drying.

One more point to be considered is the best medium for clearing. Oils may be used—such as linseed, olive, or castor oils—but they require a long time to thoroughly permeate, and if the temperature is raised above 75° or 80° Fah., the print will become very yellow. From twenty-four hours to forty-eight hours may be required, which will be found tedious in practice. Therefore the heating in a mixture of wax and Canada balsam is far preferable; I have used spermaceti, white wax, and solid paraffine, and think the proportions given in the first part of this article as good as any I have tried; but there is a field for experiment in this direction. I may mention that I cleared one print with some Autotype waxing solution, and I intend doing some more in the same manner, but altering the proportions and adding Canada balsam thereto. If, as I anticipate, there should be any gain over the medium previously recommended, I will report the same at an early date.

Correspondence.

COLD METHODS OF EMULSIFICATION.

Sir,—Mr. A. J. Brown's paper read before the London and Provincial Photographic Association, and which appeared in your columns of November 17th, seems to me to be so extraordinary that if it is not intended to give every one their due, it must be to provoke discussion; I heartily congratulate Mr. Brown on his success, especially if the latter was his object, as the debate waxed so warm that an adjournment ensued. In the first place, Mr. Brown represents that I claim the originality of the cold method of emulsification, and then he goes on to give the credit to Mr. Cowan. If my memory serves me well, it tells me that Captain Abney gave a formula for mixing emulsion cold, but I have yet to learn the name of the one who has succeeded in making a good plate by Captain Abney's original formula; Mr. Cowan distinctly disclaims the honor of the discovery.

I think it needless to analyse all Mr. Brown's statements, except that one more particularly where he says, "It is impossible to make a healthy plate with gelatine that has been in contact with ammonia; it is sure to suffer from green fog." Oh, Mr. Brown! this is indeed a good joke.

I presume Mr. Brown will also give the introducer of ammonia and emulsion the credit of having discovered green fog. I may say that I am not aware at what date Monckhoven or Eder advocated ammonia; but at one of the early Brittlebank meetings I not only suggested ammonia, but made some ammonia nitrate for one of the members to try. He failed—got fogged plates. I now believe that the non-success was due to the insufficiently safe light in the dark room.

Concerning green fog, I have discovered (an opinion I have long held) that it is due to more than one cause. I will publish a cure in the next Year-Book—Apologising for thus encroaching on your space, believe me, yours, &c.,

A. L. Henderson.

PS.—I have no authority to give the name of the large maker of gelatine plate referred to in Mr. Brown's paper. Seeing that I am not a professional plate maker, I am at a loss to understand what Mr. Brown can mean by "capital being made in this way." A. L. H.

A GRIEVANCE.

Sir,—I have read with great interest the complaints as to the quality of "dry" plates as sold by the leading makers.

I have two gross half plates which are now almost used up. Every one of these plates, when used for a cabinet picture, requires to be vignetted owing to markings, and almost every plate has a kind of fog running from the edge of the plate to, in some cases, the extent of half an inch. These plates are by one of the best (?) makers.

Another two gross by another leading maker (if not *the* leading maker) have been a great source of anoyance to me. I think I can safely say that nine out of every twelve have been faulty—every plate more or less thin, small holes in the film, corners quite bare, and six out of every twelve have had to be intensified, so thin have the films been.

Some time since I had the pleasure (?) of working some plates from a well-known house; every plate showed green fog and insensitive spots all over the plate, some as large as a threepenny piece. I and my then employer tried every variation of developing and exposure; but the result was always the same (my employer was one of the very first to take up the dry plates, and had had, perhaps, as much experience as any one in dry plates). After entire failure to work the plates, he wrote to the maker. The maker replied that "the plates were perfect, and that the only fault was incompetent developing."

I should like to ask some of the large makers why they do not try to keep up the quality of the plates, and so keep their customers?

Personally I would rather pay more and have them good and reliable. I do not ask for too much, I think, but surely such things as thin plates, uneven coating of plates, holes in films, corners not covered, and broken plates in the middle of a package, can be avoided.

I have had such splendid plates by both makes of whom I speak, that I can fully appreciate faults when they do come.—I am, yours &c., A Sufferer.

Sir,—I should like to make a few remarks on the correspondence that has followed the complaints of "Exact Measure" and myself. I am glad that Mr. George Pendry has secured such a reliable supply of plates, and should be much obliged by the address of the maker; but Mr. Pendry is mistaken in supposing that I think there are no good plates in the market, for I am daily using good, but not quite perfect ones. His advice to stick to a good article is wise, and for about fifteen months I did stick to one maker, his plates being excellent until last May, when they became very uncertain in rapidity, and foggy, and then I looked out for another maker; but those plates, although very good, like those I am now using, were not very rapid, and so I have tried various makers who advertise very rapid plates. There are great differences in the way different makes of plates register light and shade, and the plates that I am now using do not, in my hands, give quite such a round image as those I formerly used, although in uniformity, cleanliness, and even coating, they are firstrate, and moderate in price.

In your last issue Mr. C. J. Dobbs asks if the fault does not lay with the user rather than with the maker? No doubt many a good plate is condemned from want of skill on the part of the user, but the faults most complained of are not chemical, but chiefly uneven and insufficient coating, spots, holes, &c.; and surely it does not require a very skilful person to judge of each defect.—Faithfully yours,

E. Williams.

THE PLÜCKER STAND.

Dear Sir,—Allow me to send you some remarks about my patent telescopic camera stand, spoken of in the last number of your valuable paper.

This stand has been tried now for more than four years, without affording the least trouble. The one I employ myself has been almost daily at work, mostly in Belgium, but I have been with it in Germany, in Switzerland, in Italy, and in Spain. Until now the tripod has not the least bruise; in fact, it is, no more than are any other photographic materials, such as cameras, lenses, &c., &c., liable to get damaged in operation, and then it will stand a very rough handling. When travelling, and the tubes of each leg are fitted in each other, it is as strong as, if not stronger than, other stands weighing, perhaps, ten times as much, and being twenty times as bulky; it could, besides, be protected with a leather or cloth sleeve, which would weaken an extraordinary blow.—I am, dear sir, yours truly, J. F Pluecker,

Antwerp, 14th Nov. Capt. Belgian Artillery.

PS.—I have just made the following experiment: the three tubes of one leg of the stand being slided into one another, I put them flat on a marble floor, and stood upon it about half a minute with one foot, allowing the whole weight of the body to press on the tripod leg; after which I drew the tubes out, and could not discern the least injury to them.

[We are happy to insert Captain Plücker's favourable opinion of his stand; but we must repeat our own, which is to the effect that a sharp blow on any of the tubes would probably prevent their sliding in or out. So long as it is handled with due care, doubtless all would be well.—Ed. P. N.]

AMATEURS AND THEIR WORK.

Sir,—If no one else will take up the cudgels, I will, and strongly protest against the assumption that amateurs are not in the habit of developing their own negatives. I know a number of amateurs, but not one who would not take as much interest in the development as in the exposure of his plates. My wonder is why they do not go further, and make their own emulsion, which is simple enough, and the coating and drying by no means such a bother as seems to be generally supposed. Without fear of contradiction, I say that 90 per cent. of my pictures are from plates of my own make. My time for photography is chiefly limited to a month in the summer, when I manage to take a goodly number of landscapes, from which I print transparencies for the lantern, and make enlargements in the winter. Thus I do not require such a rapid plate as is usually termed "instantaneous," and, in fact, think it a mistake to use such an one for views. Changing the plates at the hotel taxes all one's ingenuity, and a stray ray of light falling on such exquisitely sensitive films may spoil a day's work.

If there are any amateurs who get the professional photographer to develop their plates, I advise them to take him with them on their tour, and let him focus, expose, and develop the plates, and the thing will be complete.—Yours truly, W. H. Plaister.

THE SWAN LIGHT FOR THE WINDOW.

Dear Sir,—I have used the Swan lamps as recommended by you in a recent article, and though the battery is troublesome to manipulate, I can bear testimony to the attractiveness of the light, and of its undoubted use as an effective advertisement. I use it particularly for lighting *opal* pictures, for which it is well suited, and find it gives an impetus to this branch of business.—Yours, &c.,

J. Berryman.

Proceedings of Societies.

Photographers' Benevolent Association.

On the evening of the 16th inst. the Exhibition of the Photographic Society of Great Britain was open from 7 till 10 in aid of the Photographers' Benevolent Association, when the attendance was extremely good, and the Gallery presented a very pleasant aspect, the ladies being well represented, and, judging from appearances, the display of pictures thoroughly interested the visitors.

London and Provincial Photographic Association.

At the meeting held on the 16th inst., Mr. J. Barker in the chair,

Mr. A. J. Brown read a paper on "Cold Emulsification with Uniformity" (see last week's News), and a highly interesting discussion ensued.

Mr. Henderson gave Captain Abney the credit of being the first to introduce a formula for cold emulsification, which "was tried and found wanting." What he (Mr. Henderson) claimed was, that he was the originator of the ammonia nitrate process, he having prepared a quantity and handed it to a gentleman at one of the Brittlebank meetings; he further stated that within the last few weeks he had made great improvements in his process, whereby no green fog was obtained. He said he did not use gelatine in the ordinary manner, but emulsified with a substance called lucine, which he said was a meta-gelatine, and promised that full details of the process should be published in the Year-Book for 1883. He thought that green fog was due to at least two causes, viz., the gelatine and the bromide.

Mr. Cobb had produced some of his best plates by the ammonia nitrate process; but, at the same time, he had also obtained some of his worst failures by that method.

Mr. Haddon found that green fog was obtained by rapid mixing, and not by slow.

Mr. Debenham had seen plates prepared by Mr. Henderson's process clear of green fog, and excessively rapid.

Mr. Cobb said that ammonia nitrate was introduced by Mr. Johnson about July, 1879.

Mr. Orseman thought that green fog was not due to silver; he had tried to remove it by placing the plate in chlorine water. Chlorine having a great affinity for silver in any form, the plate became quite white, all the silver being converted into chloride of silver, but the green fog was still present.

At this stage, owing to the lateness of the hour, the discussion was adjourned till next meeting.

Talk in the Studio.

Mr. Peter Collins' Camera.—A camera recently exhibited at the Dublin Exhibition by Mr. Peter Collins, of Clonmel, and which Mr. Collins has been good enough to forward to us for inspection, deserves the attention of photographers. One of its main points is, that on drawing the slide to expose, a horizontal spring in the upper part of the camera presses into a cavity in the dark box, thus doing the double duty of protecting the plate from light, and also, so to speak, locking the camera. In fact, the dark box cannot again be withdrawn until the slide is put back into its place, and a button at the side of the camera pressed, to move back the spring. Another point is, that the slide of the dark box is solid, so that there is no chance of light entering by a join. The camera is constructed for universal use; it can be employed not only in the studio and out doors, but also for copying, a support and bellows arrangement permitting the camera to be lengthened from the front as well as from the back.

The Indian Troops.—On Saturday afternoon, after the review by her Majesty, the officers and men of the Indian contingent, accompanied by Colonel Pennington, visited the studios of Mr. J. E. Mayall, 164, New Bond Street, who took a number of portraits and groups by the electric light. The visitors (thirty-four in number) were much pleased by the novelty of the process and its satisfactory results.

Photographic Society of Great Britain.—The next social gathering of this Society will be held on Tuesday next, November 28th, at the Gallery, 5a, Pall Mall East, at 8 p.m.

Death of Professor Henry Draper.—The death is announced at New York of Mr. Henry Draper, Professor of Physiology in the University of New York. He was well known through his astronomical researches, which gave him a world-wide reputation, and his photographed spectra placed him in the front rank of photo-physicists. On page 285 of the present volume of the News will be found Professor Draper's last important contribution, and those who take an interest in astronomical photography have no need to be informed that he held the same rank in the United States as Dr. Huggins does in this country. It was only in January of the present year that his father, the late Dr. J. W. Draper, the contemporary of Daguerre and Möser, died—a *savan* whose researches upon light are universally known. Dr. Henry Draper had distinguished himself especially in photo-spectrum work, and had he been spared, we might have looked forward to further important results. One of the last observations of Dr. H. Draper's was in respect to the exquisite sensitiveness of gelatine emulsion in astronomical photography. "It is only a short time since," he writes, "that it was considered a feat to photograph a star of the 9th magnitude; but now I have been able to secure a picture of a star of the 10th magnitude, and this not in the form of a point, but with the light dispersed as a spectrum." Professor Henry Draper's death was announced on the 20th inst.

Treating Gelatine Negatives with Dilute Sulphuric Acid—Platinotype Printing.—Mr. Dresser, of Norwood, writes to us as follows:—"Some time ago I found out a way to make pyrogallic negatives look like wet negatives, and which I described in the News to you many weeks ago. Since then I have tried it frequently, and find it acts very well; beside this, it seems to clear the hyposulphite, and necessitats less washing; this I do not know for certain, but since using it I wash my negatives only for a short time, and have had none go bad or stained. I have told several, who have tried it, and they find it does as I say. You will notice what Mr. Prestwich says at the meeting of the London and Provincial Association, page 670 of the present volume. Try it! Adopt pyrogallic development without sulphite of soda; fix in hyposulphite, then pour on dilute sulphuric acid, one ounce to one quart of water. Do not soak the negative in it for any time, or you will spoil it. After pouring sulphuric acid over, wash well under the tap, and then soak for one or two hours in running water, and you will find your negative look like a wet one without any brown stain. You can clean old negatives the same way—never mind how old—but then you must soak them in sulphuric solution till they are clear. I have also found out that if you put a negative in old iron developer for five or six seconds after using pyrogallic development, it will clear it fairly well, and greatly strengthen it in printing power. As regards platinotype printing, Mr. Dresser says:—"After reading your paper on platinotype printing, I bought a licence, and am very glad I did so, as so far I have found it a great success. I find it much harder to do double printing than in the usual way of silver printing, but manage fairly well. I am doing all I can to get my friends to try it, as I am sure it ought to be better known, and it is so much easier to manage after the picture is printed, and one has none of the horrid hyposulphite, which I think by far the most favourable point of platinotype printing, as I find more trouble with the use of hyposulphite than anything I use in way of photography. How is it we see so little about platinotype in the papers or year-books? As for an amateur who only wants a few prints of subjects he gets while travelling about, it is just the thing, as he can print while away, and have no trouble with washing. I think every photographer ought to know how to do it, as at this time of the year, when the sun is seen so little, you can so easily get a print by the platinotype process, and therefore can develop at once. A friend sent me three negatives one evening, and said he wanted some prints by twelve next day, and did not know how to get them. I said I would do my best, and at twelve next day I gave him three good permanent prints of each negative, and I think that is not bad; it could not have been done with the silver process."

Mr. Thomas Fletcher on Gas and Electricity.—"The Electric Light Companies are exceedingly good customers for gas. I have supplied all, or nearly all, the Electric Light Companies, both in England and America, with gas apparatus, and some of them to a very large extent. Some of them would be considerably puzzled to carry on their business without gas, and many are very large users. Not only in making lamps and apparatus, but directly or indirectly, the use of coal-gas comes in continually. For instance, one maker of cables for carrying the currents, ordered thirty large gas blow-pipes, for brazing up lengths of wire; and the 'Apostle' of the electric light—Edison himself—has sent to Warrington for gas furnaces. Places such as the Savoy Theatre, in London, lighted, according to public statements, exclusively by the electric light, have to use gas for ventilating the place, and I believe I am well within the mark in stating that the gas bill of the Savoy Theatre exceeded seven hundred pounds last winter, in addition to the cost of the electric light."

Guillebaud's Photo-reliefs for Decorative Purposes.—The admirably-finished photo-reliefs produced by Messrs. Guillebaud and Co. have been noticed several times in the Photographic News; but we have several times expressed our opinion that, although the general basis of the work is undoubtedly photographic, the special qualities which distinguish Guillebaud's work are due to a subsequent beating or pressing up of the device at the reverse side. The German specification of Guillebaud, which has just been issued, confirms us in this idea. The patentee insists on the oft-asserted advantage of adopting means to diffuse the light during the exposure of the sensitive gelatine or other body; the use of matt glass and distance pieces of transparent material being especially mentioned. We ourselves strongly deprecate any such attempts to obtain more relief by the diffusion of the light, as the thickness of the necessary gelatine film generally gives too much diffusion. Next the use of damp or even fluid gelatine is recommended; but thoroughly wet bichromated gelatine is but slightly sensitive to light, and attempts to take advantage of the greater sensitiveness of *slightly damp gelatine* were discarded several years ago by the most experienced Woodburytype printers. There is nothing original in the methods claimed of taking moulds and reproducing by electrotype, just the same method being adopted as we have repeatedly recommended in the Photographic News and the Year-Books. The method of stamping up is to cut out a profile in wood of the device, let us suppose a portrait; and to use the ground and figure portions as stamping tools on the wax model. It is desirable that the negative should be so retouched as to reverse the shading of such darks parts as would be hollow in a simple cast from an exposed gelatine relief, as, for example, hair or a dark coat. Guillebaud definitely claims the use of light diffusing mediums, the exposure of undried gelatine, and a particular form of copying frame as far as they apply to the production of photo-reliefs. Our readers will remember that Mr. Emery, of Burslem, recently exhibited a photo-relief of Chiswick Church executed in biscuit porcelain. The mould from which this was cast was made by the method which we elaborated and recently described in the News.

To Correspondents.

*** We cannot undertake to return rejected communications.

J. H.—The appearance is such as to lead to the belief that the mount contains hyposulphite of soda.

G. G. L. B.—1. The term "permanent engagement," as distinguished from a temporary one, signifies that the assistant is taken on rather for current business work than to meet a sudden pressure or the special work of a season; and it need scarcely be said that when an engagement is merely understood to be a permanent one, the usual notice will suffice in the case of dissatisfaction on either side. 2. Unless there is a written agreement to the contrary, the notice required will depend on the periods of payment.

E. Poole.—It would be a difficult task, even for an experienced electro-metallurgist, to gild it by the galvano-plastic method, and there would be a considerable probability of entirely ruining the original. You had better, therefore, be contented to cover it with gold leaf, using the ordinary gold size as a cement. Rub the gold size on, remove the excess, and let it half dry before applying the gold leaf.

H. D.—The dimensions will do very well for a general studio, and you might glaze about fourteen feet run of the roof, and carry the glass to within three feet of the existing wall. As regards the front, you had better glaze to within about two feet of the ground. As a rule, it is better to err on the side of too much glass rather than too little, as it is easy to stop out any redundant light.

F. Gregory.—1. Attend the next meeting, which takes place at the house of the Society of Arts, on Thursday, December 6th, at 8 p.m. 2. The subscription is 10s. or 10s. 6d. per annum, and any communication for the Secretary should be addressed to Mr. F. A. Bridge, at the place of meeting.

G. F. Weber, Jun.—1. Certainly the rounded corner is a little in the way, and will tend to make the lighting unequal on the two sides of the work; we would suggest bringing the whole system of enlarging apparatus more towards the middle of the room. This will give better lighting, and will enable you to get free access to both sides of the apparatus. Remember that notwithstanding the fact that excellent work may be done under unfavourable conditions, it is most important to lose sight of no circumstance which may facilitate operations. The higher up you place your enlarging apparatus, so much the less will the wall interfere. Do not hesitate to write again should you require further information; and we shall be glad to hear how you get on.

Constant Reader.—Moisten the tips of the finger with a trace of oil of turpentine, and rub gently on the varnish until a sufficient tooth or roughness is produced.

G. R. P.—Pickle them in strong soda solution, and scrub off the films, which, if collected, will yield a notable amount of silver. The glass, after a thorough scrubbing, may be rinsed and dried.

C. N. B.—No series is published which would exactly rank as good photographs, all being more or less of the nature of mere outlines. As regards the apparatus, we would expect that Marion and Co., of 22, Soho Square, could obtain it for you through their Paris house.

Ignoramus.—The principal advantages are equality of illumination over a wide angle, and the straightness of marginal lines. For ordinary pure landscape work the single lens is better.

Novice.—To neutralise any acid which may arise from oxidation.

J. Berryman.—1. If you wish to obtain uniform results, make use of a fresh bath every time, as the expense of the bichromate is so small as to be insignificant. 2. Perhaps the glass has been waxed at some previous period in its history; we have experienced no difficulty when a thin substratum of chrome alumed gelatine is employed. 3. Much better to use a fresh solution of gelatine every time.

J. W. Barry (Ajaccio).—There is nothing better than Epsom salts, say half a teaspoonful, and if you ask for sulfate de magnésie you will obtain it without difficulty.

G. W. Hale.—Thanks for your interesting communication, of which we will make use shortly.

Positive on Glass.—Before experimenting with it, you would do well to obtain as good a copy as you can by means of the camera; make attempts not only by reflected light, but also with transmitted light. To whiten it, immerse the plate in a saturated solution of mercuric chloride, and allow it to remain till the blackening which first sets in becomes reversed. Copy the picture at this stage by reflected light, using a black foil behind the picture. If you should still fail, immerse the plate in a 10 per cent. solution of ammonium sulphide, wash, dry, and you will have a negative.

D. T. (Lewes).—Both difficulties may be overcome by developing on collodionized glass, instead of on the flexible support. The glass should be well waxed, and, after collodionizing, should be soaked in cold water until all aspect of greasiness disappears.

THE PHOTOGRAPHIC NEWS.

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CONTENTS.

GELATINE IN THE PRESENCE OF NITRATE OF SILVER.

Three well-known members of the Vienna Photographic Society, Captain Pizzighelli and Lieutenants Hübl and Stadler, have recently investigated the behaviour of a mixture of gelatine and nitrate of silver. Obernetter, as our readers know, in making emulsion, mixes his gelatine with nitrate of silver solution in the first place, and when set, puts it into a closed apparatus to be treated with the bromide solution necessary to form the haloid silver salt. This innovation in emulsion making has no doubt led the above-named gentlemen to undertake a research upou the subject, and the results of their study are, therefore, at the present moment of unusual interest.

We will describe the outcome of their labours as briefly as possible. If a solution of nitrate of silver is mixed with gelatine at a high temperature, an instantaneous browning of the mixture ensues; at a very low temperature, however, there is very little change in colour at first, though a yellow tint becomes apparent after a few hours—even if light is excluded—and in a few days the mixture assumes a brownish-red. In the presence of daylight the colouring, of course, follows at once. Employing darkly-tinted silver gelatine of this type in emulsion making will result in producing the well-known red fog; but, apparently, a serviceable emulsiou may very well be made with a mixture only slightly tinted.

When a large proportion of nitrate of silver solution is added to the gelatine, the latter loses its setting properties in a great measure. Thus, a solution of equal parts of gelatine and silver sets pretty well after a short time; but if the proportion of silver is doubled, then, even after an interval of some hours, the mass is by no means firm. This defect may, however, to a great extent be counteracted by the addition of alum, only the latter has some disadvantages that become apparent in the subsequent operations. Thus the process of bromising is rendered more difficult, and on the employment of ammonia, a precipitate of hydrate of alumina ensues; moreover, the addition of alum is limited by the fact that a most difficultly soluble salt—silver sulphate—is formed.

A trace of free acid, it is found, robs mixtures of silver and gelatine almost completely of their property to gelatinise. But it is different iu the case of a mixture of gelatine and ammonio-nitrate of silver prepared by the treatment of nitrate of silver with ammonia; such a mixture easily sets in the form of a hard cake, and its colour does not alter even after standing for days.

That bromising of the silver-gelatine mixture proceeds very slowly, is the next point laid down by our commission of three. But here the concentration of the mass, as also the nature of bromine salts employed, exercise a material influence. Thus a concentrated mixture takes a long time to be acted upon by the bromine solution, the ammonium salt having, by the way, a quicker action than the sodium, and this again working with more energy than bromide of potassium. As we have said, the addition of alum to the gelatine goes to prevent the penetration of the bromine salt.

By employing concentrated gelatine and bromide of potassium solutions, it is often quite impossible to bring about a uniform formation of bromide of silver. In this case a section of the bromised gelatine mixture reveals three distinct layers; an outer one, containing a large proportion of coarse-grained bromide; a middle layer, containing less silver bromide, but in a finer state of division; and finally a translucent mass, containing but bromide of potassium. This fact can only be explained by the circumstance that not only does the bromide of potassium penetrate the gelatinous mass, but that silver solution exudes from it. To prevent any such inequality or defect, it is necessary, obviously, to employ the proper proportion of silver salt and gelatine, as also to control the strength of the solution of bromine salt.

The next point taken up by the Vienna Commission was as to the nature of the silver bromide formed. An emulsion produced from gelatine and silver nitrate permits red light to pass, and the bromide of silver particles are for the most part in the form of minute well-shaped crystals, apparently hexagonal, and equal iu size to about 0·006 millimetre. On the other hand, an emulsion prepared from gelatine and ammonio-nitrate of silver, or from gelatine and silver nitrate with a mixture of bromine salt and ammonia, yields green silver bromide; this emulsion permits blue rays to pass ouly, and crystals of silver bromide are in the latter case but unfrequently met with, and iu the former, not at all.

As regards the sensitiveness of these emulsions, the Commission reports it to be less than that usually found in gelatine plates. For instance, an emulsion formed by bromizing a mixture of 20 grammes of silver nitrate, 20 grammes of gelatine, and 300 cubic centimetres of water was much less sensitive than au ordinary emulsion after half an hour's boiling; the latter was at least twice or three times as rapid. An emulsion formed with gelatine and ammonio-nitrate gave a much more favourable result, however, but even this was not so sensitive as the ordinary emulsion.

A fact worth noting, says the triumvirate of photographic chemists, in connection with the use of ammonia, is, that the silver gelatine then yields negatives of great density. Altogether, the investigation embraces many points of interest, and it will furnish an admirable starting point for any of our readers who desire to experiment with the Obernetter process. Its simplicity is a great recommendation, while the circumstance that that there is no need for working in ruby light or in darkness is another advantage that will be valued by many. That the emulsion does not possess a high degree of sensitiveness will be regarded as a drawback by some, though not by everybody; in any case, photographers are not likely to rest until the new *modus operandi* has been thoroughly investigated.

BURTON'S EMULSION METHOD.

Since describing a fortnight since the process which formed the subject of a paper read by Mr. W. K. Burton before the Photographic Society of Great Britain, we have taken the opportunity of giving it a practical trial. Our experience leads us to corroborate in the main the results described by the author of the paper. We have also, in the course of our experiments, got some bye-results which we consider worthy of notice. We have made in all four emulsions, in each case, varying the results. Before commencing to describe them, we should state that the numbers which we give as representing sensitiveness are read from plates exposed under the standard sensitometer. As we have widely different figures given by different operators as representing the average sensitiveness of good commercial plates, we recently took samples of the rapidest plates made by eight different plate makers, exposed them, and developed them each with the developer recommended by the maker. The figures we got varied from 15 to 20, which latter is the highest we have ever got from any commercial plate. The average got by adding the numbers, and dividing by the number of plates, was a shade under 17·5. We may therefore take from 17 to 18 to be the average sensitiveness of a good plate, so far as such can be gauged by the sensitometer.

In our first experiment we made up our emulsion precisely as directed by Mr. Burton, but we poured off the first water after about twenty-four hours, the second after about fourteen. Each of these waters was far from clear, but as we know how very little silver haloid in a fine state of division will make a great show, we thought little of this. We kept the two waters—40 ounces in all—and, evaporating a portion of it, found that it held in suspension a total of a shade less than a grain of solid matter per ounce; that is to say, we had, roughly speaking, lost by decantation nearly 40 grains of the silver haloids out of 440—a quite appreciable loss, certainly, but one which we thought would not be likely materially to affect the final result.

We finished this emulsion, and on testing got No. 15 of the sensitometer and a thin image; that is to say, a plate which was somewhat slow, and which lacked the power of giving brilliancy. After keeping the emulsion for six days, plates coated with it gave the figure 18 and a somewhat denser image, but still one not quite as dense as should be.

We now set about to make three separate emulsions. These we shall call Nos. 1, 2, and 3.

No. 1 was made precisely according to instructions. In No. 2 the only variation from instructions was that the alcohol advised by Mr. Burton to be added along with the ammonia was omitted. No. 3 was boiled for two and a half hours with periodic stirring, but no ammonia was added. The first two were allowed to stand for forty-eight hours, when the supernatant fluid was found to be practically clear. It was poured off. In No. 3 the water was by no means clear. After a lapse of another day it was, however, very nearly so, and was poured off. The same length of time was in each case allowed for the second subsidence.

The emulsions were made up, and plates coated, with the following results.

All gave this time dense and vigorous images. No. 1 gave the figure 15; No. 2, the figure 17; No. 3, the figure 19. On exposing in the camera, the rapidities appeared to be about 1, 2, 2; that is to say, the plates Nos. 2 and 3, giving respectively figures 17 and 19, were as nearly as possible of the same rapidity, and almost double that of No. 1, which gave 15 only.

And now for the lessons indicated by these results. In the first place, it would appear that the bromide of silver which is in the finest state of division is that which tends to give density to the image, and that the loss of a quantity of this finely-divided bromide, representing a very small percentage of the whole contained in an emulsion, gives thin images. It is therefore necessary, in such a process as the one under consideration, to allow as little as possible of the haloid to pass over with the washing water. Of course the larger particles of bromide are the first to precipitate, and the finer the last. When we have leisure we shall make a series of emulsions, taking advantage of this fact to enable us to separate a quantity of precipitating bromide into particles of different sizes. We think it quite possible that in every emulsion there is a considerable quantity of silver bromide in such a state of division that it will readily pass through a filter, but yet is so coarse that it does not add to the efficiency of the emulsion, but might, on the contrary, with advantage be separated out and cast into the residue tub.

The next fact which we gather from our experiments is that it is an advantage to leave out the ammonia given in the original formula, as it appears to act only as a restrainer. We do not see that it is at all necessary to guard against putrefaction of the gelatine, especially as even if such does take place, the putrefied gelatine will be afterwards eliminated. We must acknowledge having got the hint to omit the alcohol from the paper by Mr. Alfred Brown recently printed in our columns.

As the emulsions last mentioned have only recently been finished, we are unable at the present time to give the result of keeping them. It is quite possible that No. 1 may in a week's time increase in rapidity, so as to catch up or overtake the other two. At present we would decidedly describe it as a somewhat slow emulsion; but we were given by the author of the paper to understand that this was to be expected in the case of plates coated immediately after the gelatine is mixed with the washed haloid. The others, Nos. 2 and 3, on the other hand, give plates of a sensitiveness quite up to the average, and if any marked increase takes place in their case, they will give plates of very exceptional rapidity.

It will be seen that we have found it at least possible to do without any ammonia at all. The emulsion made from the bromide which had gone through the very long time of heating mentioned, showed no tendency to fog. We have found the process quite a workable one, and have discovered no difficulty in any of the manipulations. The quality of the plates has been excellent.

MENDING THE MINOR DEFECTS OF NEGATIVES.

Although but few ordinarily attend the Social Gatherings of the Photographic Society of Great Britain, it occasionlly happens that matter of considerable interest is discussed in a manner so thoroughly informal as to contrast strikingly with the ordinary meetings of the photographic societies. On Tuesday last the assembly consisted of thirteen gentlemen, who sat around the table in the Council Chamber of the Photographic Society; and while they regaled themselves with the tea and coffee so liberally provided, they discussed the best means of patching up such negatives as are generally good, but may be disfigured by trifling blemishes.

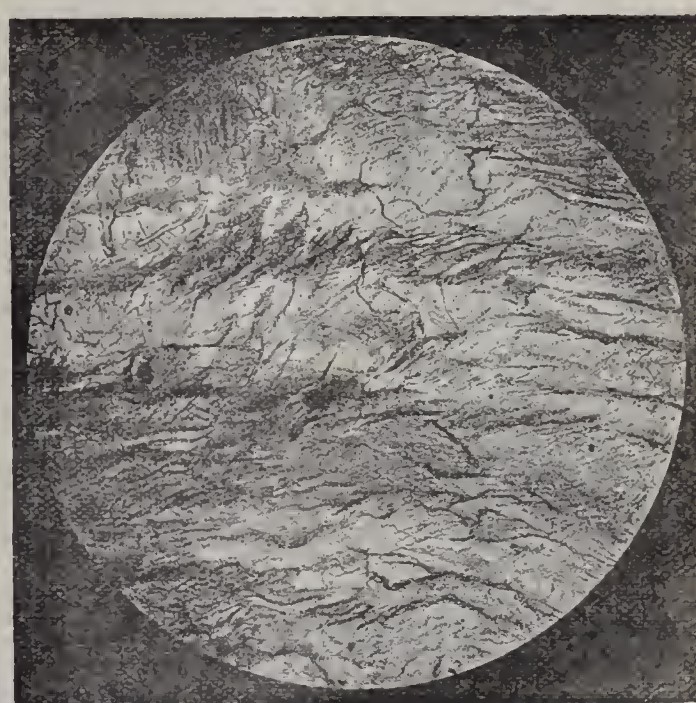
The most usual defect, and perhaps that which on the whole causes most annoyance, is the small transparent spot, generally somewhat larger than the so-called pin-hole, but still of inconsiderable size. Mr. Sebastian Davis referred to the use of carmine mixed with gum, but remarked that there is considerable difficulty in so applying it as to avoid overstepping the bounds of the transparent spot, as in such a case, a lightish ring appears on the print; and this ring is often even more noticeable than the dark spot which would have arisen if the negative had been let alone. It is very desirable to thoroughly incorporate the carmine with the gum, and we would recommend the addition of a trace of ammonia, as this not only tends to dissolve the pigment, and so yield a mixture better calculated for delicate work, but it also serves to somewhat soften the varnish, and give rise to a thorough union between the pigment and the resinous material; the kind of spotting or retouching now referred to being generally carried out on the varnished negative. Ox-gall is also used for a similar purpose, but a trace of Castille soap will serve just as well. Mr. England seemed to look on the blacklead pencil as better calculated to be of service for shading over spots; but when circumstances make it desirable to use anything of the nature of a pigment, sepia is convenient, as its tint harmonises well with that of the negative, and its physical condition is such as to well fit it for the work. Gelatine negatives are frequently seen with ring-like transparent marks, due, apparently, to the de-sensitizing action of solid particles which may either remain in the emulsion despite the straining, or may settle on the films before they are dry. These may be stippled over with a pigment, as mentioned by Mr. Bedford, or may be shaded over by means of the retouching pencil. But it is well to adopt some means of roughing up the film first, Mr. Ashman's usual plan being to abrade the surface with a fine needle; but there are instances in which a retouching medium is convenient. One ounce of common resin dissolved in two ounces of oil of turpentine answers well, a small quantity being rubbed on the varnished negative either with the tip of the finger, or with a small tuft of rag, the friction being kept up until the surface is dry and rough. Powdered resin, or a mixture of powdered resin and dextrine, is sometimes made use of; but powders tend to produce a lumpy and uneven surface.

The printing-in of clouds was referred to as one of the most frequent after-operations required to be performed on the negative, it being very difficult to realise the conditions necessary for securing both sky and negative on the same plate. The use of waxed paper sky negatives was well spoken of, and they seemed to be regarded as being more convenient in practice than glass negatives. They are, however, subject to the disadvantage of readily absorbing silver, and of becoming granular in texture, owing to a physical change of the wax; but Mr. Ashman pointed out that this granulated texture can be remedied by holding the negative before the fire so as to soften the wax. Mr. England strongly advocated the simple plan of working-in clouds on the back of the negative with Indian ink, and remarked that a very moderate amount of artistic culture is necessary for this purpose; while the rapidity and the ease with which the work can be altered also recommend this method. The Indian ink may be applied with a brush, and then stippled or distributed by a rag stump, or even the top of the finger. We have frequently made use of Brunswick black for a similar purpose, and are inclined to think that it offers some advantages over Indian ink, as a most delicate and transparent shading can be produced by rubbing down the dried work with a rag slightly moistened with benzole or turpentine. If, on the other hand, an attempt is made to reduce the dried Indian ink by friction with a moist rag, the whole thickness is removed at once, leaving bold and ragged edges.

PHOTOGRAPHING THE INTERNAL MICROSCOPIC STRUCTURE OF METALS.

BY J. VINCENT ELSDEN, B.Sc. (LOND.), F.C.S.

One of the most characteristic properties which is common to all metallic substances is their extreme opacity. This opacity, however, is not perfect when the metals are reduced to exceedingly fine leaves; pure gold, for example, when hammered out to a thickness of about $\frac{1}{200000}$ inch, or ·0000125 mm., allows green light to pass. Nevertheless, so little light is transmitted, even by the thinnest metallic leaves, that the examination of their molecular structure by the aid of a microscope is impossible, and still less could that structure be photographed. Thinking, however, that something might be learnt from the effects upon the molecules of malleable metals, of the extreme pressure to which they have been subjected, I devised, after some consideration, a method whereby metallic leaves can be made sufficiently thin, and, at the same time, transparent enough to enable a photograph to be taken of their structure enlarged to any required extent by means of a microscope. My experiments were chiefly confined to gold and silver, since these metals, of all others, are to be obtained in leaves of the greatest tenuity; but I also examined the structure of Dutch metal, tin, lead, and other more or less malleable metals. In the case of silver leaf, the method adopted was extremely simple. The silver leaf was first fastened down upon one of the ordinary glass slips used for mounting microscopic objects. This can be done with a very thin solution of gum. Care must be taken to have the leaf spread out as flat as possible, leaving no wrinkles upon the surface; for these would interfere with the appearance of the leaf, by transmitted light, by presenting layers of varying thickness and opacity. The leaf is then covered with a weak solution of iodine, and allowed to dry, or, more convenient still, it may be coated with bromine, which evaporates spontaneously, and is immediately dry.



The effect, in either case, is to convert the silver leaf into a perfectly transparent film of iodide or bromide of silver, which preserves most perfectly the minutest details of structure of the original metal. This film is well adapted to microscopic investigation; but its yellow colour is so non-actinic as to be rather against its employment for obtaining a photograph showing the structure satisfactorily.

For the latter purpose, the following method is by far preferable. The silver leaf, having been fastened as before upon a glass slip, is subjected, for a few moments only, to the action of chlorine gas. This can readily be done by simply passing it over the mouth of a test-tube in which manganese di-oxide and hydrochloric acid are heated together by a spirit lamp. The chlorine rapidly attacks the metal, but it does not act upon it uniformly. Owing to the great pressure to which the silver leaf has been subjected, its particles have become arranged in more or less parallel fibres, which are bound together in interlacing masses, somewhat resembling masses of human hair.

These fibres are less easily attacked by chlorine than the intermediate portions; so that, if the action is stopped in time, the metallic fibres will be left imbedded in a matrix, so to speak, of silver chloride. In order to render this fibrous structure still more apparent, the whole mass is next coated with plain enamelling collodion, and, when thoroughly dry, the glass slip is immersed in a solution of hyposulphite of soda. By this means, the collodion film being permeable by the hyposulphite solution, the silver chloride is dissolved away, and nothing remains but the mass of interlacing metallic fibres, which are kept in position by their adhesion to the collodion film. Frequently, during the operation, the collodion film separates from the glass slip; but this is not of the slightest consequence, as it can be handled with impunity, and again mounted upon the slip when the solution of the chloride is complete. In this way can be obtained a perfectly transparent representation of the structure of the silver leaf in a condition which favours its reproduction by photography. By the ordinary methods of microscopic photography a negative can be obtained, showing the magnified structure to great perfection.

The methods given above, however, are not applicable to all metals. In dealing with gold leaf, it was found advisable to render the film transparent by coating it with collodion, and then reducing it to extreme tenuity by immersing it in a solution of *aqua regia* for a short time. A similar result can be obtained, in a more certain manner, by the action upon the gold leaf of a solution of perchloride of iron or cyanide of potassium. By this means the leaf is much more slowly attacked than by the *aqua regia*, and the action can, therefore, be more easily stopped when the required degree of transparency has been obtained. Gold leaf shows the same tendency to a fibrous structure as silver, but in a slightly less marked degree. Other metals, like tin, show no trace of any fibrous structure, the particles being essentially granular.

The extremely fibrous arrangement of the particles in silver and gold leaves is doubtless the result of the great pressure by which they were beaten out, and is no doubt intimately connected with the tenacity of these leaves, the leaves of the granular metals, like tin, being far less tenacious than those of gold and silver.

Doubtless similar methods to the above might be adopted for photographing the minute structure of many other substances, which, in their natural condition, are too opaque for this purpose.

PHOTOGRAPHIC WRECKS.

BY EDWARD L. WILSON.*

A good many mistakes are made by photographers who begin to feel a little of the vanity which comes from prosperity. One of the most fatal of these is the disposition to discount the future, and to enlarge and improve their quarters more speedily than their business warrants. I would be one of the last ones to say a word against progress in any direction which would improve a photographer or the art which he represents, and yet, with the knowledge that I have of the history of many men in the profession in this country, I am compelled to say that the most fatal mistakes that have been made by those who once seemed to have a fortune almost in sight, and who ultimately failed, have been in the direction of extravagance in improving some other person's property for the sake of having what they choose to call "a palace of art."

One need not go further than the city of New York, and look into the history of photography there, to find the truth of what I say. All of us can remember when certain leading spirits moved from their down-town studios to places further up in the city where rents were much higher, and where, in their anxiety to obtain "desirable locations," they yielded to the proposition of their landlords, and, *at their own expense*, made an extravagant outlay, thus embarrassing themselves to a greater extent than they were ever able to recover from. It is not necessary to mention names, but I could point to no less than six or seven who, fifteen years ago, stood in New York as the grand lights of photography, but who have made an utter failure of it, and who have had to give up all these "palaces," and were glad to inhabit smaller quarters. Some of them lost all they had, some only a part; but all have been disappointed, and doomed to a life of hardship the rest of their days.

But this fatality, so to speak, is not confined to New York Philadelphia has had her share of just such wrecks. Chicago has had similar fortune; and how many smaller places have had photographers who have indulged in extravagance, and lost their all in the same way? I would not feel called upon to mention this matter now, were it not that I learn through the vast correspondence which comes to me continuously, the constant disposition to do this same thing on a greater or smaller scale. I believe thoroughly in photographers being comfortably fixed in pleasant and attractive places of business, and in their having about them every convenience which will enable them to produce the best work in the most expeditious manner, but still at the least possible cost to themselves. And if our younger generation desires to profit by the experience of those whom they have been taught to look up to as "veterans" in the art, they will steer clear of this great rock upon which so many have split.

If capital be meagre, it is best always even to pay a higher rent, and to have some one else invest in the arrangement of the studio, than to undertake too much one's self, and to find out afterward that the anticipations of business have not been realized, and that the whole must be given up to some one who holds a mortgage upon the property.

This temptation is not peculiar to photographers solely, but is a common thing in all lines; but as our interests lie with photographers, it seems wise and best at this time to place on record a word of caution. Sometimes this extravagance is resorted to in order to fulfil the false idea of getting ahead of one's neighbour. This is by no means necessary. It has been my experience that good work attracts more trade than a "palace." I can point to more than one studio where the proprietor indulged in a "palace of art," but his work was so inferior as to prevent him from getting the share of trade that one would think that his palace would attract for him; while in the same city I have seen the humble occupant of a place with more stairs to climb as busy as he could possibly be, with a good force of hands from morning to night, and making and saving money.

There is an old adage that "every dog has his day." Had photography been invented when that adage was written, doubtless its author would have substituted the word *photographer* for that of the other animal. For in scanning the history of photographers for a few years back, it can be truly said that very many of our older ones have had their day in the sense which the coiner of our adage meant, or, in other words, they have had prosperous days, and, neglecting their opportunities, have become neglected and forgotten.

The moral of all this is meant to be that photographers should not be anxious to become possessed of extravagant establishments. It is better to lay by a sufficient sum to enable you to bear any loss that may occur from such an indulgence without hampering your business. No extravagance should be indulged in when it would in one's business or take him from it. Those who attended our convention in Cleveland, in 1870, probably remember, as they stood on the back platform of the car chatting with Dr. Vogel, while they passed through certain portions of Ohio, a long series of oil derricks and over-turned machinery which lined some portions of the road, and how a certain individual compared the disappointment which must have followed the ruin here to that which many photographers at that time were feeling because of the extravagance in the line in which I have indicated.

I trust a word to the wise will be sufficient, and that our rising generation, who are becoming famous, and who even now have their eyes open, will not build up some other person's "palace," but will have a care first to build themselves a lasting reputation, and have a good round sum of money before they go too far.

* *Photographic Times.*

By-the-Bye.

LANDSCAPES AND PORTRAITS.

A photograph must be either a landscape or a portrait. So, at least, most people were wont to think, even if the majority are not of the opinion still. Medals were given for landscapes, and medals were given for portraits, and photographers were usually classed as pre-eminent in the one branch or the other. Some ten or twelve years back, it is true, another term came into general vogue—worse luck to the photographer who aimed at making pictures—and *genre* prints began to be spoken of. *Genre* is an indefinite name at best, but it was thought sufficiently appropriate for work undertaken by photographers who could not make up their minds to produce a portrait pure and simple, or a photograph of land and water. The estimation at which a *genre* picture was held is easily gauged by looking at the prospectuses of bye-gone exhibitions held in London and elsewhere. If a dozen medals were set apart for portraits and landscapes, a single one was deemed sufficient for the new class of picture; or, if gold and silver medals were proclaimed as the awards in the recognised branches of photography, the *genre* pictures were set down to divide a bronze medal between them.

We do not know if those who introduced the word *genre* photograph attached any specific meaning to it, or whether, as is indeed most likely, it was simply borrowed from the painter's vocabulary. It is a little difficult to define what a *genre* painting is, for authorities are divided on the subject. Thus while one author tells us that "genre" is applied to "various branches of painting except history and landscape," another says that *tableaux de genre* are paintings of interiors, and adds gratuitously that they are called so *d'une manière fort impropre*. Again, a third definition is, that a *genre* picture is one that tells a story. Still, all agree in this, that a *genre* picture is a picture, and not a mere representation of a bare fact or phenomenon.

Therefore, if we have adopted the word from painters, a *genre* photograph means a pictorial photograph, and instead of being at the bottom, it should be at the top, of the departments of photography. This is a home-truth that photographers will be bound to recognise sooner or later; and, indeed, in the case of the Photographic Society, the matter is, we are glad to see, half-recognised already. We mean that, instead of separating the pictures in the Exhibition into classes, they leave it to a jury to award medals as they please to the most deserving exhibits. In other words, in an art exhibition, only one standard is employed, namely, that of art. Whether the pictures exhibited year after year on the walls of the Pall Mall Exhibition have much or little to recommend them in the way of artistic treatment, it is only according to the standard of art that they can be judged; and even those critics who deny that any photograph can possess even a modicum of artistic feeling can at any rate say which pictures are least offensive to good taste, and award the palm to these.

In speaking thus, we are, of course, only alluding to the general pictures in an exhibition, and not to those having special qualifications to recommend them, and whose appraisement comes under the notice of another class of judges. We speak of photographs as pictures, and we say that in future exhibitions it were well indeed if the words portrait, landscape, and *genre*, are altogether ignored. Very soon after photographic exhibitions were established a notice was issued that carte-de-visite portraits were not desirable, and that, if forwarded, only a limited number would be admitted. It would be wise if the same rule applied to cabinet portraits as well; for exhibitions, although established for the benefit of photographers generally, must have some limits imposed, else the collection would speedily degenerate into a number of ordinary show-cases. In the ordinary every-day work of the photographer one is less interested than in his endeavours to progress as an art-student or as a pioneer in art photography.

To show sterling work is the object of an exhibition, and whether this is in the form of a simple landscape, or portrait, or study, or interior, so long as it has pictorial merit, it is welcome; and a man who achieves a photograph of merit, and forwards it for exhibition, it should be remembered, not only increases his own reputation, but the repute also of photography in general.

We need not dwell upon the fact that photographs which were neither pure landscapes nor pure portraits have been much neglected in our exhibitions. Everybody is perfectly aware of the fact. They have not been admitted to the same advantages as portraits and landscapes. We do not mean that the latter have been overrated, or that they have not the art-qualities the so-called *genre* photographs possess; on the contrary, there have been, as a rule, more art feeling and good taste displayed in in these branches than in many *genre* prints, for the simple reason that in creating a pictorial photograph, most photographers fail. What we ask is that all shall compete on the same platform. If this is not done, we foresee the approach of much controversy and endless wrangling. Who shall decide that a photograph belongs to this class or that class? The bust of a lady is decidedly a portrait, and a group of trees upon a sloping lawn is decidedly a landscape; but let the lady be reading a letter, or the landscape have a figure gathering sticks in the foreground, and what are the pictures then? Some judges would say that the portrait is still a portrait, notwithstanding the letter, and the landscape has not altered its character. But what if we give the pictures a title, calling the first "Is it True?" after Rejlander's admirable study, and the second "Harvest for the Winter;" do we change them into *genre* pictures in that case? Only the other day we had an illustration of the difficulty. Mr. Pettit's picture, which secured one of the awards at the Edinburgh Exhibition, is stated to be the only landscape that secured a medal. This is nonsense. Mr. H. P. Robinson, of Tunbridge Wells, had the gold medal awarded to him for a picture which was as much a landscape as anything by Turner, Wilson, Linnell, Calcott, or any other distinguished landscape painter.

Some photographers are content with landscapes pure and simple, while others think that life and animation are imparted by one or more suitable figures. But in any circumstances the introduction of figures should not be regarded as a cause for relegating the productions to an inferior class; yet this is what has been done time after time in our past exhibitions. The hanging committee, or the jurors, have taken upon themselves to say which is a *genre* picture, and which is not, and these productions have been arbitrarily put on one side and thrown out of competition, although representing the application of consummate taste and rare skill, and just in that direction, too, in which efforts are most praiseworthy. To take an example, we may put forward, with little fear of contradiction, all Rejlander's studies as belonging to no other class but that of so-called *genre* photographs. There was a story in every one of Rejlander's pictures. "Homeless," a ragged beggar-boy asleep on a London doorstep; "Did She?" where a laughing face listens to a humorous story; "Grief," "Despair," "Resignation," and other female studies, would but be regarded as *genre* photographs according to present regulations, and entitled to compete only in a class where the prizes are fewer and of less value than those accorded for pure landscapes and portraits.

We have already pointed out the folly of giving medals for portraits as portraits, since a judge cannot form a true opinion on the subject unless he has the models themselves before him; whereas, if he regards the photographs as studies, then all competitors are on the same footing. We hope that the day is not far distant when neither "portrait" nor "*genre*" photographs find a place in the prospectus of an exhibition, and that, whatever the nature of the photograph, it be judged by its pictorial value. There would be no harm in dividing pictures into interiors and exteriors; but, as a rule, the less attempts at division, the more likely is a spirit of fairness and good faith to prevail.

PHOTO-LITHOGRAPHY AND PHOTO-ZINCOGRAPHY.

BY MAJOR J. WATERHOUSE, B.S.C.,
Assistant Surveyor-General of India.

CHAPTER IV.—REVERSED NEGATIVES—*continued.*

BEFORE stripping the film, it should be placed in a damp place for an hour or so, to prevent the breaking up of the film. When the negatives are to be stripped, the plates must not have a substratum, nor should they be varnished. The film negatives should be kept perfectly flat between sheets of paper when not in use. Old varnished negatives may sometimes be stripped successfully by the above methods after removal of the varnish with a suitable solvent; but as there will always be a risk of destroying the negative, it is better to employ one of the multiplying processes to be described further on.

When the image is to be printed directly on to a metal plate or lithographic stone, materials which, even with every care, often have hollows in their surface, which render it difficult to obtain sharp results with glass negatives, it is a good plan to transfer the negative film at once on to the sensitive coating, whether bitumen or bichromated gelatine. By this means the most perfect sharpness is secured; but, as a rule, the negative will only serve once, and, in case of failure, must be taken again.

For zinc or copper plates coated with bitumen, the following method, used at the State Printing Office, Berlin, will be found useful.

The negative is first treated with a bath composed of—

Sulphuric acid	1 part
Glacial acetic acid	1 ,,
Water	320 parts

It is left in this for a short time till loosened, and is then washed with water. The film is then lifted off the glass in a dish of water, and laid down reversed on another glass plate. In order to give intensity, the film is blackened with a solution of bichloride of platinum. The plate is immersed in a bath containing one part of a solution of—

Bichloride of platinum	1 part
Distilled water	128 parts

to thirty-two parts of distilled water. When sufficiently blackened, it is carefully lifted out, rinsed with water, and laid in a large dish containing a mixture of—

Glycerine	1 part
Water	4 parts

The coated zinc or copper plate is also placed in the glycerine solution, and the loose film is carefully drawn on to it, and fastened to one end with a narrow strip of lead. The film is smoothed out till free from wrinkles, and air-bubbles are removed with the aid of a brush. The plate is then lifted out obliquely, so that the solution may drain away. If the film does not lie firmly enough, its edges must be fastened with strips of gummed paper.

Film negatives may be laid down on bichromated gelatine by first waxing the gelatine surface with a solution of wax in benzole, and then transferring the film negative to it in a bath of spirit of wine, and squeegeeing it down in the usual way.

Gelatino-bromide negative films may, according to Chardon, be stripped if the precaution be taken, before coating with emulsion, to rub the glasses with powdered French chalk, and coat them with plain collodion, which is allowed to dry. After the negative is finished and dried, it is coated again with collodion, and when this is dry, the compound film may be easily removed from the glass.

III. *Reversed Negatives by Contact Printing.*—It often happens that a reversed negative is required when only a direct image is available. In such cases one of the best and simplest methods that can be employed for obtaining a reversed negative from the direct one is that known as the "dusting" or "powder" process, in which a glass plate is coated with a hygroscopic mixture of gum, sugar, and bichromate dissolved in water, thoroughly dried with heat, and then exposed to light under the negative to be reversed. After removal from the printing-frame, the gumming film is dusted over with very fine plumbago, which adheres to it in inverse proportion to the action of light; *i.e.*, the parts rendered insoluble and unhygroscopic by the action of light refuse the powder in proportion to the intensity of the action of the light, while the protected and more or less hygroscopic parts, attracting moisture from the air, and so becoming tacky, take the powder readily, and thus an exact transcript of the original negative is produced, but reversed.

A great many formulæ for the gummy mixture have been published, but I have succeeded well with the following, slightly modified from one given by Geymet in his "Photo-lithographie."

Gum-arabic	50 parts
Glucose	100 ,,
Sugar	20 ,,
Saturated solution of bichromate of potash	125 ,,
Saturated solution of bichromate of ammonia	125 ,,
Water	1,000 ,,

carefully filtered.

The glass plate having been cleaned with care, so that no greasiness may remain on, the surface receives a thin and even coating of this solution, poured on like collodion. It is then dried over a spirit lamp or hot plate, if of large size, and exposed at once under the negative to be copied. It is next taken into the dark room and brushed over with fine plumbago till the image appears of the proper strength. The development of the image may be helped, if necessary, by breathing on the plate or laying it in a slightly damp place to absorb moisture from the air.

After development the plate should be left for a few hours, so that the plumbago may become thoroughly attached to the film, and is then exposed to light from the back to harden the whole coating. It is finally soaked with water to remove the bichromate, dried, and varnished.

Reversed negatives may also be obtained by contact printing on a dry collodio-bromide plate. After exposure to light in the printing frame, the plate is developed, as usual, with alkaline pyrogallic, the development being pushed till deposited silver is apparent in the deepest shades at the back of the plate. After development the plate is washed with water, and a mixture of equal parts of nitric acid and water is poured over it. This dissolves the reduced silver in the exposed parts of the film, leaving a negative image formed of silver bromide in the unexposed parts. The plate is then well washed with water, followed by a very dilute solution of ammonia to neutralize any acid remaining. After another thorough washing, the plate is again exposed to light, and developed, as before, with the alkaline developer, which produces a negative image. If too weak, the image may be intensified in the same way as an ordinary wet collodion negative.

Mr. Bolas has published (PHOTOGRAPHIC NEWS, vol. xxiv., p. 304) a method of obtaining reversed negatives by contact printing applicable to gelatino-bromide dry plates, and results I have seen by it are exceedingly good.

A gelatino-bromide plate is soaked for a few minutes in a four per cent. solution of bichromate of potash, and after this it is rinsed for a few seconds in a bath composed of equal volumes of alcohol and water. On removal from this it is laid down on its back, and the moisture blotted off with clean blotting-paper, the paper being pressed gently into contact with the plate by means of a cloth.

The paper is removed, and the plate is dried in a warmish place. When dry, the plate is exposed to light under the negative to be reproduced, giving the same exposure as one would give a carbon print in the same light. After exposure, a delicate positive impression is visible on the exposed surface. The plate is first soaked in several changes of cold water in order to remove the excess of bichromate of potash; and when this is done, the plate is developed with any suitable developer, preferably with pyrogallic acid and ammonia.

Under the action of the developer, the nature of the picture rapidly changes, the light parts becoming dark and opaque, while the parts already tinted by the action of light either become actually clearer, or appear to be so by contrast. The positive, having been converted into a sufficiently dense negative, is rinsed with water, and fixed with hyposulphite in the usual manner.

Captain Biny, of the French Engineers, has published a somewhat similar method (Photographic News, vol. xxvi., page 79).

A gelatino-bromide plate is immersed for ten minutes in a four per cent. solution of bichromate of potash, and allowed to dry. When quite dry, it is exposed in a pressure frame below the negative to be reproduced. The plate is then taken into the dark-room, and immersed in water to remove the bichromate. It is next rinsed in two waters, and then, being placed on the black ground of the bath, it is exposed to diffused light for a few seconds. The plate is then developed with the ordinary ferrous oxalate developer, when the image will become visible either as a negative or a positive, according as the original from which the copy has been taken is one or the other. It is then fixed in the usual way. In order to prevent stripping of the film, it is a good precaution to expose the back of the film to the light, either before exposing it in the printing frame, or afterwards.

4. *Reversed Negatives in the Copying Camera.*—When the reversed negative is required to be either larger or smaller than the original one, the most convenient method of producing it is by first obtaining a transparency, either in the camera or by contact printing on dry plates, or on the special carbon tissue prepared by the Autotype Company for this purpose; and this transparency is copied in the camera to the required scale. The details of various methods of making transparencies are given in Captain Abney's "Instruction in Photography."*

5. *Factitious Negatives.*—When circumstances permit, very fine results may be obtained by the use of what may be called factitious or artificial negatives, in which the drawing is etched or engraved in by hand with a point or graver on an opaque film. The drawing being made direct, the negative will be reversed, and suitable for contact printing; but if the negative is required for transfer printing, the drawing must be reversed as it would be if drawn direct on stone or engraved on copper.

Several methods of obtaining these factitious negatives have been proposed. A very good one, which I used many years ago, is to coat a glass plate of the required size with ordinary iodized collodion, sensitize it as usual, then expose it for a moment to light, and develop till the film is perfectly opaque; wash, dry, and varnish. If suitable collodion and varnish are used, the film will cut very cleanly, and the greyish colour of the developed film is quite clear enough to enable the progress of the drawing to be seen if the plate is laid over a piece of black paper or cloth.

Rodriguez coats a well-cleaned glass plate with an 8 or 10 per cent. solution of gelatine, to which sufficient carbonate of lead has been added to form a sort of paste. The coating is applied with a brush, so as to form an even, thin, and uniform coating, without showing transparent places. The plate is then dried in the open air, or with gentle heat.

* Piper and Carter, 5, Castle Street, Holborn, London, E.C.

To draw on the plate, it is laid on a piece of black paper, and the drawing, having been (if necessary) traced on the coating in the usual way with black or red paper, is cut in with points or gravers. Corrections may be made, if required, with a brush and a little of the preparation.

When the drawing is done, the dust is brushed away, and the plate treated with a watery solution of hydro-sulphuric acid, which turns the white carbonate of lead to an intense black. The plate is then dried, and varnished. Mr. Toovey's method, by which I have seen some very admirable results—more like delicate *aquafortis* work than photo-lithography—is given by Mr. L. Hart as follows. Take—

White wax	80 grains
Litho varnish	3 drachms
Benzole	3½ ounces

Dissolve the wax in the benzole, and add the varnish; clean some glasses of the required size, and spread a very little of the solution on a lithographic printer's inking slab. Now with a lithographic roller lay on the glass a very thin coating of this varnish; while still wet, shake over it powdered orange chrome through a very fine sieve, and, when covered, dust it about on the plate with a dusting brush softly and with a circular motion; let it dry, and then flow over it the following:—

Turpentine	3½ ounces
Litho varnish	1½ drachms

When this is evaporated, dust over in the same manner with the white colour known as *blanc d'argent*, place the plate to dry, and it is then ready to be etched or engraved.

In the Administration of the French *Ponts et Chaussées* at Paris, an ingenious method of transforming a drawing on paper into a photographic negative is used. A tracing or drawing is made in lithographic ink on tracing-paper, taking care to have plenty of ink on the lines, and not to cut the paper. The drawing is then laid on a board over a piece of blotting-paper, and brushed all over with a strong solution of aniline brown in water, and, when dry, is rubbed over with a tuft of cotton soaked in turpentine, which removes the ink, without altering the coloured ground. The lines then appear clear on a dark reddish-brown ground. The negatives thus obtained are good, but more suited for coarse than fine work.

Positive Clichés.—In some processes of photo-lithography and photo-zincography a positive cliché is necessary. This may be obtained by any of the methods used for making transparencies, but the plate will probably require extra intensification to obtain lines sufficiently dense.

M. Rodriguez, of Lisbon, exhibited at the Paris exhibition of 1878 some very good positive clichés obtained by rubbing over a piece of finely-ground glass with powdered sandarac, and then drawing on it with a fine pen and Indian ink mixed with a little sugar and glycerine, in order to prevent the ink drying completely and leaving it tacky. The drawing is then dusted over with very fine plumbago, which darkens the lines, and makes them quite opaque. The plate is then varnished.

In the photographic ateliers of the Topographical Brigade of Engineers, at the Hotel des Invalides, in Paris, drawings on tracing-paper are largely employed as clichés for use with the Commandant de la Noë's process of *topogravure*, in which the sensitive surface is bitumen on a plate of zinc, as will be described hereafter. The drawings are made on fine, thin, white tracing-paper, with very black Indian ink, and the names, stamped in printing ink, are dusted over with bronze powder to make them more opaque. I have seen exceedingly clean nice work produced from these tracings.

A good deal of information on the subject of reversing and mulitiplying negatives and positives will be found in Vidal's *Phototypie*, and Husnik's *Gesammtgebiet des Lichtdrucks*, as well as in the pages of the English photographic journals.

(*To be continued.*)

Notes.

Professor Tyndall's Christmas Course of Lectures at the Royal Institution will be on "Light and the Eye."

Mr. Edwin A. Cade, of 8, Osborne Terrace, Clapham Road, is acting as secretary to the Provisional Committee of the Photographers' Copyright Defence Association.

We are happy to announce that Professor Alexander Herschel, M.A., a name long honoured by photographers, has promised a paper for the YEAR-BOOK, "On the Relations of Radiation to Material Structure." Mr. H. P. Robinson, Dr. Eder, Professor Donkin, M.A., and Mr. Whipple, B.Sc., the Director of Kew Observatory, will also contribute to its pages.

Professor Alexander Herschel sends us a tiny photograph of a tuft of primroses growing on the banks of the Derwent. The pale flowrets coyly nestling among the spear-headed grass, their delicate petals in contrast to the thick, strong leaves around, make up a charming little picture; but the worthy professor of physics at the Newcastle College of Science nevertheless protests vehemently against the favouritism and unfairness of photography in its representation of the dainty spring flowers. "The picture," he says, "is a crying example of the whims of silver salts ordinarily prepared, in picking and selecting their favourite colours for impression only. So, because the eye of a primrose is a little fairer than its canary-coloured lips, photography rejects it, and prints it a black centre in the poor thing's corolla. What would an orange tree with ripe fruit look like in a photograph, I wonder?"

Lieutenant von Reisinger, in the *Correspondenz*, expresses himself well satisfied with emulsion made on the Obernetter principle. His method, in brief, is to take three grammes of gelatine, 80 cub. cents. of water, and three drops of saturated alum solution. To this he adds, in daylight, five grammes of silver nitrate dissolved in 20 cub. cents. of water. After the mixture has set in a shallow vessel, it is put, finely shredded, in a beaker in the dark room, and covered with a pretty strong solution of bromide of potassium. After standing the night, the liquor is poured off, the shreds washed in five changes of water, and finally dissolved for application to the glass, adding a little more alum. There was proof of silver having separated during the period of bromizing, but Herr von Reisinger speaks very highly of the resulting emulsion and the simplicity of the process.

Touching our recent "By-the-Bye" on rapid exposures, Major Waterhouse thinks that an entirely new departure in the construction of apparatus is required in order to make the most of the advantages offered by modern dry plates. The old cameras and dark slides did well enough for dry collodion plates when exposures were counted by the minutes, rather than seconds or fractions of a second; but now gelatine enables us to secure subjects that could never have been touched by dry collodion, some quicker means of replacing the focussing glass by the sensitive plate, and exposing at any moment, is much wanted. The Assistant Surveyor-General of India suggests that this might be done by an arrangement of mirrors as described, for instance, by Mr. Harmer, in the NEWS in 1879, or by using duplicate lenses.

Major Waterhouse continues:—"A repeating arrangement for successive exposures is also a requirement. One knows, of course, that these things have been made, but you want to find them at the dealers and apparatus manufacturers. Your advertising columns show that the attention of the latter is being directed to the special wants of dry-plate photographers; and no doubt, before long, many improved forms of apparatus will be in the market. Something on the principle of Janssen's slide or *revolver*, employed at the transit of Venus in 1874, might possibly answer; in this, the sensitive plate revolves past an opening protected on both sides, when focussing, by ruby glass."

Among the salvage from the *Gulf of Finland*, recently stranded in the Red Sea, we hear of a quantity of dry plates, one maker alone being represented to the extent of £150. Considering the remarkable de-sensitising power even of traces of common salt, and its property of slowly but surely permeating porous substances, we would imagine this salvage to be of but little value. Salt water perforates the ordinary zinc lining of a packing-case in a few hours.

Again we have in the Brussels mystery a very telling illustration of photography assisting justice; in fact, the detection of the assassin was due to the camera alone. After shooting Bernays, the mysterious Mr. Vaughan decamped, leaving behind him a mass of letters and documents signed by this name. Who could Vaughan be? asked the detectives; for the fugitive had scattered about so many scraps of writing with this signature, that they felt sure the name was assumed. So they photographed the handwriting and distributed copies among the tradespeople of the principal towns in Belgium. The plan succeeded. A Verviers shopkeeper fancied that the handwriting was that of one Léon Peltzer, with whom he had business correspondence, and so communicated with the police. This proved the first link in the chain that has since fettered the brothers Peltzer.

A new photo-electric battery has been constructed by M. Saur. It consists of a square earthenware vessel containing a solution of 15 parts sea salt, 7 parts sulphate of copper, and 100 parts water. A porous pot containing mercury is put into this solution. One of the electrodes, of platinum, is plunged into the mercury; the other, consisting of sulphide of silver, is dipped into the solution of salt. The battery is placed in a box screened from the light. By putting a galvanometer in circuit, the effect of light on the battery is at once detected, a cloud passing over the sun immediately influencing the current. The theory of the battery is explained by the action of the mercury upon the bichloride of copper formed by the mixture of the sea salt and sulphate. The proto-chloride of copper reduces the sulphide of silver, but this reduction requires the intervention of sunlight, which determines the photo-electric current.

At the last meeting of the French Academy of Sciences a good deal of interest was shown in some photographs taken by M. Ferrand, a Lyons chemist, of ink spots which had been purposely made to cover up certain writings. M. Ferrand demonstrated how photography could produce a picture of characters thus hidden from the eye, his prints showing the ink spots and the writing beneath as well. The fact is explained by the different photographic properties of the two inks, which are superposed. When, however, the ink blot proves too much for the camera—as is sometimes the case—M. Ferrand recommends the cautious treatment with some reagent which acts unequally on the two inks, thus bringing about the desired contrast, and then photography may be brought into play to some purpose.

Photographers, and amateurs espceially, are warned against lens forgeries, which seem to be very rife just now. Within the space of a week no less than four cases have been detected by a well-known firm under whose attention the instruments came. They were marked with the name of Dallmeyer, but on that gentleman being consulted, he found all were spurious. One was a very impudent case; it was a lens marked "No. 3, W. A. Landscape"; and the focus, which should have been no more than ten inches, was found to be upwards of twenty-six.

The forgeries have, indeed, been so frequent and barefaced, that Mr. Dallmeyer has taken steps to trace their origin, and hopes in this way to bring the matter to a speedy issue. But we may inform our readers that he is always happy to examine any doubtful lenses that may be brought bearing his name, since it is a matter of more importance to him than to the intending purchaser that no spurious lenses be in existence. No doubt Messrs. Ross and Co. and other opticians of standing would, in like manner, afford their valuable advice if called upon.

Next Wednesday, if all goes well, we shall be favoured with a sight of the transit of the planet Venus across the disc of the sun. The phenomenon is only partially visible in this country; but still it will be well worth the while of any photographer having a long-focus lens to get a record of the phenomenon. He will never have the chance again, for when the next transit occurs—four-score years hence—there will be few of us living. The first external contact of the tiny black planet will be at 1 hr. 55 m. 57 sec., p.m.; but as the sun sets at ten minutes to four, our observation of the interesting object will be but brief. As some sort of guide of the size of the sun in the camera, we may mention that a lens of twenty-six inches focus, such as many photographers possess, will produce a disc measuring about five-sixteenths of a inch; but a sharp image of this size could, of course, be enlarged many diameters.

Gatschina has lately become known as the only refuge in which the Emperor of Russia trusts himself. Recently, alterations of an extensive nature have been carried on at the palace, and, according to the *Archiv*, photography is largely employed as a safeguard against treason and treachery. Every workman must, prior to his engagement, be photographed under the auspices of his employers, and even the women engaged in upholstery work are required to submit their portraits before entering the precincts. The photographs are not only carefully recorded in the police office, but copies are distributed among the caretakers, so that they may know if any strange face meets them.

A few weeks ago we gave the particulars and expense of fitting up a pair of 5-candle Swan lamps for the show-case, and, as a consequence, we have been asked for an estimation of the cost of lighting a whole shop-front and shop with incandescent lamps. This is another thing altogether, for a number of powerful lamps of 20 or 25-candle power would be necessary; and to set these in action a dynamo machine and small gas engine are required. Still, the expense would not be very great; thus, for a series of ten such lamps, the cost of gas and dynamo engines. with installation complete, the charge is £170, Messrs. Calder and Co., of the Westminster Bridge Road, who gives the estimate, undertaking to set up the arrangements anywhere within eighty miles of London. Three-halfpence per hour is the estimated cost of working the engine by gas or oil.

Most people know that there is a good deal of profit made upon Christmas cards, and that the selling price bears little relation to the sum paid to the original producer. But there is reason in all things, and we cannot but think that to charge eighteenpence for a picture that the photographer sells for twopence halfpenny, has very little logic in it. We do not say that the soft little landscape on its tinted card, with neat border and gold lettering, is not worth what is asked for it, but it is possible the sale would be quicker if the commercial community were satisfied with less profit.

Patent Intelligence.

Patent Void through Non-payment of Duties.

4607. Joseph Wilson Swan, of Newcastle-upon-Tyne, for an invention of "Improvements in apparatus for coating glass and other surfaces with gelatinous or viscous photographic compounds."—Dated 12th November, 1879.

Patents Granted in France.

148,516. Barrault, of Nemours, for "A screen for photographic operations."—Dated 17th April, 1882. Class 17.

148,652. Plener, for "A photographic emulsion."—Dated 28th April, 1882. Class 17.

148,660. Rouaix, of Paris, for "A photographic apparatus for superseding the camera obscura."—Dated 29th April, 1882. Class 17.

Certificate of Addition.

147,376. Lacroix, for "Photographic paper for obtaining proofs in dark lines on white ground."—Dated 27th April, 1882. Class 17.

Patents Granted in America.

267,095. Charles H. Mann, of Philadelphia, Pa., for "A drop shutter for instantaneons photography."—Application filed 28th July, 1882. No model.

267,227. WILLIAM KURTZ, of New York, for "A method of and apparatus for producing photographic images."—Application filed 6th June, 1882. No model.

TWELVE ELEMENTARY LESSONS IN PHOTOGRAPHIC CHEMISTRY.

No. XI.—ESTIMATION OF HYPOSULPHITE OF SODA, OXALIC ACID, OXALATE OF POTASH, AND CHLORIDE OF GOLD.

HYPOSULPHITE of soda is frequently contaminated with sulphate of sodium and other salts, which are quite incapable of acting as fixing agents; it is therefore very important that the photographer should know how to estimate the amount of hyposulphite—or thiosulphate, as it now termed—contained in the commercial salt.

A standard solution of iodine and a solution of starch is required. To prepare re-sublimed iodine for the first-named solution, place in a small evaporating-basin about 15 grms. of pure iodine and 3 grms. of potassium iodide, cover the vessel with a rather larger basin full of cold water, and heat the lower basin gently over a sand-bath, when the iodine will vaporise and condense in grey crystals on the outside of the upper basin. The crystals should be occasionally scraped off with a glass rod, and preserved in a stoppered bottle, the water in the upper basin being changed at the same time.

Weigh out exactly 12·7 grms. of the above re-sublimed iodine, about 18 grms. of pure white potassium iodide, and dissolve in exactly a litre of water in the usual way. The solution must be kept in small bottles filled up to the neck, and always in a dark place, otherwise it soon loses its strength. The bottles should be labelled thus:—

Standard Solution.—Iodine.

1 c.c. = ·0127 grm. iodine.
,, = ·0248 ,, hyposulphite of soda.

The starch solution is made by pouring about 50 c.c. of boiling water on to about 5 grms. of pure white starch made into a paste with a little water. If 10 c.c. of alcohol be added to the solution, it will keep for about a month. In order to perform an estimation, weigh out exactly ·496 grm. of the sample of hyposulphite of soda, dissolve it in a small flask in about 200 c.c. of water, and add a few drops of the starch solution. Fill a burette with the standard solution of iodine, and allow the solution to slowly run into the flask containing the hyposulphite and starch, till a permanent blue colour is produced, showing that all the hyposulphite has been decomposed by the iodine, and the slight excess colours the starch blue.

To calculate the result, multiply the amount of hyposulphite (which is equivalent to 1 c.c. of the iodine solution) by the number of c.c. run out of the burette; the product is the amount of pure hyposulphite contained in ·496 grm. of the salt tested. Thus, supposing 19·5 c.c. of iodine solution was run out of the burette, ·0248 multiplied by 19·5 equals ·4836, the amount contained in ·496 grm. of the sample, which is equivalent to 97·6 per cent.

For estimating gold chloride, oxalic acid, and oxalate of potash, a standard solution both of oxalic acid and potassium permanganate is required.

For the first solution, pure re-crystallized oxalic acid must be prepared, and thoroughly dried in several pieces of bibulous paper, taking care to use the acid as soon as possible, otherwise it will slowly effloresce. Weigh out exactly 63 grms. of the pure acid, and dissolve it in the usual way in a litre of water. The solution will keep well and should be labelled thus:—

Standard Solution.—Oxalic Acid.

1 c.c. = ·063 grm. oxalic acid.
,, = ·092 ,, neut. potassium oxalate
,, = ·0316 ,, potassium permanganate.
,, = ·101 ,, gold chloride.

To prepare the second standard solution, weigh out exactly 31·6 grm. of pure potassium permanganate, and dissolve it in the usual way in a litre of distilled water. If the salt be perfectly pure, 10 c.c. of the solution should be exactly equal to 10 c.c. of the standard solution of oxalic acid; but as the solution is very liable to be somewhat weaker from the presence of impurities in the permanganate of potassium, it is necessary to standardise the solution before using it. Fill a burette with the permanganate solution, place exactly 10 c.c. of standard oxalic acid in a flask with 2 or 3 c.c. of dilute sulphuric acid (1 : 4) and about 500 c.c. of distilled water. Warm the contents of the flask to about 140° F. (60° C.), and run the permanganate from the burette into the flask, till a permanent pink colour is produced in the solution, even when heated till nearly boiling. If exactly 10 c.c. is required, the solution should be labelled—

Standard Solution.—Potassium Permanganate.

1 c.c. = ·0316 gram potassium permanganate
,, = ·092 ,, neutral potassium oxalate
,, = ·063 ,, oxalic acid

If more than 10 c.c. of permanganate solution be required, in standardising, the above numbers must be multiplied by 10, and the product divided by the number of c.c. of permanganate required to produce the pink colour. Thus, supposing 10·1 c.c. were used in the above experiment, in order to calculate the amount of potassium permanganate really contained in the solution, we first note that in the above label 1 c.c. = 0316, therefore ·0316 multiplied by 10 equals ·00316, and ·00316 divided by 10·1 equals ·031179, the exact amount of permanganate contained in 1 c.c.

In order to analyse commercial samples of oxalic acid, weigh out 1·26 grm. of the substance, dissolve it in about 300 c.c. of water with 2 c.c. of dilute sulphuric acid, and heat to about 140° F. Run the above permanganate standard solution in the usual way out of a burette into the solution till a permanent pink colour is produced.

To calculate the result, multiply the amount of oxalic acid which is equal to 1 c.c. of permanganate, by the number of c.c. run out of the burette; the quotient is the amount of pure oxalic acid contained in the weight of the substance originally taken. Thus, for example, 1·26 grms. of commercial oxalic acid was used, and 19·5 c.c. of permanganate (same strength as the above label) was run out of the burette; therefore 19·5 multiplied by ·063 equals 1·2285 grms, the amount contained in 1·26, or 97·6 per cent. To analyse oxalate of potassium by this process, dissolve 1·84 grms. in 300 c.c. of water, add 5 c.c. of dilute sulphuric acid, and proceed as in the above method.

For example: 1·84 grms. was used, and 19·8 c.c. of standard solution of permanganate required to produce the pink colour, therefore 19·8 multiplied by ·092 (the amount of oxalate of potassium which is equivalent to 1 c.c. of the standard solution) equals 1·8216 grms., the weight of pure potassium oxalate contained in 1·84 grms. of the substance. If the sample shows an acid reaction, the percentage may, on analysis by the above process, appear to be over a hundred, from the presence of an excess of oxalic acid in the salt.

To analyze chloride of gold, weigh out 1·01 grm. of the sample, dissolve it in about 10 c.c. of water, add 15 c.c. of standard solution of oxalic acid, and add sufficient distilled water to make the volume up to exactly 300 c.c. Keep the solution in a warm place for about twenty-four hours, when the chloride of gold will be reduced to the metallic state, forming a deposit at the bottom of the vessel. When the reduction is completed, transfer 100 c.c. of the solution by a pipette to a flask containing about 300 c.c. of distilled water with 2 or 3 c.c. of dilute sulphuric acid, and run in from a burette standard solution of permanganate, as in the above process for estimating oxalic acid.

To calculate the result, multiply the number of c.c., run out of the burette by 3, and subtract the product from the number of c.c. of standard solution of oxalic acid, provided 1 c.c. of permanganate is exactly equal to 1 c.c. of the oxalic acid (otherwise, of course an allowance must be made for the difference); the remainder, when multiplied by ·101, equals the amount of pure gold chloride contained in 1·01 grm. of the sample.

NOTES ON PHOTOGRAPHY.

BY E. HOWARD FARMER.

LECTURE II.—THE EARLY HISTORY OF PHOTOGRAPHY AND THE DAGUERREOTYPE PROCESS.

A.D., 1556, the alchemists noticed that horn silver (fused silver chloride) blackened when exposed to the sun's rays.

1777, Scheele, the great Swedish chemist, discovered that silver chloride is very readily darkened by blue light, and very little, or not at all, by red light (origin of the employment of red glass in our dark-rooms). He also proved that when this darkening occurs, chlorine is liberated, and that the darkened salt acted upon by ammonia leaves a residue of metallic silver.

1801, Ritter extended Scheele's experiment. He found that silver chloride darkens in the space beyond the violet end of the spectrum, demonstrating the existence of rays which do not excite vision; these are now called the ultra-violet rays. Ritter also observed that the red (least refrangible) rays not only do not darken silver chloride, but that they actually whiten silver chloride that has been darkened in the blue (more refrangible) rays.

1802, Wedgwood, the great potter, and Sir Humphrey Davy, coated paper and leather with silver nitrate and chloride, and obtained profiles by the agency of light; they, however, could not fix the pictures thus produced.

1827, Niepcé came to England, and brought specimens of pictures taken in the camera. He discovered the property of light of rendering various resins insoluble.

1839, The Daguerreotype process was published. The same year Mr. Fox Talbot communicated his paper process to the Royal Society, and first produced negatives. Mungo Ponton also this year discovered that potassium bichromate, when on paper, alters in composition by exposure to light.

1840, the Rev. J. B. Reade accidentally observed the development of the latent image by gallic acid.

1841, Calotype process introduced by Fox Talbot (description postponed).

1843, Sir John Herschel first took pictures on glass, and recommended the use of hyposulphite of soda for fixing.

1851, Scott Archer and Dr. Diamond introduced the collodion process in a practical form.

The Daguerreotype Process.—A silvered copper plate is polished with tripoli and rouge and chamois leather buffs, until the surface is quite free from scratches, when it is exposed to the fumes of iodine for about three minutes, or until the surface presents a bright yellow colour; and then to bromine until it assumes a violet hue, when it is ready for exposure. After exposure no image is visible; but on placing the plate above mercury heated to about 150° F., it rapidly appears, the lights being represented by an amalgam of mercury and silver, and the shadows by silver. It is fixed by immersion in a 10 per cent. solution of hyposulphite. After washing, the image may be intensified by pouring on the plate mixed solutions (very dilute) of gold chloride and hyposulphite, and heating over a spirit lamp. The picture should be protected with a glass plate.

Theory of the Process.—The iodine (and bromine) attack the silver, forming a thin film of silver iodide (Ag I). On exposure to light this is reduced to sub-iodide—

$$2\ AgI = Ag_2I + I$$

The silver underneath the film acts as a sensitizer, combining with the iodine set free to form fresh iodide. On development the silver in the sub-iodide forms an amalgam with the mercury.

FRENCH CORRESPONDENCE.

OPERATORS' EXAMINATIONS—POITEVIN ON PHOTOGRAPHIC IMPRESSIONS—EXHIBITION OF DECORATIVE ARTS—TECHNICAL SCHOOL OF CHEMISTRY AND PHYSICS—M. BRETAGNE'S ENDLESS PELLICLES.

Examinations for Photographic Operators.—The Chambre Syndicale of Photography, at the last meeting on the 9th ult., fixed the date of the first session of examinations for operators for the second fortnight in March next. All applications should be addressed to M. Lévy, President of the Chambre Syndicale, 113, Boulevard de Sébastopol, Paris. Particulars of these examinations may be obtained of the Editor of the PHOTOGRAPHIC NEWS, in London, or M. Lévy, in Paris.

Second Edition of Poiteven's Work.—A second edition of the treatise on photographic impressions by Poitevin has just been issued from the house of Gauthier-Villars. This work is a complete abstract of the principal discoveries of this illustrious inventor. We have inserted appendices and notes rendering it very different to the former edition. Collectors of works relating to our art will not fail to provide themselves with this treatise, the historical and technical importance of which will not escape them. It is indispensable to all photographic libraries.

Closing of the Exhibition of Decorative Arts.—This Exhibition, the limit of which had been fixed for the 15th of November, has been prolonged to the 30th of the same month. The distribution of rewards has not taken place yet; we mentioned the names of the principal winners in our preceding letter.

Formation of a Technical School of Chemistry and Physics.—The Municipal Council of Paris has just founded a Technical School of Chemistry and Physics. The idea is excellent; but it seems to us that, if it is desirable to make it complete, there should be room in such a school for a special course relative to the industrial applications of light to the graphic arts. Photography receives aid from physics by the optical instruments employed; and from chemistry, by the processes and manipulations of which it makes use. The rôle played by photographic applications in the industrial arts is now considerable, since in France alone it amounts to the sum of thirty millions of francs. A course of this kind would naturally belong to the Conservatoire National des Arts et Métiers. It would, therefore, well fill its place in the municipal school in question. Without trespassing the boundaries of any other subjects, it would be, on the contrary, one of the special and immediately practical applications. We should be pleased to see this truly useful, but at present neglected, course of instruction organised at once.

M. Brétagne's Pellicles.—A Parisian photographer has just manufactured endless translucid pellicles—that is to say, of a length not exceeding six metres. These pellicles coated with gelatino-bromide constitute sensitive films perfectly suitable for panoramic reproductions. The panoramic apparatus destined for their use is in course of construction. The pellicle will unrol itself from one reel to roll round another while passing the focus of the lens, itself partaking of an equal circular movement, in such a manner as to reproduce by one continued movement circular panoramic views, and to print them afterwards in one piece, as the negative will be formed of one continuous band. Specimens of these pellicles which we possess show us that they are composed of gelatine allied to a substance capable of hardening it. LEON VIDAL.

CONCAVE GRATINGS FOR PHOTO-SPECTRUM WORK.

THE prism is fast falling into disuse as a means of producing a spectrum to be photographed, and, instead, the employment of gratings is becoming more general. The grating, so-called, consists of a number of finely-ruled parallel lines very close together, so that a beam of light striking them, becomes diffused. It has been the custom to produce these gratings on a plane surface, but photographs of the spectrum can be produced much more sharply and correctly, it seems, if the lines are ruled upon a concave surface. At the last meeting of the Physical Society, Professor Rowland, of Baltimore, exhibited a number of his new concave gratings for giving a diffraction spectrum. He explained the theory of their action. Gratings can be ruled on any surface if the lines are at a proper distance apart, and of the proper form. The best surface, however, is a cylindrical or spherical one. The gratings are solid slabs of polished speculum metal ruled with lines equidistant by a special machine of Professor Rowland's invention. The number of lines per inch varied in the specimens shown from 5,000 to 42,000, but higher numbers can be engraved by the cutting diamond. One great advantage of their use is that the relative wave-lengths can be measured by the micrometer with great accuracy. The author has designed an ingenious mechanical arrangement for keeping his photographic plates in focus, and by it pictures of great distinctness can be obtained. Professor Rowland exhibited some 10 inches long, which showed the E-line doubled, and the large B groups very clearly. Lines are divided by this method which have never been divided before; and the work of photographing takes a mere fraction of the time formerly required. A photographic plate sensitive throughout its length is got by means of a mixture of eocene, iodised collodion, and bromised collodion. Professor Rowland and Captain Abney, R.E., are at present engaged in preparing a new map of the whole spectrum with a focus of 18 feet.

In reply to Mr. Hilgar, F.R.A.S., Professor Rowland stated that if the metal is the true speculum metal used by Lord Rosse, it would stand the effects of climate, he thought; but if too much copper were put in, it might not. In reply to Mr. Warren de la Rue, he said that 42,000 per inch was the largest number of lines he had yet required to engrave on the metal.

Professor Guthrie read a letter from Captain Abney, pointing out that Professor Rowland's plates gave clearer spectra than any others; they were free from "ghosts" caused by periodicity in the ruling; and the speculum metal had no particular absorption.

Professor Dewar, F.R.S., observed that Professor Liveing and he had been engaged for three years past in preparing a map of the ultra-violet spectrum, which would soon be published. He considered the concave gratings to make a new departure in the subject, and they would have greatly facilitated the preparation of his map.

ANIMAL PHYSIOLOGY.

BY M. MAREY.*

An indispensable complement of the applications of photography to physiological researches is the authentic reproduction of images obtained, the easy printing of copies, and the possibility of interspersing them in the text of a book; these conditions have been realized in a very satisfactory manner by M. Petit, by means of a process which he calls *similigravure*. Two specimens of these prints will enable the reader to appreciate all the resources of applied photography to certain scientific demonstrations.

Fig. 1 shows the successive attitudes of a man walking at parade step, as it is called in our schools of military gymnastics.

MILITARY GYMNAST MARCHING AT PARADE STEP.

This figure is obtained by means of successive photographs on the same plate. I hasten to remark that the copy presents almost all the imperfections of the original negative. Thus, at the lower portion, the background is not of an intense black, and the attitudes of the legs and feet do not stand out well. This is due to defects in the screen in front of which the photographs were taken, its lowest part not realizing the condition of absolute black so well as above.

Across the fifth figure may be noticed a vertical white stripe; it is the trace of a post supporting the black screen. This post will disappear in the new arrangement I intend making with regard to the screen. My present apparatus does not yet permit of photographing the nude figure, the movements of gymnasts being difficult to seize under the folds of flowing garments.

However, such as it is, this print gives at the first glance a good deal of information. It shows that at each complete step the walker presents different attitudes; that the step was taken in three-fifths of a second, and that during the time the head made two vertical oscillations, the maxima corresponding to the centre of support of each of the feet, while the arm effects ample oscillations contrary in movement to the corresponding

Fig. 2.

leg. The successive phases of change of foot or leg may easily be followed, and in all these alterations one may estimate the real value of the displacement effected

* Read before the French Academy of Sciences.

between two consecutive images, in the space, say, of one-tenth of a second.

The second figure represents a white horse leaping over an obstacle. It was an old Syrian stallion, as a horseman would recognize from its aged form. The screen in this case has fewer imperfections than the other, but I hope in my future experiments to improve it still more.

LIGHT AND LIGHTING.

BY THOMAS H. KANE.*

The principles governing the illumination of the photographic model are matters of importance to the professional photographer, for without a proper knowledge of them it is impossible to work intelligently, or to solve the problems which are likely to occur in practice. Yet how few of us thoroughly understand these principles. Veterans who have grown grey in the service are equally as deficient in this respect as many of us of more recent date.

The valuable and instructive paper which Mr. Coonley read before the Association of Operative Photographers (see News, Nov. 3, p. 663), dealt principally with the quality of light There are other phases of this subject that will repay attention. In the illumination of the model, and the making of the negative in addition to the quality of light, it will be found necessary to give some attention to the volume or amount of light employed; its distribution on the subject; the direction from which it comes; the interior illumination of the studio; the relation of the sitter to both top and side-lights; the aspect of the sky; the manipulation of the light by curtains, screens, &c.

The aspect of the sky, the condition of the atmosphere, and the daily and yearly altitudes of the sun determine or modify the quality of the light, as was stated by Mr. Coonley. It sometimes occurs that light from a clear, unclouded, blue sky is less actinic than that from white or light-tinted clouds. A hazy, humid, or dingy atmosphere also affects the quality of light.

The angle at which the sun's rays meet the earth—in other words, the daily and yearly altitudes of the sun—must also receive attention in connection with the subject of actinism, for it involves the question of refraction, which, as is well known, implies a loss of actinic power, as is shown by the waning actinism of the solar rays during the autumn and winter. At these seasons the sun's rays enter our atmosphere at an acute angle and are refracted, giving the yellowish light which we have all observed; while during the spring and summer they fall on the earth at a greater angle, are less refracted, and possess greater actinic power, as we know.

The light is sometimes modified by other causes with which we are not acquainted. An illustration of this occurred about a year or so ago, when for a day or two the solar rays were of a pinkish tint. The phenomenon was very peculiar.

The quality and condition of the glass used for glazing the studio have a modifying action on the actinism of the light, as was explained by Mr. Coonley.

The amount of diffused or reflected light in the studio must be observed, as it plays an important though subordinate part. Where the sky and side-lights have been properly constructed, this point will not be of so much importance as it would be under an imperfectly-constructed skylight—as, for instance, a very high light. Unless the interior of such a room be sufficiently illuminated, the lighting of the model will, under certain conditions, be defective, especially in the shadows. An illustration of this is found in the difficulty experienced in photographing dark or dimly-lighted interiors.

The volume of light by which the model is illuminated is another point deserving of consideration. It is advisable to employ as much light as possible consistent with the attainment of the desired effect. In making this statement I do not wish to be understood as advising the use of a great flood of light from one or all directions. When the image on the ground glass appears flat, lacks roundness and softness, or does not show every detail, even to the minutest, it is probable that too great a volume of light is being used, or that some other detrimental agencies are at work. The part that a volume of light plays may be observed in a darkened room by admitting light through a door-way or window, with the door or sash opened to different widths. In a similar manner the same effect may be studied in the operating room by opening the top and side-light curtains to different widths.

* *Photographic Times.*

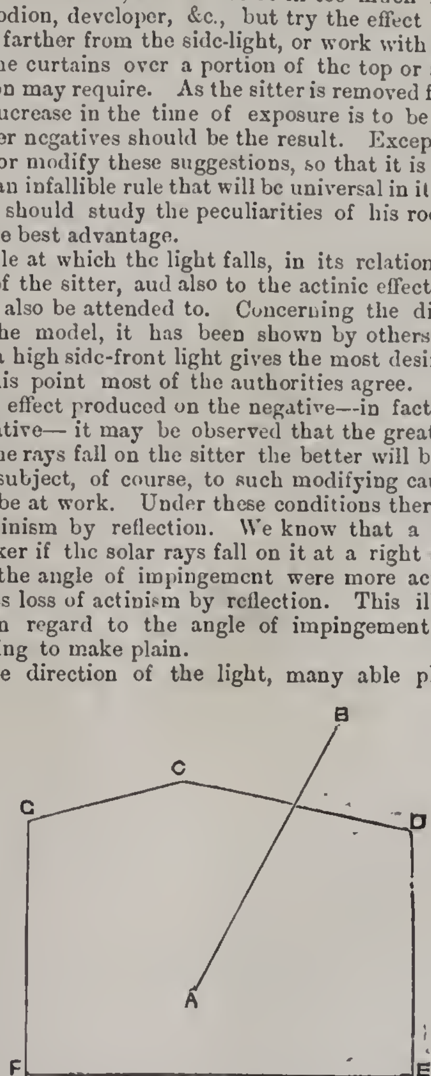
It seems desirable to sit the model in shade, not shadow, and then illuminate with either direct or diffused light as may be wished. The resulting effects of this mode of lighting are fine. A familiar illustration is found in the brilliancy of the stars at night, when the moon is not visible. In the increased light of the moon's beams this brilliancy is considerably diminished; in the blazing light of the sun this brilliancy disappears, and the stars themselves become invisible, while their contrast in twilight is not near so fine as in the deeper "shades of night." Some poet has noticed this, for he exclaims—

"How fair amid the shades of night
Appears the star's pale ray!
Before the sun's more dazzling light
It quickly fades away."

The relation of the model to the top and side-lights should also receive attention. Do not confine your sittings to a single spot unless there are good reasons for doing so. On the contrary, work all around the room as the occasion requires. In some studios a point from six to ten feet from the side-light affords a satisfactory distribution of light on the model, and the attainment of a proper actinic effect in the negative. If a negative has been properly timed, and the development proceeds too rapidly, and the fault be not with the chemicals, look for it in defective illumination, and do not be in too much haste to condemn collodion, developer, &c., but try the effect of removing the sitter farther from the side-light, or work with less light by drawing the curtains over a portion of the top or side-lights as the occasion may require. As the sitter is removed from the side-light an increase in the time of exposure is to be anticipated, while better negatives should be the result. Exceptional causes may alter or modify these suggestions, so that it is impossible to lay down an infallible rule that will be universal in its application. Each one should study the peculiarities of his room, and then work to the best advantage.

The angle at which the light falls, in its relation to the illumination of the sitter, and also to the actinic effect in the negative, must also be attended to. Concerning the distribution of light on the model, it has been shown by others that what is known as a high side-front light gives the most desirable results, and on this point most of the authorities agree. In regard to the actinic effect produced on the negative—in fact, the quality of the negative— it may be observed that the greater the angle at which the rays fall on the sitter the better will be the chemical effect, subject, of course, to such modifying causes, if any, that may be at work. Under these conditions there will be less loss of actinism by reflection. We know that a negative will print quicker if the solar rays fall on it at a right angle than it would if the angle of impingement were more acute, because there is less loss of actinism by reflection. This illustrates the principle in regard to the angle of impingement which I am endeavouring to make plain.

As to the direction of the light, many able photographers



C, D, E, F, G is a vertical section of a skylight room, of which C D is top light, D E side-light, E F floor, F G vertical wall. G C covered roof. A B is a plane besecting the top-light at a right angle, and A is the point referred to.

assert that a light from one general direction gives the best results. Hence it has been suggested in skylight construction to use a single sloping light, which would embody the properties of both top and side-lights. Without endorsing the single sloping light as the best form of skylight, but conceding its valuable features, the writer thinks that the principle enunciated concerning the direction of the light is correct, for it is not advisable to have a great volume of light from all directions falling on the sitter. If it be necessary to illuminate the model with light from more than one direction, the principal light must be stronger than the rest, and the others subordinate and subdued. Equally strong lights from various directions are likely to prove fatal to good work and correct illumination. Some operators curtain the upper half of the top-light, using the lower half and the side-light. Other equally able men, like Reutlinger, of Paris, curtain the upper half of top light and lower half of side-light, using the upper half of side and lower half of top-light for work.

One more point, and I will close. In every studio there are points where a maximum of actinic effect is attainable. Each one should endeavour to ascertain where those points are. In my room I have found them in a plane bisecting the top-light at a right angle. The diagram will, perhaps, make the matter more intelligible.

If these few beads "at random strung" will induce some of the abler members of the profession to still further discuss this subject of lighting, the purpose of this paper will have been accomplished.

Correspondence.

FOCUSSING SCREEN AND CARRIERS.

Sir,—In these days of dry plate photography, new ideas and suggestions follow each other in rapid succession.

My object in writing is to ask whether up to this time cameras have been made without focussing screens, as for indoor work with dry plates I certainly think this article a superfluity, insomuch as if the door of dark slide was made small enough to open inside the framework of the camera, it would be a more simple arrangement to have a plate of ground glass the exact size of sensitized plate, whereon to focus, placed in the carrier, this being removed and replaced by dry plate for exposures.

The above arrangements would, I think, have many advantages: firstly, the distance between lens and ground glass and lens and plate would perforce be identical; secondly, the image could be placed more surely in the exact position desired on plate; thirdly, it would facilitate work; and lastly, I may suggest, lessen cost of production.

If the idea is not in use, and you can find space for these few lines, possibly the suggestion may be of practical value.—Yours, &c., Fletcher Ritson.

COLD EMULSIFICATION WITH UNIFORMITY.

Dear Sir,—I will try and reply to Mr. Henderson's mis-statements in the order in which he makes them.

The first few lines of his letter I must pass by, as I cannot exactly grasp the meaning of them. He is clearer, however, when he says the debate waxed so warm that an adjournment ensued. Allow me to say the debate was, in my estimation, not warm, and that it was adjourned because of the lateness of the hour; moreover, the discussion was only upon side issues (green fog, &c.), which I had referred to in a foot-note, added two or three weeke after the paper was written, principally to make my meaning clearer.

I did not represent that your correspondent claimed the originality of the cold method, &c. My paper was a comment upon two communications to our Association (see Photographic News, August 18th, and October 6th). I was referring only to the particular process under consideration, which had nothing whatever to do with the question of who first emulsified cold. If anyone cares to take the trouble to turn to p. 487 of the News, and then to p. 170, "Photography with Emulsions," he will see that the processes are practically the same, *except* that Mr. Henderson uses alcohol, which I maintain deters, if it does not prevent, exalted sensitiveness. I think the similarity of the processes quite justifies what I said, that "there is little that he can claim as his own in this method."

Then your correspondent says he thinks it needless to analyse all my statements. He shows, probably, more judgment in that sentence than in the whole of the preceding and following ones.

There is no joke, good or bad, in the statement as regarding plates made with gelatine that has been in contact with ammonia suffering from green fog. I hope to find time shortly for a communication upon this subject.

The next sentence is again foggy. I confess I don't know what it means.

Then your correspondent claims to be the first who used ammonia in emulsions (he does not say for what purpose). I know nothing of the Brittlebank meetings, but, if my memory serves me well, it was Dr. Monckhoven who first *published* a working process wherein it was used. If your correspondent can establish prior claims to its publication, he will probably thank me for giving him the opportunity; if he worked it only in secret, the less said about it the better. As to his statement concerning green fog—cause and cure—albeit he trumpeteth as loudly as Jumbo, I must ask your readers, for the present at least, to take it *cum pound-and a-half-o salis*.—I am, yours truly, Alfred J. Brown.

A FORTUNATE PHOTOGRAPHER.

Dear Sir,—In your valuable paper of September 29, which has just come to hand, you state that "a guinea a dozen—or, rather, a guinea for ten cartes-de-visite —is the highest price charged in any photographic establishment in London at this time, or indeed anywhere." I am at the present moment getting £2 per dozen, and sometimes £2 10s., for cartes-de-visite; cabinet portraits, £3 per dozen. Half-a-dozen cartes are charged £1 10s.; and half-a-dozen cabinets, £2.—I remain, faithfully yours, J. Trim.

Kimberly, Diamond Fields, South Africa, November 2.

TIME OF EXPOSURE.

Sir,—I notice in your report of the meeting of the Edinburgh Society of October 4th, that one of the members advised employment of mechanical means to correctly indicate time of exposure, and Mr. W. Crooke, in his paper read at the meeting, gives instructions to the beginners to commence to count "one" as the cap is taken off the lens, and "two, three" for an exposure of two seconds.

A better method, by which exposure can be judged easily to one quarter of a second, is as follows:—Any person who plays in an orchestra (especially the big drum) has occasional "rests," in which several bars have to be counted. This is done by counting the bars 1,2,3,4—2,2,3,4—3,2,3,4, &c., for as many bars of rest as may be indicated by the score.

Most persons will find, on trial, that to ejaculate the words *one, two, three, four, five*, as quickly as possible, will occupy one second of time. Some persons can ejaculate only up to four, some up to six.

By timing ourselves by a watch, and counting up to 1,2,3,4 or 5, or 6, as the case may be, a few times, we can easily ascertain our average, and know to a nicety the pace at which we can form the words audibly or inaudibly.

I can myself count up to twenty seconds, and be pretty sure of arriving at the close within half a second of truth; and as I only count four to the bar, I can expose to exactly one-quarter of a second.

The plan is by no means new, but it is simple and useful. The words can be inaudibly ejaculated, and an emphasis on the leading numeral aids in eliminating chance of error.—Yours faithfully, J. C. Hannyngton.

Proceedings of Societies.

The Postal Photographical Society.

At a committee meeting held Nov 18, at 21, Ladbroke Grove, W., the following resolutions were passed:—

1. That the Committee, having before them the competition

prints, and having regard to the number in each class sent in and the quality of the work shown, authorise the Hon. Secretary to expend out of the funds of the Society 15s. for two prizes of 10s. and 5s. each for the first subject (landscape) ; 5s. for a prize for the second subject (portrait) ; and 7s. 6d. for a prize for the third subject (the set subject), such money to be spent upon something of a photographic character selected by the winners.

2. That the portfolio of competition prints be sent to each member twice, and that it shall be kept by each member for *one* clear day only the first time round.

3. Mr. J. Pocock was unanimously elected president in accordance with rule 6.

That a competition be invited among members for the spring : pictures to be sent lightly mounted before April 10th, 1883. That a prize be offered for the best view, one for the best portrait group or figure subject, and that a prize be offered for the best "set subject," the same to be a "winter subject," figure or view. That the prizes to be awarded should be proportionate to the number and excellence of the exhibits, the other conditions of competition to be the same as those of the current November competition.

5. That all members be requested to express their stops in terms of the focal length of their lenses, and not by numbers.

6. That it is desirable to send a frame of specimens of the Society's work to the Photographic Society's next exhibition. That members be asked to co-operate under the form of a competition, that any subject may be sent, the fitness for exhibition to be determined by the committee, and the names of chosen exhibitors will appear on their own work.

7. That when lists of the members are printed, all prize-takers be distinguished by an asterisk or otherwise.

London and Provincial Photographic Association.

At the meeting of the above held at the Mason's Hall Tavern, Basinghall Street, on the 23rd inst., Mr. Brigenshaw in the chair, the discussion adjourned from last meeting on Mr. Brown's paper on "Cold Emulsification" was continued.

Mr. Henderson said that in his opinion Captain Abney was the originator of cold emulsification, and that plates free from green fog could and had been produced even in the presence of ammonia, and he had letters which proved that many besides himself had been able to do this. As regards alcohol, he had long since published the effect of alcohol on emulsion, and the person whose name Mr. Brown had forgotten might be himself. Dr. Monckhoven, when advocating ammonia in order to hasten the formation of the most sensitive form of bromide of silver, points out that a high temperature produces fog ; therefore a low temperature is preferable to boiling, since by boiling ammonia is produced, a high temperature also tending to produce granularity. Though the credit of adding ammonia to emulsions is usually given to Dr. Monckhoven, Professor Stebbing had at a meeting of the French Photographic Society reclaimed the ammonia method for an Englishman. Mr. Henderson further said he did not find alcohol act as a powerful restrainer ; he had used in some cases as much as 80 per cent. without any evil effects. If mottling appeared from the use of a large proportion of alcohol, he soaked the plate in water before development, and the mottling disappeared.

Mr. Brown, in reply, said that the reason so many had succeeded with cold emulsification in the presence of so much ammonia was in his opinion due to the powerful restraining action of the alcohol present : he did not give the credit of cold emulsification to Mr. Cowan, but simply that he ripened his emulsion by keeping it some time in the presence of ammonia.

Mr. F. W. Hart thought that Mr. Johnson was the first to use ammonio-nitrate in the manufacture of gelatino-bromide plates.

Mr. Brown asked if alcohol in any way increased the sensitiveness of bromide of silver.

Mr. Henderson said that by its use he was able to produce a much finer division of the bromide of silver, and also greater speed.

A question was asked, "Why harder lighting was necessary with gelatine than with the wet process ?"

Messrs. Cowan and Debenham thought the reverse was the case.

Mr. Henderson said that greater contrast is necessary, and if the two processes were tried side by side, it would be found to be so.

The Chairman drew attention to the great resemblance between the picture in the *Art Journal*, 1872, vol. xi, new series, entitled "Cherries Ripe," by Metzmarcher, and "Cherry Ripe," of the late Pall Mall Exhibition, and remarked on the coincidence of similar ideas occurring to two different artists.

Mr. Mark Carey was elected a member of the association.

Glasgow Photographic Association.

A general meeting was held on 16th November, when the following business was transacted.

Messrs. Francis Kerr, George Y. Henderson, Patrick Falconer, and W. H. Queen were admitted members.

The Question-Box having been opened, the questions proposed gave rise to some discussion, after which

Mr. Norman Macbeth, R.S.A., read a paper on the "Art Aspects of Photography," recently communicated by him to the Edinburgh Society. The paper was received with marked attention, and the meeting unanimously awarded Mr. Macbeth a vote of thanks.

The Secretary intimated that at next meeting Mr. Mc Lellan would give a demonstration with his new Eclipse light, and members were invited to bring their own cameras to test its powers.

Talk in the Studio.

The Social Gathering or Intermediate Meeting of the Photographic Society.—On Tuesday last the principal subject brought under discussion was the best means of mending the minor defects of negatives ; and our readers will find in another column a full account of the remarks made on this subject. The now generally recognised advantage of enlargements from small negatives over extremely large direct pictures was considered, and it was remarked that on enlarging a gelatine negative, details often appear which cannot be traced in the original negative ; but a member said that all such can be readily traced by adopting the method of a powerful oblique illumination, so well known to microscopists. Mr. England referred to a trifling difficulty which sometimes presents itself in Alpine photographic work owing to the legs of the tripod becoming warmed by the solar heat, and then sinking steadily in the ice during exposure ; and he said that by resting the tripod on three small stones, all difficulty on this score might be easily overcome. Before the close of the meeting general dissatisfaction was expressed with respect to the use of the term "technical meetings" as a designation for the social gatherings, the term "technical meeting" being so universally understood to signify the annual gathering of the South London Society. Mr. Sebastian Davis, who occupied the chair, said that he naturally took some interest in the matter, as he had assisted Mr. W. Brooks in organising the annual technical meetings of the South London Society—these being now a thoroughly recognised photographic institution ; and in committee he had strongly opposed the adoption of the same title by the Photographic Society of Great Britain. The next social gathering will take place on Tuesday, December 19th, at eight o'clock.

South London Photographic Society.—Thursday next, December 7, being the annual meeting of this Society, the election of officers for the year ensuing will take place, and the general and financial reports be submitted. The decision of the judges with regard to the artistic competition will also be made known.

The Photographic Club.—The Annual Dinner of the Association, which took place on Wednesday evening, was one of the best attended at which we have been present, about fifty gentlemen being assembled. The Rev. F. F. Statham presided in his usual friendly manner, and the proceedings were diversified by music and recitations, a song and violin performance by Herr Behnke being especially approved of. We may mention that this gentleman is working in conjunction with the eminent surgeon, Mr. Lennox Browne, in order to obtain a series of photographic representations of the organs of the throat while being exercised in the production of the various musical notes. Herr Behnke obtained such throat pictures some twelve years ago, when using bath plates and the lime light ; but it is hoped that the old results will be far surpassed when gelatino-bromide plates are used in conjunction with the electric light.

Mr. Andrew Pritchard, F.R.S.E., died at his residence in St. Paul's Road, Highbury, on the 24th inst. Born in 1804, he devoted himself early to the study of the microscope and the minute animal world which it revealed. He published in 1827 a memoir "On the Art of Forming Diamonds into Single

Lenses" (Royal Institution), and subsequently fifteen other works and editions connected with microscopy. "A History of Infusoria," of which the fourth edition was published in 1861, is still a standard work of reference on the subject. He was one of the oldest members of the Royal Institution, with which he had been connected for nearly half a century.—*Times.*

The Newcastle Photographic Association.—At a recent council meeting of the Photographic Association, Mr. J. T. Dunn was appointed a vice-president, to take the place of Professor Marreco, and Mr. J. W. Robinson was elected to take the place of Mr. L. Davidson on the council.

To Correspondents.

*** We cannot undertake to return rejected communications.

"A Misty Morning on the Wear."—We believe the price you name for Mr. McLiesh's picture is that paid only by the members of the Newcastle Society; however, you had better write to him at Northgate, Darlington.

X. Z.—1. It is, as you suppose, owing to the fact of the acids not being of full strength. 2. Thanks for the suggestion.

Carbon.—If you will take the trouble to look back for two or three months you will find full details of the ingenious method by which double-headed and two bodied photographs, the so-called monster pictures, are ordinarily produced.

G. Rossi.—It is generally a result of over-emulsification, but sometimes results from the layer of emulsion on the glass plate being too thin.

E. C. Bath.—1. Benzole will soften it, but not bring it into a state of true solution. 2. A mixture of Canada balsam and turpentine.

S. W. O.—If you add less alcohol, say about a quarter of an ounce, the result will probably be satisfactory. You might also reduce the proportion of ether, and increase the benzole to a corresponding extent.

Constant Reader (York).—An india-rubber roller may be used instead of the usual leather lithographic roller; but it should be well vulcanised, and turned in the lathe to an exact cylinder.

Constant Reader (Islington).—1. Equal parts. 2. Heat in a water bath, by all means. 3 You might easily gather from the context that the work must be carried on in a non-actinic light.

G. R.—By cleaning them off, as suggested last week, and then finding someone to try the glass; we fear, however, that the latter process will prove more difficult than the former.

Studio.—1. Use light bars of T iron with the central web placed upwards (⊥), and so depthed as to come about an eighth of an inch above the floor-level. The most suitable wheels for running on these are cast iron plate pulleys, such as are used in window frames for the sash-line to run on. The actual guage of the tramway must depend on circumstances, but about eighteen inches will suit in ordinary cases. 2. The north side.

Pyro.—1. We hope to give them in abstract. 2. The book is now in the press. 3. Roscoe's "Elementary Chemistry," published by Macmillan and Co., would suit you very well.

Eighty.—Try a weak solution of potassium cyanide.

E. Turner.—From any stationer or dealer in fancy goods.

S. Comber.—1. All will depend on the wording of the agreement; but from what you say we should imagine that there may be some doubt as to the real meaning. 2. About one-tenth should be iodide. 3. It is so usual an impurity that it is rare to find a commercial sample entirely free from all traces. After neutralising the solution with nitric acid, add about one-fourth the quantity which was required for neutralisation. A few drops of chloride of barium solution are now added, and if sulphates are present to a considerable extent, a white precipitate will be formed immediately; but if traces only are present, the precipitate will only be deposited after some hours. The nitric acid should have been previously tested; but it is necessary to dilute with water, as strong nitric acid gives an immediate precipitate with a barium salt.

F. Fowler.—1. The action is almost instantaneous, unless a notable excess of a strong acid be present. 2. In such a case it is much more convenient to work on the film before varnishing. 3. About one-fifth part by volume.

Charles B——.—There is no legal aspect to the question, as it merely depends on gentlemanly feeling and politeness.

Printer.—Burn the cuttings in an ordinary fire-place, and reduce the ashes by the method you mention.

In Trouble.—The bath is almost certain to be alkaline under the circumstances, and it is probable that three drops of nitric acid to each pint will prove a cure. It should slowly redden blue litmus paper.

Dark Room.—You have evidently failed to dry your paper sufficiently, and there is very little chance of the mischief being remedied. Mop the surface with a solution of potassium cyanide, and wipe as dry as possible. Next remove the varnish by means of warm alcohol, and soak the plate in a weak solution of cyanide, say 1 part in 50 parts of water.

THE EVERY-DAY FORMULARY.

The Gelatino-Bromide Process.

Emulsion.—A—Nit. silver 100 grains, dist. water 2 oz. B—Bromide potassium 85 grains, Nelson's No. 1 gelatine 20 grains, dist. water 1½ oz., a one per cent. mixture of hydrochloric acid and water 50 minims. C—Iodide potassium 8 grains, dist. water ½ oz. D—Hard gelatine 120 grains, water several oz. When the gelatine is thoroughly soaked, let all possible water be poured off D. A and B are now heated to about 120° Fahr., after which B is gradually added to A with constant agitation; C is then added. Heat in water bath for half an hour, and stir in D. After washing add ¾ oz. alcohol.

Pyro. Developer.—No. 1—Strong liq. ammonia 1¾ oz., bromide potassium 240 grains, water 80 oz. No. 2—Pyro. 30 grains, water 10 oz. In case of an ordinary exposure mix equal vol.

Iron Developer.—Potassium oxalate sol. (1 and 4) 80 parts, ferrous sulphate sol. (1 and 4) 20 parts, dist. water 20 parts. To each 4 oz. of the mixed developer add from 5 to 30 drops ten per cent. sol. potassium bromide, and 30 drops sol. sodium hyposulphite (1 and 200).

Substratum or Preliminary Preparation.—Soluble silicate of soda 1 part, white of egg 5 parts. water 60 parts. Beat to froth and filter.

Fixing.—Sat. sol. of sod. hypo. 1 pint, sat. sol. of alum 2 pints, mixed.

Cowell's Clearing Solution.—Alum 1 part, citric acid 2 parts, water 10 parts. Edwards makes this sherry coloured with perchloride iron.

Eder's Method of Intensification.—The negative is whitened by soaking in sat. sol. of mercuric chloride, and after thorough rinsing immersed in potass. cyan. 10 parts, potass. iod. 5 parts, mercuric chloride 5 parts, water 2,000 parts. As film becomes dark brown, the actinic opacity is increased; but prolonged action causes brown tint to become lighter, until at last the negative is no denser than at first.

Fol's Backing Sheets.—A chromographic paste is prepared with gelatine 1 part, water 2 parts, glycerine 1 part, and a very small addition of Indian ink. Strong paper or shirting is coated, and the sheets are laid, face downward, on waxed glass to set. Press to back of glass plate.

The Wet Collodion Process.

The Nitrate Bath.—Water 14 oz., nit. silver 1 oz., nitric acid 1 drop. Before using coat a small plate, and immerse it for 20 minutes.

Cleaning Preparation for New Plates.—Alcohol 4 oz., Jeweller's rouge ¼-oz., liquid ammonia ½-oz.

Film-removing Pickle for Old Plates.—Water 1 pint, sulphuric acid 4 fluid oz., bichromate potassium 4 oz.

Substratum.—Whites of 2 eggs well beaten, 6 pints of water, and 1 dr. liq. ammon.

Negative Collodion for Iron Development.—Alcohol 1 pint, pyroxyline of suitable quality 250 grains, shake well and add ether 2 pints. *Iodize this by mixing with* one-third of its volume of alcohol ½ pint, iod. ammon. 80 grains, iod. cadm. 80 grains, brom. ammon. 40 grains.

Normal Iron Developer.—Water 10 oz., proto-sulphate iron ½ oz., glacial acetic acid ½ oz., alcohol ¾ oz. The amount of proto-sulphate iron may be diminished to ¼ oz. when full contrasts are desired, or increased to 1 oz. when contrasts are unduly marked. With new bath quantity of alcohol may be reduced to ¼ oz.; but when bath is old more is wanted.

Intensifying Solution.—Water 6 oz., citric acid 75 grains, pyro. 30 grains. When used, add a few drops of the silver bath to each ounce.

Lead Intensification.—After neg. washing, immerse in dist. water 100 parts, red pruss. potash 6 parts, and nit. lead 4 parts. When it is yellowish white wash and immerse in liquid sulphide ammon. 1 part, water 4 parts.

Fixing Solution.—1. Potass. cyanide 200 grains, water 10 oz. 2. Sat. sol. of sod. hypo.

Varnish.—Shellac 2 oz., sandarac 2 oz., Canada balsam 1 dr., oil of lavender 1 oz., alcohol 16 oz.

Printing Processes.

Albumen Mixture for Paper.—White of egg 18 oz., 500 grs. ammon. chlor. in 2 oz. of water. Beat to a froth, stand, and filter.

Sensitizing Solution.—Nit. silver 50 grs., water 1 oz., sod. carb. ½ gr.

Acetate Toning Bath.—Chl. gold 1 gr., acet. soda 20 grs., water 8 oz.

Lime do.—Chl. gold 1 gr., whiting 30 grs., boiling water 8 oz., sat. sol. chl. lime 1 drop. Filter cold.

Bicarbonate do.—Chl. gold 1 gr., bicarb. soda 3 grs., water 8 oz.

Fixing Bath.—Sodium hypo. 4 oz., water 1 pint, liq. ammon. 30 drops.

Reducer for Deep Prints.—Cyan. potass. 5 grs., liq. ammon. 5 drops, water 1 pint.

Encaustic Paste.—Best white wax 1 oz., oil of turpentine 5 oz.

Sensitizing Bath for Carbon Tissue.—Bichromate potash 1¼ oz., water 30 oz., ammonia 1 dr., methylated spirit 4 oz.

Enamel Collodion.—Tough pyroxyline 120 grs., methylated alcohol 10 oz., ether 10 oz., castor oil 20 drops.

Mountant.—1. Fresh solution of best white gum. 2. Fresh starch.

Collotypic Substratum.—Soluble glass 3 parts, white of egg 7 parts, water 10 parts.

Collotypic Sensitive Coating.—Bichromate potash ½ oz., gelatine 2½ oz., water 22 oz.

Collotypic Etching Fluid.—Glycerine 150 parts, ammonia 50 parts, saltpetre 5 parts, water 25 parts.

Printing on Fabric.—Remove all dressing from fabric by boiling in water containing a little potash, dry, and albumenize with ammonium chloride 2 grammes, water 250 cubic cents., and the white of 2 eggs, all being well beaten together. A 70-grain silver bath is used, and the remaining operations are as for paper.

Cyanotype Printing.—Water 1 oz., red prussiate of potash (ferricyanide) 1 dr., ammonio citrate of iron 1 dr. Prepare and preserve in the dark. Float the paper and dry. Fixation by mere soaking in water.

Various.

Luckardt's Retouching Varnish.—Alcohol 300 parts, sandarac 50 parts. camphor 5 parts, castor oil 10 parts, Venice turpentine 5 parts.

Matt Varnish.—Sandarac 18 parts, mastic 4 parts, ether 200 parts, benzole 80 to 100 parts.

Encaustic Paste.—Best white wax, in shreds, 1 oz., turpentine 5 oz.; dissolve in gentle heat, and apply cold with piece of flannel.

Ferrotypes.

Collodion.—Ammonium iodide 35 grains, cadmium iodide 25 grains, cadmium bromide 20 grains, pyroxyline 70 grains, alcohol 5 oz., ether 5 oz.

Bath.—Silver nitrate 1 oz., water 10 oz., nitric acid 1 drop.

Developer.—Ferrous sulphate 1 oz., glac. acetic acid 1 oz., water 16 oz.

Fixing and Varnish.—Same as wet collodion process.

THE PHOTOGRAPHIC NEWS.

Vol. XXVI. No. 1266.—*December* 8, 1882.

CONTENTS.

OUR SUPPLEMENT.

We have little to say in introducing Mr. McLiesh's picture to our readers, for its beauty speaks for itself. The fine outline of Durham Cathedral as we see it limned in the mist, across the placid water, is in delighful contrast to the strong branches and vigorous summer foliage through which the old North country pile is seen. Our illustration is the first, we hope, of a long series, which, if all goes well, will accompany these pages at regular intervals, whereby we shall bring vividly before our readers the progress of photography as an art, in the same way as we have striven hitherto to mirror its scientific aspect.

"A Misty Morning on the Wear," Mr. McLiesh assures us, is from a single negative, and that it was secured upon a gelatine film need scarcely be stated. It was a familiar picture to all visitors at Pall Mall this autumn—these can judge how perfect is the printing process by which it has been reproduced—and although it secured no medal, the Newcastle Society have done Mr. McLiesh the honour to choose it as their presentation print.

The "Ink-Photo" process of Messrs. Sprague and Co., of Martin's Lane, Cannon Street, by which the illustration is produced, has much to recommend it. In the first place, it is far cheaper than any other mechanical process which will reproduce a photograph from nature; and secondly, it admits of the most rapid printing. Doubtless a collotype impression could be produced of a more delicate character, but we should inform our readers that the impression before them is taken, not from the original negative, but from an ordinary silver print. Printing by collotype would be at once more costly and less rapid.

The "ink-photo" method is, as our readers will see, a species of lithography. Ordinary photo-lithography has been in use many years; but, as is well known, it is applicable to black and white lines only. In our picture, it will be seen that the entire image is made up of a kind of stipple, more or less dark according to the depth of half-tone and shadow. Once put upon the lithographic stone, the work of printing goes on apace, as many as 1,000 copies an hour being "pulled" if necessary.

The finest prints are obtained from a pale photograph with clean details—a much faded print frequently giving exceedingly good pictures—but the best and truest result is given by a carbon transparency. Messrs. Sprague and Co. have already issued some excellent illustrations in the *Engineer* and *Engineering*, and there is every likelihood of the process being extensively employed ere long in our illustrated periodicals.

GLASS.

Second Article.

In our former article we commented upon the importance of the use of a pure sand and its direct influeuce upon the colour of the resulting glass; but there are other considerations bearing upon the same issue which cannot be overlooked. In the early specimens of window-glass, the colour was almost invariably a dirty green colour, as witness the old glass in our cathedrals; which colour it is now our pleasure to affect—imitation of the antique being considered true art, whether it be to adorn the cathedral or the gin palace. As already stated, this dirty green colour was almost entirely attributable to the iron and other impurities in the sand; but the alkali employed to flux the sand has also much to do with the colour of the glass made therefrom. The earlier glasses were, no doubt, made by the use of kelp salts (burnt sea-weed), or potash (wood ashes), which contain a considerable percentage of iron, to say nothing of the impurities in the flint or quartz employed by our ancestors in their glass-making operations. During the present century the alkali employed by glass makers has been almost exclusively salt cake (sulphate of soda) employed in its crude state, just as it results from the decomposition of common salt by brown vitriol, this being effected in iron pans, and from which, as well as from the vitriol itself, considerable traces of iron are carried into the sulphate of soda, or, as it is termed, salt cake. A few words of digression may be permitted here to explain what probably not one Englishman in a hundred understands, viz., the manufacture of that article of everyday use—soda; whether as salt cake, soda ash (washing powders), carbonate of soda (soda crystals), or the white powder erroneously called carbonate of soda, but which is really the bi-carbonate of soda.

Perhaps sodium in its various forms is one of the most widely diffused substances to be found in nature. Spectroscopists know, to their annoyance, that the sodium band is seldom absent when least wanted; and if we reflect upon the millions of tons there must be in the waters of the ocean, we cannot help thinking that sodium plays an important rôle in the economy of nature, very difficult for us mortals to comprehend. However, the source whence we obtain our common alkali known as soda is ordinary salt—rock salt, simply refined.

If we take a handful of common kitchen salt, put it in any suitable vessel, and pour thereon a few ounces of vitriol (sulphuric acid), sulphate of soda is formed, and hydrochloric acid is given off. In the English chemical manufactories crude or brown vitriol is made by roasting "pyrites" (native sulphide of iron), and allowing the fumes to rise into large leaden chambers, where by the aid of steam, nitrous vapours, and atmospheric oxygen, complex reactions are brought about, after which the products condense and form sulphuric acid or crude vitriol. Into a large iron pan as much as half a ton of common salt is thrown, and then down a leaden spout a sufficient quantity of the brown vitriol is allowed to trickle so as to completely decompose the salt; hydrochloric acid gas is copiously evolved, and this is led off to a special arrangement to be condensed into liquid hydrochloric acid. The result of the action of the sulphuric acid on the chloride of sodium is sulphate of soda. The sulphate of soda is then roasted, and salt-cake, as used by the glass maker, comes out as the climax of this exceedingly simple chemical experiment. Salt cake, or commercial sulphate of soda, is a friable, white, cakey substance, with just the faintest trace of green when seen in a strong light. That trace of green, when seen as the curious stuff rides in truckloads through the sunlight as it is being shunted into the glass-works, signifies the presence of iron.

To follow the salt-cake until it becomes washing soda or bi-carbonate of soda, we must still a little further digress. The salt cake has now to be converted into black ash, and to effect this a certain weight of the salt-cake is wheeled in an iron barrow, and shot out on the floor, and mixed with another certain weight of small coal (termed slack) and of chippings of limestone (carbonate of lime). This agglomeration is then shovelled on to the horizontal floor of a furnace over which passes the flame of a fire which roasts the queer-looking mass. It bubbles and burns whilst the workman torments it with an iron bar until he gets it into a pasty condition. resembling a Brobdignagian plum-pudding, when he rakes out the seething mass into an iron wheel-barrow, in which it sets. It is then known as a black ball, but of a totally different sort to those occasionally employed by the members of the Photographic Club.

The said black balls (which, by the way, are square, and take the form of the interior of the iron wheel-barrow), are taken to the lixiviating vats, which are large iron pans, into which these square black balls are pitched, and hot water run in, which dissolves out the carbonate of soda; for the chemical reader will have gathered that the effect of roasting sulphate of soda in the presence of carbonate of lime has been to induce the carbonic acid to unite with the soda, the sulphur going to the lime to make what is known as alkali waste. The solution is now evaporated into soda ash, this is then dissolved, and the solution allowed to crystallize, when washing soda is the result. By this time the substance is carbonate of soda, and to convert this into the bi-carbonate, the crystals are packed in huge chambers into which carbonic acid gas is forced; the acid gas readily becomes absorbed by the crystals, which turn quite white, and when ground up and packed in barrels or kegs, the snowy white powder becomes the merchantable article properly termed bicarbonate of soda.

After reading this digression it may be said, "What has this got to do with the making of glass?" Well, it has very much indeed to do with the making of glass, for glass cannot be made without an alkali, and, for reasons of economy, either salt-cake or bicarbonate of soda must be used. It is only of late that the bicarbonate has been so used to any extent, for whereas salt-cake has been and still is used in many glass works, the price of bicarbonate of soda having fallen to a lower price than has ever hitherto been known (about £6 per ton), it has come much more into use than formerly, being preferred as giving a glass of purer colour than is obtained by the use of salt-cake.

It will now be comprehended that the alkali is quite as important an item as the sand was shown to be, and bi-carbonate of soda is as much superior to salt-cake as Belgian sand is to common sea sand, from a glass manufacturer's point of view. Indeed the question of cheap and pure alkali appears solved in the introduction of bi-carbonate of soda. The use of pot or pearl ashes, except for the highest qualities of glass, is quite out of the question, by reason of the price, which is many times that of the soda salt. In those countries where natural alkalies abound, and where a manufactured article such as soda would have to be imported, of course advantage is taken of the article nearest at hand; thus saltpetre, potashes, pearlashes, borax, and boracic acid find use in glass making, serving as fluxes of the sand, flint, limestone, or other principal ingredient. Here, however, recurs the previous question of the colour of the glass thus made. If one of the ingredients be impure, it will avail little if all the others are pure—we speak here of purity as the absence of iron—because all glasses are more or less degraded in tone by the presence of minute traces of certain metallic oxides, especially iron. Therefore, it will be pretty clearly conveyed to our readers that, as regards purity of colour—or, more correctly speaking, entire absence of colour—the first essentials are the employment of pure materials, and we have now shown that the sand and the flux should possess this property in the highest degree.

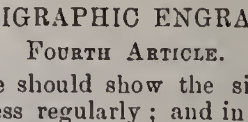
The foregoing remarks are directed mainly to the article of clear glass, such as crown glass, sheet glass, polished plate, or patent plate, all of daily use in a thousand requirements, and all employed in photography. Given, a colourless glass made from pure materials in their correct proportions, we can desire nothing better. Light would be transmitted practically unaltered, at least photographically, and if the glass remained colourless when exposed to light and air, which it does not always, we should then be able to modify it in a variety of ways to suit our further requirements, such as coloured or ornamented glass.

Probably no more glaring examples of impure glass can be found than are met with daily in the shape of common wine or beer bottles. These are often made from the crudest and roughest materials imaginable, so extremely inexpensive as to provoke a smile of incredulity when we are told the cost of a ton. But the fire, and the labour, and the carriage, and the profit, have all to be taken into the account; and however cheap the materials may be, even beer bottles cannot be made for nothing.

CHEMIGRAPHIC ENGRAVING.

Fourth Article.

The cleaned plate should show the sides of every line stepped more or less regularly; and in the case of a line standing fairly by itself—that is to say, at a considerable distance from other lines—a cross section in a vertical plane will show distinctly the step made by each etching, the edges of these steps being ordinarily sharp and well defined. The following arrangement indicates the configuration of a section taken at right angles to a line:—



These sharp angles, if not removed, would tend to take a charge of printers' ink from the roller, and to set it off on the paper during the process of printing; and it is usual to subject the plate to one or more subsequent etchings in order to clear away these objectionable asperities.

A hard lithographic roller is charged with a moderate amount of a special stiff ink; this may consist of ordinary letter-press ink, with about one-fourth of its weight of wax. When the ink has been properly distributed, the plate is very slightly warmed, but not so much as to in any way cause inconvenience if it be held in the hand for some minutes, and the plate is next carefully and steadily rolled in various directions with the inked roller; but care must, however, be taken that little or no pressure is employed, the mere weight of the roller being sufficient in ordinary cases. Under these circumstances the upper faces of the lines become covered with a complete protective layer of ink, and in order to cause this to flow down the sides of the first, second, or, at most, the third step, the plate is once more warmed; but it is as well to ink it once more when it has become nearly or quite cold. After this it is dusted with the asphalt powder, and a gentle heat is applied, so as to cause the ink and asphalt to thoroughly unite, and to flow down a little farther than was the case with the ink, it being generally safe to cover the first four or five steps. A test line is now made on one of the edges of the plate, and a mixture of one part of nitric acid and forty parts of water is used as before for etching. The action may be allowed to continue till the test line shows a depth of about half a millimetre, after which the plate is washed, dried, and thoroughly cleaned, as after the final etching of the first series. The clean and dry plate is now once more inked; but this time it should not have been previously warmed, and the greatest care should be taken not to allow any ink to flow down the sides of the relief. Once more the surface of the plate is dusted with asphalt powder, and very gently heated, but not sufficiently to cause the ink to become completely incorporated with the asphalt, or to run down the sides of the steps. All is now ready for the final etching, which is intended to round off the angles of the first, second, third, and fourth steps. One and a-half parts of nitric acid with forty of water will prove about right as regards strength, and one minute to a minute and a-half is generally sufficient.

Once more the plate is cleaned with turpentine or benzoline, and certain mechanical operations are required to fit it for use. In the first place, those portions bearing no part of the device are cut away with drill, saw, and chisel, so that the shape of the plate roughly corresponds with the outline of the device, after which any other widely-extending whites should be cut out in a similar manner. The next step is to mount the plate on a block of wood, so as to bring it to exactly the usual type height; the most convenient way of fastening it down to the wood being by means of small wire nails. Any considerable portion of the wood block which may extend beyond the plate should be shaved down, so as to slope towards the margin. The block is now ready for the printer; or, if the photographer wishes to print from it himself, he must obtain a small press and inking roller. Care and observation will enable him to obtain good impressions without any special instruction; but if he can spare half-an-hour with a good pressman who is "making ready" for printing from a wood engraving, he will gain some ideas which will, at any rate, serve to help him in his progress as a typographic printer. There are several small and popularly-written hand-books of letter-press printing, either one of which may be useful to the chemigrapher.

Our fifth and final article on chemigraphic engraving will deal with the method of printing directly on the zinc plate by the asphalt process of Niépce.

PHOTOGRAPHY AND THE TRANSIT OF VENUS OF 1874.

As our readers know, the value of photography in observing the transit of the planet Venus across the sun has been a moot question for some time past. The American astronomer still holds vigorously to the worth of photographic results, but in England the opinion is divided. Our contemporary, *Nature*, gives an interesting account of the manner in which photography was employed by various nations in 1874, and the results obtained. A perusal of this at once shows why all do not agree on the importance of the camera as an observing instrument. Speaking of this 1874 transit, our contemporary remarks that while all astronomers decided upon employing photography, there was much difference of opinions as to how it should be applied.

The European astronomers preferred instruments modelled upon the Kew photo-heliograph, whose objective has 3·4 inches aperture and 50 inches focus, giving an image of the sun 0·482 of an inch in diameter, which is enlarged by a secondary magnifier to 3·93 inches. On the other hand, the American astronomers contended that photographs taken with such instruments would be affected by troublesome errors due to the secondary magnifier, that position angles could not be measured from them accurately enough to be of any use, and that it would be exceedingly difficult to determine the exact linear value of a second of arc. They advocated the use of horizontal photo-heliographs, which are free from all these disadvantages; and the instruments which they adopted had apertures of 5 inches, and focal distances of 38½ feet, giving images of the sun slightly more than 4 inches in diameter. Notwithstanding this radical difference of opinion respecting the best form of photo-heliograph, the astronomers of the old and new worlds were in perfect accord as to how the instruments should be employed. Between the first and second contacts, and again between the third and fourth contacts, photographs about five minutes square, showing the indentation cut by the planet into the sun's limb, were to be taken at intervals of a few seconds; and from these it was hoped the true times of contact could be deduced with great accuracy. Between the second and third contacts, pictures of the entire sun were to be taken at short intervals, and the positions of Venus relatively to the sun's centre were to be obtained from them by subsequent measurements. In the latter case, the photo-heliograph took the place of a heliometer, and was superior to that instrument in its power of rapidly accumulating data.

The question of instrumental outfit having been disposed of, stations were selected, and parties dispatched to almost every available point. The United States, England, France, Germany, Russia, Holland—in short, nearly all the nations of the civilised world—took part in the operations. The weather was not altogether propitious on the day of the transit, but nevertheless a mass of data was accumulated which will require years for its thorough discussion. When the parties returned home the contact observations were first attacked, but it was soon found that they were little better than those of the eighteenth century. The black drop, and the atmospheres of Venus and the Earth, had again produced a series of complicated phenomena, extending over many seconds of time, from among which it was extremely difficult to pick out the true contact. It was uncertain whether or not different observers had really recorded the same phase, and in every case that question had to be decided before the observations could be used. Thus it came about that within certain rather wide limits the resulting parallax was unavoidably dependent upon the judgment of the computer, and to that extent was mere guesswork. Attention was next directed to the photographs, and soon it began to be whispered about that those taken by European astronomers were a failure. Even yet I am not aware that the Germans have published anything official on the subject; but the English official report has appeared, and it frankly declares that "after laborious measures and calculations it was thought best to abstain from publishing the results of the photographic measures as comparable with those deduced from telescopic view." From the way in which these photographs were taken, Sir George Airy saw that they could not yield position angles of any value, and therefore differences of right ascension and declination could not be determined from them; but they did seem capable of giving the distance between the centres of Venus and the sun with considerable accuracy. Upon trial this proved not to be the case. No two persons could measure them alike, because "however well the sun's limb on the photograph appeared to the naked eye to be defined, yet on applying to it a microscope, it became indistinct and untraceable, and when the sharp wire of the micrometer was placed on it, it entirely disappeared." In short, the British photographs are useless for the present, but Sir George Airy hopes that in the future some astronomer may be found who will be capable of dealing with them.

We turn now to the American photographs. They present a well defined image of the sun about 4·4 inches in diameter, and are intended to give both the position angle and distance of Venus from the sun's centre. A special engine was at hand for measuring them, but when they were placed under the microscope only an indistinct blur could be seen. Here again was the same difficulty which had baffled the English, but fortunately its cause was soon discovered. The magnifying power of the microscope was only 37½ diameters, which seemed moderate enough, but was it really so? The photographic image of the sun was about 4·4 inches in diameter, and this was magnified 3·31 times by the objective of the microscope, thus giving an image 14·56 inches in diameter. To yield an image of the same size, a telescopic objective would require a focus of about 1,563 inches, and if the eye-piece of the microscope, which had an equivalent focus of 0·886 of an inch, were applied to it, a power of 1,764 diameters would be produced. This then was the utterly preposterous power under which the image of the sun was seen when the photograph was viewed through the microscope, and no useful result could be expected from it. Means were immediately provided for reducing the power of the microscope to 5·41 diameters, and then the photograph seen through it appeared as the sun does when viewed through a telescope magnifying 255 diameters. After this change, all difficulty vanished, and the photographs yielded excellent results. The measurements made upon them seem free from both constant and systematic errors, and the probable accidental error of a position of Venus depending upon two sets of readings made upon a single photograph is only 0·553 of a second of arc. To prevent misunderstanding it should be remarked that this statement applies only to pictures taken between second and third contact, and showing the entire sun. The small photographs taken between first and second contact, and again between third and fourth contact, proved of no value.

These investigations consumed much time, and before the result from the American photographs was generally known, an international convention of astronomers was held in Paris to consider how the transit of 1882 should be observed. The United States was not represented at this conference, and, guided only by their own experience, the European astronomers declared that photography was a failure, and should not be tried again. They knew that the contact methods are attended by difficulties which have hitherto proved insurmountable, but under the merciless pressure of necessity they decided to try them once more. Unfettered by the action of the Paris Conference, the United States Transit of Venus Commission took a very different view of the case. Its members knew that the probable error of a contact observation is 0·15 of a second of arc, that there may always be a doubt as to the phase observed, and that a passing cloud may cause the loss of the transit. They also knew that the photographic method cannot be defeated by passing clouds, is not liable to any uncertainty of interpretation, seems to be free from systematic errors, and is so accurate that the result from a single negative has a probable error of only 0·55 of a second of arc. If the sun is visible for so much as six minutes between the second and third contacts, by using dry plates thirty-six negatives can be taken, and they will give as accurate a result as the observation of both internal contacts. These were the reasons which led the American Commission to regard photography as the most hopeful means of observation, and thus it happens that the astronomers of the old and new worlds differ radically respecting the best means of utilizing one of the most important astronomical events of the century. The Europeans condemn photography, and trust only to contacts and heliometers; the Americans observe contacts because it costs nothing to do so, but look to photography for the most valuable results.

By-the-Bye.

PHOTOGRAPHIC PRINTING BY THE ELECTRIC LIGHT.

SOME experiments we have recently made in printing with the electric light may have interest for our readers, albeit they are not likely, at any rate for some time to come, to resort to electricity as a general printing agent. As many of our readers know, photographic printing is no novelty. A dozen years ago, when the Woodbury Printing Company were installed at Hereford Lodge, Kensington, a powerful magneto-electric machine found a place among the apparatus to be employed for printing the gelatine tissue when lack of daylight might otherwise bring work to a standstill. The power of this light was, if we remember aright, about 1,200 candles; it was frequently made use of, but we believe, in the end, that daylight was found quite sufficient to produce all the gelatino-reliefs needful, and consequently the more expensive method of light-making fell into disuse. Compared to sunlight or daylight, this electric lamp was very weak, for at the short distance of eighteen inches from the carbon prints, chloride of silver paper was blackened but slowly; indeed, the actinic power exerted was reckoned to be but $\frac{1}{24}$ that of sunlight on a summer's day.

Another photographic use has, however, recently been found for the electric light. The importance of photo-etching to the publishing trade has caused those who undertake such work to avail themselves of electricity for taking negatives, and also for printing upon gelatine paper to secure the necessary transfer. Any picture or engraving in an illustrated paper may be copied by the photo-etching method without difficulty, and a publisher eager to reproduce an illustration from a foreign paper may have an engraving block in his possession within twenty-four hours of snipping out the print with a pair of scissors. Nay, in some cases, a firm will undertake to deliver the printing block in three hours. The chosen print is set up flat on a drawing board, the electric light is directed towards it, and a negative—the wet collodion process is still generally used—is taken in a few seconds. The plate is quickly intensified, put into the printing frame, and, if it is night time, printed by electric light. The transfer is then made, it is laid successively upon stone and upon a zinc plate, and the latter finally etched in acid.

In some cases enlargements are made by the photo-etching process to serve as placards, the size of the original print being multiplied to monster dimensions.

Of the employment of the electric light for taking negatives in this way we shall speak at some future time; on this occasion we confine ourselves to discussing its action upon chloride of silver paper, and paper treated with salts of iron, as in the Herschel or Pellet process. To get printing power sufficient for practical purposes it is necessary to have an arc light of considerable energy, and to employ the direct rays. In producing portraits by electricity, Van der Weyde and others who have followed in his footsteps, although they, too, employ powerful arc lights—from 6,000 to 10,000 candles—do not use the direct rays, but shield these from the sitter by a saucer placed immediately under the source of light. The rays are cast upwards against a parabolic reflector, fashioned like a huge umbrella, and then reflected downwards upon the model. In printing, there is nothing to be gained, but, indeed, much to be lost, by getting rid of the direct rays, and hence the plan usually adopted is to employ the naked light, with a sheet of white paper or other simple reflecting surface behind it.

The light with which we made experiment was of 6,000 candle power. It was a lamp of Messrs. Siemens' construction, worked by a dynamo of their make, which required for its driving an engine of four-horse power. It was our object more especially to ascertain whether the electric light could be employed with any degree of success for printing tracings, and diagrams by the Pellet process, which, compared to silver printing, is somewhat slow. In fact, it would not be far wrong to set down the comparative sensitiveness of silver and iron as represented by the figures 4 and 1.

The distance at which we tested the light was five feet from the carbons. Distance, as everybody knows, plays a very important part in photometric experiments, the intensity of the light decreasing as the square of the distance; so that at $2\frac{1}{2}$ feet from the source of light, this would be four times as powerful as we found it at 5 feet. We chose the latter, however, because tracings and drawings are frequently of large dimensions, pressure frames from 4 to 6 feet in length being sometimes employed in this branch of photography. By placing these upon a movable stand, so that the printing frames are not at rest during the printing, the electric light, even when direct rays are used, can be made to print with uniformity.

A light screen graduated in squares from 1 to 25, such as Mr. Warnerke has recently introduced, was used for making the test. Employing chloride of silver paper to print upon, it was found that in fifteen minutes the number 20 was faintly legible. Unfortunately, the fixing bath dissolves away a faint image very completely, so that the result was only equal to a pale 15 in a fixed and washed print. We are not able to say how quickly a summer's sun would produce a similar print, but on a fine day in mid November at noon, with the sun shining, two minutes and a-half was sufficient to give a like impression. With the sun behind the clouds on the same fine day, and also about noon, ten minutes were necessary to secure what the electric light furnished in fifteen minutes. So we may take it that a 6,000 candle arc lamp, at 5 feet, gives from half to two-thirds the light afforded by an Autumn day at noon without sun, while in the sunshine six prints could be got off, for every one by the electric light.

At two and a-half feet distance, we should get very much quicker results; the printing would go on at least twice as quickly as on an autumn day without sun, but in order to get a light as intense as autumn sunlight, the printing frame would have to be placed at a less distance than two feet.

Printing by the electric light is, therefore, decidedly practical, if it is only worth while to employ it. We have said that chloride of silver paper is about four times as sensitive as the iron process; and, practically, we found that half-an-hour was necessary to produce a Pellet print—that is, employing an ordinary draughtsman's tracing in place of negative—at a distance of five feet from the carbons. With a little management, several big frames may be set printing at one time around an electric lamp, and by changing their places during exposure, the printing action proceeds with considerable evenness over the whole surface.

It is, however, only for special work, obviously, that electricity can be used for printing, since the expense of a powerful light is considerable. Still the advantages are many, especially when it comes to printing with iron or bichromate salts, as in the case of making transfers for the photo-etching process. In both cases, it is impossible to judge with the eye alone as to the progress of the printing. Now, as the illumination from an electric light is practically constant, it is only necessary to reckon by time in order to get a print of the right character. One of the greatest difficulties in both the iron and bichromated gelatine process is thus overcome, and it is possible, with a little care and attention, to produce prints one after the other in succession, all of the same nature as regards depth of printing. The same holds good in the making of negatives in the camera with the electric light; given a certain distance from the object to be copied, a certain lens and a certain diaphragm, the exposure may be reckoned with accuracy, provided, of course, the sensitive film is to be trusted.

FRENCH CORRESPONDENCE.

Photography and Postage-Stamps—Studio for Nature-Printing at Lyons.

Photography and Postage-Stamps.—The Bank of France has always made strenuous efforts to issue bank notes rendered incapable of reproduction by photography; and if it has not succeeded absolutely to prevent counterfeiting, it has, at any rate, made it very difficult. It might be well to ask why the Postmaster-General has not endeavoured to hinder the forging of postage-stamps, which are so easy to reproduce with the camera, and afterwards engraved by means of one of the ordinary processes of photo-engraving? Some months ago it was stated in the newspapers that a great deficit was found in the sale of postage-stamps, and it was attributed to the use made of obliterated stamps, all traces of obliteration being made to disappear. We have tried washing used stamps, but we have not succeeded without the aid of some other substance and, without certifying that this washing is impossible, we do not think that by this means any great risk of fraud exists. It would be so easy to reproduce stamps and print new plates, that we cannot conceive so much time being spent over cleaning the old ones. In fact, the operations of reproduction and engraving offer no difficulties whatever; and the typographic negative once obtained, what can be easier than printing and finally perforating? Photography, perhaps, accomplishes the copying and engraving without the help of an artist; and, as to the printing, a simple typographic press suffices. With the State, however, in order to realise several thousand francs in stamps, great quantities must be issued. The deficit of many tens of thousands of francs cannot be attributed to the washing of obliterated stamps, but more likely to an ingenious photographic counterfeit. Many establishments deliver articles, stamps being returned to the required amount as payment; and this is a method by which hundreds of francs are circulated daily. The postage-stamp is, in fact, a recognised, if not a forced form of paper money; and it seems to us worth while taking some precautions against counterfeiting. We have remarked that English stamps are printed on paper bearing a water-mark, a step in advance of France, where the paper is simply tinted, and does not in that respect hinder the exercise of fraud.

Nature Printing at Lyons.—An establishment for photo-painting has just been set up at Lyons by M. A. Durond, who acts as director. He has invented a process of oil painting on the back of prints or albumenized paper. When painted, the prints are heated in an oven at the temperature of 90°, when all the volatile portions of the oil, fatty essences, &c., are eliminated from the prints, upon which the colouring matter alone remains. By this means the freshness of the colour is preserved, and the photographic image, according to M. Durond, will also resist the action of time. No doubt the presence of an oily body in close contact with the print would preserve it from the damp. This process is patented under the name of *Photonature*,* and it is proposed to execute prints in colour at the same price as those in monochrome. We shall see how this affair will proceed. The opening of the studio is fixed for the 10th inst. A similar one will shortly be organised in Paris.

Leon Vidal.

THE POSTAL PHOTOGRAPHICAL SOCIETY.

The honorary secretary of this Society has been good enough to forward for our inspection a most interesting collection of prints contributed by members, and which forms "Competition Portfolio" No. I. We may here recapitulate what it is the Society strives to do. The want having been felt by many ardent amateurs scattered up and down the country of some means of intercommunication and of comparison of the work they were doing with that being done by others, and the then existing societies mainly located in large towns and centres failing to assist this large class, who lived, for the most part, in country places, it was thought a society which could circulate its members' work by post from place to place and from door to door might have a *raison d'etre*; and though the Society only dates from the 1st July, it now numbers some thirty members, with representative members in all three Kingdoms and in the Principality.

The contributions now under consideration have been sent to the secretary in accordance with an announcement made that prizes would be offered in (1) landscape, (2) portraiture, and in a "set subject" which was "A Rustic Group," such as a painter would introduce; "The Mill;" "Family Troubles," or, "In Doubt." The idea of such a competition was founded on similar competitions familiar to members of sketching clubs, and with a view to encourage a pictorial resource and inventiveness among the members.

* See our Patent List this week.

The forty odd prints, some of considerable excellence, and all of credit to the amateur contributors, amply justify the originators of the scheme, and the collection will now circulate by post to all the members, who are, as it were, their own judges. For with the portfolio is a book for amateurs, and an ingenious plan is adopted by which every member has three votes in each class—one vote for the picture he thinks shows the best negative, one for the best print, and one for the best pictorial composition. The prizes will be decided by the votes, and the committee have determined on giving a second prize for the landscape shown, and also on repeating the competition, prints to be sent before April 10. The first two subjects are the same in this next competition, the set subject being "a winter subject" (view or figure).

We are asked further to say that the first album of contributions is still on its rounds, that the second is ready and will start as soon as the portfolio has got clear ahead, and that the third is now in course of preparation from the prints already sent. The note-book accompanying the first album has been copiously used by members, and the criticisms, though sometimes pungent, are extremely instructive. All members were asked to note down in it, experience in the various intensifiers and in the methods of obviating halation or blurring, and some very practical remarks have resulted.

The name and address of the Hon. Sec. is H. H. Cunningham, B.A., 7, Fig Tree Court, Temple, E.C.

NOTES ON PHOTOGRAPHY.

BY E. HOWARD FARMER.

Lecture III.—Principles Involved in Representing Chemical Changes by Means of Formulæ, etc.

Matter may be defined as that which occupies space and possesses weight; it can neither be destroyed, created, nor transmuted.

Matter exists in three principal physical states called respectively solid, liquid, and gaseous. Solid matter may again be divided into three principal kinds, viz., amorphous, crystalline, and cellular.

In investigating the properties of the different kinds of matter which exist on the earth, chemists find that they can be divided into two great classes; first those which cannot by any known means be split up, or from which nothing essentially different can be obtained—these are called elements; and second, those which can be split up, and consist of two or more of these elements in chemical combination—these are called compounds. There are about sixty-four elements at present known; the innumerable other substances with which we are acquainted being composed of two or more of these sixty-four elements.

The elements are divided also into two classes called metals, and non-metals; there are thirteen non-metals, the remainder being metals.

LAWS WHICH REGULATE CHEMICAL COMBINATION BY WEIGHT.

1. *Law of Constant Proportion.*—The same compound consists invariably of the same substances in the same proportion by weight. Thus it has been found that 188 parts by weight of silver bromide contain invariably 108 parts of silver and 80 parts of bromine.

2. *Law of Reciprocal Proportion.*—The proportion in which any two substances combine together is that in which they combine with every other substance. Thus, 80 parts of bromine combine with 108 of silver to form silver bromide, and 127 parts of iodine combine with 108 of silver to form silver iodide; but 80 parts of bromine is the exact quantity which combines with 127 of iodine. Or again, 35½ parts of chlorine combine with 108 of silver to form silver chloride; but 35½ parts of chlorine is the very quantity which combines with 80 of bromine or 127 of iodine.

3. *Law of Multiple Proportion.*—When one substance combines with another in more than one proportion, the higher proportions are always multiples of the first; this law is well illustrated by the five compounds which nitrogen forms with oxygen, viz:—

Nitrogen monoxide	=	Nitrogen 28	+	Oxygen 16		
„ di „	=	„ 28	+	„ 32	=	16 × 2
„ tri „	=	„ 28	+	„ 48	=	16 × 3
„ tetr „	=	„ 28	+	„ 64	=	16 × 4
„ pent „	=	„ 28	+	„ 80	=	16 × 5

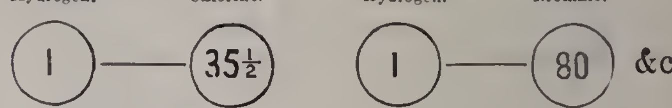
4. *Law of Compound Proportion.*—The combining proportion of a compound is the sum of the combining proportions of its constituents. Thus, 17 parts of ammonia contain 14 of nitrogen and 3 of hydrogen, and 81 parts of hydrobromic acid contain 80 of bromine and 1 of hydrogen; now 17 to 81 are the exact proportions in which ammonia and hydrobromic acid combine to form ammonium bromide.

These laws were explained by Dalton by means of a remarkably ingenious theory, called the atomic theory, and which so facilitates the comprehension of chemical changes generally, that we must consider it for a moment or two.

THE ATOMIC THEORY.

This theory supposes the elements to be aggregations of tiny particles called atoms, which atoms are themselves indivisible by any means. It further assumes that every atom of the same element has the same weight, so that if one atom of hydrogen weighed one-millionth of a grain, every other atom of hydrogen would weigh the same; but that the atoms of different elements have different weights, their respective weights being represented by the proportions in which they combine, or some simple multiple of that number. Thus, if we take the weight of an atom of hydrogen as unity, the weights of the atoms of chlorine, bromine, and iodine would be 35½, 80, and 127 respectively, this being the proportion in which they combine together (see fig.)

Hydrogen. Chlorine. Hydrogen. Bromine.

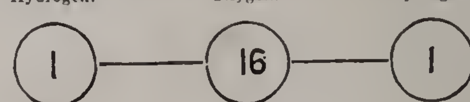


Hydrochloric Acid. Hydrobromic Acid.

Single atoms always combining together, whatever quantity we take of these compounds, there will always be the same number of atoms, and therefore the same relative weight of each element.

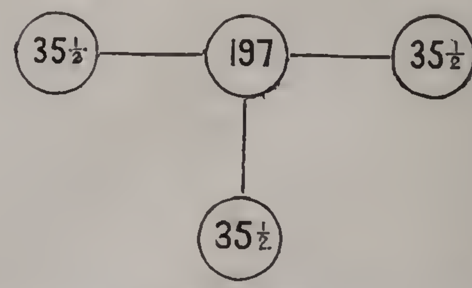
In other cases two, three, four, or more atoms of one element are supposed to combine with one atom of another element, in which case the combining proportion of the latter has to be multiplied two, three, four, or more times in order to represent its atomic weight (see fig.).

Hydrogen. Oxygen. Hydrogen.



Water.

Chlorine. Gold. Chlorine.



&c.

Gold Chloride.

These atoms are supposed to be incapable of existing in the free state, but two or more (either of the same or different kinds) are invariably combined together, and are then said to form a molecule.

It will be seen with a very little thinking that if we adopt this theory, the laws we have been considering follow as a matter of course.

CHEMICAL FORMULÆ.

Chemical formulæ are employed to represent (qualitatively and quantitatively) chemical changes in matter in as simple and abbreviated a manner as possible. In order to understand and use these formulæ, the following points should be engraved on the memory.

The chemical elements are represented by the first and sometimes two letters of their Latin names; thus, Cl, Br, I, Au, and Ag, represent chlorine, bromine, iodine, gold, and silver respectively.

These symbols further represent the supposed weights of their atoms, the weight of an atom of hydrogen being taken as unity, thus :—

Cl represents	$35\frac{1}{2}$	parts	by	weight	of	chlorine
Br	,,	80	,,	,,	,,	bromine
I	,,	127	,,	,,	,,	iodine
Au	,,	197	,,	,,	,,	gold
Ag	,,	108	,,	,,	,,	silver

When two or more elements combine together to form a compound, the compound is represented by placing the symbols of its elements in juxtaposition, the symbol of the metallic element (if present) being placed first; thus, KBr, AgI, represent in the first place potassium bromide and silver iodide, and in the second place their composition by weight.

When more than one atom of an element is required to be expressed, it is done by placing a small number to the right hand, and somewhat beneath the symbol; thus $CdBr_2$, $AuCl_3$ represent one atom 112 parts of cadmium combined with two atoms 160, 80×2 parts of bromine, which is the composition of anhydrous cadmium bromide, and one atom of gold combined with three atoms of chlorine to form gold chloride.

When a number is placed before and on a line with symbols it multiplies all which follow it as far as the first comma, + (plus sign), or full stop; thus $2H_2O$ represents 2 molecules $18 \times 2 = 36$ parts by weight of water, and $FeSO_4, 7H_2O$ represents $FeSO_4 + 18 \times 7 = 126$ parts of water, or common iron sulphate (green vitriol).

When it is required to represent a chemical change, the formulæ of the substances brought together are connected by the algebraic sign +, and the resulting products to these by the sign of equality =; as in algebra, the total quantity on each side of the equation must invariably be the same; thus we represent the formation of silver bromide by the action of silver nitrate on potassium bromide as follows :—

$$\underbrace{\underset{\underbrace{108+14+48}_{170}}{AgNO_3} + \underset{\underbrace{39+80}_{119}}{KBr}}_{\text{Total } 289} = \underbrace{\underset{\underbrace{39+14+48}_{101}}{KNO_3} + \underset{\underbrace{108+80}_{188}}{AgBr}}_{\text{Total } 289}$$

and by which we learn that 170 parts by weight of silver nitrate, mixed with 119 parts of potassium bromide, produce 101 parts of potassium nitrate (nitre) and 188 parts of silver bromide.

All chemical changes belong to one or other of five types, and in order to familiarize ourselves with these formulæ we will take a few examples of each of these types.

1.—*Direct Combination or Synthesis.*

$$H + Cl = HCl$$
$$Ag + I = AgI \quad \text{Daguerreotype plate}$$
$$NH_3 + HBr = NH_4Br$$

2.—*Splitting up or Direct Analysis.*

$$2AgCl + \text{light} = Ag_2Cl + Cl$$
$$HgO + \text{heat} = Hg + O$$
$$AuCl_3 + \text{heat} = Au + Cl_3$$

3.—*Displacement of one Element by another (selective affinity).*

$$KI + Br = KBr + I$$
$$KBr + Cl = KCl + Br$$
$$2AgCl + Zn = ZnCl_2 + 2\,Ag$$

4.—*Double Decomposition.*

$$AgBr + KI = AgI + KBr$$
$$HgCl_2 + 2KI = HgI_2 + 2KCl$$
$$2AgNO_3 + K_2CrO_4 = Ag_2CrO_4 + 2KNO_3$$

5.—*Re-arrangement.*

$$HgI_2 \text{ red} + \text{heat} = HgI_2 \text{ yellow}$$
$$\text{Albumen soluble} + \text{heat} = \text{Albumen insoluble}$$

PROFESSOR HENRY DRAPER, M.D.

The late Professor Henry Draper was born in Virginia, in 1837, but removed to New York when his father, Prof. J. W. Draper, was appointed to the Chair of Chemistry in New York University. At this University Dr. Draper was educated, graduating in Medicine in 1858, after which he travelled abroad. In 1860 he was elected to a professorship in his own University, which he retained till his death the other day. In 1866 he was elected Professor of Physiology in the Medical Department of the University and Managing Officer of the Institution, a position he resigned in 1873.

Dr. Draper's scientific work began with a series of experiments in 1857 on the function of the spleen, carried out by the aid of microscopic photography, an art then in its infancy. On his return from Europe, stimulated by a visit paid to Lord Rosse's 6-foot reflector, he began the construction of a $15\frac{1}{2}$-inch reflecting telescope, and with this, when completed, he took photographs of the moon.

Dr. Henry Draper subsequently constructed an equatorial reflecting telescope of 28 inches aperture, making both the mounting and the silvered glass speculum himself. The object for which this instrument was intended, and which it succeeded in accomplishing in 1872, was photographing the spectra of the stars, a work which has been carried on with such success by Dr. Huggins in this country. Since the invention of the gelatino-bromide dry process the difficulties of this research have much decreased; all the more credit is therefore due to Draper and the other pioneers in this branch of inquiry; he had taken more than a hundred spectra of various stars.

In 1872 Dr. Draper produced a photograph of the diffraction spectrum of great excellence. It comprised the region from below G, wave length 4,350, to O, wave length 3,440, on one plate.

In 1874 Draper was appointed by the United States Transit of Venus Commission, Superintendent of its Photographic Department, and his duties in this connection were so satisfactorily performed, that in the fall of that year the United States Government caused a special gold medal to be struck in his honour at the Mint in Philadelphia, bearing the inscription, "Decori Decus Addit Avito." This was the first time that such a public recognition had ever been accorded to a scientific man in the United States by the Government.

In 1877 Dr Draper printed his paper on the "Discovery of Oxygen in the Sun and a New Theory of the Solar Spectrum." This research has given rise to as much interest as any in recent times; whatever the future verdict may be upon it, it was the result of several years' work and most costly and elaborate apparatus. In 1877 Dr. Draper went to the Rocky Mountains, and made experiments on the transparency and steadiness of the atmosphere at elevations up to 11,000 feet. In the succeeding summer he took a party into the same region to observe the total eclipse of the sun, and was fortunate enough to photograph the diffraction spectrum of the solar corona, which, on this occasion, was shown to be continuous.

During the last autumn and winter he took photographs of the nebula in Orion. These were the first he ever made, and required an exposure in the telescope up to 140 minutes, even when the most sensitive of Eastman's gelatine plates were used.

Dr. Draper's work has been done mainly at his observatory at Hastings-on-Hudson, and at his laboratory in New York. In the former he had three large telescopes.

Dr. Draper's genial nature won him many friends, and many English men of science well knew the hospitable home at Dobb's Ferry. These and many more will sympathise with Mrs. Draper in the loss which not only she but science has sustained in the death of so earnest a seeker after truth.—*Nature.*

Notes.

We welcome a new Americau contemporary, *The Southern Amateur*, a monthly journal published in Baltimore.

Our next pictorial supplement is promised us by the end of December. We are going to try how far the ink-photo process is suitable for portraiture, the title of our picture being, "Waiting to Go On," at a Christmas pantomime.

The first photographic annual has reached us in the form of the German *Kalender*, edited by Herr K. Schwier, of Weimar; our own Year-Book will, as in the past two years, be published punctually on the 20th inst.

Many an amateur photographer, aye and professional too, would practise the beautiful process of Daguerreotype if he only possessed the vapour generators, exciting-boxes, and other strange paraphernalia he has been given to understand are necessary for the production of the image. Mr. William England, one of the few Daguerreotypists still living, has, we are glad to say, promised us to dispel the illusion of all this mystery, and will explain in the Year-Book for 1883 how common utensils may very well be used in the process, and how simple it really is from first to last.

Another article in the Year-Book which will be appreciated by a host of landscape photographers is one written by Mr. J. Gale, upon whom the mantle of Mr. Russell Manners Gordon seems to have fallen. Mr. Gale treats in a practical fashion of the wants of a photographer who may be out for a day or a week, and sums up succinctly the list of apparatus and appliances he should take with him.

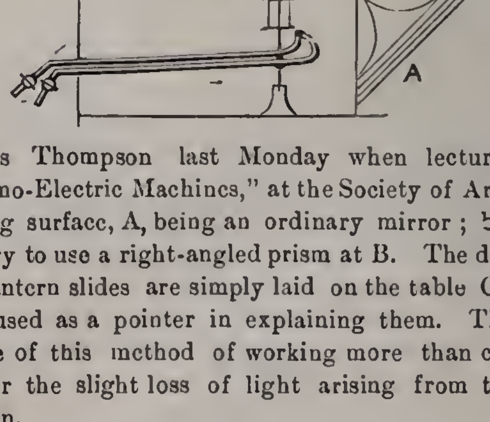
The phenomenon of the Transit of Venus on Wednesday was hidden in the neighbourhood of the metropolis by cloudy weather, much to the disappointment of all photographers with astronomical tastes. Let us hope that Lieutenant Darwin, R.E., the late Hon. Secretary to the Photographic Society, who has gone all the way to Queensland to observe the phenomenon, will be more fortunate.

Plymouth and Penzance seem to have been most favoured for observing the Transit of Venus. At Plymouth there was a fine view of the phenomenon; first a small black indentation appeared, and graduully passed into the body of the sun until a black spot appeared in the solar mass. With a good telescope Venus could be seen inside the sun's limb, yet bound to it by a black ligament, giving the well-described appearance of a pear-drop. In New York, at Yale College, all but the first contact was visible, and several hundred photographs were taken. At Harvard Observatory both the first and second contacts were recorded; while at Washington a dozen good photographs were secured. In Florida, where our friend Mr. J. T. Taylor is living just now, continuous photographs of the phenomenon were obtained. Altogether, therefore, our photographers and astonomers are to be congratulated on their results.

They have had to send all the way to Paris, to our friend M. Gobert, the photographic authority of the Bank of France, in order to get a satisfactory opinion on the handwriting of the prisoners in the Peltzer trial. M. Gobert, our readers will remember, has for a long time past acted as photographic adviser at the Bank of France, and has been so successful in the discovery of forgeries by the aid of the camera, that all doubtful handwriting now passes his inspection. Amounts scratched out and written over, similated signatures—and even forgeries of the blue bank notes, which have lately troubled the leading banking establishment in France—have been detected repeatedly by M. Gobert, whose experience in such matters is perhaps greater than any other living expert.

Three important works come to us this week from the Continent. The first is Poitevin's *Traité des Impressions*, a new edition, entirely revised by our esteemed Paris correspondent, M. Léon Vidal (Gauthier-Villars, Paris). The second is a new edition of our friend Dr. Eder's work on gelatino-bromide, which now appears in a most complete form; and the third book is entitled *Die Platinotypie*, from the pens of Captain Pizzighelli and Lieutenant von Hübl. The two latter works are published at the office of the *Photographische Correspondenz*, in Vienna. We shall have the pleasure of saying a few words about these volumes shortly.

Our diagram will give some idea of the convenient form of demonstrating or optical lantern used by Professor



Sylvanus Thompson last Monday when lecturing on "Dynamo-Electric Machines," at the Society of Arts—the reflecting surface, A, being an ordinary mirror; but it is necessary to use a right-angled prism at B. The diagrammatic lantern slides are simply laid on the table C, and a needle used as a pointer in explaining them. The convenience of this method of working more than compensates for the slight loss of light arising from two-fold reflection.

As the lecture progressed, small magnets were placed on

A MISTY MORNING ON THE WEAR.

the stage, and the lines of force were made obvious by dredging iron filings out of a pepper-box. Afterwards the magnetic properties of conductors were illustrated, and the magnetic condition of Pacinotti's annular electro-magnet (the so-called Gramme ring) was demonstrated.

Now that an inspector of ancient monuments has been appointed in the person of General Pitt-Rivers, we may hope something will be done to protect our interesting relics from Vandals and "trippers." Photography is able to afford a valuable guarantee that no monument is injured or defaced, or rather we should say a trite means of detecting injury or wilful destruction. Certainly some trustworthy record of the monuments as they are at present will be necessary, if the inspector's duties are to be discharged efficiently. Proof of this is afforded by Mr. W. G. Smith, who, writing to a contemporary on the subject of the stone circles at Penmacnmawr, says: "While I was at the smaller circle, I noticed that one of the stones had recently been pulled out of its setting, and was lying beside the hole. I noticed several other stones in the neighbourhood of the circles that had recently been thrown down."

The most efficient plan, therefore, of preserving the monuments as they are—for which duty the inspector has been appointed—would be to have each carefully photographed from two or three points of view, and then make sure from time to time that they are still standing. The photographs, printed of course by a permanent process, would be properly recorded and dated, and any change worked upon the monuments by time could be noted. On the other hand, the detection and punishment of evil-doers would not be difficult if the inspector did his duty. Speaking of some "trippers" visiting the wall of the great camp at Penmacnmawr, Mr. Smith says he saw "several of these terrible persons on the top, taking off the stones from the ancient walls and throwing them down below."

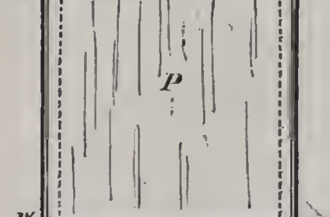
We were not quite right the other day in summarising the points at issue between Norman Lockyer and Dr. H. W. Vogel anent the dissociation of elements. Not merely because several of the iron lines appear broader, but because they are also displaced or curved—in the spectrum of a sun spot—is the basis of Dr. Vogel's objection to the dissociation theory. The phenomenon in question may imply movement, but Dr. Vogel explains it by a fact very often observed in terrestrial absorption spectra, viz., by the mixing of the absorbing body with another one of high dispersion, when some lines of the absorption spectrum are displaced, and others not. In the same way it is possible, Dr. Vogel thinks, that some iron lines in a sun-spot spectrum are also displaced, and others not, if a gas of high dispersive power is mixed with them.

By the way, Dr. Vogel's classification of photographic bromide of silver into two kinds, the blue-sensitive bromide, and indigo-sensitive bromide, appears to be perfectly warranted by the most recent experiments of Plener and Eder in Vienna. These gentlemen can not only produce the two forms at will, but separate the one from the other without difficulty. Step by step we are surely advancing in our knowledge of the wonderful haloid silver salt.

While on the subject of silver bromide, we may mention an interesting result which Tomassi has recently recorded He exposed for three months to the action of sunlight some bromide of silver in water, taking care to shake the same repeatedly, and at the end of this period he found the salt had lost 2·3 per cent. of bromine. Chloride of silver under the same circumstances lost 2·27 per cent. of chlorine. The fact of the bromide parting with bromine in this way points indisputably, our Italian chemist thinks, to the formation of a sub-bromide, of which the photographic image is composed, on the surface of the bromide.

The production of coloured photographs behind glass is occupying a good deal of attention on the Continent. The best results we have seen are those produced by Herr Koller, of Pesth, whose method we described in "At Home" and in our "Studios of Europe." Herr Klose, of Constance, who recently exhibited some of these so-called chromo-photographs at Berlin, gives the following *modus operandi*. Cement your photograph behind a glass plate with wax composition, which renders the picture transparent (Koller employs gum-dammar and Canada balsam, heating the print to obtain the utmost transparency), and paint in on the back all the salient details. A very thin glass plate is then used for backing up, and finally a sheet of drawing paper, upon which pastel colours have been vigorously but smoothly applied, so that they appear through the transparent photograph. The drawing paper is best stretched upon a zinc plate, so as to remain flat and even.

In the *Mittheilungen* appears a sketch of the cardboard box employed by Schwartz for packing dry plates, which seems both simple and effective. We reproduce it here—



k k represents the box as we look down into it, with the cover removed. The plate P is represented by dotted lines. Four wooden uprights, *V V V V*, are at each corner of the box, and serve to wedge the plate in position. The plates are simply laid flat in the box, and separated by strips of cardboard, *a a*, one at each end. The uprights, *v v v v*, keep the strips of cardboard in their places.

Mr. Hannyngton's advice in our last issue to depend upon rapid counting when timing exposures is exceedingly practical, as many experienced photographers can testify. As everybody has his own way of counting, however, he should not adopt the counting of other people. Mr. Haunyngton tells us how, by referring to a watch, the average speed of one's counting can be gauged to a nicety, and we think, for short exposures, the most accurate measurement is arrived at by counting as quickly as one can.

As an example of clever counting, Mr. Hannyngton instances the case of "the big drum" in an orchestra, who has occasional "rests," which he can time to a "beat." We wonder whether our correspondent had in his mind "the big drum" at Exeter Hall, of whom it is said he could count so accurately, that he made no difficulty about leaving his place in the middle of an overture when a number of "rests" came together; he used to slip downstairs, counting, walk across the Strand to his favourite tavern, without ceasing to count, swallow his refreshment, counting meditatively the while, and make his way back into the hall of harmony just in time to bring his sonorous instrument into play again.

Patent Intelligence.

Grants of Provisional Protection.

5395. Adolph Tuck, of 72 and 73, Coleman Street, in the city of London, Fine Art Publisher, for an invention of "Improvements in ornamenting terra-cotta plaques."—Dated 13th November, 1882.

Patent Void through Non-payment of Duties.

4738. Charles Guillaume Petit, Photographic Artist, of the city of Paris, in the republic of France, for an invention of "Improvements in photo-typography."—Dated 21st November, 1879.

The object of this invention is to transform a half-shade plate taken from nature, to a line plate forming a typographic relief. One of the characteristic properties of a layer of bichromated gelatine when exposed for a certain time beneath a photographic plate in the midst of actinic light is, that it resists expansion when immersed in cold water in proportion to the amount of light it receives, and this peculiar property is utilized for producing images from this plate in relievo or intaglio. Another peculiarity of this layer of gelatine is, that it also resists solution in warm water in proportion to the light received, and hence images in relief and hollow can be produced. The only difference between the two is, that in the first case a positive is required for the blacks of the plate forming relief, and, in the second case a negative is used. A white or photogenic substance, such, for example, as wax, susceptible of delicately receiving the impression of the gelatine thus prepared, is employed. This operation done, the surface of the modelling is rendered anti-photogenic by blacking it as superficially as possible with black lead; for example, the modelling thus prepared is placed in an engraving or etching machine in such a position that the point of the tool, which is V-shaped, can make incisions on the surface in a precise and rigorously mathematical manner. The following then occurs:—The maximum of penetration is regulated on the deepest hollows of the modelling by sparing all the large hollows, and cuts the reliefs in proportion to their height. At the second incision, whose proximity to the first is regulated on the highest reliefs, like the first, spares the greatest hollows, and cuts the reliefs in such a manner as to meet the incision made by its preceding course only on the highest, and so to remove all the anti-photogenic matter with which they were covered. Thus, by the successive incisions of the tool well regulated in depth, in proximity to each other and in intersection, an image is formed on the surface of the modelling, which, properly lighted and photographed, reproduces the original plate in a plate formed solely of perfect whites and blacks; that is to say, useful for all kinds of printing reproducing the characteristics of the original subject, especially applicable to typography. The principle of the invention, or the transformation of an ordinary photographic plate into one formed of white and black lines, or points in proportion to the size of the relief obtained by chemical combinations which are rendered insoluble by light, may also be effected as follows:—For the sake of shortening the operations above mentioned, which may be considered as an analysis of the process, by engraving the surface of the wax before modelling, or by the simple use of grained paper, or bearing the dry impression of the several combinations of hollow lines, the modelling is then performed in the following manner:—After having selected a wax or paper on which the depth of the cuttings is equivalent to the highest reliefs of the gelatine, the paper or wax is placed on a hard and perfectly even surface. Above this is placed the gelatine uniformly, and as superficially blacked as possible, and then another smooth hard surface. The whole is then submitted to pressure, and the wax or paper, as the case may be, will each carry in all the lines of their surface as much more black (deposited on the gelatine) in proportion as these lines or grain have been more or less flattened by the reliefs of the gelatine. By this means an image is formed of black and white lines, the depths of colour being proportionate to the reliefs of the gelatine, which image, re-photographed, produces a plate capable of serving as a typographic relief in the manner and by the means specified. I claim the transformation of a half-shade plate taken from nature to a lined plate forming a typographic relief.

Patents Granted in Belgium.

59,223a. A. and G. Bernheim, of Paris, for "Applying photographic portraits on tie-breast-plates."—Dated 9th October, 1882.—French Patent, 30th September, 1882.

59,408. J. Chaine, A. Durand, and Sallonnier de Chaligny, of Lyons, for "Coloured photographs or so-called 'photonature.'"—Dated 28th October, 1882.

Patent Granted in France.

148,834. Meisenbach, for "Preparing stereotype plates by photography."—Dated 8th May, 1882. Class 17.

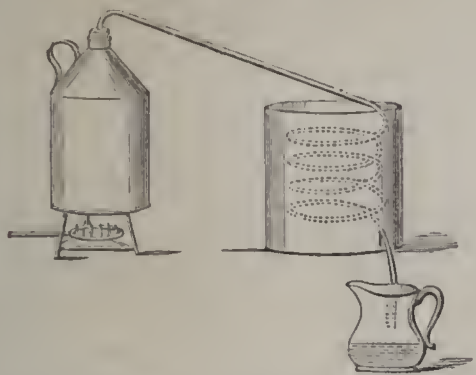
TWELVE ELEMENTARY LESSONS IN PHOTOGRAPHIC CHEMISTRY.

No. XII.—Collecting and Working-up Residues.

As a good deal of interest has been taken in the treatment of residues of late, we make no apology for concluding this series of lessons by describing the processes proved to work best in practice. We shall consider the subject under five headings, viz., alcohol, gold, oxalate, platinum, and silver.

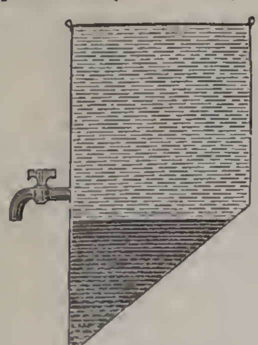
Alcohol.—Now that this liquid is being used so extensively for precipitating gelatine emulsion, hardening and facilitating the drying of gelatine plates, it is very important that photographers should know how to recover the alcohol for future use. The desired result may be obtained either by treating the dilute alcohol with dry potassium carbonate, or by distilling the liquid over quick-lime. In the first process, the potassium carbonate forms with the water a saturated solution which will not mix with the alcohol, thus allowing it to separate, and from its low specific gravity rises to form an upper liquid. The alcohol is drawn off by a syphon, and the solution of potassium carbonate evaporated down ready for future separation. The objection to this process is that it does not free the alcohol from all the water, and is very liable to leave certain impurities still dissolved. Although the alcohol might be used with impunity for precipitating gelatine emulsion, the liquid would not be sufficiently pure for a great many photographic processes; it is therefore preferable to purify all alcoholic residues by distilling over lime.

For alcoholic distillations, an apparatus consisting of a tin oil-can of suitable size, fitted with a perforated cork, is required. A piece of lead pipe half-an-inch in diameter, and about six feet long, one end of which is inserted in the perforated cork, while the other end is bent into a spiral, serves to condense the liquid. The spiral tubing is placed in a small tub or barrel having a hole just large enough to admit the end of the tubing (see figure).



The alcohol residue mixed with an equal weight of fresh quick-lime is placed in the tin can on a sand-bath or a saucepan of water, and heat applied, when the pure alcohol vaporises and condenses in the spiral tubing. The vessel enclosing the spiral must always be kept full of cold water, the warm water being occasionally drawn off from the surface, while cold water is added down a tube at the bottom. Alcohol purified in this way contains about five per cent. of water, and is quite strong enough for all photographic purposes, except for the manufacture of collodion.

Gold.—Most photographers neglect the gold contained in old toning baths, on account of the small amount contained therein, and no doubt in small establishments it is hardly worth troubling about, but in large establishments, where a great deal of silver printing is done, the collection of residues should always be attended to. A large barrel, tub, or wedge-shaped tank (see figure) should be set apart,



Section of Residue Tank.

wherein all used toning baths are collected, and when the vessel is full, a solution should be added, containing about thirty grains of protosulphate of iron for every gallon of the residue contained in the tank. After allowing the liquid to stand for about twelve hours, the supernatant liquor must be drawn off by a stopcock or a syphon, leaving the residue of metallic gold, together with waste liquor to the depth of three or four inches. The remaining liquor and precipitated gold should be thrown on a filter of bibulous paper, washed by pouring hot water over it, and, when dry, the gold is ready for conversion into chloride in the manner previously described.

Potassium Oxalate.—The ferrous oxalate developer, when once used, is generally thrown away; yet how often we hear photographers cry out at its expense; but if attention is given to re-converting the used solution into potassium oxalate, the developer will be far cheaper than any other. Either caustic potash or potassium carbonate will decompose the oxalate solution, but we prefer to use the latter compound.

The solution to be acted upon should be placed in a large beaker, and sufficient quantity of a saturated solution of potassium carbonate added till no further precipitate of carbonate of iron is produced; the solution must then be filtered through bibulous paper, and should appear perfectly colourless. If the solution is still tinted brown, it shows that the whole of the iron has not been precipitated, and that the addition of potassium carbonate and the process of filtering must be repeated.

The solution of potassium oxalate thus prepared contains a certain amount of potassium carbonate, therefore a saturated solution of oxalic acid must be added to decompose the potassium carbonate, the exact point of neutrality being found by testing the solution with litmus paper. The solution should finally be evaporated down till the salt begins to crystallize, and allowed to cool; the mother liquor can be poured off ready for use, and the crystals dissolved in sufficient water to prepare a "saturated solution."

Platinum.—If only workers of the platinotype process knew what a large quantity of platinum salt is wasted when they throw a used developer into the sink, perhaps they would be more careful to collect platinum residues. In the first place, it must be remembered that the prepared paper is coated with a solution containing sixty grains of the platinum salt to the ounce, and that only about one-tenth of the platinum is actually deposited on the print, while about three-fourths of the salt is dissolved, and remains in the developer. It is therefore evident that in order to obtain the greater part of the waste platinum, all that is necessary is to treat the developer with a reducing agent, such as is used for obtaining gold from its solution. The following is the method which has proved most successful in our experience. Place the used developer in a large beaker, and heat the solution over a sand-bath till nearly boiling, then add to the solution one-fourth its volume of a saturated solution of protosulphate of iron; a black precipitate will be immediately produced consisting of pure metallic platinum. The supernatant liquid, consisting of ferrous oxalate, is carefully poured off into the oxalate residues, and the precipitated platinum, after being washed by decantation, should be either converted into chloride, or sold to a refiner.

Silver.—This element is present both in the wash-water of silver prints, and the fixing solutions used for negatives and prints. In order to obtain the silver from the wash-water, the solution must be collected in a vessel similar to that used for gold solutions, and containing two or three handfuls of common salt. When the collecting tub is full, the supernatant liquor should be poured off, leaving at the bottom the precipitated chloride of silver, which must be dried, and either sold to a refiner, or mixed with an equal weight of dried sodium carbonate and fused in a furnace, as described in the lesson on the preparation of silver nitrate.

To obtain the silver from hyposulphite fixing baths, the solution should be collected in the usual way, and precipitated by means of sulphide of ammonium. It is impossible to give any definite quantity to insure the precipitation of the silver, but 3 per cent. of the alkaline sulphide should be added to the ordinary fixing bath used for gelatine plates, while 1 per cent. of the precipitant will suffice for solutions used for fixing silver prints.

To obtain metallic silver, the precipitated silver sulphide obtained as above, must be dried, and mixed with an equal weight of a mixture of potassium nitrate and sodium carbonate, and fused in a blast furnace.

EFFECTS OF TEMPERATURE ON THE LUMINOSITY OF SULPHIDE OF CALCIUM.

BY E. BRIGHTMAN.*

At a previous meeting of the Association I pointed out the fact that the sulphide of calcium is not reliable as a standard light for comparative experiments with the sensitometer, from the fact that an increase in temperature causes an increased luminosity in the previously excited surface. Carrying the experiments I

* Read before the Bristol and West of England Photographic Society.

then made still further, I find the following results. First, that a high temperature not only increases the luminosity of the surface previously excited by light, but that it is also capable of causing luminosity altogether apart from the action of light. Secondly, that a decrease of temperature causes a decrease of luminosity, whether the luminosity has been excited either by light or by heat. Thirdly, that if the temperature be sufficiently reduced, the luminosity altogether ceases.

In order to clearly show the effects of temperature, I have prepared a series of thin glass test-tubes coated with the sulphide of calcium. To No. 1, which is already slightly luminous, I will add some water at a temperature of 212°, you will note an immediate icnrease of luminosity. To No. 2, which has been kept in the dark for some days, so that the luminosity is entirely gone, I will add in the same manner water at 212°; with the result that the luminosity is immediately established. To No. 3, which is brilliantly luminous, I will add water slightly chilled by the addition of a freezing mixture, with the result that the luminosity is considerably lowered; on adding a still further quantity of the freezing mixture the light entirely ceases.

It thus is clearly evident that the sulphide of calcium as a standard light for sensitometrical experiments is utterly unreliable, unless some method is adopted by which a regular temperature could be maintained.

PHOTO-LITHOGRAPHY AND PHOTO-ZINCOGRAPHY.

BY MAJOR J. WATERHOUSE, B.S.C.,
Assistant Surveyor-General of India.

Chapter V.—Theory of Photo-Lithography, and General Considerations.

With the taking of the negative the first and purely photographic stage of the operations comes to an end, and we now enter upon an intermediate stage, in which photography and lithography are to a certain extent combined, in order to produce on the stone or zinc, by the agency of light, an image in fatty ink from which impressions may be printed by the ordinary methods of lithography or zincography.

This result may be brought about in different ways; depending, first, on the nature of the sensitive substance and the chemical reactions by which the image is produced under the influence of light; and secondly, on the mode in which the image is applied to the stone or zinc, whether directly or by transfer.

First, as regards the nature of the sensitive substance, there are two distinct methods of obtaining the photographic image, viz., with asphaltum or bitumen, and with alkaline bichromates mixed with colloid substances, such as gelatine, gum, albumen, &c. In both cases advantage is taken of the fact that if a thin dry film of asphaltum or a chromo-colloid mixture be applied to the surface of paper, stone, or other suitable material, and exposed to light under a photographic cliché, those parts of the film upon which the light can act through the transparent parts of the cliché will become more or less insoluble in the usual solvents, while the parts protected by the dark parts of the negative, and therefore unacted on by light, retain their solubility. The amount of insolubilty thus produced is in direct proportion to the intensity of the light and the duration of its action.

If, after exposure to the light, such a film be washed with a suitable solvent, the soluble parts will wash away, leaving a more or less perfect image in asphaltum or insoluble colloid, both of which substances are capable of receiving and retaining a coating of greasy ink, which will yield impressions suitable for the purposes of the lithographic printer.

Asphaltum or bitumen of Judea is a brownish-black resinous substance or mineral pitch found chiefly in Syria and Trinidad. It is soluble in the volatile and essential oils, such as turpentine, lavender, &c., and also in benzole, mineral and coal-tar, naphtha, and the fixed oils. It consists of three resinous principles; one a yellow resin, soluble in alcohol and ether, forming about 5 per cent. of the whole; if the residuum be digested with ether, a further 70 per cent. of a brownish black resin is obtained which is freely soluble in the volatile oils and in about five parts of mineral naphtha. The remaining 25 per cent. left undissolved by ether is very soluble in the oils of turpentine and petroleum, also in chloroform. According to Kayser this portion is the most sensitive to light, and it may be obtained for photographic purposes by dissolving bitumen in chloroform, and then adding three times the quantity of ether, which precipitates the sensitive principle. A thin coating of a solution of asphaltum in turpentine or benzole is of a light brown colour, which does not perceptibly change in tint under the influence of light, though it loses its power of dissolving in its usual solvents.

From the researches of Niepce de St. Victor and Chevreul it appears that this alteration of asphaltum under the influence of light is due to oxidation, and does not take place in a vacuum or in an atmosphere of nitrogen. Further, the sensitiveness of the bitumen, whether in the solid or dissolved state, may be considerably increased by allowing the air to have free access to it for varying periods, according to the quality of the specimen. It was found by Bayer that if, on the other hand, free access of air was prevented during exposure to light, as when a collodion film is attached to the varnished surface by means of gum, the transformation of soluble to insoluble under the action of light does not take place.

The peculiar property of asphaltum to become insoluble under the influence of light was first utilised by Joseph Nicephore Niépce, of Chalons-sur-Marne, about the year 1813, in the course of the researches he made to find a substitute for lithographic stone by producing images through the action of light on metal plates coated with resinous varnishes; and this was the first known process of permanent photography.

Niépce coated metal plates, usually of tin, with a thin varnish of asphaltum dissolved in oil of lavender. After a sufficient exposure to light under an engraving or in the camera, the plate was washed with a mixture of oil of lavender and oil of white petroleum, which dissolved the asphaltum where the light had not acted, while in the parts acted on by the light it remained insoluble, and formed an image which could be bitten in by acids, and used for printing from, like a copper-plate engraving.

Though asphaltum is now scarcely ever used as a sensitive coating for stone, the earliest practical process of photo-lithography, introduced in 1852 by Messrs. Lemercier, Barreswil, Lerebours, and Davanne, depended on its use. They coated a lithographic stone with a solution of bitumen in ether; the stone was exposed to light under a negative, then developed by washing the varnished surface with ether, which dissolved the coating in the parts protected from the light, while the insoluble parts acted on by light remained, and formed a resinous image, which, after the usual preparation of the stone with acid and gum, could easily be inked up and printed from.

The principal cause of the abandonment of asphaltum for photo-lithography was the very long exposure required to produce the necessary degree of insolubility of the sensitive film, six or seven hours being necessary in a good light, while in dull weather the exposure might extend to days. As noted above, recent discoveries by Dr. Kayser have shown that the most sensitive constituent of asphaltum is insoluble in ether, and by eliminating the less sensitive constituents the sensitiveness of a thin film of this substance is very largely increased. This discovery has again drawn attention to the asphaltum processes, and rescued them from the neglect which seemed at one time almost to have consigned them to oblivion, and they are now very largely used, as we shall see in a subsequent chapter, for obtaining photographic images on zinc, suitable for typographic etching, the superior sharpness of the asphaltum image, and its capability of resisting the acid solutions used for biting, making it peculiarly suitable for this purpose.

(To be continued.)

Correspondence.

CHOCOLATE MOUNTS.

Dear Sir,—In your "Notes" of November 27th, you mention the fading of photographs when mounted on chocolate mounts. I have now entirely discontinued the use of chocolate mounts owing to my own experience. I have found prints (after careful washing and mounting with perfectly fresh paste) fade in a day or two when mounted on the chocolate mount, while prints mounted at the same time on other mounts show no sign of fading.

I enclose for your inspection three cabinet prints on chocolate mounts. In two days from mounting, all the half-tones were gone, and they have faded to what they now are in a month's time.—I am, &c., F. Stanley.

[The pictures sent are very yellow.—Ed. P.N.]

PLAGIARISM.

Sir,—At the last meeting of the London and Provincial Photographic Association, the chairman brought before the members a matter which, as affecting photographic morality, should not be dismissed without some further notice.

Among the pictures to which medals were awarded at the last Exhibition of the Photographic Society, was one called "Cherry Ripe." This, as the chairman pointed out, was copied, as nearly as a photograph from life could be copied from a painting, from an engraving in the *Art Journal* for 1872. The costumes differ, but all else is the same, with the exception of the titles. The engraving is entitled "Cherries Ripe," the photograph "Cherry Ripe," a difference scarcely calling for a great amount of ingenuity in the photographer, but it is a sample of the amount of difference in other respects between the engraving and photograph. I am willing to admit that coincidences are sometimes very surprising, but that this is not a coincidence is satisfactorily proved by the fact that in the same volume of the *Art Journal* is an engraving of a girl with a tambourine, which has also been imitated by the same photographer, the only difference being the substitution of an ugly model for a pretty one, and submitted to the judges in the same exhibition as his own work.

The photographer possibly sinned through ignorance—it is not given to some minds to know that another man's property and ideas are not his own—and this may be a case in which honest photographers should be lenient, and pass some such sentence as "not guilty, but don't do it again." But it now becomes a question if the photographer ought not, in honesty and for his own honour, to return the medal which he has received, I won't say under false pretences, but through a misapprehension on the part of the judges, for they must have relied on the good faith of the exhibitor, and taken for granted that a photographer with a well-known name would not put before them a work which, in all essential respects, was not his own.—Faithfully yours, An Exhibitor.

TIME OF EXPOSURE.

Sir,—The most simple arrangement for timing dry plates is to purchase a "metronome." It struck me three years ago as being just the thing. If you count "anxiety," for fear the sitter moves, or you may give too long or too short an exposure, you make a mistake. I think it extremely difficult to count twice alike. Now the metronome ticks quite loud, and, by shifting the balance weight either up or down, it will go fast or slow just as you wish, according to the known rapidity of your plates. The price is ten to twelve shillings, and will last a very long time, and, when wound up, will go for quite half-an-hour. Almost all music shops keep them, or Marion's, Soho Square.—

James Syrus Tulley.

Proceedings of Societies.

Bristol and West of England Amateur Photographic Association.

The ordinary monthly meeting was held at the usual place, the Association's studio, Kingsdown, on Wednesday evening, 29th November, Mr. J. Davey, one of the vice-presidents, in the chair.

The minutes having been confirmed,

Mr. H. A. H. Daniel, hon. sec., gave notice that at the next meeting he should move to rescind the resolution carried at a previous meeting, altering the date of annual meeting from October to January. He stated that it had been done with the desire to render the meeting of the Association more convenient; but it had been found that it was very awkward not to have all changes likely to be made in the Association accomplished before the end of the current year, and that, on the other hand, the feared difficulty as to the accounts had not been realised.

The Chairman then stated that the next subject for consideration was their "Triennial International Exhibition."

The Hon. Secretary stated that a meeting of the Council had been held at his residence in the preceding week, and he had called it so that the large number of foreign exhibitors should have timely notice and information as to the list of medals, dates of opening and closing the exhibition, &c. He stated what had been decided upon at the meeting of the Council, and remarked that any suggestions from members present would be welcomed.

There was a considerable amount of discussion, and many suggestions offered, the following being the list of medals finally and definitely decided upon.

1. A gold medal for the picture or series of pictures which, in the opinion of the judges, possesses the highest degree of merit, irrespective of size or subject.
2. One silver and one bronze medal for the best and second best landscape or series of landscapes of $8\frac{1}{2}$ by $6\frac{1}{4}$ or under.
3. One silver and one bronze medal for the best and second best landscape or series of landscapes above $8\frac{1}{2}$ by $6\frac{1}{2}$.
4. A silver medal for the best instantaneous picture or series of pictures of land or sea scapes.
5. A silver medal for the best interior or series of interiors.
6. One silver and one bronze medal for the best and second best portrait or series or portraits of $8\frac{1}{2}$ by $6\frac{1}{2}$ or under.
7. One silver and one bronze medal for the best and second best portrait or series of portraits above $8\frac{1}{2}$ by $6\frac{1}{2}$.
8. One silver and one bronze medal for the best and second best *genre* picture.
9. A silver medal for the best enlargement of any subject, and by any process, provided it be the work of the exhibitor.
10. A silver medal for the best enlargement of any subject, and by any process, provided both original negative and enlargement be entirely the work of the exhibitor.
11. A bronze medal for the best transparency or series of transparencies.
12. A bronze medal for the best ceramic photograph or series of photographs entirely the work of the exhibitor.
13. Four bronze medals, to be awarded according to the discretion of the judges, for improved apparatus, materials, processes, or other meritorious productions.

The exhibition will be held, as before, in the Galleries of the Academy of Arts, Queen's Road, opening on Monday, December 17th, 1883, and remaining open four weeks.

The Chairman then called upon Mr. E. Brightman to read his notes on "The Effects of Temperature on the Luminosity of Sulphide of Calcium" (see page).

Mr. Brightman made his remarks most interesting by illustrating them by very conclusive and clear experiments, which, with his remarks, were paid great attention to.

Mr. Daniel ventured to differ from Mr. Brightman as to the sensitometer being so very unreliable from the causes he had mentioned, for he concluded most persons kept their dark-rooms or laboratories generally at about the same temperature when testing plates; and presuming the luminous plate was not unduly fingered, the variation, he should consider, was but trifling. Also it was quite a question if the tablet could be rendered more luminous when in a given temperature than it would be on another occasion when thoroughly acted upon by the magnesium light at a somewhat lower temperature.

Mr. Brightman considered that it was so, and said that he hoped during the session to work out one or two other matters which suggested themselves to him in connection with luminous paint.

The Chairman asked what was a good mode of making a sand-bath.

Colonel Playfair replied that the sand from a fresh-water river was generally the best, being finer than sea sand, and a metal or porcelain dish was as good a holder for it as anything. A bath or other vessel once warmed could be kept so for a long time in a similar manner to that in which the Chinese keep their teapots warm, viz., to place the vessel in a box with a closely-fitting cover, the vessel being well packed with hot wool or flannel.

Some informal conversation and a vote of thanks to Mr. Brightman closed the proceedings.

London and Provincial Photographic Association.

At a meeting of the above, held at the Mason's Hall Tavern, Basinghall Street, E.C., on the 30th ult., Mr. A. J. Brown in the chair,

Mr. Henderson stated the following reasons why in his opinion gelatine plates require harder lighting than collodion, and a lengthy and interesting discussion followed. First, because (as a rule) gelatine plates when developed are thinner and require stronger contrasts; secondly, the liberation of free bromine is greater in the lights, consequently acting as a more powerful restrainer.

Mr. Cowan did not think that as a rule gelatine plates gave a thin image.

Mr. Coles said his experience was that very great rapidity tends to give a thin image.

Mr. Barber had always found in wet plates that when extreme rapidity was attained, the image was thin, and found the same in gelatine plates.

Mr. Debenham thought the discussion had somewhat diverged from the question; it was not admitted by anyone, save the writer of the question and Mr. Henderson, that harder lighting was necessary for gelatine plates. He remembered some time ago reading an article stating it was necessary to have soft lighting for gelatine work in the studio; he thought that the writer of that article was mistaken, and that Mr. Henderson was equally so in asserting that harder lighting was necessary. The best conditions of collodion and gelatine require identical lighting.

Mr. Henderson said that very few had worked the two processes side by side as he had done; if worked together under same conditions of lighting there would be found a marked difference in favour of the collodion, the dry plate negative having no pluck, owing to want of contrasts.

Mr. C. Walters found no necessity to alter the lighting for gelatine plates; he worked the two side by side, and produced with dry plates, with identical lighting, quicker and better results than with wet plates.

Mr. Barker said the quickest wet plate bath he ever made contained nitrate uranium.

Mr. Hart said to prepare a very rapid bath he used a neutral silver, and worked with a collodion not more than two days old; under these conditions he did not get an intense image, but a very brilliant and soft one, which, with very little intensifying, gave a very soft dense and brilliant picture.

Mr. Barker said a good collodion was prepared as follows:—

Alcohol ·815	½ ounce
Ether ·725	½ ,,
Iodide cadmium	2 grains
Iodide ammonia	2 ,,
Iodide sodium	2 ,,
Bromide cadmium	1 grain
Bromide ammonia	1 ,,
Powdered pyroxiline	7 grains

It gave a blue transparent film, was very sensitive, gave good density, kept well, and worked best when about three months old.

Mr. Hart had prepared a similar collodion for abroad, and had obtained splendid results with it when about three years old; when using cadmium in high temperature, pyroxiline was necessary.

Mr. Osman said he would bring forward a theory in connection with the subject for discussion at the next meeting. He however stated that he believed that free bromine was liberated, which acted upon the bromide of silver in contact with it, converted this with a sub-bromide, which was reduced by the developer.

Mr. Haddon pointed out that if the liberated bromine did act upon the neighbouring bromide, it would convert it into per- and not sub-bromide of silver as stated by Mr. Osman.

Mr. Ashman said that the pyrogallic solution alone was thrown on the plate: no image could be obtained without the ammonia solution, therefore he inferred that the bromide of silver was dissolved by the ammonia, and that the solution was necessary for development.

Mr. Debenham said that the ammonia used in developing was so dilute, it could not be supposed to dissolve enough bromide of silver to form the image; besides this, the fact that ferrous oxalate developed the image showed that the solution of bromide of silver was not necessary.

Mr. Orsman, in support of Mr. Ashman's theory, said the question was: Was the ferrous oxalate development a chemical one?

Mr. Debenham replied that even with pyrogallic development, the addition of ammonia was not necessary, as potash or soda would supply its place, and these did not, at all events, act by dissolving the bromide of silver.

Mr. Barker pointed out that one of the functions of the organic matter in the film was to absorb the free bromine that was given off after the impact of light, and the greater the affinity of the organic matter for the bromine, the greater the sensitiveness. He further stated that he had said at a previous meeting that in an emulsion the bromide of silver was formed first, and was then insensitive to development; that organic matter joined the compound next, and rendered it sensitive; and that nitrogen would be found in the more sensitive compounds, much the same as it is found in the more explosive compounds.

Mr. Collins showed a photograph, sent him from the Cape, of the great comet.

Liverpool Amateur Photographic Association.

The annual meeting of this Association was held at the Free Library, on Thursday, the 30th ult., the President, Mr. E. Roberts, in the chair.

The minutes of the October meeting having been read and passed, the following gentlemen were elected members of the Association:—Messrs. W. G. Holland, W. J. Grimshaw, J. W. Whiteman, and H. R. Boult.

The Hon. Secretary read the following report:—

"The Liverpool Amateur Photographic Association enters to-day upon the twentieth year of its existence, and the President and Council are glad once more to congratulate the Association upon its continued prosperity and advancing numbers.

"There have been nineteen new members elected since the last annual meeting; while, on the other hand, there have only been four resignations. The numbers of members on the books at the close of each of the last five years stand as follows:—1878, 59; 1879, 67; 1880, 71; 1881, 78; 1882, 93.

"Our meetings during the past year have been exceedingly well attended, and no effort has been spared in the endeavour to maintain their character for interest and practical usefulness. This is sufficiently evident from the following list of papers read, and demonstrations given during the past year:—'On the Platinotype Process,' Mr. H. N. Atkins; 'Passing Thoughts,' Mr. J. H. T. Ellerbeck; 'On Intensification,' Mr. Houlgrave; 'On Instantaneous Shutters,' 'On Illumination of the Dark-Room,' Mr W. H. Kirkby; 'On Gelatino-Bromide Emulsion,' 'On Landscape Lenses,' Dr. Kenyon; 'On the "Eclipse" Light,' Mr. J. Y. McLellan; 'On Enlarging with Lancaster's Lantern,' 'On Comparative Effectiveness of Intensifiers,' 'On Comparative Values of Remedies for Blistering,' Rev. H. J. Palmer; 'On his Gelatine Films,' Mr. A. Pumphrey; 'On Instantaneous Photography,' Mr. E. Roberts; 'Historical Notice of the Origin and Progress of the Collodio-Bromide Process,' Mr. J. Sayce; 'On a New Toning Apparatus,' Mr. J. Scheukenhofer.

"Exhibits of objects of interest to photographers have been produced at the meetings by Messrs. Atkins, Bean, Blanchard, Bruce, Crowe, Day, Ellerbeck, Forrest, Gorst, Greenwood, Houlgrave, Kenyon, Kirkby, Palmer, Phillips, Phipps, E. Roberts, Sayce, Wood, and others.

"Two summer meetings were held at the houses of the Rev. H. J. Palmer (at Wallasey) and of Mr. E. P. Houghton, at New

Brighton. Judging the attendance of members, they were highly appreciated.

"Mr. J. H. T. Ellerbeck has inaugurated a new and useful feature in the social side of the work of the Association by kindly receiving the members at a bi-monthly 'at home' at his house, for the discussion and practice of the various details of the art of photography.

"The outdoor meetings of the Association have been but few, and these have been scantily attended. The Council hope that, with the largely-augmented numbers of the Association, the excursions of 1883 may be better supported than has been the case of late years.

"An exhibition of the lantern was given in the Free Library Lecture Hall, on December 22nd, 1881, and a large collection of photographs was shown in the adjoining room. The slides exhibited on the occasion were by Messrs. Beer, Ellerbeck, Kirkby, Palmer, and Twigge.

"The Association took a prominent part in contributing to the interest of the proceedings at the *soirée* of the Associated Societies in St. George's Hall, on the 21st of December last. The Chancery Court and barristers' robing-room contained a fine display of prints and apparatus. About 500 pictures were exhibited by Messrs. Watling, Ellerbeck, Boothroyd, Kirkby, Banner, Palmer, and Wharmby.

"A lecture was delivered by the Rev. H. J. Palmer on 'The Popular History of Photography;' and Mr. Forrest showed a large number of transparencies by the lime-light on a sheet of opal glass, giving at the same time an explanatory lecture upon the pictures, which illustrated the ancient ecclesiastical architecture of Europe.

"The first of the annual competitions has taken place since the Council issued their last report, and its success sufficiently justified the addition of this feature to the proceedings of the Association. Rules have been drawn up for the regulation of these competitions, and subjects selected for the years 1882 and 1883.

"The Council have decided that the presentation print for the present year shall consist of an enlargement of a suitable negative, if possible, contributed by a member of the Association.

"The Council consider that the time has now arrived to form the nucleus of a library of books of reference and of text-books, on subjects connected with photography and the arts and sciences allied to it. For this purpose they have decided to inaugurate the twentieth year of the existence of this Association by setting aside a sum not exceeding £5, to be devoted to the purchase of such works, which will be at the service of the members of the Association, subject to certain rules which have been drawn up to regulate their use.

"The thanks of the Association are due to the Library, Museum, and Arts Committee of the Corporation of Liverpool for granting the use of the room in the Free Library, in which these meetings are held; to the Photographic Society of Great Britain for copies of the journal; to the Liverpool Engineering Society; the Microscopical Society; the Field Naturalists' Association; the Philosophical Society, and the Geological Society, for copies of the annual report of their proceedings and transactions."

The Chairman proposed the acceptance of the report of the Council, which was seconded by the Rev. T. B. Banner, and carried.

The Honorary Treasurer then laid his statement before the meeting, showing a balance in favour of the Association of £32 9s. 9d.

The Secretary brought forward the proposal to print in pamphlet form all particulars relating to the Association, and its proceedings during the past year, which was carried unanimously.

The following gentlemen were elected officers of the Society for 1883:—

President—B. Boothroyd.

Vice-Presidents—J. W. H. Watling, M.R.C.S., G. A. Kenyon, M.D.

Treasurer—E. Twigge.

Secretary—Rev. H. J. Palmer, M.A.

Librarian—J. H. Day.

Auditor—W. H. Wharmby.

Council—H. N. Atkins, W. Atkins, Rev. G. B. Banner, A. W. Beer, F. W. Bruce, K. Bean, J. H. Day, W. H. Kirkby, E. Phipps, E. Roberts, B. J. Sayce, and W. H. Wilson.

The rules drawn up for the regulation of the use of the library were passed by the meeting.

The Honorary Secretary hoped that each of the members would make lantern slides from the best of their negatives, and present them to the Association.

The Chairman thought it very desirable that an exhibition of old work should be occasionally held.

Mr. F. W. Bruce proposed that there should be a special prize given for old work.

The Rev. G. B. Banner said that it was not advisable to multiply prizes, and that the Treasurer's balance would not last very long, if so many suggestions for its employment were made and carried out.

Mr. T. Huson, on behalf of himself and Messrs. Pelham and Phipps, who had been requested by the Council to act as judges in this year's competition, then delivered their awards as follows.

Subject.	Number of competing pictures.	Prize winner.
Instantaneous	6	W. H. Kirkby.
Figure Study	6	W. H. Kirkby.
Fruit, Flowers, and Ferns	5	Rev. H. J. Palmer.
Waterfall	6	J. H. Day.
Relics of the Past	6	J. H. Day.
Country Lane	6	A. W. Beer.
Landscape with Distance	7	J. H. T. Ellerbeck.
Winter	1	J. H. T. Ellerbeck.
Own emulsion	2	W. H. Kirkby.
Best picture of the year	49	E. Twigge.
Best series of pictures	11	J. H. Day. J. H. T. Ellerbeck. } equal.

The judges further desired to commend the figure study and instantaneous pictures by Mr. W. J. Little.

The Chairman proposed a hearty vote of thanks to the gentlemen who had so kindly fulfilled the onerous and difficult duty of awarding the prizes on this occasion.

The Rev. H. J. Palmer gave a successful demonstration of the process of enlarging on matt opal.

The Honorary Secretary begged members who propose to exhibit at St. George's Hall, on the 20th inst., to send their prints and apparatus, &c., to Mr. Ellerbeck, 54, Bold Street, on or before Tuesday, the 19th inst. He further announced that the members of the committee for the arrangement of exhibits would meet in St. George's Hall, at 10 a.m., on the morning of the 20th inst.

Mr. A. Tyrer exhibited a number of very fine 12 by 10 prints from his own negatives, and Mr. A. W. Beer a frame of choice specimens of his work among the old halls of Cheshire during the past season.

A cordial vote of thanks having been passed to the Rev. H. J. Palmer for his demonstration, the meeting, which was a crowded one, was adjourned.

Halifax Photographic Club.

At the monthly meeting held at the *Courier* Office, Mr. J. B. Holroyd in the chair,

After the reading of the minutes of previous meeting, Mr. T. H. K. Lees was elected a member of the Club.

Mr. W. C. Williams was then called upon to give his paper on "The Enlargements of Photographs." He especially recommended 5 by 4 and 8½ by 6½ plates as the best adapted and most portable for negatives, and then for enlarging from. He exhibited a sharp and clean negative, 5 by 4, and an enlarged transparency, 15 by 12, from the same. He wished the members especially to well consider both the position and the lighting of a landscape, in order to get the best results. Two of the negatives and enlargements were very choice views in the Hebden Bridge Valley, and comprised a good distance with very well selected foreground of rocks and water, while behind were some fine trees, ferns, and ground foliage; the other was a stranded vessel at Barmouth, North Wales.

A hearty vote of thanks was passed to Mr. Williams for his most instructive paper, of which he will give the second part on January 9th, 1883.

Talk in the Studio.

Photographic Society of Great Britain.—The next ordinary meeting of this Society will take place at the Gallery, 5a, Pall Mall East, at 8 p.m., on Tuesday next, December 12 (the Winter Exhibition of the Royal Society of Painters in Water Colours being on view), when the discussion on Mr. W. K. Burton's paper, read at the last meeting, will be taken; and a paper on "The New Diffraction Grating and Photography," will be read by Captain Abney, R.E., F.R.S.

SOUTH LONDON PHOTOGRAPHIC SOCIETY.—The annual dinner is fixed for Friday, December 15th, at the Holborn Restaurant. Dinner will be served at 6.30 punctually. Tickets, 5s. each, from Mr. F. A. Bridge, Hon. Treasurer and Secretary, 9, Norfolk Road, Dalston Lane, E.

PHOTOGRAPHIC SOCIAL MEETING.—On Tuesday, the 28th ult., the employées and friends of Messrs. Turnbull and Sons, Jamieson Street, Glasgow, numbering upwards of two hundred, held a brilliant *conversazione* in the Coal Exchange Hall, West Regent Street. Dancing began at eight o'clock to the inspiring music of Adams' talented band. Mr. H. D. Wilbeck emerged from his retirement to do honour to his friend the senior partner of the firm, and acted as M.C. with all his well-known courtesy and energy. Some songs well rendered by a number of amateurs contributed in no small measure to the harmony of the evening.

PURIFICATION OF BEET SPIRIT.—L. Salzer effects this by caustic potash. According to his patent, 80 grams pure potassium hydrate are left in contact with every hectolitre of 90 per cent. alcohol, with frequent stirring during the first twenty-four hours; then 10 per cent. of water is added, and the whole stirred for thirty-six hours. Filtration and neutralisation with tartaric acid follows, after which pure alcohol may be distilled off.

A NEW USE FOR POTATOES.—G. Boeck finds that, if potatoes be peeled and treated with 8 parts sulphuric acid and 100 parts water, then dried and pressed, a mass is obtained resembling celluloid, which can be used instead of meerschaum or ivory.—*Journal of the Chemical Society.*

To Correspondents.

*** We cannot undertake to return rejected communications.

CAPT. TURTON.—We regret we cannot give you the information you ask for.

T. M. AND R. A. J.—Thank you, but your contributions come too late. We are truly sorry, for the loss will be our readers' and our own; still, it is scarcely our fault, if it is our misfortune for we asked for them early last month. The poet most tritely observes, "Thirty days hath November," and we should have been glad of your contribution on any one of them.

J. BARNES.—We do not know of any who make a speciality of such work; but as no unusual qualifications are required, you had better make arrangements with someone in your own neighbourhood.

J. H.—Doubtless the simple carbonate or washing soda is intended; at any rate, good results may be obtained by its use.

VELVET ROLLER.—You should obtain the works of Léon Vidal on the subject. 2. Write to Mr. Woodbury, Java House, The Manor Road, South Norwood, S.E.

F. W. BARBER.—1. Principally a basic ferric oxalate. 2. To workers on a moderate scale, the product is of so little value that it is better not to waste time on it.

CONSTANT READER.—Cheap sets are advertised in our columns; but you had perhaps better get just those things which you actually require.

T. L.—We shall be pleased to have a short account of the methods employed.

W. H. M.—A weak solution of chloride of lime—the so-called bleaching powder—will answer perfectly.

LILAS.—No very detailed account has been published.

S. B. M.—The so-called encaustic paste—see the Formulary last week

HECTOR COLARD.—We believe that Mr. Warnerke has not published full details on this point; but we will endeavour to obtain the information you require.

A. A. CAMPBELL SWINTON.—About one part of Castile soap in twenty of water. If you blow the bubbles with a mixture of gas and air, there is not much difficulty in making them of about the same specific gravity as air. If they are blown in a room free from air currents, it is often practicable to keep them for several minutes before they burst. The addition of glycerine to the soap mixture favours the lastingness of the bubbles, but does not favour the production of the Newtonian thin-plate colours.

D. MCARTHUR.—A little better from a theoretical point of view; but, as a matter of actual practice, we prefer to use the ordinary form.

C. V. H. W.—1. Far too much top-light, hence the dark shading round about the eyes. 2. Just what might be expected, and you had better now extract the silver and make a fresh bath. 3. Try by all means; the difficulties are not nearly so great as you appear to imagine.

COLLOID.—Sulphate of lime in crystals is largely used for the purpose, but clay is more usually employed.

A. LITTLE.—A notable degree of cold is produced when the hyposulphite is dissolved in water; and the solution fixes prints with extreme slowness, unless time is allowed for it to reach something approaching a normal temperature. You may use slightly warm water for dissolving the hyposulphite, but if the solution is used warm, your prints will be considerably reduced.

VAUXHALL.—The expansion will be about one-sixtieth, as regards linear measurement.

W. H. MASON.—Write to Mr. A. L. Henderson, King William Street, London, E.C.

*** Authors may have Reprints of their Articles at 3s. per page per hundred copies; but the order must be given when the proof is returned.

# THE PHOTOGRAPHIC NEWS.

Vol. XXVI. No. 1267.—*December* 15, 1882.

CONTENTS.

ON THE EFFECT OF KEEPING EMULSIONS BEFORE AND AFTER WASHING.

It will be recollected that in describing the emulsions made by Mr. W. K. Burton's method, we gave the results as regards sensitiveness of plates coated immediately after finishing the emulsions. We shall give the result of a week's keeping before entering into the consideration of such observations as we have made on the effect of time in ripening emulsions made by ordinary methods.

We described, in the article alluded to, three emulsions, one made exactly in accordance with Mr. Burton's directions, another showing departure from them only in the omission of the alcohol recommended to be used in conjunction with the ammonia, and the last made without ammonia at all, but boiled for two and a-half hours. These we called Nos. 1, 2, and 3. The sensitometer number given by No. 1 was 15, by No. 2, 17; and by No. 3, 19. After a week's keeping, the numbers were respectively 18, 20, and 21, whilst the sensitiveness to the camera was as near as possible in the ratio of 2, 3, 3; that is to say, the whole of the three emulsions gave plates of unusual sensitiveness. That given by Mr. Burton's exact formula gave plates somewhat slower than those got from the formula slightly modified by the omission of the alcohol or by omitting the ammonia, and substituting for it a long period of boiling. The emulsion which was lowest has increased in rapidity to the greatest extent, and shows a sensitiveness but little short of the others. The greatest increase is represented by 3 or 4, the least by 2. We are now referring to true sensitiveness as exhibited in the camera, and not to sensitiveness as exhibited by the sensitometer.

So much for the particular experiments which we have recently been making. We shall now give the results of such observations as we have made on the effects of keeping emulsions made by the ordinary methods both before and after washing.

An emulsion made by the boiling method may be kept for an apparently indefinite length of time, either immediately after the boiling, or after the bulk of the gelatine has been added. In the former case a considerable subsidence of the bromide is likely to take place, in the latter case not. In both cases a certain increase in sensitiveness will take place, but how much greatly depends on temperature. If this be low—say only about 40° or 45° Fah.—no perceptible change is likely to take place in a week's time. On the other hand, if the temperature range from 60° to 75°, an increase represented by 2 or 3 may occur.

It is in the case of the ammonia nitrate method that the advantage of keeping an emulsion before washing is most evident. It is natural that it should be so, as the whole of the ammonia liberated at the moment of combination is still in the emulsion. The period of keeping which is of an advantage may vary between a week in cold weather, to twenty-four hours in warm. In either case an increase of sensitiveness of from two to three times should take place. The period may be increased without actual destruction to the emulsion, but there would appear to be little advantage as regards sensitiveness, whilst green or red fog is likely to make its appearance. Of course in the case of the acid or neutral method, the ammonia may be added after cooking, when the same result will ensue as if the ammonia nitrate method had been used. We believe Mr. A. Cowan was the first to recognize the advantage of the keeping of an ammonia nitrate emulsion before washing.

Captain Abney was, we believe, the first to notice that, even after washing, an emulsion increases in sensitiveness by keeping. Since he published his discovery, many different opinions have been expressed on the subject. Some have found even greater advantage from ripening than Captain Abney claimed for it; others less, some few none at all, and one investigator has even gone so far as to state that emulsions sometimes become slower by keeping. We believe we can account for an apparent slowing of an emulsion through keeping, even although the sensitiveness in truth did not decrease, but probably, on the contrary, slightly increased. Probably the observations of sensitiveness were made by the aid of a sensitometer. It is quite possible that the emulsion was impressed during preparation with a certain amount of light, not enough to produce fog, but sufficient to give a delusively high sensitometer figure. It is further possible that the free bromide was not perfectly washed from the emulsions, but that a sufficient amount remained to eliminate during a few days of keeping the effect of the light, and restore the sensitometer to the normal figure. It has been stated that soluble bromide even in a dry film may destroy the latent image. We are unable to corroborate this, but we consider it more than probable that in the wet state, as in an emulsion, bromide of potassium or ammonium will destroy a slight effect of light.

There are two factors which greatly modify the extent of the increase of sensitiveness which takes place in an emulsion after keeping. One is the condition of the emulsion as regards acid or alkaline reaction, the other is temperature. A neutral or even acid emulsion will increase in sensitiveness to a small extent. It will nearly double its rapidity, and in this case the increase appears to be almost, if not quite, independent of temperature, so long as a very low degree of heat be avoided. It is only when the reaction is alkaline that the increase is very marked. Here temperature appears to have much to do with the matter. It is not safe to render an emulsion very alkaline after the restraining bromide has been washed out. In fact, anything beyond barely perceptible alkalinity is useful. When the emulsion is slightly alkaline, and the temperature is high, say about 70°. Fah., then the increase of sensitiveness is greatest; but a very great element of uncertainty is introduced.

We had last autumn a remarkable example of this. We made an emulsion which was moderately rapid. It gave the figure 14 of the sensitometer. The plates were quite free from all defects, such as green, red, or other fogs. We rendered it slightly alkaline; more so than we now consider safe. We added nearly a minim of ammonia to each ounce of emulsion. The weather was warm; the temperature of this emulsion, during the time of keeping, probably averaged little, if at all, below 70° Fah. After keeping the emulsion for four days, we coated plates once more. These showed figure 21; that is to say, an enormous increase of sensitiveness had taken place—an apparent increase of seven or eight times, probably an actual one of five or six times. On fixing, however, there were decided indications of green fog—not very great, but still they were there. It was a premonitory symptom of what was to come. We kept our emulsion for a few days longer, and once more coated plates; this time the sensitiveness had actually fallen. The figure given was only 17, and there was dense red fog. This is not the only time in our experience when the advent of red fog appears to have rendered an emulsion less sensitive than it was before. All who have the misfortune to be conversant with red fog must know the appearance—as if the peculiar ruby deposit actually pushed the finer details under.

We may say, in conclusion, that we have at least in cold weather no hesitation in rendering an emulsion slightly alkaline before laying it by to keep, but the reaction should be the faintest possible. Beyond what may be required to render the gelatine neutral, an addition of a minim of ammonia to each six or eight ounces of emulsion is sufficient.

ELECTRICAL CONDUCTIVITY AND MELTING POINT OF CHLORIDE AND IODIDE OF SILVER.

Our readers will remember that we brought to their notice a little while ago an interesting investigation by Mr. G. F. Rodwell on some physical properties of iodide and chloride of silver. We all know in photography how different is the behaviour of these haloid salts, and on this account, if for no other, it is interesting to observe their characteristics elsewhere, if only to trace, if we can, the same peculiarities which mark them in other branches of science. In other words, the behaviour of chloride, bromide, and iodide of silver in the presence of light is often so remarkable that the influence of these same bodies under heat and electricity offers an attractive study, since it may lead us to explain matters we are at present unable to fathom in the formation of the photographic image.

Recently Herr Kohlrausch has published in the *Annalen der Physik und Chemie* the results of a series of experiments which prove that mixtures of chloride and iodide of silver do not behave in the same way, physically, as do these salts separately; moreover, he tells us that the behaviour of iodide of silver in the presence of heat and electricity is totally unlike that of chloride and bromide of silver. In these circumstances, the question naturally arises whether this exceptional behaviour does not bear some reference to the similarly exceptional behaviour observed in photography when iodide of silver is in admixture with other silver salts.

According to Kohlrausch, the melting point of chloride silver is above 485° C. (Rodwell putting it at 451° C.), and the melting point of iodide of silver 450° C. (Rodwell says 527° C). A mixture of equal equivalents of chloride and iodide of silver melts at a much lower point than either of the bodies separately—viz., at 260° C. This, clearly, is a most remarkable fact.

Chloride of silver, bromide of silver, and iodide of silver are good conductors of electricity above the melting point; then, chloride of silver becomes the best conductor, and the worst is iodide of silver, bromide of silver being in the middle.

The electrical resistance of chloride of silver and bromide of silver increases, on setting, very much indeed (passing from the amorphous to the crystalline condition); it rises, on cooling to 20° C., to more than a million times what it originally was. Iodide of silver, on the other hand, does not alter its resistance in the least degree on setting (540° C.), but shows a rapid decrease when it passes from the amorphous to the crystalline condition (145° C).

So that we have here a new proof, quite apart from that in photography, of the existence of different modifications in the three well-known haloid salts of silver.

PLENER'S METHOD OF SEPARATING AND EMULSIFYING BROMIDE OF SILVER.

BY DR. J. M. EDER.

Plener's method consists, as I need scarcely inform the readers of the Photographic News, in completely separating the bromide of silver from a photographic gelatine emulsion by means of a centrifugal machine, the gelatine from which the silver salt is isolated being in most cases partly decomposed, owing to the operation of emulsification to which it has been submitted. The advantages of such proceeding I may here set down:—

1. The bromide of silver is separated from gelatine which has been modified by heating or digestion with ammonia, and which is often a source of fog, flatness, and frilling; this silver salt may then be added to fresh gelatine and emulsified, thus improving the quality of the emulsion.

2. A large stock of very sensitive bromide of silver without gelatine may in this way be kept for some time unchanged, capable of employment at any time in emulsion making, and this bromide has always a uniform sensitiveness.

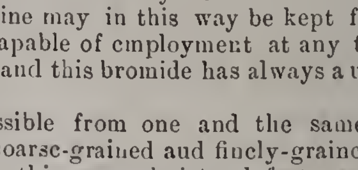
3. It is possible from one and the same emulsion to separate the coarse-grained and finely-grained bromide of silver, and in this way obviate defects and difficulties which their mutual presence leads to.

4. The ripening of the emulsion can also be pushed to the utmost, without fearing any decomposition of the gelatine, which frequently brings about fog, &c.

5. It is practicable in the preparation of the original emulsion to employ not only gelatine, but other substances which are likely to increase sensitiveness, since all these can be completely eliminated subsequently, so that nothing of them remains behind in the finished plates; at the same time, the washing is more complete than in any other method.

Mr. Plener has been staying for some time in Vienna, and, working with him, we have together undertaken certain experiments with his centrifugal machine, in order that I might form an opinion on the value and construction of the instrument.

The reservoir in which the separation takes place consists of a vessel of gun metal.* Some idea of its shape may



be gathered from this sketch, the vessel being first thickly electro-plated inside, and then gilded. The reservoir or

* In experiments undertaken with a rapidly revolving instrument of this kind, much care is necessary; several copper vessels too thinly constructed were destroyed during Mr. Plener's early experiments in London.

separator turns on a vertical axle, which revolves at a speed of from 4,000 to 6,000 revolutions per minute.

On turning at this speed, the centrifugal force is sufficient to throw all the comparatively heavy particles of bromide of silver against the walls of the separator, forming a clotted film over the interior of the instrument, so that, in the end, the liquid gelatine may be poured off and the vessel rinsed with water.

The finely-caked bromide of silver is scraped from the sides of the separator with a spoon, and is now in the form of a paste. This pasty mass emulsifies but badly in water, and soon precipitates, while in alcohol it will not emulsify at all. On the other hand, it becomes immediately incorporated and most uniformly emulsified in a warm gelatine solution, let this be either acid or ammoniacal, the result being a fine-grained emulsion, as fine as the original.

The pasty mass aforesaid dries in the air to a hard gum-like amorphous substance, which is with difficulty pulverised in a mortar. The mass, notwithstanding the washing to which it is subjected, contains gelatine and traces of water; on this subject I will send the readers of the News further particulars as soon as my experiments are ended.

The dry bromide of silver disintegrates quickly in water, and assumes again its pasty character; it may be emulsified just as easily as before drying. It is very different from the flocculent bromide of silver precipitated in water and dried.

Mr. Plener, in my presence, passed several samples through the centrifugal machine, which samples had been prepared in various ways—viz, by means of ammonio-nitrate of silver, the acid cooking method, &c. Even in the case of emulsions very rich in gelatine, the separation was effected in from five to six minutes. The finest precipitated bromide of silver, which I produced for the purpose, Mr. Plener separated in ten minutes.

I found that Mr. Plener's statement was well founded, that every ripe emulsion contains coarse and fine-grained bromide of silver. The former was thrown against the wall of the separator at the commencement of the operation, and the finer silver salt later on. By breaking the centrifugal operation at a certain period, it was possible to collect the two kinds separately. It was found that in a half-ripened emulsion, the coarse-grained bromide was more sensitive than the fine-grained. In an emulsion which approached the maximum of sensitiveness, the course-grained bromide separated, and gave fog, while the fine-grained bromide was perfectly free from this defect, and was very sensitive. The fine-grained bromide of silver gave too dense negatives.

If the separated bromide of silver is put into the developer, it will blacken even in the dark. A film of it applied to an adhesive surface and dried, gives a fogged and very thin image. A dried film of this character, coated with gelatine, gives an exceedingly weak picture, which is fixed with very great difficulty. On the other hand, the silver bromide in form of powder, mixed with gelatine and emulsified, gives brilliant vigorous negatives, which are rapidly developed and fixed.

As regards the chemical quantities of ripened and not ripened bromide of silver recovered by the Plener separator, I must defer my remarks until I have completed the research which I am conducting on the subject. This will take me some time yet, but in due course I will communicate the results to your readers. I may say the same in respect to the mediums I have employed for mixing with the bromide of silver powder under various conditions.

The machine, which Mr. Plener has now employed for upwards of a year, has given exceedingly good practical results, and some emulsion prepared with it repeatedly, showed No. 25 under Warnerke's sensitometer, together with a high degree transparency and density. As the best German commercial houses prepare plates with an average sensitiveness of No. 15 (Warnerke), and the best English instantaneous plates (according to the Photographic News, 1882, page 722) show an average sensitiveness of No. 17½ and a maximum of No. 20, we may take it that the Plener plates are sixteen times as sensitive as the first-named, and four times as sensitive as those of English makers.

Vienna, December 5, 1882.

IMPURE BROMIDE OF AMMONIUM.

The following, which appeared in the last issue of the *Pharmaceutical Journal*, is written by Mr. E. G. Hogg, and may have an important bearing on the work of the emulsionist:—

A somewhat curious case of poisoning having come under my notice a few months since, it has occurred to me that a short account of it might be of interest to your readers, and also be a warning to pharmacists of the necessity of assuring themselves of the purity of the chemicals they purchase. A prescription (written by a physican known to me) consisting of ammon. bromid. and sal volatile in ordinary doses, was dispensed at a Continental pharmacy. The first dose, instead of producing the usual effects, caused violent sickness, the vomit being of a peculiar red colour, accompanied by all the symptoms of irritant poisoning. A portion of the mixture was brought to me by the doctor in question, who went over to investigate the matter. Upon making an examination of the mixture, I found, in addition to ammon. bromid. in solution, there was an insoluble precipitate, amounting to about one grain per fluid ounce of the mixture, which, upon analysis, I proved to be carbonate of cadmium. This result seemed so improbable, that a further portion of the mixture was taken by the physician to a well-known analyst, who confirmed my report. Subsequent inquiry has brought to light the following facts. That the principal fault lay with the manufacturers, who have since acknowledged that they found the whole batch of ammon. bromid., of which that used by the Continental pharmacist was a part, had, through the carelessness of their workmen, become contaminated with a cadmium salt, of which they were large makers. I have since learnt that cases of poisoning by cadmium are rare. In several books that I consulted, I could find nothing about its physiological effects. I am told the colour of the vomit is highly characteristic.

From a medical point of view this, of course, is a very serious affair, much more so than as far as it concerns the photographer; unless, indeed, he happened to be the party dosed.

The bromides have for some time past been largely prescribed in cases of epilepsy, and it might be reasonably supposed that for medicinal purposes none but pure chemicals would ever find their way on to the shelves of the pharmacist; but we fear the demand for cheapness causes a laxity in the manufacture, which the warning in the above letter more than hints at.

Whether such a contamination as cadmium carbonate would influence the photographer in the matter of his emulsions, we are scarcely in a position to state without trial; but this much may safely be said, that in the adoption of any given formula the result may easily be interfered with by the presence of any adulterant which weighs, even although it might be mere sand, because the calculation of equivalents would be completely upset. We have heard of something of the nature of this complaint before, instances of impure bromides having been mentioned in photographic circles; indeed, other chemicals, such as silver nitrate, are sometimes found to be sophisticated.

The subject from a photographic stand-point has sufficient importance to warrant attention, and perhaps some of our chemical readers may have something to say on the matter.

A NEW DEPARTURE IN ALKALINE DEVELOPMENT.

BY JOHN MCKEAN.*

As there is still a conflict going on—if not in the pages of the photographic journals, in the minds of photographers in general—

* Read before the Edinburgh Photographic Society.

as to the best method of developing the gelatino-bromide plate, I need offer no apology in bringing before you this evening my experience in this direction.

That we are now in the possession of dry plates that surpass in many ways our old and well-tried friend the wet collodion, no one will venture now to dispute. It is interesting to look back on the early struggle of gelatine to overcome collodion, and to reflect that, though the former has triumphed, it has not been through any vast improvement in the formula, but in the mode of treating it; and certainly we have yet much to learn before there is anything like harmony of results between plates of different makers.

Looking over the advertisement pages of journals, when the wet collodion held sway, when photographers could do nothing without alcohol, we find that every manufacturer of collodion produced the best article. Photographers knew, however, that each had certain qualifications, and, without disputing the right of priority in either, wisely mixed their different samples, and so secured more favourable results. But now it is otherwise; our picture must be produced according to the individual merit of the plates; and until photographers make their own, they must be content to labour under that feeling of uncertainty which naturally takes hold of one before applying the developer. Doubts arise as to length of exposure, which, in the bustle of a thorough-going studio, is practically impossible to remember; nor is it necessary, for, as we all know, the light must be varied according to the model under treatment. We have as yet nothing practical to guide us in this respect but our own experience, and here it is that beginners naturally fail; though in my own experience there is a wider latitude of exposure in gelatine plates than was at first thought possible—that is, if the developer is cautiously applied—which also requires some experience, imparting knowledge of what really constitutes a good negative. It has always been my aim to simplify the process of development, to call forth the latent image with as little ceremony as possible, with all the bloom and beauty of a perfect negative. How far I have been successful remains to be seen.

There are two developers which have found most favour in the dark-room—namely, alkaline pyrogallic and ferrous-oxalate. The former has always been a favourite with me. Though I have obtained good results with the latter, it requires in my hands more care, and consequently more time and trouble, before proceeding to develop, not to speak of its being more expensive when only a single plate may chance to be operated upon at a time. To these two developers is due, I believe, the success of the modern dry plate. Yet there is still a murmur throughout the profession against that want of something in the gelatine negative which characterised that of the wet collodion. In the former we have certainly more detail in the shadow than in the latter, yet there seems a want of harmony between the high lights and deepest shadows of the picture. The half-tones lack strength; unless in very favourably-lighted subjects their beauty will vanish with the printing.

Having tried several modifications in the pyrogallic developer, using bromide as a restrainer, I began to suspect the latter as the principal agent in the evil just referred to—namely, weak half-tones and exaggerated high-lights in the negative.

I need not mention the many substitutes for bromide that passed over as many plates and down the sink before finding a suitable one to control harmoniously the action of the ammonia. Suffice it to say I found one, a close relation to ammonia, and so beautifully do they work together that they have induced me to dismiss from my formula the services of bromide, and for over six months I have never once returned to seek its aid to help me through the densest fog which I may have encountered during that period. It must not be supposed, however, that I have found in the developer a cure for fog, chemical or otherwise; the plate itself is usually the fountainhead of all our troubles in this direction. We are aiming at greater speed; but, like the good ship in the presence of fog, we must proceed with caution. But to my developer.

A cold saturated solution of bicarbonate of soda	..	1 ounce
Liquor ammonia, ·880 ...	...	1 ,,
Water ...	...	4 ounces

A few drops of the above, according to the size of plate, in a three-grain solution of pyrogallic will develop any good plate with less exposure and with more printable detail in the shadows than has ever yet been secured with the use of bromide. I need hardly say that, should you find the shadows not so clear as may be desired, increase the quantity of bicarbonate; but in this particular I have had no trouble with my own plates.

After development, place the negative for a few minutes in the alum bath; then fix as usual. One or two drops of nitric acid in the hyposulphite solution will dispel any trace of fog that may exist after a forced development in the case of under exposure.

Carbonate of soda and ammonia sounds something like carbonate of ammonia, a chemical, as some of you are aware, used in alkaline development for collodio-bromide plates, restrained in its action by the use of bromide. I have never taken the trouble to enquire into the chemical change, if any, that takes place when making up my developer; yet glancing at the formula it does not seem as if carbonate of ammonia can be formed to any great extent. If otherwise, what is the restraining power by which I am able to abandon the use of bromide?

I shall add no more, further than my recommendation to all at least to give the bicarbonate developer a fair trial; and if you find it as I have—simple, cheap, and reliable—I shall not repent my non-procedure to the patent office.

With your permission I shall now in a practical way show my method of using this "new departure in alkaline development." You have been requested to bring impressed plates for demonstration; but before taking it upon me to do them justice, it is well to remind you that I can only develop that which is impressed by light; but if the plates have a tendency to fog, that shall I also develop. I trust, however, you will be able to see through it, and so proceed.

FLEXIBLE WINDOW FOR DARK TENT.

BY A. B. STEWART.*

Most of the papers read before this Society are the productions of the professional members of the Society, very few being contributed by amateurs. The reason of this is not difficult to discover. Human nature is chary of exposing its own ignorance, and amateurs generally are naturally rather diffident about airing the little knowledge they possess before a meeting of skilled professional workers such as generally fill this room. Of course it is not for me to complain of this fact, as I and other amateurs who are not too old to learn, or too proud to take a hint from the experience of others, benefit by it.

Professional men as a rule—aye, and tradesmen too—are averse to communicating what may be called their trade secrets to outsiders. Photographers, however, form a noble exception to this rule, as in my experience I have always found them one and all ready and willing to give every information required to anyone asking it. And here I would like to express my sense of the obligation which I lie under to this Society as a body for much valuable information conveyed in the papers read before this Society, and published in the Transactions, and the discussions which have taken place on these papers, and to the individual members of this Society, both professional and amateur, for advice and assistance readily and willingly given whenever asked. Gratitude has been defined as a lively sense of benefits to come, and in the future, as in the past, I shall show my sense and gratitude by at once, whenever I find myself in a photographic difficulty, applying to the nearest photographer, sure of obtaining freely whatever advice or information I may need which lies in his power to afford. I come before you, therefore, in the hope that my little contribution may be accepted, not so much on account of any merit it may possess, but rather as an acknowledgment of the benefits I have received from this Society and its members.

My invention—for, although there is not much in it that is actually new, I think I am justified in calling it an invention—is one which may be of very little use to professional photographers or to those amateurs who are possessed of plenty of means, and who can, therefore, easily procure lots of double dark slides or such a camera as that shown by our friend Mr. Wane at a recent meeting; but to those amateurs like myself, of limited means, fond of the art, and pursuing knowledge under difficulties, I think it may prove to be of some service. It is a window for a changing-tent for open-air work, and I make it thus:—On a well-polished plate of glass I pour a film of plain collodion; while this is drying, I dissolve 25 gr. gelatine and 4 gr. bichromate potassium in 1 oz. of water. Then I dissolve 4 gr. nitrate of silver in ½-oz. of water, and mix the two solutions; this forms a dark red emulsion, which I filter, to expel air-bubbles. I then warm the collodionized plate, and pour on sufficient emulsion to form a film of the tint required, and set it

* Read before the Edinburgh Photographic Society.

aside to dry. When dry, I put over it another film of plain gelatine to strengthen and protect it. I show you the result. In its present state it would not stand much rough usage, and I therefore mount the window so made on thin Turkey cotton with gelatine, and give it a coat of copal varnish, after which I fasten it in its place in the dark tent. I show you my completed window. As I have said, there is nothing new in any part of it—all the novelty I claim is the utilization and combination of other men's ideas and applying these to the object in view.

My window has one thing to recommend it—it fulfils all the conditions necessary in an article of the kind. It is non-actinic—as perfectly non-actinic as anything short of total darkness can well be. I have exposed exceedingly sensitive plates under it to the full glare of the sun, of course for as short a time as possible, without a trace of fog. It admits quite sufficient light to enable the operator to change his plates; I show you a few prints from negatives changed in the light transmitted through such a window. It is cheap—the whole thing can be made for less than twopence. It is easily made—every one who dabbles in photography has the whole of the ingredients and apparatus at his hand, and the process is simple. It is perfectly flexible—it may be rolled up or folded with the tent in any way the operator chooses; and practically, with ordinary usage, it is indestructible. Light only improves it by rendering it more and more insoluble. It is waterproof—I had to take shelter under my tent once in a thunderstorm, and had to roll it up wet after the shower was over; it remained so rolled up all night, and was only thoroughly dried when I got home two days afterwards, and it is not a bit the worse. Indeed the window in my dark-tent after one month's constant use—and pretty hard usage too—is as good as on the day I put it in.

ON A MODIFIED GELATINE EMULSION PROCESS.

BY W. K. BURTON.*

I PURPOSELY avoid entitling the modification which I propose to describe to you to-night a new process. Although, so far as I know, it has never before been published in a practical working form, yet I know that the principle on which it depends has often been noticed. This is nothing other than the property which an emulsion made by the so-called boiling process exhibits when, after the heating has been continued for long, the bromide of silver commences to settle to the bottom of the vessel.

I believe I shall best make you understand the process by explaining, as briefly as possible, and without comment, the method which I follow in making an emulsion; after which, I shall go over a few of the more important points in detail, and then describe to you what I conceive to be the advantages of the process over those usually practised.

A.	Potassium bromide	340 grains
	Nelson's No. 1 gelatine	60 ,,
	Water	20 ounces
	Hydrochloric acid, enough to render the solution very slightly acid ... about	2 minims
B.	Iodide of potassium	10 grains
	Water	1 ounce
C.	Nitrate of silver (dry)	400 grains
D.	Ammonia ·88	¾ ounce
	Alcohol	1 ,,
E.	Heindrich's gelatine	360 grains
	Water	20 ounces

I place A in a hock bottle, and warm till the gelatine is melted; I then add the dry nitrate of silver in one quantity, and shake up till I know, by the sound of the crystals striking the bottle ceasing, that they are all dissolved and emulsified. I now add B.

The next operation is precisely similar to that which is usual in the boiling process. The emulsion is poured into any convenient vessel, and boiled for about fifty minutes; it is then allowed slowly to cool to 120° Fahr. D is now added, and the whole allowed to stand for forty-eight hours; at the end of this time the supernatant fluid may be poured off almost quite clear; 20 ounces of water are again added, the bromide being stirred into it. The whole is once more allowed to stand for forty-eight hours, when the water is again poured off. The bromide of silver I now consider to be sufficiently washed. E is added; the two ounces of vessel is warmed, and the emulsion is complete. methylated spirits, with 20 grains of salicilic acid dissolved in it, and 4 or 5 minims of ammonia to counteract the acidity of the gelatine, are added. The emulsion should be kept a few days before coating plates with it.

* Read before the Photographic Society of Great Britain.

Now I propose to go somewhat more into detail in regard to one or two points. First, as regards the formula used I may say that any one suitable for the boiling process will do. The only thing noticeable about the quantities in the formula which I give is the large amount of water used. This I consider very important. There appears to be a general impression that the amount of bromide of silver which a given weight of gelatine is capable of suspending is greater if the quantity of water be reduced so as to make a comparatively concentrated gelatine solution. To take an example, it is, I believe, the general opinion that if the 60 grains of gelatine above mentioned be dissolved in 6 ounces of water, so as to make a 10-grain solution, it will suspend more bromide of silver than if it be dissolved in 30 ounces of water to make a 2-grain solution. The very reverse is the fact. The more a gelatine solution is diluted, the more bromide of silver may be suspended in it, and that in a finer state of division.

In most formulas the addition of a large quantity of water is objectionable, as the emulsion will not afterwards set sufficiently stiffly to allow it to be washed. With the process under consideration the objection does not hold. With the quantity of water given it is *impossible* to get other than a finely divided emulsion of a ruby colour by transmitted light, however carelessly the mixing be performed. I therefore adopt the very simple method of dropping the silver in one mass into the bromide solution, and shaking till the former is dissolved. It will be seen that an emulsion in a very fine state of division, and of a ruby colour, is the result.

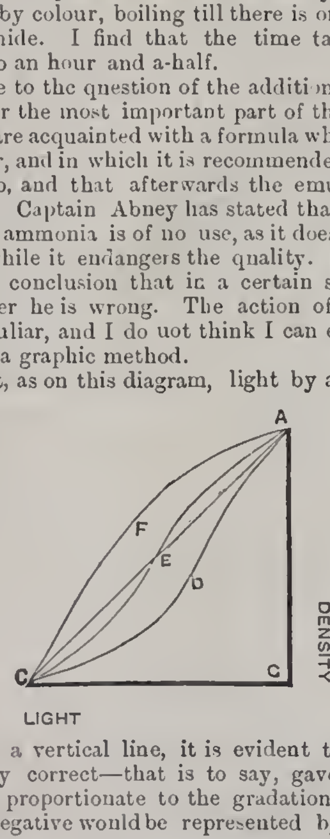
I add the iodide in a separate solution afterwards, for the reason given by Captain Abney—that by so doing the iodide will be in the same state of division as the bromide, the iodine of the iodide replacing so much of the bromine of the already formed bromide of silver.

As regards the time of boiling, I find fifty minutes as an average time. Very insignificant modifications in conditions, however, considerably alter the time necessary: and in practice I always judge by colour, boiling till there is only a trace of red left in the bromide. I find that the time taken varies from forty minutes to an hour and a-half.

We now come to the question of the addition of the ammonia, which I consider the most important part of the process.

Most of you are acquainted with a formula which, I believe, is due to Dr. Eder, and in which it is recommended that boiling be first resorted to, and that afterwards the emulsion be treated with ammonia. Captain Abney has stated that the subsequent treatment with ammonia is of no use, as it does not increase the sensitiveness, while it endangers the quality. My experiments lead me to the conclusion that in a certain sense he is right, whilst in another he is wrong. The action of ammonia on an emulsion is peculiar, and I do not think I can explain it except by resorting to a graphic method.

If I represent, as on this diagram, light by a horizontal line,



and density by a vertical line, it is evident that if a negative were absolutely correct—that is to say, gave a gradation of density exactly proportionate to the gradations of light in the subject—that negative would be represented by a straight line, C A.

I believe no sensitive substance has been investigated which will give such an absolutely correct negative; but that, on the contrary, all sensitive substances will give gradations represented by curves more or less nearly following the course of the straight line C A.

With a boiled emulsion, the curve representing density will follow a course something like C D A. On the other hand, in the case of an ammonio-nitrate emulsion the curve will be like C F A. Now, inasmuch as these curves both commence at the same point, plates which are represented by them will, if exposed under a sensitometer-tablet and afterwards developed, each show the same last figure, aud, if judgment be taken by reading the sensitometer in the usual way, will both pass as of the same sensitiveness. Let them be exposed in the camera, however. It is quite evident that uo exposures can give precisely similar results ; but to get what is somewhat indefinitely described as a well-exposed negative iu each case will require for the plate C D A a much longer exposure than for C F A. I have knowu plates giving the same sensitometer figures, but requiring camera-exposures varying as 4 or 5 to 1. On the other hand, plates requiring the same camera exposure may show differences to the sensitometer of 5 and 6 figures. I am here not taking into account the effects of pre-exposure.

There is an objection, however, to the very high curve C F A, inasmuch as it is a very great departure from a correct rendering of the intensities of light reaching the plate, although it is more like that given by collodiou, which is so often aud so incorrectly held up as a model to dry-plate workers.

It is possible, however, by a combination of the boiling and the ammonia processes, to get any curve between the two extreme ones which I have given. I believe that, with the formula which is above, a curve very like C F A is obtained ; and that is as near an approach to the hypothetical straight line as it is possible to come.

I have always, previous to this, deprecated the use of ammonia in the making of emulsions, because it is liable to give rise to green, red, brown, and other fogs ; but, with the process in question, this drawback is entirely overcome, inasmuch as the bulk of gelatine never comes in contact with the ammonia at all. I have never had a case of green fog in plates coated with emulsions made as detailed.

The alcohol is added with the idea that it will prevent the possibility of decomposition—or, rather, putrefactiou—of the gelatine. I believe it is not very necessary.

With regard to the washing of the precipitated bromide and iodide of silver, of course there is no objection to stirring it with water twice, and allowing it to settle altogether three times ; but I find that, with the amount of washing recommended, the whole of the free bromides, as well as the nitrate and ammonia, are practically got rid of.

In giving forty-eight hours as the time necessary for the bromide of silver to settle, I consider that I am making a very ample allowance. The time taken is naturally very much modified by the form of the vessel used ; it, moreover, varies with conditions which I have not been able to discover. I may say that, on an average, the bromide settles at the rate of about an inch in six hours. Forty-eight hours would thus allow for a vessel eight inches deep. The one I now use has about six inches of fluid in it, and it would take an average of about thirty-six hours for the bromide to settle. Often, however, I have known it to take less than half that time.

It will be evident that the use of a shallow vessel will cause the precipitation to take much less time. There are, however, obvious objections to the use of a shallow vessel. I think it quite likely that means may be discovered of causing the precipitation to take place far more rapidly than I have described. The fact that occasionally the bromide will settle without the addition of the ammonia, whilst at other times it will not, even when the circumstances and treatment are apparently the same, shows that the matter is not thoroughly understood as yet.

I now come to the mixing of the gelatine with the bromide of silver, to form the emulsion. Here, it is just possible that, by carelessness, the operator may fail to so mix the bromide and the gelatine as to get a fine state of division. He cannot, however, fail, if he follow the method which I now show. I have here, in one glass beaker, 360 grains of hard gelatiue soaked in 20 ounces of water; in the other I have the bromide of silver, with the washing-water still over it. I pour the water away, and you will see that it is almost colourless, and that it is necessary to leave only the smallest quantity conceivable, to prevent any of the haloid from coming over with it. I now plump the 20 ounces of water, and the 360 grains of gelatine into the silver haloid. I take a glass rod, and twist the gelatine round the end of it. With the kind of mop thus formed, I scrape the bromide and iodide of silver from the bottom of the vessel whilst I gently apply heat. When the gelatine is melted, the emulsion is complete.

I have tried the result of varying to a very considerable extent the proportion between the bromide of silver and the gelatine iu emulsions made as described, and find that there is remarkably little difference in sensitiveness between an emulsion rich in silver bromide and one poor.

I have divided the precipitated bromide of silver, and to one-half have added double as much gelatine as there was dry bromide, whilst to the other portiou I have added only half as much gelatine as there was bromide. Plates were coated with these emulsions, oue contaiuing four times as much gelatine as the other. In each case the plate was coated until it was thought to be sufficiently opaque. This took, of course, much more emulsion in one case than in the other. Iu fact, the quantity of bromide of silver ou each plate would be approximately the same. On exposure and development the oue plate was scarcely distinguishable from the other. That which had the least gelatine in it showed, after fixing, somewhat of a better colour of image than the other, which, by the way, took an inordinate time to fix.

Only one point still deserves mention, and that is—the effect of keeping the emulsion. Some considerable time ago, Captain Abuey poiuted out that emulsions improved by keeping. I have found this to be so in some cases, but uot in others ; and I have been quite unable to find any rule to account for the action of an emulsion on keeping it for a length of time. I have known an emulsion to increase in sensitiveness several times when kept for a week ; whilst another, prepared by precisely the same formula, did not change or even grow slower. The change is more likely to take place if the emulsion be rendered slightly alkaline. With the formula which I have just given, I have never known an emulsion fail to get very considerably rapider on keeping it a week, whilst the density appears to increase even more than the sensitiveness. I have known an iucrease of sensitiveness, represented by a ratio of quite four or five to one, take place in a week. Those who try the process must not, therefore, be disappointed if plates coated immediately after preparation are thin, and not exceedingly rapid. After keeping for a week or ten days the emulsiou will make plates of the very highest sensitiveness, and giving ample density.

The fact that increase in sensitiveness is so very marked in this process would tend to show that time is necessary to let that combination between pure bromide of silver and gelatine take place, which possibly accounts for the extraordinary sensitiveness of a gelatine plate.

I uow come to consider what I believe to be the special advantages of the process. I have pointed out, as a minor advantage, that as much water as is desired may be used in emulsification. A further advantage is to be found in the fact that, unlike other precipitation processes, the operations gone through to give sensitiveness are exactly the same as those which are used in ordinary cases, and with which all emulsion-workers are familiar. I think that most will find it a decided convenience to do away with the washing of the finished emulsion, and to put in place of it the simple operation of decanting some water, and again filling up the vessel.

The great advantage, to my mind, of this process over most others lies in the fact that the gelatine which has gone through the ordeal of the operation necessary to obtain sensitiveness is eliminated. It is this gelatine which I believe gives rise to many of the evil phenomena which gelatine plates exhibit, especially when ammonia is used.

I am well aware that several processes have been described for bringing about the same result : I need only mention that of Plener, and the acid method. Mine has a certain advantage over Pleuer's, in that no special apparatus is required. The uecessity for a steam-engine, which the process of that geutleman involves, would probably be an objection in the case of most photographers.

The process I have described has, I think, several advantages over that which was described long before Plener's, and which consists in rendering the gelatine which has been used in boiling soluble in cold water by the action of an acid, after which the silver haloids will be precipitated. I have uot been able to get any very great sensitiveness by this process.

Of course I do not recommend the method I have described for use in cases where it is desired to obtain an emulsion in the shortest possible time ; but for regular day-to-day working, as in the case of commercial plate-makers, I can conceive of nothing more convenient, whilst there is, at any rate, no process capable of giving better reults.

In systematic working, the emulsion which was made to-day would be set on one side; that which had been made the day before yesterday would be ready for decantation; whilst that which had been made four days before would be ready for mixing with gelatine and setting on one side to ripen for as long as the photographer thought fit.

I may say that, following advice given by Mr. A. Cowan, I am pouring each emulsion as it is finished into a large stone jar, there to lie till the vessel is full, when I shall commence coating plates with it. The alcohol and salicilic acid added prevents decomposition from taking place.

I imagine that the bromide of silver formed in the process might be dried and kept indefinitely. I have not tried this. I have tried to emulsify it with collodion, but with little success. The very slight nature of my experience with collodion emulsions may, however, account for this.

I pass round one or two plates which were coated with the very first emulsion which I made by this process.

The following will be found to be a suitable alkaline developer for plates made by the method which I have just described :—

Pyro....	1 to 2 grains
Ammonio bromide	1 grain
Ammonia, ·880	3 minims

To each ounce of developer.

WITH A CAMERA IN NORTH ITALY.

BY GREENWOOD PIM.*

It is with some hesitation that I venture to bring the annexed sketch, a very pleasant trip taken this spring to Savoy and Northern Italy, before the members of the Society; but trust that it may prove of at least passing interest—all all events, to any who may purpose turning their steps in that direction.

My kit consisted of a $7\frac{1}{2}$ by 5 camera by Hare, with four double backs, a Ross' portable symmetrical lens No. 4, and also a small single lens without a name, but screwing on to the Ross flange. My stand was a light tripod, folding up, and was constructed for me by a friend, and proved thoroughly satisfactory. I took a supply of Froedman's Dublin plates; also a few of Solomon's Wunderschönen for rapid work and dark places. Although I did not mean to develop to any extent during my tour, I brought a small quantity of Edwards' developer and hyposulphite in solution. For carrying the exposed plates, I had made some zinc boxes, similar to those in which the plates are supplied, the top going quite down over the bottom; inside was a square of Turkey red twill, in which the plates were enveloped when taken from the holders. I found this arrangement answer admirably, and to be much more convenient than folding them up in their own papers and replacing in the card-box, which are usually very flimsy, and easily split at the corners. Moreover, if it was desired to develop while away, a sheet of thin india-rubber replacing the twill turned the zinc box into a developing or fixing tray. I made but little use of them for the purpose, finding the washing in a hotel very troublesome. However, the few I did gave me valuable information respecting exposure.

Now, I would say to anyone contemplating taking his camera abroad—especially to Italy—to take as his main stock very slow plates and a slow lens, as the light is extremely powerful, or otherwise over-exposure is pretty sure to result. For example, in Venice, I found two seconds were sufficient for Froedman's plates, with a Ross' portable symmetrical and No. 4 stop.

Leaving Dublin on the 18th of April last, we made little delay ere we reached our first halting place of any account—namely, Aix-les-Bains, in Savoy, where we remained nearly three weeks, while my companion went through a course of the baths for which Aix is now so celebrated. The village is charmingly situated on the slope of the Revard, on the border of the Lake of Bourget, a sheet of water some twelve miles long by two wide, and overshadowed by the picturesque Dent du Chat.

Although Aix would not be likely to detain a photographer bound for more highly-picturesque regions, such as Chamouni, &c. nevertheless there are several very pretty bits in the neighbourhood in addition to the town itself, with its old Roman-arch church, &c.; such are the mill and stream at Gresy, Haute Combe Abbey, the Castles of Chatellon, and Bordeau on the Lake; while the Gorge and Valley of the Tier and the charming Lake of Annecy are within easy reach by rail. From Aix we proceeded *via* Mont Cenis to Turin, passing through a succession of wooded valleys with snowy mountain peaks, which would doubtless afford abundant occupation for the camera had we had time to stop.

* Read before the Photographic Society of Ireland.

We only remained one night in Turin, there being little to delay either tourist or photographer, so we proceeded to Genoa. There is a very fine Campo Santo or cemetery here, which contains many admirable examples of modern Italian sculpture, whose characteristic is copying details of dress, and with almost microscopic fidelity. Unfortunately, although admitted myself on payment of a small fee, the camera was excluded, the custodian selling photographs of the monuments himself. Genoa is a difficult city to photograph in, as the streets are very hilly, very narrow, and very high (and therefore very dull), defying any amount of swing-back. I essayed a photograph next morning from the Molo or Pier, which is strongly fortified, but it unfortunately proved a failure.

The coast line from Genoa *via* Spezzia to Pisa is extremely picturesque; but so numerous are the tunnels as to almost drive one frantic in one's endeavours to catch a passing glimpse ere one is again engulfed in darkness. An idea may be formed of their number when I say that there are upwards of eighty tunnels in one hundred and four miles of rail.

Early next morning I was in the large open square containing the Cathedral, Leaning Tower, Baptistery, and Campo Santo, where I exposed seven plates, of which five turned out fairly well. Here the custodian of the cemetery, unlike his *confrère* in Genoa, on learning that I was not a resident in Pisa, kindly admitted me and my camera. I might have used many more plates over the quaint old statues, &c., in the Campo, to say nothing of the Cathedral and Baptistery, where there is a very fine pulpit and font. Besides the Cathedral and its satellites, there is but little interest in Pisa.

Our next halt was Florence, where most of my time was occupied in seeing churches and picture galleries. I managed, however, to secure a view or two of the quaint old Ponte Vecchio, with its rows of shops, and the neighbouring houses; also of the Fountain of Neptune, and one or two more. Florentine churches are, as a rule, comparatively uninteresting outside, the chief attractions being within, where the subdued light would render photography a very slow process—much too slow for a passing tourist—to say nothing of difficulties with money, figures, &c.

From Florence a day's run by train brought us to Venice, passing on our way sundry quaint old cities, such as Bologna, Ferrara, Padua, &c., which I would have longed to stop at, and secure these beauties, but time would not admit. However, of all the Italian cities we visited, none interested us so much as Venice, and few present more attractions to a photographer.

Arriving at a railway station is not in general a remarkable incident in one's life; but arriving in Venice for the first time is very striking. The train crosses the Lagune on a bridge two and a-quarter miles long, and consisting of 222 arches. Then, on emerging from the station, which is nothing in itself, you find yourself, not, as usual, under a colonnade, with rows of omnibuses and cabs, but at the top of a broad flight of steps leading to the Grand Canal, which here swarm with gondolas, lying in wait for passengers. The porter of your hotel conducts you to the particular gondola to await your baggage. Presently the gondolier extricates his craft from amid the crowd, and turns into a narrow canal, whence you turn again into the Grand Canal near the Rialto.

Again driving into another narrow canal, after many windings you reach the Grand Canal a third time, near the Piazzitta and St. Marks. Subjects for the camera are simply endless. The Grand Canal is a huge watery avenue of palaces, each one surpassing in beauty the one before it, so that the difficulty is not what to select, but what to pass by.

Then the quaint old houses bordering the smaller canals, and the innumerable stone bridges, so like each other, and yet so different, form any number of attractive bits; to say nothing of the Doge's Palace, the Bridge of Sighs, and the many beautiful churches, such as Santa Maria della Salute, St. Moïsé, San Giorgio Maggiors, &c. The latter looks better in a photograph than in reality, on account of its red campanile. The Venetian churches—or many of them—differ from the Florentine ones, in being more attractive outside than inside. This is especially true of St Mark's, which is a very remarkable edifice in the Byzantine style.

With Venice my trip may be said to have ended as far as photography is concerned; for after packing up my camera in its travelling case, I did not take it out till after my return home, whither we travelled rapidly *via* Milan, Turin, and Paris.

In conclusion, I would say that while the Continent affords a great variety of interesting districts for the photographically-inclined tourist, Switzerland, the Tyrol, Italian Lakes, and the old towns of Northern Italy are well worth visiting, and should be by no means passed over.

Notes.

Mr. W. T. Bashford has accepted the appointment of Honorary Secretary to the Edinburgh Photographic Society. As the Society is larger than any other in this country, the office of Executive is an important one.

We hope shortly to speak of Captain Pizzighelli and Lieutenant Von Hübl's recently-published work on "Platinotype." Meanwhile we have included in our YEAR-BOOK a short account of the mode of working adopted by these gentlemen.

We hear good accounts of Henderson's cold emulsion process from the Continent. Among others, Captain Pizzighelli has been successful in producing good plates. After standing for one hour in the cold, the emulsion indicated 15° on Warnerke's sensitometer, and after six hours, 21° to 21°, the plates being developed with ferrous oxalate. After a lapse of eighteen hours, no increase in sensitiveness was remarked. Pizzighelli does not advise precipitation with alcohol, since the gelatine is thereby transformed into a tough rubber-like mass.

The Obernetter process is also spoken well of both in Vienna and Berlin. All agree that the emulsion does not possess a very high degree of sensitiveness, but in other respects it is highly satisfactory.

The rôle played by "restrainers" in photgraphy—and especially in development—has never been perfectly explained. Many quite neutral or indifferent substances, for instance, are powerful "restrainers," a fact observable in purely chemical operations. Thus, Hood points out, in a recent number of the *Philosophical Magazine*, that the oxidation of ferrous-sulphate ($FeSO_4$) through chlorate of potash ($KClO_3$) is greatly influenced by the addition of indifferent substances. If, for instance, potassium sulphate, sodium sulphate, ammonium sulphate, ammonia alum or potash alum, magnesium sulphate or zinc sulphate, are added, the process of oxidation is at once retarded or restrained; and in most cases the restraining action is in direct proportion to the weight of the inactive salt which has been added.

Mr. Swan would be a little surprised to see the last application of his incandescent lamp. The fairy queen in the new Gilbert-Sullivan Opera of *Iolanthe* wears one of these shining stars in her hair, the supply of electricity coming from a battery which hangs to her dress at the back. Her flowing hair conceals both wires and battery; but the latter need not weigh more than a pound or two if, instead of employing a 25-candle lamp, a smaller one, strained to the utmost, is used in the manner we have already pointed out in these columns. Indeed, we should not wonder if the idea of producing a star-light in this way was not taken from our suggestion.

Another point may be noted in this same production. Mr. George Grossmith—himself a capable amateur photographer—has apparently been studying a photograph of the late Lord Brougham, so correctly has he "made up" face and features after the renowned Chancellor. Most actors make a point of collecting old and rare prints of bye-gone celebrities, upon which to model face and costume—Mr. Lionel Brough is noted for a very fine collection—and if they wish to keep pace with the times, they will now have to form a collection of photographic portraits as well, for a generation and more has slipped by since camera pictures were a novelty.

On Tuesday night, at the Photographic Society, Capt. Abney gave a very good idea of the advantage of a grating over a prism in photographing the spectrum. Hitherto, as we explained a fortnight ago, the general way of securing the spectrum of a ray of light was to send the ray through a glass prism, which disperses it. If you wish to disperse a ray very much, you employ not one prism, but several; but every time that you interpose a prism, you lose a great deal of light by reflection and absorption of the glass; and to gain some idea of the terrible amount of loss from these causes, it may be mentioned that, when a ray is made to pass through ten prisms, all but $\frac{1}{10000}$ of the light is lost. But it is different when you employ a grating—fine lines ruled close together with a diamond upon speculum metal—which also produces a spectrum when light is reflected upon it.

By using a grating, you secure a spectrum with comparatively very little loss; and if your grating be engraved upon a concave surface, as Professor Ronalds has recently suggested, you may get, as well, all the sharp definition of lines prisms give you. In a word, a spectrum equal to that diffused by ten prisms is obtainable with a Ronalds grating, with a loss of but fifty-five per cent. of the light of the original ray. The advantage of a Ronalds grating over glass prisms in photographing the spectrum is therefore very obvious.

To judge fairly of the colour of an emulsion is not very easy at all times; and Mr. Burton's suggestion to mix a few drops with a beaker full of water is particularly useful. On trying it we were struck by the ease with which the colour can be observed; and where several emulsions have to be compared as regards colour, Mr. Burton's method seems to have especial value, as each sample can be adjusted so as to give approximately the same degree of density.

Mr. Burton also says:—"The sensitiveness is reduced by one-fourth when the emulsion contains about half a-grain of free alkaline bromide to each ounce; but a very much smaller proportion has a considerable influence." By-the-bye, Mr. Burton had to emphasise on Tuesday the fact that the chief point of his process was to get rid altogether of the decomposed gelatine with which the emulsion had been made, thus suppressing the tedious labour of washing. Indeed, his resulting silver bromide may be well compared to the sensitive product Mr. Pleuer isolates, and of which Dr. Eder speaks in another column.

"By the way, I observe in the Belt case," says *Truth*, "that there is a conflict of evidence as to whether certain pencil entries have been erased in a diary. This might easily be discovered by holding the pages over steam. If words have been erased, the pressure made upon the paper in writing them would show, and in all probability even indications of lead would be visible." Photography, we would remark, would be a still sharper detective.

The Berlin photographers complained, a little while ago, that commissions were levied upon them by agents who secured for them sitters of celebrity. Paris is now calling out on the same score. Our German friends determined to set their faces against the growing evil, and a request was preferred, through the Society for the Advancement of Photography, that all photographers should refuse to pay such commissions. About the levy of black mail there cannot, of course, be two opinions; at the same time, if the celebrity himself, or herself, is disposed to bargain for a facial copyright, there is no reason why a photographer should not entertain the bargain.

It cannot be denied that the right to photograph is a valuable commodity in many cases. Madame Sarah Bernhardt, for instance, when she went to New York, sold the sole right of taking her portrait for several thousand dollars, and the bargain is said to have been satisfactory on both sides. But it is different when it is not the celebrity, but some unaccredited agent, who gains by the transaction. The demand in this case usually comes after the sitting. An actress or opera-singer is invited, or invites herself, to sit, and, in return, the photographer presents the sitter with a few dozen copies of the portrait. Then it is that the vampire usually appears. He gives the photographer to understand that it was through his influence that the sitting was arranged, and the former, for fear he shall offend or lose subsequent favours, usually pays the fee demanded of him.

One ludicrous point in connection with the whole affair is the fabulous price many third and fourth class celebrities (?) set upon their portraits. A young lady who has been entrusted with a rôle of two lines at some West End theatre, or appears in "the front row" in a ballet, will demand a sum equal to six months' salary, pointing to the portraits of Maud Branscombe and Mrs. Langtry in support of her claim. In Paris it is not unusual for an agent to demand a thousand francs commission, and to get it, too.

Our readers will peruse with interest the first communication that comes to us from Vienna respecting the experiments of Mr. Plener and Dr. Eder. The preparation of isolated silver bromide seems now to be a very simple matter, and our readers may hope for the day when they can purchase a haloid salt of uniform sensitiveness in the shape of powder, which, as Dr. Eder tells us, emulsifies with great readiness in a simple solution of gelatine. Fogging, frilling, and freckling will be unknown in these halycon days to come.

Mr. Mayland has forwarded us from Deal a series of delightful sea sketches. The foreground—if foreground we may call it—is the lapping sea, the smooth translucent waves sweeping one over the other to our feet. In two of the sketches we have the dark form of a shrimper, net in hand, who stands knee deep in the water, sharply limned against the white sea and bright cloud masses. In a third sketch, the middle distance is made up of white crested waves, breaking over into deep-shadowed furrows, while afar off are the tiny forms of vessels riding in the Downs. Another striking effect in one of the studies is a silver line near the horizon, which marks the well-known Godwin sands, the sun shining on the far-off waves as they break over the dreaded bank.

Patent Intelligence.

Notice to Proceed.

5131. Henry Harris Lake, of the firm of Haseltine, Lake, and Co., Patent Agents, Southampton Buildings, London, for an invention of "An improved method or process of and apparatus for producing coloured photographs."—A communication to him from abroad by Joseph Chaine, Arthur Durand, and Sallonier de Chaligny, all of Lyons, France, Engineers.—Dated 27th October, 1882.

Specification Published during the week.

2156. F. Wirth, for "Preparation of photographic plates."—A communication from G. Meisenbach. The subject-matter of this was detailed on page 682 of our present volume.

Patents Granted in America.

267,663. John E. Beebe, of Chicago, Ill., for "A drying-rack for photographers' dry plates."—Application filed 15th September, 1882. No model.

267,821. Erasmus B. Barker, of New York, U.S., assignor to E. and H. T. Anthony and Co., of the same place, for "A photographic shield."—Application filed 31st December, 1881. Model.

PHOTO-ETCHINGS AND PHOTO-ELECTROTYPES FOR POTTERS' USE.

BY F. J. EMERY.

Embracing an opportunity which the kindness of its officers afforded me, I had the pleasure of suggesting to the South London Photographic Society, at their meeting in October last, the extension of photography to the production of intaglio copper-plates suitable to the requirements of pottery printing.

Obviously, the only means of printing on pottery must be by transfer, and the medium must be an easily yielding one.

In the old days this was effected—but only on the glazed surface—by using a supple bat of glue, and the *modus operandi* was as follows.

A thick oil, composed mainly of boiled linseed oil, was rubbed into the engraved lines or dots, and the surface of the copper-plate, first wiped with cotton-wool, was afterwards cleaned with the palm of the hand, itself slightly smeared with whiting.

The glue bat, previously moistened with a damp sponge, was then firmly but gently pressed against the engraving. This brought out the stiff oil, so that the bat carries the design as a low relief typograph. The bat being then pressed steadily against the piece of pottery and carefully pulled back, the transfer design—faintly represented by the oil—was dusted with very finely-ground enamel colour; all loose particles and smear being removed with clean cotton-wool.

This process, although able to reproduce the finest engravings, had the double drawback of limitation in size, and application only to glazed surfaces.

It is said that a scrap of newspaper which, lying in the sun against a piece of biscuit pottery, had imprinted itself on the dry surface, first suggested the employment of tissue paper as the medium of transfer, and at the present time the glue bat—except for small and delicate work—has gone out of use.

Why there is now a good opening for photo-etched or photo-electrotyped copper plates was shown in the paper read on the occasion to which I have referred; and it only remains to be said to those who choose to experiment in this direction, that what is needed is an intaglio copper plate which should have a margin on all sides of three-quarters of an inch, and that I shall be ready to test the work free of charge.

FRENCH CORRESPONDENCE.

The Photographic Society of France—Photography with Magnesium Light—Gelatino-Bromide Pellicles for Negatives—Supplement in Last Number of Photographic News—Transit of Venus.

The Photographic Society of France.—At the last meeting of the Society, many new things in the way of instantaneous pictures were presented, and among them those taken by M. Londe, with his own shutter, and some by M. Demarchy. These prints, more or less perfect, show the continual effort made by amateurs to reproduce animated nature, or objects in motion. It gives supreme satisfaction to an amateur to seize an animal at a gallop, a steed trotting, a crowd, or a flight of birds. Among the studies taken in this direction it is not unlikely that the art of producing instantaneous photographs will soon attain a higher standard of perfection.

Photography with Magnesium Light.—M. Londe showed the Society some *post mortem* prints taken by magnesium light. The photographs are taken in the hospital at all hours of the day or night, and a magnesium lamp is the best means of lighting. The exposure is from five to ten seconds. It is unnecessary to say that gelatine plates are used.

Gelatino-Bromide Pellicles.— The competition organized by the Photographic Society of France for the best process for making sensitive pellicles will be closed on the 31st inst. M. Gaillard has offered a prize of 800 francs, to which the Society has added 200 francs as a reward for whoever fulfils the conditions of the competition the best. On this subject we may be permitted to give a little advice to those who make pellicles. It is useless to superpose a film of gelatine over collodion to be afterwards coated with gelatino-bromide. This is how we would proceed:—On a plate of talc spread a film of 1 per cent. gun-cotton collodion, then pour over this the gelatine in a limpid condition, containing one-half per cent. of alum; as soon as well set, superpose with a fresh coat of collodion, and allow it to dry. When ready, proceed as with glass, by rubbing over the surface with French chalk, and spreading over the sensitive film. By this means the pellicle serving as vehicle or support is rendered almost impenetrable to water, and in the operations of development, fixing, &c., does not admit of greater difficulty than in the employment of glass.

The Supplement to the "Photographic News."—The print published in the last number of the Photographic News has been the object of our attention. The photo-ink process consists, as far as we are able to judge from the interesting specimen in our possession, of a reticulated image obtained by the ordinary phototype process. The phototype or collotype impression is transferred to stone, and printed lithographically. The idea is undoubtedly excellent; but we think a still better result would ensue by transferring the image on to zinc, so as to make a typographic block. We are sure that the iuventor of the photo-ink process will find no difficulty in making phototype blockes from his prints.

The Transit of Venus.—The transit of Venus was hardly able to be observed, the cloudy weather almost entirely preventing a view of the phenomenon. Fortunately, several of our expeditions, especially that under Colonel Perrier, have succeeded in obtaining several photographs during the time of the transit. Leon Vidal.

NOTES ON PHOTOGRAPHY.

BY E. HOWARD FARMER.

Lecture IV.—Atomicities, etc., of Elements and Compound Radicals in Common Use in Photography.

Electro-Positive or Metallic.

MONADS.

Name.	Symbol.	Combining W't.
Hydrogen	H	1
Potassium	K	39
Sodium	Na	23
Ammonium	NH_4 or Am	18
Silver	Ag	108
DYADS.		
Magnesium	Mg	24
Zinc	Zn	65
Cadmium	Cd	112
Iron (Proto or Ferrous) ...	Fe	56
Copper	Cu	63·5
Mercury	Hg	200
TRIADS.		
Iron (per or ferric)	Fe	56
Gold	An	196
TETRADS.		
Platinum	Pt	197

Electro-Negative or Acidulous.

MONADS.

Symbol.	Combining Weight.	Forms with Metals.
Cl*	35·5	Chlorides
Br*	80	Bromides
I*	127	Iodides
NO_3	62	Nitrates
NO_2	46	Nitrites
$C_2H_3O_2$	59	Acetates
CN	26	Cyanides
HO	17	Hydrates
(Forms water with H.)		
DYADS.		
SO_4	96	Sulphates
CrO_4	116	Chromates
Cr_2O_7	216	Bichromates
SO_3	80	Sulphites
S_2O_3	112 ...	Hyposulphites or Thiosulphates
C_2O_4	88	Oxalates
O	16	Oxides
TRIADS.		
PO_4	95	Phosphates
$C_6H_5O_7$ or C	189	Citrates

The above table shows at a glance the names, chemical symbols, combining weights, and quantitative composition

* A compound radical consists of a group of elements which enters into or is expelled from combination without itself undergoing decomposition. In the compounds Ag_2 Cl, Ag_2 Br and Ag_2 I Cl, Br & I appear to act as dyads.

of the various elements and compounds in general use in photography.

Thus the symbol of sodium chloride is NaCl, its molecular or combining weight is $23+35\frac{1}{2}=58\frac{1}{2}$ or $58\frac{1}{2}$ grains of NaCl contain 23 of Na and $35\frac{1}{2}$ of Cl; or again, the symbol of iron protoxalate (ferrous oxalate) is Fe (C_2O_4), and its combining weight is $56+88=144$.

The substances marked dyads are equivalent to two of those marked monads; those marked triads equivalent to three monads, and platinum is equivalent to four monads or two dyads.

Thus the symbol of potassium oxalate is $K_2(C_2O_4)$, K being a monad, and C_2O_4 a dyad; or again, iron persulphate is represented by $Fe_2(SO_4)_3$; two triad atoms of iron being equivalent to three dyad molecules of (SO_4).

The element hydrogen forms with the elements and compound radicals on the right-hand list the various acids, *e.g.*, HCl hydrochloric acid, HNO_3 nitric acid, $H_2(C_2O_4)$ oxalic acid, and $H_3(C_6H_5O_7)$ citric acid, &c.

PHOTO-CHEMICAL ARITHMETICAL PROBLEMS.

A.—To find the weight of any substance contained in (or required to form) a given weight of any compound.

1. Obtain the chemical formula of the compound (see Table).
2. Put down its numerical composition (see Table).
3. Make simple rule-of-three statement.

Example: How much silver is there in 50 ounces of silver bromide?

1. The chemical formula is Ag Br
2. Its composition is $108 + 80 = 188$
3. Rule-of-three statement is

188 : 108 : 50
50
188)5400(28
376
1640
1504
.136 *Answer*=28 ounces.

B.—To find the weight of any substance it is required to substitute for another in a chemical change.

1. Put down the chemical equation for the change which occurs in each case.
2. Convert the chemical equations to numerical ones.
3. Make simple rule-of-three statement.

Example.—How much anhydrous cadmium bromide is equivalent to 5 grains of ammonium bromide in a bromized collodion?

1 and 2. The chemical and numerical equations are (see table)

$CdBr_2 + 2Ag(NO_3) = 2AgBr + Cd(NO_3)_2$

| 80   108+62   108+80
112+160   80
160   170   188
2   2
272 + 340 = 376

$(NH_4)Br + Ag(NO_3) = AgBr + (NH_4)NO_3$

18+80   108+62   108+80
80   62   80
98 + 170 = 188

3. Rule of three statement is

98×2 : 272 : : 5
5
196)1360(6·9
1176
1840
1764
··76 *Answer*=6·9 grains.

C. To find the weight of any substance used or produced in a chemical change.

1. Put down the chemical equation for the change which occurs.
2. Convert the chemical to a numerical equation.
3. Make simple rule of three statement.

Example.—How much potassium bromide is required to convert the whole of the silver in 10 grains of silver nitrate to bromide, and how much silver bromide will be produced?

1. Chemical equation is

$KBr + Ag(NO_3) = K(NO_3) + AgBr.$

2. Numerical equation is

$119 + 170 = 101 + 188$

3. Rule of three statement is

170 : 119 : : 10
10
170)1190(7
1190
Answer=7 grains of KBr.

and again

170 : 188 : : 10
10
170)1880(11
170
180
170
10 *Ans.*—11 grains of AgBr.

Silver nitrate, $AgNO_3$

Combining weight 170 of which 108 parts or 63·5 per cent. is silver.

Prepared by dissolving pure silver in nitric acid diluted with an equal bulk of water

$Ag + 2HNO_3 = AgNO_3 + H_20 = NO_2.$

the solution is evaporated until the salt crystallized out, and which then form the ordinary silver nitrate of commerce. In order to purify it, and get rid of the free acid still adhering to the crystals, they are dissolved in water, and the solution again evaporated, when we get re-crystallized silver nitrate.

Silver nitrate thus prepared occurs as fine white crystalline plates which become perfectly colourless and transparent on being moistened with water; it is, both dry and in solution, perfectly neutral to test paper. When heated, it fuses into a clear, transparent liquid: a piece of charcoal dropped into the liquid mass deflagrates and becomes coated with a bright film of metallic silver.

Soluble in its own weight of cold water, but less so if the water be acid; soluble in half its weight of boiling water, also in four times its bulk of hot alcohol. Practically insoluble in ether and wood spirit (naphtha).

In solution it is reduced by Cu, Hg, Fe, &c., metallic silver in a crystalline condition being set free.

$2Ag(NO_3) + Cu = Cu2(NO_3) + 2Ag.$

It is also reduced by protosalts such as $FeSO_4$, $SuCl_2$, &c.

$3Ag(NO_3) + 3FeSO_4 = Fe_2(SO_4)_3 + Fe(NO_3)_3 + 3Ag.$

Organic matter, whether animal or vegetable, more or less quickly reduce it to the metallic state, the rapidity depending on the nature and reducing power of the substance.

These reductions are generally accelerated by alkalies, heat, and exposure to light, and retarded by acids and a low temperature.

Free chlorine, bromine, and iodine, and soluble chlorides, bromides, and iodides, decompose it, forming insoluble silver chloride, bromide, or iodide.

$$AgNO_3 + 3Cl = AgCl + 2HClO + NO_2.$$
$$AgNO_3 + KBr = AgBr + KNO_3.$$

Alkalies and soluble hydrates precipitate it as oxide, which in the case of ammonia is soluble in excess.

$$2AgNO_3 + 2KHO = Ag_2O + 2KNO_3 + H_2O.$$

Tests for Silver Nitrate.—Add a few drops of HCl to a solution in a test-tube; if there be a white precipitate, add ammonia—the precipitate dissolves. *Presence of Silver.*—Fuse a little of the dry salt in a test-tube, and drop in a piece of charcoal—deflagration with evolution of red fumes. *Presence of* (NO_3).—Substance is silver nitrate.

Estimation of Silver Nitrate.—Prepare a solution of KBr containing 112 grains to the pint of water. Put in a narrow-necked two-ounce bottle a drachm of the solution to be estimated, and acidify it with HNO_3; now add (a drachm at a time) the KBr solution (shaking up violently between each addition) until no further precipate is produced. The number of drachms of KBr solution require is the number of grains of $AgNO_3$ in the solution in the bottle, and this multiplied by eight gives the number of grains per ounce.

Impurities in Silver Nitrate.—$AgNO_3$ is sometimes adulterated with other nitrates, such as KNO_3, $Pb(NO_3)_2$, &c. $Pb(NO_3)_2$ can be detected by the bright yellow precipitate given with KI; the best way is to weigh out a few grains of the suspected salt and estimate it

Correspondence.

SMALL LANDSCAPES ON BLACK MOUNTS.

DEAR SIR,—I have recently been mounting my little landscapes upon black gilt-edged mounts, after the manner to which you called attention some time ago. I have no difficulty in getting cabinet-sized black mounts with gold bevels, and the little landscapes mounted on these, showing just an eighth of an inch of black all round, are very effective; but I have difficulty in getting cards for my larger pictures—for whole-plate size, for instance. It seems to me that the manufacturers of these mounts having only portraiture in view, make cards only to suit portraits; and these slender formats are not suitable for landscapes. At any rate, if square mounts are made, suitable for landscapes, I have hitherto failed in procuring them. Possibly if you let this letter appear in your columns, it may be the means of calling the attention of manufacturers to the matter.

Any one who has tried the effect of mounting small landscapes upon these gilt-edged black mounts cannot fail to be pleased with the results, for the mounts frame the pictures as well.—Yours faithfully, A. A. W.

CHOCOLATE MOUNTS.

DEAR SIR,—Your correspondent "F. Stanley" evidently has a very bad quality of mount, to cause his photographs to disappear in a month. For the last two years I have mounted a series of 9 by 7 views on black and chocolate cards, bevel edges, and, as far as can be ascertained, have no cause to regret this effective kind of mounting. Most of these views are sent to stationers, and exposed in shop windows. There are some large photographs of actresses exposed in a theatrical agent's window in the Strand, mounted in the same manner, on chocolate cards; these, I believe, have been exposed to the public gaze for twelve months, and show no signs of fading. There are no doubt some very cheap cards issued "black and chocolate," which give off a very disagreeable smell when damped, showing, I think, decomposition; but in the dearer mounts this is not so.—Yours, &c., P. MITCHELL

GREEN LIGHT FOR THE DARK-ROOM.

SIR,—Since using dry plates I have suffered a good deal with bad eye-sight caused by the trying effects of the ruby light. In consequence, all this summer, I have adopted a green light for my dark-room window, and find it answer better than ruby for seeing the development, &c. It is not in the least trying to the eyes, either in the dark-room or when you come out. I use one sheet of ground glass—one of deep orange, and one of green.

I may add that I use the extra sensitive plates of the best makers, and no foggy results ensue. Possibly these few lines may be of use to other sufferers like yours truly,

W. S. BRADSHAW.

PRIZE PICTURES AT THE LIVERPOOL AMATEUR PHOTOGRAPHIC ASSOCIATION.

DEAR SIR,—In the list of prizes gained in this year's competition of the Amateur Photographic Association, the name of Mr. A. W. Beer appears by mistake as the winner of the prize for "A Country Lane." The beautiful picture which gained the award in this subject was produced by Mr. Kenneth M. Bean, and the hon. secretary greatly regrets the "clerical error" which deprived this gentleman of the honour he has justly gained.—Faithfully yours, H. J. PALMER.

PLAGIARISM.

SIR,—The letter of "Exhibitor" justly exposes one of the grossest cases of plagiarism which has come under my notice; but the mere return of the medal does not, in my opinion, meet the case; an apology in addition is imperatively demanded for being found out in the attempt to foist off as original the conceptions of other brains.

Poor old "Dizzy" was mercilessly taken to task when he "appropriated from the French" the peroration of his speech on the Duke of Wellington's death; but perhaps he was only chaffing the House in his sleeve. At any rate, his punishment was severe, and the present case merits equal retribution.

A word of advice to those "photographic artists" who, while laudably desirous of emulating the works of those more gifted than themselves, are only in the possession of sufficient artistic training and sufficient development of brain to turn to the pages of the art journal for a "crib;" and I would suggest to them, in the absence of a proper lay figure, they can purchase for a few pence a good sized doll, and if they twist and twirl the jointed limbs of this toy, they will doubtless, in course of time, arrive at a "pose" which, whatever characteristic it may possess, will at least bear the charm of originality.—Yours truly,

MAULSTICK.

DEAR SIR,—There cannot be a doubt that it was quite right to call attention to the original of the photograph "Cherry Ripe;" at the same time I cannot help thinking that the flood-gates of indignation have been opened a little too widely. It is more than likely that the author of "Cherry Ripe" was unaware of the extent of the charge to which he laid himself open, and probably was equally ignorant of the circumstance that if he had put the words "After Rubens, &c.," on his picture, he would have been saved from all chance of reproach. It is much to be regretted he did not do this, as he now loses much credit that is probably his due; for when you have turned over the pages of the art journal or magazine, and decided upon an engraving to reproduce with your own models and own lighting in the camera, there still remains the fact that your photograph has still to be done. Let, however, every photographer who takes a picture as his model, understand that he ought always to place upon the frame "After ——," naming the artist whose production has served him for study.—Yours sincerely, Another Exhibitor.

Proceedings of Societies.

Photographic Society of Great Btitain.

The ordinary monthly meeting of the above Society was held at 5a, Pall Mall East, on Tuesday evening the 12th inst., the President, Mr. James Glaisher, in the chair.

The minutes of the previous meeting having been read and confirmed, Miss Rosamond, F. A. Lyell, and Mr. John Jeffcoat were elected members of the Society.

The Chairman stated that the number of visitors to their recent exhibition was 7,439, as compared with 6,221 in 1881, 5,000 in 1880, and 4,803 in 1879; whilst the money taken this year was £41 14s. 6d. in excess of last year's receipts.

Mr. Glaisher then invited a discussion upon the paper read by Mr. W. K Burton at the last meeting, and called upon Mr. Sebastian Davis to offer some remarks.

Mr. Sebastian Davis said he did not anticipate being called upon to open this discussion. He had not had time to read the paper properly, but had noticed that in this and many other processes, an effort had been made to do away with washing the emulsion, and in this particular only could any special interest be taken in Mr. Burton's process. By his method we produce a precipitate of silver bromide in the presence of gelatine, and after a period of forty-eight hours we pour away the clear liquid, leaving the sediment to be mixed with a fresh quantity of water, and again allow to subside for another period of forty-eight hours. After making up the emulsion with the first quantity of gelatine, we are told that the sensitiveness can be further increased by allowing the emulsion to stand for some days; but he failed to see in what respect any advantage was gained over the ordinary method, either in sensibility or convenience. By the ordinary method of emulsification and washing, the same result could be obtained in a few hours Certainly some special claim was made with regard to the action of ammonia, but he failed to see its beneficial effect.

Captain Abney alluded to a series of articles written by himself in 1872, in which he showed, by means of diagrams, the relative gradations produced upon wet and dry plates. He had found that an ammonia-prepared emulsion gave a curve closely resembling that given by the wet plate; while in the case of a boiled emulsion the curve more nearly approached the straight line. The latter form of emulsion was therefore preferable to either the wet plate or the ammonia preparation. With regard to precipitation, he had little to say, except that, being of an impatient turn of mind, he objected to wait forty-eight hours.

Mr. Leon Warnerke said, with regard to Mr. Burton's curve, his own experience led him to think that any boiling process could give a better gradation than the ammonia process, in the latter of which there was always a too sudden falling-off in density. Again, he thought that the boiling process gave greater regularity. Not having had an opportunity of trying it, he was not in a position to say whether Mr. Burton's process was capable of giving the highest sensitiveness; but if it were, he thought it had advantages over the ordinary method of washing. As was well known, emulsion making was an operation of some uncertainty, much of which was traceable to the water employed in washing. This he had found to be specially the case in St. Petersberg, where in summer the water was very impure; and under such circumstances he thought Mr. Burton's method would be decidedly advantageous, inasmuch as it dispensed with the operation of washing

Mr. W. Ackland thought that Mr. Davis had scarcely done justice to Mr. Burton's process, in which the whole of the gelatine which had been submitted to boiling was subsequently got rid of. With regard to the action of ammonia, he thought it was very marked. Using a formula which he had worked for some months, and which ordinarily gave 19 on the sensitometer, the addition of ammonia at once gave him 24, and that without the slightest tendency to green fog. With regard to the time occupied in precipitation, while he was not prepared to say that forty-eight hours were too long, he thought that if the liquid were passed through a filter-paper, at the end of twenty-four hours the quantity of bromide of silver still held in suspension would be found to be extremely minute.

Mr. Herbert B. Berkeley said that in some respects Mr. Burton's process resembled one which he had himself used for some time, though he employed a larger proportion of water, and did not use added acid, his bromide being acid, which amounted to the same thing. In his experience he did not find that continued boiling aided precipitation, though possibly, as Mr. Burton stated, the ammonia acted as a powerful agent in that direction. At the same time processes had been described in which ammonia was said to have the opposite effect. He had never been able to secure perfect precipitation, but the quantity of bromide left in precipitation was so extremely small that it might be disregarded. With regard to Mr. Burton's observation that some emulsions increased in sensitiveness, while others did not, he thought it improbable that an acid emulsion would improve in rapidity by keeping at an ordinary temperature after boiling. Referring to the effect of altering the proportion of gelatine, he did not advocate the use of too small a quantity. He concluded by expressing an opinion that the precipitation process must be looked forward to as the most likely method of producing plates of uniform sensitiveness, and free from green fog.

Mr. J. Cadett thought that the question of gradation depended a great deal on the treatment the emulsion had received. When ammonia was used, a very good gradation would be obtained if a high degree of sensitiveness were not aimed at; but as the sensitiveness was increased, gradation became inferior. With the boiling process the sensitiveness could be pushed to a greater extent without loss of gradation. The beneficial effect of ammonia added to a boiled emulsion was, he considered, only due to the fact that the emulsion had not been properly treated in the first stage. He was of opinion that the highest degree of sensitiveness was obtainable with an acid boiled emulsion.

Mr. Archer Clarke said that he had made five or six batches of emulsion by Mr. Burton's method, and was very much pleased with it; its only fault was that his shelves were getting blocked up with jars. He thought it was a process eminently suited for amateur use, but not commercially. He had been for some time experimenting with a precipitation process, and was now able to make an emulsion and use it within two hours from weighing out the chemicals. He then proceeded at some length to describe his mode of working.

Mr W. K. Burton, in reply, said that Mr. Davis appeared to criticise without having tried the process, and thought that dispensing with the washing was the only advantage to be gained. He had been at some trouble in trying to explain that the chief benefit was found in the elimination of the whole of the gelatine that had been submitted to boiling, which did away with all danger of green fog, as a simple experiment would show. With regard to the effect of ammonia, he thought that Mr. Davis had failed to understand him. He agreed with Captain Abney that the boiled emulsion gave a more satisfactory curve than ammonia, and he had been sorry to have to introduce the latter; but he had recently succeeded in working without ammonia by prolonging the time of boiling to periods of five and six hours. He had just completed an emulsion which was boiled for five hours, and which seemed to be as near perfection as possible, giving 22 on the sensitometer. Speaking of the standard sensitometer, many people imagined that it was of little use; but he found the contrary to be the case. He was glad to hear the result of Mr. Ackland's experience, as it quite coincided with his own. As far as he could see, while he quite appreciated the value of slow plates for certain purposes, this process was incapable of producing any but rapid ones, which might by some be considered a disadvantage. He had been much interested in Mr. Clarke's process; but his own experience was that the slightest trace of free bromide in the emulsion produced slow plates.

The Chairman then proposed a vote of thanks to Mr. Burton and those who had taken part in the discussion.

Captain Abney then gave a brief abstract of his paper on "A New Diffraction Grating," illustrating his remarks by projecting a number of photographic spectra on the screen. This paper will appear in full in a subsequent issue.

After a few remarks from the Chairman, a vote of thanks was passed to Captain Abney.

An announcement was made in connection with the election of officers in February, and the meeting was then adjourned.

The next meeting will be held on Tuesday next, the 19th of December.

At the previous meeting of the Society held November 14th, the following gentlemen were duly elected members of the Society:—

Arthur Ackland, Christchurch, Oxford; W. M. Ashman, 3, Amersham Road, New Cross, S.E.; Luke Berry, Chapel Street, Chorley, Manchester; T. W. Boord, M.P., 14, Berkeley Square, W.; W. J. Byrne, Hill Street, Richmond, Surrey; George F. Dew, Norton Street, Coventry; W. Davies, Greaves Street, Ripley, Derby; Adam Diston, Leven, Fife, N.B.; B. J. Edwards, The Grove, Hackney; P. H. Emerson, M.R.C.S., A.K.C., Clare College, Cambridge; Thomas Fenn, 14, Bedford Square, W.C.; G. A. Garret, 60, Doughty Street, Mecklemburgh Square, W.C.; Major J. E. Gubbins, R.A., Yarmouth, Isle of Wight; W. Harris Heal, 195, Tottenham Court Road; J. A. Kay, 160, St. George's Road, Bolton; W. J. Lancaster, F.R.A.S., F C.S., Colmore Row, Birmingham; E. J. Lucas, 32, Half-Moon Street, Piccadilly, W.; Arthur G. Massey, Belfast; Lieutenant S. Maycock, R.E., Brompton Barracks, Chatham; William Muller, 89, Highbury New Road, N.; Samuel E. Phillips, Holbrook, Shooter's Hill, Kent; Charles Sawyer, 3, Windsor Road, Ealing, W.; G. Graham Toler, 21, Cornwall Gardens, S.W.; W. Trenemen, 7, Great Sutton Street, Goswell Road; and G. Sydney Whitfield, 14, Sandringham Gardens, Ealing, W.

South London Photographic Society.

The ordinary monthly meeting of this Society was held in the house of the Society of Arts, John Street, Adelphi, W.C., on Thursday evening, the 7th inst., the Rev. F. F. Statham, M.A., President, in the chair.

The minutes of the previous meeting having been read and confirmed,

Mr. J. J. Briganshaw, proposed by Mr. W. Brooks and seconded by Mr. E. W. Foxlee, was elected a member of the Society.

The Chairman said the first business of the evening was to announce the award for the prize competition of the past year. He was sorry to say they had not been quite so successful as in preceding years, there being fewer competitiors and fewer prints sent in. The judges had given their award in favour of a print marked with a monogram consisting of a circle with a cross inside it and another cross above it, and on the sealed envelope bearing this monogram being opened by Miss Harding, it was found that Mr. E. Dunmore was once more the successful competitor. A discussion had taken place in committee with regard to these competitions, in order, if possible, to see if any improvement could be made with respect to them. The chairman said it had occurred to him that if they could give something more valuable in the shape of a reward than the Society's medal, they might perhaps induce more of the members to send in pictures for competition. It was the intention of the committee to consider the matter privately, and the result would be reported at a future meeting.

Mr. Foxlee moved and Mr. Brooks seconded a vote of thanks to Messrs. Vicat Cole, R.A., and S. P. Jackson, for kindly giving their services as judges.

Mr. Bridge (the Hon. Sec.) read the report of last year's proceedings of the Society, and also put before the meeting the financial statement for the past year, showing a balance in hand of upwards of £16, after satisfying all claims upon them. Messrs. Wilmer and Collins were appointed auditors. A vote of thanks was passed to the Society of Arts for kindly granting the use of their room, also for permission to use the electric light at one of the meetings during the past year; and, at the suggestion of Mr. E. W. Foxlee, a vote of thanks was also passed to Mr. Woods separately, it having been through his instrumentality that much of the kindness had been received.

The election of officers for the ensuing year then took place, the nominations having been made at the November meeting. The Chairman said that for the office of president, no other name then his own having been put forward, he would be most happy to act again. For Vice-Presidents, Messrs. Jabez Hughes, P. Mawdesly, E. Cocking, W. Brooks, and F. Howard were re-elected unanimously. Committee, of the ten nominations, Messrs. T. Bolas, W. B. Bolton, W. Cobb, A. Cowan, E. Dunmore, E. W. Foxlee, J. Nesbit, and H. Wilmer were elected. For the office of Hon. Secretary and Treasurer, Mr. F. Bridge was elected unanimously.

The Chairman then proposed a vote of thanks to the officers of the past year for their services. He said he did not remember when they had had such a satisfactory balance-sheet, and thought the hearty thanks of the members were due to Mr. Bridge for having pulled them through so successfully, as for performing some very special duties on the abdication of Mr. Garrett Cocking, their late treasurer. The vote of thanks having been passed with acclamation, Mr. Bridge briefly responded.

Mr. Foxlee called for a further vote of thanks to the President, who had, he said, by his regular attendance at the meetings, rendered the office of Vice-President virtually a sinecure.

This having been cordially responded to,

The President said it was a very great source of pleasure to him to act as President. If would be a great grief to him if the Society were on the decline. It had now been in existence something like twenty-three years. There was only one thing required to make the Society more successful in the future, and that was, that they should have some existing rule for providing papers. He thought that they should not be entirely dependent on their own exertions in this respect, and if they were to put themselves in communication with some of the former members, now resident in distant parts of the country, they might suggest useful subjects for discussion, and thus give a helping hand. Meantime, he thought they could not do better than think over in their own minds subjects for papers during the ensuing year, and each member should let Mr. Bridge have a short notice in order to make it known, when he had fixed on something suitable for a paper. With regard to the lantern exhibition, he thought it would be well to try and procure interesting slides, as, for instance, scenes from Egypt, in connection with the late war—in fact, anything which mightt end towards demonstrating the usefulness of photography. He also called attention to the Annual Dinner to be held at the Holborn Restaurant, on Friday, 15th December, at 6·30 punctually. Tickets (5s. each) could be obtained from Mr. Bridge.

The Chairman then put before the meeting, for discussion, a question found in the box, "Would it not be beneficial to the Society if a certain portion of the officers retired annually, not eligible for re-election?" A discussion followed, during which

Mr. Eyres, though of opinion that they could not well dispense with the valuable services of the President or of Mr. Bridge, thought that there should be six vice-presidents and twelve committee, two of the former and four of the latter to retire annually and not be eligible for re-election, by which means the Council would be entirely reconstructed every three years.

The Chairman objected that any proposition of this nature ought to have been brought forward prior to the nomination meeting in November: they had afforded the members every opportunity of giving expression to their wishes if they desired any change in the officers. He thought that if the question in the box had the approval of the members, the result would be to thrust out some of those who had well done their duty in council.

Mr. Bridge thought Mr. Ayres' suggestion might help them in one respect, viz., in getting papers. Perhaps if they infused new blood into the Council every year, they would have more papers from some of the younger members.

Mr. T. Bolas could not help thinking that theoretically, it was the right thing to force new blood into the Committee, but practically it might be awkward. If it were to be done, the Committee ought to be much enlarged.

Mr. Foxlee said that unfortunately large committees did not work.

The Chairman said it seemed to him that if the names of the Committees for a few years back were looked over, it would be found that they were changed very much, which practically fulfilled the object of the question in the box.

The Hon. Secretary called the attention of the meeting to one of the rules of the Society, which stated that "the Committee should be elected from the names proposed at the November meeting," and remarked that, according to this rule, they could do nothing in the matter until the next November meeting.

The Chairman thought that the thanks of the meeting were due to Mr. Eyres for his suggestion, and recommended him to bring the matter forward again a month or two previous to the nomination meeting in November.

The Hon. Secretary informed the meeting that tickets for the lantern exhibition would be sent to all members about a fortnight beforehand, and asked them to bear it in mind when making their Christmas engagements.

The Chairman asked if there was any chance of getting photographs of the transit of Venus, or the comet, for that exhibition?

The meeting then adjourned.

The following is the Secretary's report:—

"In submitting the Annual Report of this Society for 1882, the committee congratulate the members on the continued prosperity of the Society. This is particularly satisfactory, having regard to the existence (in close proximity) of other societies meeting weekly, and therefore, to a certain extent, forestalling many matters of interest that would otherwise, for the first time, probably, be introduced at the meetings of the South London Society.

"The actual number of members for the present year is 78, only four of these being honorary.

"During the year papers have been read as follows, viz:—'Co-operation in Matters Concerning Photography,' Mr. W. Cobb; 'A Few Common Objects of the Studio,' Mr. E. Dunmore; 'A Gelatino-Chloride Process,' Mr. B. J. Edwards; 'Realism and Idealism in Photography,' Rev. F. F. Statham, M.A.; 'Practical Experiences with the Alkaline Developer,' Mr. W. Brooks; 'The Decoration of Pottery,' Mr. F. J. Emery; 'The Past Season,' Mr. E. Dunmore; and 'A Trip to West Cornwall,' Mr. W. Brooks.

"It is scarcely necessary to say that the Popular Lantern Meeting in January was very successful, upwards of 300 slides having been exhibited by various members and friends. The out-door meeting at Hampstead on the 1st of July was also very pleasantly spent.

"The tenth Annual 'Technical' Meeting in November, notwithstanding a series of meetings, have now been inaugurated by the 'Parent' Society, under the same title, was as usual very satisfactory.

"The committee earnestly hope that all the members will exert themselves, so that the ensuing year may be well supplied with papers; and that those who may have communications which they may deem worthy of a 'Paper,' will avail themselves of the 'Question Box,' as very often a simple question on some apparently well-worn subject, will furnish material from which a very interesting and profitable discussion may arise.

"With regard to the 'Artistic Competition,' it must be admitted that this has not met with that amount of success which was anticipated, and the committee intend devoting a special meeting to the re-consideration of the subject.

"In conclusion, the committee tender their hearty thanks to all those members and friends who have contributed in any way to the advancement of the Society during the past year, and trust they may rely on their kind co-operation for 1883."

London and Provincial Photographic Association.

At the meeting of the above Association held on the 7th inst., at the Mason's Hall Tavern, Mr. Mark Carey in the chair,

Mr. Cobb showed a lamp for dark-room use with a bull's eye lens constructed similarly to the lamps used in railway trains.

During a short discussion which took place on the solubility of silver bromide—in which Messrs. Debenham, Brown, Coles, and others took part—

Mr. F. W. Hart quoted the following extract from Pohl:—100 parts ammonia solution s.g. 0·986 dissolve 0·051 parts silver bromide, at 176 F., or about 1 grain in 43 ounces; s.g. 0·986 contains about 3 per cent. ammonia, 0·88 being 33 per cent.

Photographic Society of Ireland.

The usual monthly meeting of this Society was held in the Royal College of Science, Dublin, on Friday, the 8th inst., at 8 p.m., Mr. George Mansfield in the chair.

The minutes of the preceding meeting having been read and confirmed, Messrs. George N. Jacob and C. Frederick Allen were proposed for membership.

Mr. Greenwood Pim read a paper entitled, "With the Camera in North Italy" (see page 759), and Mr. C. W. Watson gave an account of a recent trip in the West of Ireland.

Mr. Edward Roper exhibited a series of views taken in Bournemouth, which were much admired.

Sheffield Photographic Society.

The usual monthly meeting of the above Society was held at the Freemasons' Hall, Surrey Street, on Tuesday, December 5th. Mr. J. H. Ranson, Vice-President, occupied the chair.

The minutes of the last meeting were read and confirmed, after which Messrs. Gilley and Turner were unanimously elected members of the Society.

The Secretary reported that no replies had been received in response to the advertisements which had been inserted in the photographic journals, inviting pictures to be sent for the purpose of selecting a presentation print. The accounts for the past year were presented and passed.

The question of holding another exhibition was then brought before the meeting, and an animated discussion arose upon it; but eventually it was decided to postpone the exhibition until next October, on the ground that the last summer was considered to have been unfavourable for securing many good pictures. It was resolved that the presentation prints for next year be selected from the members' own work of the next season. The meeting was then adjourned.

Dundee and East of Scotland Photographic Association.

The third regular meeting of this Association for the winter session was held in Lamb's Hotel, on Thursday evening, December 7th, Mr. James C. Cox, President, in the chair. There was a large attendance, including members and friends from Glasgow, Arbroath, and other districts.

Mr. C. Johnson, Honorary Secretary, read the minutes of last meeting, which were approved and confirmed. The following gentlemen were unanimously elected members of the Association:—James B. Crighton, James M'Farlane, Mr. Noble, Manager Northern Electric Light Company; William Hendry, Alexander Hutcheson, Alfred Guthrie, Willard B. Wells, Consul, U.S.A.; and Rev. Robert Clapperton.

The Secretary read the report on the lantern exhibition, which was approved, and congratulatory remarks made as to the excellency of the slides shown, and the interesting description given by Mr. M'Call.

Mr. G. D. Macdougald, Public Analyst, read a paper on "Emulsion Making," which he illustrated by a series of very neatly-executed experiments, showing the whole process in a simple and practical manner, and concluded by coating a plate with the finished emulsion.

On the motion of the President, Mr. Macdougald was awarded a hearty vote of thanks.

Mr. John Y. M'Lellan, of Glasgow, exhibited and explained his patent eclipse lamp, constructed for burning magnesium wire in oxygen gas.

Members having been invited to bring their cameras, several plates were exposed to test the light. It was decided that the results should be shown and further experiments made at the next meeting.

The question-box contained three subjects for an interesting and instructive discussion, in which both amateurs and professionals did good service.

It was decided to hold the next lantern exhibition on the 20th inst., when Mr. D. Ireland, jun., will show slides and give "Notes on a Tour in Norway." The usual courtesy to the Chair closed the meeting.

Photographers' Benevolent Association.

The Board of Management of this Association held its usual monthly meeting on the 6th inst. at 181, Aldersgate Street.

Messrs. H. W. Bibbs (Greenock), A. Robinson, and A. Jung (London), were proposed and duly elected members of the Association.

The committee passed a vote of thanks to the Council of the Photographic Society for use of their Exhibition on November 16th, the Secretary stating that the benefit, as far as could be judged at present, would about equal that arising from the *soirée* held in the early part of the year, viz., nearly £10. He also stated that J. Glaisher, Esq., had sent a guinea for the funds of the Association.

The other business having been disposed of, the meeting adjourned until January 3rd at 8 p.m.

City and Guilds of London Institute.

Last evening, at Goldsmiths' Hall, Dr. Siemens, F.R.S., distributed the prizes and certificates competed for last May at the Institute's Technological Examinations. Among the awards the following were given for photography.—

First-class Honours Certificates.—1st. prize, W. A. Watts, £5 and silver medal; 2nd prize, A. J. Spiller, £5 and bronze medal.

Second-class Honours Certificate.—E. Banks.

First-class Ordinary Certificates.—1st prize, G. Embrey, £3 and silver medal; 2nd prize, E. H. Farmer, £3 and bronze medal; 3rd prize, H. G. Templeton, £2 and bronze medal; H. Hinchcliffe.

Second-class Ordinary Certificates.—A. J. Banks, F. Caldwell, A. Raiuger, and W. S. Ramson.

Talk in the Studio.

MR. WARNERKE ON PRACTICAL SENSITOMETRY.—At the Photographic Club on Wednesday evening last, the question as to the difference now generally admitted to exist between camera sensitiveness and sensitometer sensitiveness, was discussed. Mr. Warnerke said that the difference would probably disappear if the highest number reaching a given standard of density were taken as the sensitometer reading; those faint tints which can only be recognised by careful examination with oblique light being disregarded. In order that the full advantage of such a method of reading the sensitometer might be realised, it would probably be desirable to fix the plates and compare them, together with the pattern tint or standard of visibility, by placing them together on a sheet of paper. The sensitometer would then become not only a test of the quality and value, but also of that sensitiveness which can be reckoned on in actual every-day work.

THE BEHAVIOUR OF SELENIUM IN LIGHT.—At the last meeting of the Physical Society (25 Nov.) Mr. Shellford Bidwell gave an account of some experiments he had made to test the theory of Dr. James Moser, that the action of a selenium cell under light was due to the heat rays making a closer microphonic contact between the selenium and the metal electrode, by expanding the material. He submitted selenium cells to dark heat rays, and found their resistance to rise. Under light rays, however, their resistance fell. He therefore concluded that Mr. Moser's theory was erroneous, and that the fall in resistance due to the light rays is the differential result of the rise due to heat, and the fall due to light. He also explained the "fatigue" of a selenium cell by use, as caused by its increase of temperature. When the cell cooled again the fatigue disappeared.

ARTIFICIAL PARCHMENT OR LEATHER. (Chas. Weygang.)—One or more layers of long-fibred paper felted or textile fabrics are treated with glue or gelatine, and then with chromic acid, chromates, alums, or other chemicals well-known to have a tanning or "insoluble-ising" effect on glue or gelatine. It is then rolled between hot or other rolls.—*Jour. Chem. Ind.*

To Correspondents.

*** We cannot undertake to return rejected communications.

JNO. W. BEAUCOCQUE.—There is too much ink on your transfer. The layer should be as thin as is consistent with perfect continuity, there being a considerable risk of blurring if this point is not attended to.

FRED JOHNSON.—1. It is probably no more than a question of careful attention during the process of printing. 2. Not at present, but something of the kind will appear shortly. 3. There are several, and one of them will expire in little more than a month.

R. PIKE.—The process is quite out of date, and it is probable that no work at present in print contains any sufficient description. If you enquire at a second-hand book shop for old works on photography, you are likely to find one with working details.

H. SPINK.—We imagine your bath must have been weak, as we have obtained good results with the formula in question; still you may somewhat increase the proportion of iodizing salts.

W. H. M.—Probably the texture of the paper is unequal.

E. P. H.—Dilute your collodion with about one-third of its bulk of ether and alcohol mixed in equal volumes.

HARRY POINTER.—We shall be happy to insert your letter if you will append your name to it.

AN OLD AMATEUR.—Roscoe's Elementary Chemistry, published by Macmillan at four or five shillings, is a very suitable book for your purpose.

A. B.—We are inclined to think that the essential features are covered by a patent; but we are sure that it would cost you a great deal more to make a single one than the price demanded.

W. H. GOVER.—Gas light, or the light of a number of paraffin lamps, will answer well, provided that a sufficiently long exposure is given. The electric light or the magnesium light is suitable for portraiture. Mr. Solomon, of Red Lion Square, sells the ordinary magnesium lamp, but a far more actinic light is obtained by the arrangement of Mr. McLellan for burning magnesium in oxygen. Look back through our advertisement columns for particulars.

CAMBRIDGE.—Such a lens, though admirable as an optical instrument, and capable of doing first-class work, has scarcely any recognised commercial value as a second-hand article. One was sold at Stevens' Auction Rooms some months ago for 15s. 6d., and a friend of ours recently bought one at a second-hand shop for 25s.

*** Several answers are unadvoidably crowded out this week.

*** Authors may have Reprints of their Articles at 3s. per page per hundred copies; but the order must be given when the proof is returned.

THE PHOTOGRAPHIC NEWS.

Vol. XXVI. No. 1268.—December 22, 1882.

CONTENTS.

PHOTO-ELECTRIC ACTION IN ROCK-CRYSTAL.

The influence of light on various substances, whatever the result, has always a certain interest to the photographer. With the action of light upon selenium, rendering this a more or less efficient conductor of electricity, according to the power of illumination, we are all of us tolerably familiar; and now an investigation by Hanckel teaches us something of the electrical behaviour of rock-crystal under the action of actinic rays.

Hanckel's experiments have already formed the subject of remark in these columns; he has found, so we read in a German contemporary, in continuing his research, that when the rays of the sun, or of the electric light, or even of a flame or heated body, penetrates rock crystal, there is produced on all six edges an electric pole. These six poles are alternately positive and negative electrically, so that every secondary axis carries at one end a positive pole, and at the other a negative one.

The maximum of these photo-electric or actino-electric spans is reached after some thirty or forty seconds, and remains so long as the rays shining upon the crystal maintain their power. As soon as the light rays cease to impinge upon the crystal, the photo-electric quality ceases in like manner, first quickly, but afterwards more slowly.

An electric arc-light equal to 4,000 candles is capable of producing a photo-electric action upon rock-crystal equal to that provoked by sunlight; a gas-burner (Schmidt's) gives a result about one-seventh of this.

The actino-electric or photo-electric action is, in like manner, produced by heat rays, as many of our readers are aware.

INTENSIFYING GELATINE PLATES.

In the development of wet collodion plates little or no difficulty is experienced in obtaining the requisite density, and in knowing when that requisite density is arrived at, for, by reason of the comparative transparency of a bromo-iodide film of collodion, it is very easy to judge in the pale yellow light of the so-called "dark room" how development progresses, and it is quite convenient to carry that operation on to exactly the required extent, as the cooks would say, to "do it to a turn." Now, in the reign of gelatine, another phase presents itself.

We have extremely dense films; the dimmest of dim lights in the red room; development carried to the very verge of fog, indeed more by time than sight; and so many disturbing and distracting conditions prevalent, that the wonder is our successes are as great as they are, especially when we find such wide differences in the behaviour of the various makes of gelatine plates. There is no doubt that the photographer of the present day must know more of the chemistry of his art than those of the bye-gone age.

The extreme difficulty of judging in the developing room of the density of the plates under development is one of the most serious drawbacks attending the use of gelatine plates. Individuals may know with their own or a given make of plates what are the characteristics under development, and can so time their operations and manage their chemicals that they can very accurately arrive at the result they desire; but it must be admitted that the behaviour of gelatine plates under development is very variable, and it is just this variableness that brings about that uncertainty which may entail either intensification or reduction of the negative. Certain makes of plates will, with their proper exposure, develop so that the resulting negative is almost perfect, requiring neither strengthening nor reducing. Other makes, no matter what the exposure, will invariably require strengthening, but it by no means follows that such a plate should be discarded; on the contrary, some of the very finest results can be obtained with plates of such a character, and for the simple reason that everything is visible on development, intensification being merely required to strengthen the whole image, all over, not in part; this being of course just what does not happen when we intensify wet collodion negatives with pyro. and silver. Then, again, certain other makes of plates will give excessive density, no matter what the exposure, nor what the development. Some plates require a very small amount of ammonia, others a very small amount of pyro.; a sort of apprenticeship being needed to master their peculiarities. Finally, some plates won't yield a vigorous image by any treatment.

We will drop the last-named out of the question, and give our attention to such plates as either develop with lack of density in the high lights, or such as develop an image which requires re-inforcing all over. The subject of intensification of gelatine plates has become a burning one, the more so since it has been found that the readiest method of intensification—*i.e.*, mercurial—is not quite reliable. There are conditions about the behaviour and treatment of gelatine plates which are widely different from collodion, so that the methods of intensification employed in the past will not do in the present. In the acid silver intensification of collodion negatives we have an electro-chemical action set up, whereby the silver is thrown upon those parts most elective, and this deposit, which is partly metallic silver, and partly oxide of silver, becomes sufficiently thick to obstruct the light; thereby the contrast of the whole surface is heightened. But this form of intensification does not usually re-inforce the shadows in collodion plates; hence, if a plate be under-exposed, intensification only makes matters worse. However, acid silver intensification of collodion plates is said to give permanent results, and no doubt, if the operations have been properly conducted, these are permanent; i fading or changes of colour take place, most probably the manipulation, especially the washing, is at fault.

But silver intensification of gelatine plates is by no means an easy matter. It was soon found that ordinarily any attempt to employ acid pyro. silver on a gelatine negative merely resulted in a reddish-brown stain or dye all over the plate. This is usually attributed to the presence of hypo. left in the film, and to a certain extent is true, for the same effect can be produced in collodion plates from which the hypo. has not been effectually removed. It must not be overlooked that the film itself, whether it be collodion or gelatine, is susceptible of being stained by silver, especially in the presence of a reducing agent so powerful as pyro. Various attempts have been made, and with considerable success, to eliminate the hypo., a mixture of citric acid and alum having proved efficacious, not only in removing the yellow tinge, but in eradicating the last traces of hypo. or hyposulphite of silver, after which intensification with acid pyro. and silver can be effected.

Whilst the foregoing succeeds in but few hands, the other method of intensifying by means of mercury is so extremely simple, that if it only had the advantage of stability, really scarcely anything more effective could be desired. Mercury intensification of gelatine plates has the property of intensifying the whole image equally, unlike the action of acid pyro. silver. If we have, say, an instantaneously exposed plate on one of those emulsions which will render everything, but yet give little contrast; on development we may find that forcing beyond a certain limit does not improve matters, and on fixing such a negative we feel disappointed to find that although detail is there even in the deepest shadows, still the whole thing is so flat and thin that it will not give a print by any coaxing. Now if we thoroughly fix it and give it fresh hypo. after it comes out of the fixing bath, then wash and soak for some hours, next immerse in solution of alum and citric acid, wash, dry, and finally immerse in a nearly saturated solution of mercury bichloride, it will bleach, or rather whiten, all over. If the plate be then thoroughly washed, and afterwards treated with weak ammonia, almost any degree of density can be obtained. After this, prolonged washing, with an intermediate bath of alum and citric acid, then more washing, should leave the image so intensified and in about as stable a condition as we can expect. If hypo. had been left in the film even in small traces, the image will actually intensify when placed in the solution of mercury bichloride, and this forms a ready method of gaining just a little intensity, copious washing, of course, following such treatment.

This method of intensification is undoubtedly to be preferred, on the grounds of stability, to that in which hyposulphite of mercury itself is the intensifying agent, for then we have certainly the elements of a changeable colouring matter, and only a short time will be required to alter this so that a beautiful negative becomes a dirty and useless piece of glass.

CHEMIGRAPHIC ENGRAVING.

FIFTH ARTICLE.

THE asphalt process of Niépce is capable of giving by far the finest result of any heliographic method known, when line subjects are to be reproduced; and the application of this method to chemigraphic engraving on zinc has long been practised with success. The asphalt process on zinc gives clearer and more perfect blacks than the transfer method already described, as the protective film of asphalt is continuous, and not a mere net-work like the blacks transferred from the usual photo-lithographic impression. Till recently, the great length of exposure required to sufficiently impress the bitumen film has largely tended to prevent the bitumen method coming into general use; but by the adoption of the mode now given for preparing the bitumen solution, this objection is removed, the exposure required not being very much in excess of that required in the case of the bichromated gelatine process. Reversed negatives are required for the process now under consideration, and these are most conveniently obtained by using a reflecting prism or a mirror when taking the negative.

The asphalt selected for preparing the sensitive solution should be light brown in colour and have a decided odour, and, at the same time, should not be so exceedingly dry and resinous as to be easily crushed into an extremely fine powder. A quantity of the sample selected should be powdered as finely as possible, and put into a bottle so as to about one-third fill it; after which the bottle is nearly filled with ether. The bottle should now be corked, and agitated at intervals during about five hours, when the powder is allowed to settle, and the clear etherial liquid is poured off. This washing with ether is repeated several times—in fact, as long as the ether dissolves anything out of the bitumen—after which the remaining asphalt powder is collected on a filter, and allowed to dry in a warm and dark place. The dry powder thus obtained is dissolved in benzole, so as to form a solution having about the consistency of ordinary black varnish or Brunswick black, and the solution is stored up in a dark place for use.

The zinc plate having been carefully cleaned and prepared as directed in the case already considered, a portion of the bitumen solution is diluted with about its own bulk of anhydrous benzole, the solution being filtered if necessary; after which the plate is coated, just as a glass plate is coated with collodion, and placed in a warm and dark place to dry. Before exposure under the reversed negative it is well to dust the surface of the bitumenized plate over with French chalk, in order to prevent its adhesion to the negative; but, of course, all excess of French chalk should be wiped off before the plate is placed in the printing-frame. In ordinary cases, an exposure of one or two hours is required in good diffused daylight. It is scarcely necessary to say that great care must be taken to ensure the complete contact of the negative with the coated zinc plate.

The exposure being ended and the plate taken into the dark room, its surface is carefully mopped over with a tuft of cotton-wool moistened with oil of turpentine; after which, extremely gentle friction may be applied with the same tuft of wool, the greatest care being necessary to treat all parts of the film with equal force. Under these circumstances, the unexposed portions of the film gradually dissolve away, and the device appears in sharp brown lines on the plate. The development being complete in all parts, a similar tuft of wool charged with olive oil is applied in a like manner, this operation serving not only to arrest the solvent action of the turpentine, but also to remove the bitumen already dissolved by the essential oil. The excess of oil having been wiped off, the plate is gently scrubbed with a tuft of cotton charged with a lather of soap and water, this operation being alternated with washings under a water-rose. When all traces of oil have been removed, the bulk of the water is removed by means of blotting-paper, and the plate is fanned till perfectly dry, and placed in a good light for an hour or so, in order to thoroughly fix the bitumen film. The edges and back of the plate are now covered with a resist of shellac varnish, test lines are made, and all is ready for the immersion of the plate in the first etching bath of one part nitric acid and forty parts of water, as already described. When the first etching is completed, the plate is rinsed, gummed, and inked, just as described in the preceding articles. All subsequent operations are now identical with those already described in connection with the transfer process.

Any of our readers who may experience difficulties in carrying out our directions in actual practice are invited to communicate with us.

By-the-Bye.

EXPRESSION.

Expression in portraiture—"there's the rub." A model may be represented well-posed, well-lighted, admirably draped with brilliant shadows and soft detail, and yet be withal a dread failure, should the expression be wanting. It is the wreath that crowns the work, and distinguishes good portraiture from bad. It is of no avail to be the most skilful of manipulators, to have exquisite taste, to possess a keen eye for effect; if the under-lip falls at the moment of exposure, and a set, wearied look creeps over the face when the critical moment arrives, all your talent and labour are in vain. Indeed, the skill and taste you have bestowed go rather to make matters worse; and the critic's cry of "What a pity!" comes out unhesitatingly when he beholds so much good work cast to the winds.

Every photographer has his own way of treating the sitter; but whatever it may be, if the model is not at ease, there is little chance of securing an agreeable expression. A man's portrait is more easy to get than a woman's, for the simple reason that most men wear hair upon their faces, which in a manner masks the expression. It is around the lips and mouth that the greatest mobility exists, and when these are covered by a moustache, the expression of the lower part of the face does not apparently alter. Indeed, it is said of some men that they take their expression from their beards. A man who has beard and moustache falling downwards in one line, from continually seeing himself grave and stern-visaged, lives up to his beard, and grows solemn, or, at any rate, makes belief to be so. Nobody ever sees him smile, and after a while he ceases also to laugh. In the same way, we are told, the exquisite with whisker and waxed moustache maintains for life the cold and superlative air he first assumed when he began to take so much pains over the cultivation of his hirsute appendages; he becomes so accustomed to the mask he wears, that, after a time, it ceases to be a mask at all. How much truth there is in all this we do not know, but certain it is that the beard governs the outward expression of the mouth, and therefore of the face, in a marked degree. An actor with a beard is never satisfactory; we like to see the full play of his features, and the most important of these are hidden if the working of the muscles around his mouth is not visible.

Anyone who will examine but cursorily the anatomy of the human head at once sees that the muscular system is centred in the mouth, and for this reason it is that the mouth plays such an important rôle in expression. It may be said, in fact, that if the photographer secures an agreeable expression of the mouth, he has done all that is necessary. The "saintly look about the eyes" is but a figurative expression, and has no real existence. There are muscles over the eye-brows, it is true, which concern expression; but the eyes themselves cannot express either joy or sorrow. They seem to laugh or cry according as the mouth muscles act, and it is impossible to say whether a model is sad or joyful if you only see the top half of the face. The late Professor Partridge, of King's College, who was for several years professor of anatomy at the Royal Academy, found it very difficult to get his students to believe that eyes could not flash fire, or languish with sweet melancholy. His painter-pupils were so deeply impressed with "the expression of the eyes," that it needed all the worthy Professor's tact and tuition to convince them to the contrary. To Professor Partridge, indeed, the Royal Academy is much indebted for the sound teaching in anatomy which the establishment enjoys to this day. The plan he adopted to convince the art students of the fact he wished to inculcate—for anatomical drawings did little to advance his dictum—was to exhibit a picture of a face, the lower half of which could be replaced either by a mouth wearing a sad expression or a laughing one. He was then able to show that by simply altering the lower part of the face, the eyes would appear to twinkle with delight, or assume that "saintly look," about which we even now hear a great deal.

Care or pain are at once expressed by relaxing the muscle of the lower lip and allowing this to fall, just as readily as a laugh or grin is produced by drawing in the muscle which is in a line between mouth and ear, and is termed the laughing muscle. It does not require human agency to move these muscles and produce expression; this can be done just as well by electricity, as Duchenne, the French physiologist, has shown. Duchenne published in 1862 a work on the mechanism of human physiognomy, which was illustrated by a series of very telling photographs; in this he showed how, by contracting certain muscles by an electric current, the features of a dead man could be made to assume the various expressions as in life, and, in a word, he produced a very good semblance of the different emotions by merely contracting or relaxing the muscular system of the face. This is a circumstance that retouchers should bear in mind, otherwise they may thoughtlessly remove from a laughing face the outline of that muscle's action which produces the laugh.

It is the lowering of the under lip that, in nine cases out of ten, mars a photographic portrait, when it is marred, and no skill of the retoucher can set matters right again. For this reason one always endeavours to keep the sitter in a humorous mood, for so long as the risible muscle is braced up there is no tendency for the lower lip to fall. Indeed, the falling of the lip only happens when the sitter is left to himself or herself, when perhaps the operations of posing and lighting have lasted too long, and the photographer's stock of lively conversation has come to an end. Fritz Luckardt has a predilection for English sitters, because he says that while they are quiet, they generally smile, the prominence of the front teeth, to be observed more especially in the Anglo-Saxon race, being conducive to a bright expression. But when they leave off smiling, and are no longer animated, then the British model ceases to be a favourite, for, says our excellent Viennese artist, as soon as the lower lip falls, the teeth are disagreeably prominent, and we get the jaded—almost painful—expression that one wants so much to avoid. The corners of the mouth sink, and then good-bye to the cheerful expression.

Some photographers occupy themselves with a sitter for half an-hour, and in this way seek to win the confidence of the model and to set the latter at ease; while others believe that the visitor should not be introduced into the studio till the last moment, and then by doing the work briskly they do not give a chance for any feeling of weariness or fatigue. By both plans, no doubt, success may be obtained, and certainly it is impossible to lay down any law by which all photographers can act. Both the qualities of the artist and of the tactician are requisite in conjuring up a happy expression and catching it upon the sensitive film. But if it is the most difficult of all to obtain, we should remember that it is most valuable.

It is expression that makes the difference between a photograph and a painting, and causes the former to be prized so highly when the original is gone far away—perhaps to that bourne whence no traveller returns. A photograph with a happy expression is not merely a pourtrayal of features, a representation of somebody; it is the man himself, with speaking lips and glowing cheeks, as he lives and moves and has his being.

NITRO-GLYCERINE IN THE DEVELOPER.

BY S. BOTTONE.

Few things have conduced so much to the advance of artistic delicacy in photographic portraiture as the use of a strong iron developer. When we look back at the hard black-and-white negatives which used to result from the employment of a pyrogallol developer alone, we cannot help admitting that although these were *photographs*, they were not *pictures*. But the iron developer may be made to give very different results, according to the mode in which it is compounded; the addition of a mineral acid (especially nitric) rendering the resulting image hard and brilliant. I need not descant on the advantages of employing sugar or gelatine in the developer—that has been sufficiently done by Mr. Carey Lea—but I will call the reader's attention to the extreme delicacy in the rendering of half-tones to be obtained by the employment of an alcoholic solution of nitro-glycerine as an addition to the developer. The large wholesale chemists now keep a one per cent. solution of nitro-glycerine in alcohol, which is used in medicine as a remedy for neuralgia, *angina pectoris*, &c. Though it contains only $\frac{1}{100}$ of its bulk of nitro-glycerine, yet it produces a most marked effect when employed as follows:—

Ferrous sulphate	120 grains
Water	4 ounces
Acetic acid (glacial)	2 drams
Sol. nitro-glycerine (1 per cent.)...	2 ,,

The bath being neutral, the collodion pale straw, and the exposure being full, the result is wonderfully fine, full of detail, and hardly ever requires any intensification.

FRENCH CORRESPONDENCE.

REPRODUCTION OF TORPEDO EXPLOSIONS—TRANSFER PROCESS ON GLASS—M. GRASSIN'S INSTANTANEOUS PICTURES.

Colonel Lébert on the Reproduction of Torpedo Explosions.—While on this subject we do well to attend to a lecture by Colonel Lébert, on the photographic reproduction of torpedo explosions. Experiments of this kind have been made everywhere, notably in France and America; and by the help of six different apparatus, all directed towards the spot where the explosion is to occur, the whole of the phenomenon has been photographed from the commencement to the end of the disturbance. In order that the experiment should possess the desired scientific precision, it only remains for the intervals of time between each successive operation to be chronometrically regulated, and that the shutters employed are exactly equal in the length of exposure. It is only under these conditions that we may hope of attaining to scientific results, permitting an absolutely true appreciation of the entire effect, from the moment it commenced to show itself, until the mass of water thrown up by the explosion has completely spent its force. These very delicate experiments form one of the fine applications of instantaneous photography.

Dr. Hénoque's Transfer Process on Glass.—Dr. Hénoque has shown us his method of transferring outlines obtained by means of a stylus on blackened paper on glass. This mode of describing curves in apparatus for meteorology, physiology, &c., is frequently employed, only the outlines are generally executed on paper rolled on cylinders. To photograph these designs, or project them on a screen, it is usual to transfer them to glass without any alteration, the transparency of which renders it capable of being used in either way. Dr. Hénoque, after removing the blackened sheet from the cylinder round which it has been rolled, spread it on a glass, and coated the smoked surface with castor-oil collodion. As soon as the collodion is set, the plate is plunged into water, and, after a moment, a floating pellicle of collodion rises to the surface, bearing the film of smoke and the traced outline. It is next transferred to glass by means of a sheet of paper, and made to adhere with gum applied all over the plate. Great precaution must be taken to fix the four edges of the pellicle by strips of paper gummed. When dry it forms a perfect negative, or may be used as a transparency to project on a screen. In the same way, as Poitevin has indicated, chalk drawings may be removed from paper and transferred to glass. The paper for smoking, says Dr. Hénoque, should be albumenized and lightly gummed. To smoke glasses on which lines are to be traced with a point, they may be coated with lamp-black paint, and the blackened surface afterwards passed over a petroleum lamp flame. The smoke covers over all the inequalities of the coat of paint, and the design may be immediately traced. It can also be taken off and transferred to another glass in the way already indicated.

M. Grassin's Instantaneous Pictures.—M. Grassin, of Boulogne, an amateur, who exhibited such remarkable work at the last Exhibition, has just sent us some beautiful specimens. Among all the instantaneous pictures of this kind which we have come across, we have not seen any superior to them. Our readers would therefore be interested in knowing what course was pursued by M. Grassin in their production. The lens is of French make (No. 4 aplanatic by Hermages), having focal length of 44 c.m. The aperture varies from 20 to 25 millimetres. The shutter is of M. Grassin's own invention, which is soon to be brought out commercially. As to plates, he uses Monckhoven's, and the most rapid are prepared by himself. M. Grassin obtained a silver medal at the last Exhibition in Paris.

EXHIBITION OF 1882.—FRAMES OF THE FUTURE, TECHNICAL MEDALS, MEDALLISTS, ETC.

BY THOMAS J. PEARSALL, F.C.S., ETC.

The general view of the Exhibition of the Photographic Society of Great Britain is satisfactory. A pleasant feeling is created by the grateful harmony of the pictures. No subjects abruptly intrude, and as the eye selects points for attention it is gratified by the good work and taste shown in the pictures exhibited. The press has given its praise, and the photographic journals are calling critical attention to the displays. Some few general ideas may be hazarded as to the teachings of exhibitions as affecting the public, the development of the laws of taste, and the profession.

This Exhibition is so good that it is exceptional to find a bad picture. It seems a severe trial to bring subjects together for the first time, and it is gratifying to find the photographs and their surroundings to be in harmony. If obvious faults were seen at former exhibitions, they now no longer appear, and it is shown that fair criticism has been well entertained by the art-public. The Greeks and ancients carried mathematics into works of art, and it has been proved that the purity and graces of their ornamental works coincide with the severe and perfect rules of geometry.

It is possible that the moderns of the present day are realising geometrical fitness or forms that surround and display photographic pictures, harmonising, as they often do, with tints and colours; and the time may come when some first-rate critic may prove how elegance and harmony of exhibits are more or less dependent upon geometrical proportions of lines and spaces, subordinating tints and colours. It is possible that satisfactory examples may readily be found of group-forms quite in accordance with pure geometry.

Exhibitions seem happy means whereby the public and individuals can each in their way become the critic of work that may accord or be exceptional to general laws. In exhibitions of pictures there are to be considered the means to show these to the best advantage. Not merely are margins in breadth to be noted—and while white and gold are usually safe for individual examples, yet a particular tone or tint may be desired. Here at an exhibition may be seen the effects of suitable surroundings. The exhibition has a quiet, elegant tone. There is scarcely to be seen any pure colour; all are tones or greys. Here can be studied examples of display, and here can well be decided whether the mounts or surroundings should have any white or light tints lighter than the lightest tints of the pictures, or any tint darker than the deepest shade of the pictures.

Frames.—Undoubtedly gold seems best adapted for frames, and it is satisfactory to find that where gold frames meet together, they seem to meet in a pleasant way, the very spaces between doing much to make harmony, where wood and velvet, &c., seem to show too obviously. "The frame of the future" will probably be of gold, of such complexion and design that it will always show as a frame. Whenever seen, and at whatever angles —distinct from a merely bright line, glancing angle, or partial form—the ornamentation may be enriched in detail and have fine work, or by skilful usage of black designs. Perhaps it will be found the skilful frame-maker will have fair play. Too close following of nature's forms may not be so satisfactory as the ideal forms of art. The wonderful completeness of truth and detail of photography do not require help from the carver, while the subjects will harmonise well with really conventional forms of foliage and ornaments so long shown on objects of ancient art—as the lotus, the pine, the honeysuckle, and acanthus leaves, &c.

In the Exhibition some photographic pictures are seen separately and judiciously framed—some twelve or more —each delicately framed, and the whole enclosed in a massive frame. Thus, while all the detail is to satisfy the observers, the whole forms an art ornament for walls as large as can be expected to be displayed in English homes.

Exhibitions seem to be the happy means for showing the progress of art. Year after year it is very satisfactory for all to see improvement. The good work on the walls is so general that scarcely any picture stands out as of unrivalled attraction; but of the amount of labour and skill the public, perhaps, have no means of judging. So intense is the love of nature and photographic art, that instances can be pointed out where numbers of pictures have been taken before the artist and amateur were satisfied that truthful representations of nature yet embodied the beauties of art which existed in the mind, and some subjects have been photographed ten or twelve times before the operator was sufficiently pleased. While the public see but one picture, many may have been taken to meet the type in the artist's mind as best fitted to give the most pleasant view of nature.

Colour Blindness.—The effects of colour blindness may account for some displays; hence exhibitions may be the cause for calling into action the means for examination of workers in photography. The exceptional examples on the walls seem to suggest the usual percentage of colour blindness, while there are sufficient statistics to show the rate of colour blindness of persons engaged on railways and in signalling, &c. There are few reliable returns of the colour perceptions of persons connected with the fine arts.

Technical Medals.—Of medals it may fairly be said that the public take for granted they are deserved, although they do not always divine the reasons for selections, and they often express sympathy for examples left out in the cold. The public seem grateful for the reasons for an award. Many well-known artists possess the talent that nearly always ensures this reward. They have been loaded with well-earned honours. It is possible there may be power yet to be evoked to advance art. The suggestion is now thrown out that medallists themselves should give a medal, strictly for technical excellence, of subjects they may indicate. They would be the fitting judges of merit, and their award might be deemed by practical men of great honour and service. A medallist's medal might lead to explanations of many difficulties found in photographic practice. If medallists in conjunction with the Society would select subjects, with full illustrations, the public would also be found to esteem technical skill.

NOTES ON PHOTOGRAPHY.

BY E. HOWARD FARMER.

Lecture V.

	Chlorine Cl.	Bromine Br.	Iodine I.
Com. w'ts	35·5	80	127

These three elements form a natural group, having in their chemical relations a remarkable resemblance to each other; they are all obtained from the sea, and hence are called the halogen elements, and their compounds the haloid compounds (from ἅλς, the sea).

Chlorine is a greenish yellow gas, producing violent coughing when inhaled, even in minute quantities. It dissolves in half its bulk of cold water, and is absorbed by slaked lime, forming chloride of lime. In presence of water it forms a powerful bleaching and oxidizing agent. It combines with hydrogen, forming hydrochloric acid, and with metals to form chlorides, such as

$$NaCl, KCl, AgCl, \&c.$$

Bromine is a red opaque liquid, having, if anything, a more irritating smell than chlorine. It is slightly soluble in water, and very soluble in alcohol and ether; its aqueous solution bleaches, but less so than chlorine. It combines with hydrogen to form hydrobromic acid, and with metals forming bromides.

$$NaBr, CdBr_2, AgBr, \&c.$$

Iodine is a crystalline solid, having a bluish black colour, and an odour similar to chlorine and bromine, but much weaker. Water dissolves a very minute quantity of iodine, but it is readily soluble in alcohol, ether, and solutions of soluble iodides. It combines with hydrogen, forming hydriotic acid, and with metals to form iodides.

$$KI, AgI, \&c.$$

Chlorine is the most chemically active of these three elements; it therefore displaces bromine and iodine from their combinations.

$$AgBr + Cl = AgCl + Br.$$

Bromine comes next, and displaces iodine, but not chlorine. Iodine displaces neither of the others.

SILVER COMPOUNDS OF THE HALOGENS.

Silver.

Chloride	$AgCl$	Sub-chloride	Ag_2Cl
Bromide	$AgBr$	Sub-bromide	Ag_2Br
Iodide	AgI	Sub-iodide	Ag_2I

Silver chloride, bromide, or iodide may be prepared by direct combination of the elements; if a plate of silver be exposed to chlorine it becomes coated with a white powder, which is silver chloride.

$$Ag + Cl = AgCl.$$

They are usually prepared, however, by double decomposition between a soluble haloid salt and silver nitrate. When a solution of common salt ($NaCl$) is added to one of silver nitrate, a white curdy precipitate of silver chloride falls, and sodium nitrate remains in solution.

$$NaCl + Ag(NO_3) = AgCl + Na(NO_3)$$

The $AgCl$ rapidly settles to the bottom of the vessel, and the liquid containing the $Na(NO_3)$ can be poured off; the precipitate is then washed several times with water and dried, when we get pure silver chloride.

Silver chloride, bromide, and iodide usually occur as powders insoluble in water and dilute nitric acid; the chloride is white, and the bromide and iodide more or less yellow in appearance; if heated, they fuse into semi-transparent masses resembling horn.

SOLVENTS.

Soluble haloid salts.—They are dissolved to a small extent by solutions of soluble chlorides, bromides, and iodides, with formation of double salts, the amount dissolved depending on the concentration of the solvents.

Ammonia.—Ammonia dissolves silver chloride readily, and also silver bromide, if it be concentrated, but not silver iodide.

Ammonium carbonate.—A solution of ammonium carbonate dissolves silver chloride, but not] bromide (Eder) or iodide.

Soluble hyposulphites (thiosulphates).—They are all three readily dissolved by solutions of these salts with the formation of soluble double salts.

$$2AgCl+3Na_2(S_2O_3)=Ag_2(S_2O_3),\ 2Na_2(S_2O_3)+2NaCl.$$

If, however, the hyposulphite be anything like saturated with the silver compound, an insoluble double salt is formed.

$$2AgCl+2Na_2(S_2O_3)=Ag_2(S_2O_3),\ Na_2(S_2O_3)+2NaCl.$$

Alkaline cyanides.—These very readily dissolve the silver haloid salts, soluble double salts being formed.

$$AgI+2K(CN)=Ag(CN)K(CN)+KI.$$

Alkaline cyauides also dissolve metallic silver when iu a fine state of division.

Silver nitrate.—Strong solutions of silver nitrate dissolve small quantities of these salts, more especially the iodide; most of the dissolved salt separates out on diluting the solution.

Silver sub-chloride, sub-bromide, and sub-iodide are produced when silver chloride, bromide, or iodide are darkened by exposure to light; they can be prepared by placing a plate of silver in solutions of the corresponding per-salt of iron.

$$FeCl_3+2Ag=Ag_2Cl+FeCl_2.$$

They are powdery, dark-coloured substauces, insoluble in water and dilute nitric acid; they are decomposed by fixing agents into silver chloride, bromide, or iodide (which dissolves), and metallic silver.

$$2Ag_2Cl+3Na_2(S_2O_3)=Ag_2(S_2O_3)2Na_2(S_2O_3)+2NaCl+2Ag.$$

Per-salts, free halogens, strong acids, and oxydizing agents generally, convert them into the ordinory salts (Captain Abney).

Thus—

$$2Ag_2Br+CuCl_2=AgBr+AgCl+CuCl;$$

Or,

$$Ag_2Br+Cl=AgCl+AgBr;$$

Or,

$$4Ag_2Br+6H(NO_3)=4AgBr+4Ag(NO_3)+3H_2O+N_2O_3.$$

PHOTO-LITHOGRAPHY AND PHOTO-ZINCOGRAPHY.

BY MAJOR J. WATERHOUSE, B.S.C.,
Assistant Surveyor-General of India.

Chapter V.—Theory of Photo-Lithography, and General Considerations—*continued.*

In the collo-chromate methods, as we have seen, the sensitive surface is composed of a mixture of an alkaline bichromate, usually the bichromate of potash or ammonia, and an organic colloid substance such as gelatine, gum, starch, and albumen, used singly or in combination.

Under the influence of light, the decomposition of the chromic salt renders these organic substances more or less insoluble in and unabsorbent of water in proportion to the intensity and amouut of the action of the light, and a thin film of such a mixture, after exposure to light, acquires several peculiar properties which have been more or less utilised by the photo-lithographer.

Thus, if paper be coated with such a sensitive mixture, and when dry exposed to light under a negative; and if, after exposure, printing-iuk be applied all over the surface of the print, and it be then washed with water, it will be found that in the parts protected from the light the coating has remained soluble, and is washed away, carrying with it the overlying and superfluous ink. Where the light has acted, however, the lines remain insoluble, and retain the ink, thus forming a clear and distinct image of the subject in printing ink, which may be transferred to zinc or stone. On this principle are founded the *transfer* processes of photo-lithography by the "washing off" method.

If the sensitive coating be applied to the surface of stone or zinc, and when dry exposed to light under a reversed negative, then inked and washed in the same way, an image in greasy ink is obtained which, after due preparation of the stone or zinc, may be printed from in the usual way. This way of working is the base of most of the *direct* processes of photo-lithography.

When the seutitive chromo-colloid film is composed of a substance insoluble in cold water, such as gelatine, it possesses another very valuable property, first discovered by Paul Pretsch, which is, that if, after exposure to light under a uegative, it be wetted, and then inked up with a roller charged with printers' ink in the same way as a damp lithographic stone, it will be found that the ink will be taken up by the parts that have been exposed to light, and thereby rendered unabsorbent of moisture; while the parts which have been protected from the light will absorb so much moisture that the fatty ink will be rejected, and this just in proportion to the amount of protection they have received. If the negative used be an ordinary photo-lithographic negative with clear lines and an opaque ground, the image will appear in black lines on a clean white ground. If, however, the negative be of any ordinary subject, with a full gradation of half-tone, it will be fouud that the parts of the sensitive surface that were under the transparent parts of the negative will take a full covering of iuk. The half-shades will take less and less as they become lighter, and finally the parts that were under the opaque parts of the negative, forming the high-lights or broad whites, will take none at all, and remain perfectly clear.

The similarity of principle between this action of a moistened chromo-colloid surface in taking up greasy ink in the insolated unabsorbent parts, and rejecting it in the uninsolated absorbent parts, and that of a damped lithographic stone in taking up ink in the greasy parts, and rejecting it in the moist gummy parts, was first recognised by Poitevin in the year 1855, and he made it the basis of a photo-lithographic process, which is, I believe, used even now. Poiteviu, however, using albumen for his sensitive coating, never completely recognized the full value of the chromo-colloid film as a printing surface, and always worked on stone, adhering closely to the ordinary methods of lithography.

It was found in practice that the images thus produced on stone, whether in line or half line, though very beautiful at first, would not stand the wear and tear of printing, and as the transfer methods were more convenient, Poitevin's process and others of the same kind have fallen into comparative disuse.

The principle of chromo-colloid printing has, however, been worked out most successfully by Tessié du Mothay and Maréchal, Albeit, Gemoser, Ernest Edwards, and others, who have introduced various methods for printing from a surface of chromated gelatine, supported usually on glass plates, by which photographic prints may be produced in the printing press possessing all the exquisite detail and delicacy of the gradation of an ordinary silver print. The appropriate name of photo-collotype has been given in this country to this group of processes, which, though akin to photo-lithography, are quite independent of it, and, indeed, have almost entirely superseded it for all half-tone work and the finest class of line work. In France, their birthplace, they are known as *phototypie*, and in Germany as *Lichtdr uck*.

The principle of inking up a damp chromo-gelatine surface is beginning to be applied to the production of photo-lithographic transfer prints on paper, in what may be called the *inking-up* methods, which are specially applicable to subjects containing very fine delicate work, which might be removed and lost in the washing-off methods.

There is another property of the chromo-colloid film which deserves mention, though it has not come into regular practical use in photo-lithography. If a chromo-colloid film be prepared containing gum, sugar, and other hygroscopic substances mixed with bichromate, as for the dusting process for obtaining reversed negatives described in the last chapter, and after exposure to light under a positive this film be dusted over with a very fine resinous powder, such as asphalte mixed with a fourth of paraffin or stearic acid, as employed by Window, it will be found that the powder will adhere to the film in the protected parts, which remain tacky just in proportion to the amount of protection they have received, while the exposed and hardened parts will refuse it. In this manner an image may be produced on paper, stone, or metal which may be transferred, printed, or etched as the case may be.

The chemistry of the reactions of the alkaline bichromates on gelatine and other colloids under the influence of light presents a good many difficulties on account of the uncertain and unstable composition of the organic and mineral substances involved, and the exact nature of these reactions does not yet appear to be thoroughly settled.

The early idea was that the chromic acid of the bichromate of potash was reduced to a lower oxide of chromium which remained in combination with the organic body, while the latter itself was altered by the liberated oxygen into an insoluble resinous substance.

This theory was shown to be erroneous by Swan, who was the first to thoroughly investigate the question as regards gelatine. He found that the insolubility of the gelatine was entirely caused by its chemical combination with a chromic compound formed by the neutral decomposition of the gelatine and chromic acid, and thus the gelatine was converted into a leather-like and insoluble substance. That this leather-like substance is not the result of oxidation is shown by the fact that it becomes soluble when treated with oxidising agents, such as chlorine, peroxide of hydrogen, &c.

Incidental to these changes, a portion of gelatine is decomposed, and carbonic acid, and probably also an organic acid, are formed.

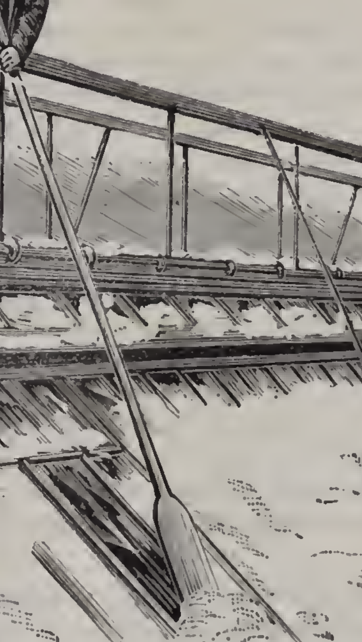
(*To be continued.*)

THE STUDIO—HOW TO VENTILATE AND KEEP CLEAN, OUTSIDE, IN SUMMER, AND FREE IT FROM SNOW IN WINTER.

BY MARSHALL WANE.

In 1879 I built one of two studios with a ridge roof, but in my absence the builder neglected to provide sufficient ventilation; so after enduring the intense heat of two summers, I placed on the top of the ridge a long box-like

cover, two feet wide and two in height (see diagram), this extending on the whole length (thirty feet). On each side, east and west, I had hinged one long glazed sash. These are worked with an Archimedean screw from inside, and can easily be opened one inch or a foot; and the studio is by this means kept cool in summer, and becomes a pleasure to work in. It will be seen by this arrangement that either side can be open, no matter how the wind blows; the frame hinged might be all wood instead of glazed. You will also see that at the extreme top are rails to prevent anyone from falling who is washing the glass with a hose, or clearing off snow in winter; and the approach is made through a window on to a platform joining the studio to the main building. The top is covered with zinc.



End view of studio roof.
A, platform; B, B′, hinged sashes, B′ being shown partly open; C, C′, hand-rails.

Notes.

Our Christmas photograph, "Waiting to go on," will be published next week.

We regret to announce the death of Mrs. Simpson, the widow of the late George Wharton Simpson.

M. Pierre Petit, who was decided by a recent lawsuit to have infringed the Van der Weyde electric light patent for portraiture, has lodged an appeal at the Paris *Palais de Justice.*

Our next elementary course of photography in these columns will have reference to "Printing and Finishing." Like those on Dry Plate Photography and Photographic Chemistry, which have already appeared, the lessons on Silver Printing will be set out in the simplest manner, and pre-suppose on the part of the reader no former knowledge of the subject. Sensitizing, printing, toning, fixing, washing, mounting, burnishing, and enamelling will be treated of, together with simple methods of colouring and mounting on glass. The first lesson will appear early next year.

We see that the popular "lantern lecture" of the South London Photographic Society is announced for the 4th January, at seven p.m., at the Society of Arts, John Street, Adelphi. The honorary secretary, Mr. F. A. Bridge, asks for the loan of any suitable photographic transparencies, which must be three and a-quarter inches high, and be delivered to him at the above address not later than three hours before the lecture.

We have to announce the receipt of the fourth part of Dr. Eder's valuable and comprehensive work on "Photography." The present part of 150 pages deals particularly with the camera and with shutters and dark slides, many interesting woodcuts being included in the volume; and by way of frontispiece there is a Woodburytype print of one of Messrs. Marsh Brothers' wonderful swan pictures. We will give a detailed notice of the work shortly.

The Christmas number of *Truth* is crowded with portraits, several hundred notabilities of the day being cleverly depicted by the wood engraver and the lithographer. Still we owe most of this to photography, an art which serves to familiarise us with the features of almost every great man of the time. Before many years more have passed, we may hope that photography will play the part of the engraver as efficiently and economically as it now delineates.

A very good photograph of the recent transit is sent to us by Mr. J. Joyner, of Cheltenham, the planet showing sharply and distinctly about one and a-half times its diameter from the edge of the sun's disc, and just at the edge of a cloud which partially obscures nearly one-third of the solar disc. Mr. Joyner promises us details of the optical arrangement which he adopted, a matter of some interest considering that the solar image is nearly two inches in diameter, and the picture is not an enlargement.

The Copyright Committee is still actively engaged in formulating and discussing rules and regulations for the new Association, and considerable progress was made with the work on Monday evening last.

Those who employ a drop shutter worked by pneumatic tube will find the cold weather a little troublesome. The rubber inside the brass projection attached to the camera becomes hard and inflexible from cold, and the most vigorous squeeze of the bulb fails in getting the shutter to act. This happens very frequently after the camera has been in the cold studio all night, and the defect may be remedied in a few minutes by holding the warm hand against the brass-work.

The discovery of photography in natural colours, that dim and distant goal towards which many an experimentalist has set out, is made the subject of an interesting story by Mr. G. Manville Fenn in "Cassell's Almanac for 1883." An old gentleman, an amateur photographer who dwells in the West country, pursues the even tenor of his way, taking landscapes and portraits as fancy dictates. There is a charming niece in the background, and a suitor who comes to woo. There is still another who plays an important rôle in the story, a sharp and shifty sort of gentleman, who possesses the secret to photograph in natural colours. He, like most people of the sort, is in want of money to exploit the discovery, and who should be more willing to assist than the old gentleman who practises photography?

The invention makes speedy progress under the fostering care of the amateur, or, at any rate, so the latter is given to understand every time money is asked for. In fact, the old gentleman turns his back upon the suitor of his niece, in his anxiety to give attention to the inventor. Fortunately the lover is a bit of a chemist, and finds out that photography in colours is mere moonshine; he injures his eyesight in the research, but he has no difficulty in exposing the impostor. Having thus rendered signal service to the uncle, we may be quite sure that permission to marry is not long withheld.

The "background" difficulty has been surmounted in most studios. A great many are content to purchase of known makers, who now thoroughly understand the photographer's wants. The main thing is to avoid backgrounds too clearly and vividly painted, pictures elaborate in character and sharp in detail. The less work there is upon a background the better We saw some really good work the other day, produced by a scene-painter with a few touches, and in a few minutes. His modest fee was but five shillings for each sketch.

Not a few photographers sketch their own backgrounds, and we may at once say that if our readers only knew how easy the canvas is to tint, many would be led to try their hands. We do not suggest the production of pictorial backgrounds without experience, but the tinting of canvas with chalks, as practised by Mr. Faulkner, Mr. Robinson, and others. The whole method consists in simply rubbing wet chalks of the desired tint upon a wet canvas surface, and then, when dry, blending and softening the tints by brushing with an ordinary clothes brush. Sharply-limned objects—such as rocks, trees, &c.—become, after brushing, wonderfully soft and sketchy.

In Paris there should be no difficulty about obtaining painted backgrounds at a reasonable price, for the scenic artists attached to the theatres in the French metropolis are paid after a cut-and-dried rate. There is, indeed, but a trifling difference between the prices paid at the Grand Opéra and the minor theatres of the Boulevard du Temple. From six to eight francs per square metre is the extent of the tariff. Elaborate and richly-decorated interiors are charged by the Paris scene-painter at eight francs per square metre, ordinary interiors at seven, and landscapes at six. As a metre is nearly forty inches, a photographic background might be painted for the charge of two or three square metres.

A propos of backgrounds, we see, by the way, that a well-known painter of these in the United States advertises: "Let me paint the backgrounds for a nation, and I care not who makes the photographs."

Marey's instantaneous "photographs of motion" are secured by capping and uncapping the lens at intervals of $\frac{1}{100}$ of a second, while a white object moves across a dark background. The plate developed, then shows the object in various positions on the negative. By employing flashes of electric light—proper means being at hand for making and breaking contact at certain regular intervals—it would be possible to employ any camera of ordinary construction in the work, the object, as before, being white, and the background black. In this way a white stone thrown across the background would be lit up with every electric flash, and a plate exposed during the period of flight would show the path of the stone in the form of a dotted line.

As an electric lamp is now easily obtainable, and the mechanism for obtaining flashes at regular intervals should not be very complicated, we think this system would be more simple than the one M. Marey now employs. Moreover, there would be this advantage; given the flashing machanism, it would be possible to employ any ordinary camera, and any ordinary lens, for securing the photographs.

A total eclipse of the sun of six minutes' duration is promised us in May next—time enough to take photographic observations without number with a well-constructed astronomical camera. Unfortunately, the rare occurrence does not take place in Great Britain, and it is only in Australasia that this wonderful period of darkness in the daytime will happen. Still, expeditions are likely to be sent out by every European nation, since it will be a famous opportunity of improving our knowledge of the strange phenomena outside the solar orb itself, about which we are gradually learning something definite.

Major Volkmer, the principal of the photographic staff of the Ordnance Map Department in Vienna, has devised an ingenious way of indicating forest land in the Government maps. The zincographic printing plate is covered except in such spots where forest is to be shown; it is then sprinkled with finely-powdered resin, and exposed to alcoholic vapour, which fixes the particles of resin upon the zinc surface. The plate is then etched for a short time in acid, and in this way minute cavities are produced, which, when the plate is printed, constitute fine shading of the map in these parts.

Patent Intelligence.

Applications for Letters Patent.

5962. Albert Aron, of Rose Street, Newgate Street, in the city of London, Importer, for an invention of "Improvements in photographic albums."—A communication to him from abroad by Adolphe Aron, of Rue Turenne, Paris, France.—Dated 13th December, 1882.

5970. John Mowat, of Barrhead, in the county of Renfrew, North Britain, for an invention of "Improvements in pentagraph engraving machines."—Dated 14th December, 1882.

6034. Silvanus Phillips Thompson, of University College, Bristol, Professor of Experimental Physics, and Colman Charles Starling, Demonstrator in the said University College, for an invention of "Improvements in photometric apparatus."—Dated 18th December, 1882.

Patent Void through Non-payment of Duties.

4607. Joseph Wilson Swan, of Newcastle-upon-Tyne, for an invention of "Improvements in apparatus for coating glass and other surfaces with gelatinous or viscous photographic compounds."—Dated 12th November, 1879.

This invention has for its object to effect the coating of plates of glass with the photographic gelatinous compound commonly known as "sensitive gelatine emulsion," by automatic machinery, so as not only to obtain more perfect regularity in the coating, but also to effect such coating with greater rapidity and certainty than has hitherto been practicable. And in order that my said invention may be better understood and readily carried into effect, I will now, with the aid of the accompanying drawings, proceed more particularly to describe the same. In order to carry my invention into effect, I construct a machine consisting of a trough containing the emulsion, within which a band, hereafter termed the coating band, revolves, and to which motion is imparted by means of a system of rollers over which it is stretched. Such coating band carries the emulsion over the side and below the level of the trough, and there delivers its charge of emulsion upon the plates as they travel in a continuous train upon a travelling band or table (hereafter termed the plate-conveying band) beneath. I so actuate the coating band and the plate-conveying band, that the coating band and the train of plates upon the plate conveying-band move in opposite directions. In the accompanying drawings, fig. 1 shows a side elevation, fig. 2 an end elevation, and fig. 3 a plan view of my improved apparatus. A indicates the trough; B, the coating band; C, the travelling or plate-conveying band; D, the glass to be coated; E and F are levers for tilting the system of rollers, over which the coating band is stretched in order to bring it into contact, or to remove it from contact, with the plates to be coated; G, G, are the driving rollers, and H indicates the worm which transmits motion to such rollers; I is a sheave for driving the machine from any suitable motor, and J is a weight for keeping the travelling band in the grip of the driving rollers, so as to ensure its travel; K is a pipe communicating with a hot water cistern; L, the immersing roller; M, the coating roller, and N, the guide roller. The trough, A, is made of earthenware, silver, or brass, or any other suitable metal plated with silver, and is jacketted off or fitted with one or more tubes for hot water; while its length is either equal to or exceeds the width of the line of plates to be coated. Its depth and width are determined by the requirements of space for the operation of the immersing roller, L, which is formed of wood, or silver, or of brass, or other suitable metal plated with silver. The coating band, B, is made of india-rubber, while the travelling band, C, is formed either of india-rubber, cloth, linen, cotton, or any other suitable fabric. The

FIG 1

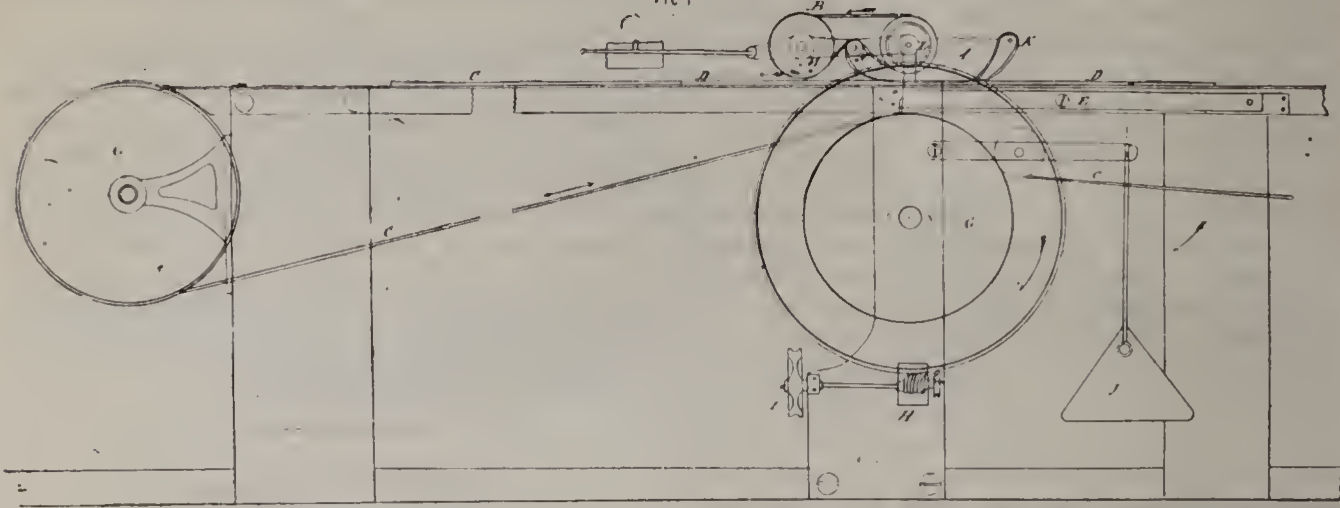
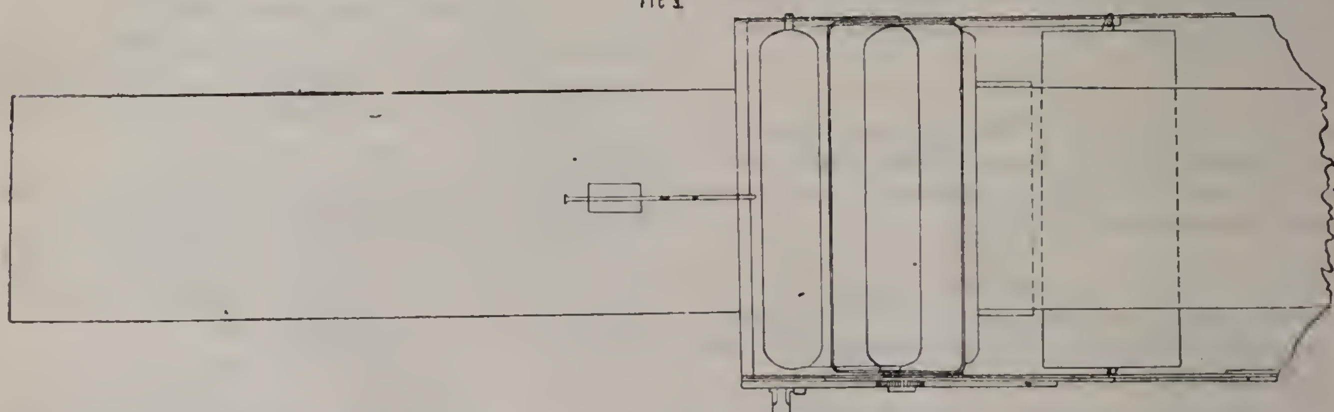
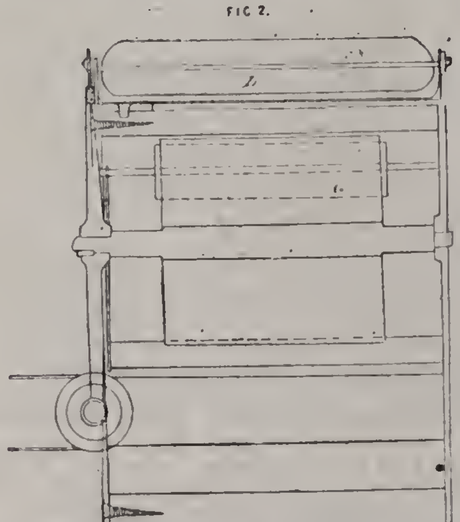


FIG 2



coating roller, M, is made of india-rubber, or any other suitable elastic material, fixed upon a rigid axle, preferably of iron. Having thus particularly described and ascertained the nature of my said invention, and the manner of carrying the same into

FIG 2.



effect, I would have it understood that I do not confine myself to the precise details hereinbefore set forth, as the same may be modified without departing from the principle of my invention, which is to effect the coating of glass and other surfaces with gelatinous or viscous photographic compounds by means of automatic apparatus, so as to obtain a more perfect regularity in the coating, and to perform the operation with greater celerity and certainty. I claim, therefore, as my invention—Firstly, the employing automatic apparatus or machinery for coating glass and other surfaces with gelatinous or viscous photograpihc compounds, for the purposes hereinbefore set forth and described; secondly, the new or improved apparatus, constructed substantially in the manner and for the purposes hereinbefore described and illustrated, wherein a revolving band dipping into a trough containing the emulsion carries a coating of emulsion over the edge and below the level of the trough, and delivers its charge of emulsion upon a train of plates, carried beneath it by a travelling band or its equivalent; thirdly, I claim the use of a revolving band for applying a coating of sensitive photographic emulsion to plates of glass and other surfaces, in order to obtain a more perfect regularity in such coating, and to effect the same with greater rapidity and certainty.

Specifications Published during the week.

2179. A. Foster, for "Squeegees." *Provisional Protection only.*

In my invention I turn a piece of wood of suitable diameter (say about one inch), and then with a revolving cutter or other instrument cut a groove along its whole length, and of abont three-eighths of an inch deep to five-eighths, and of a width just to hold the strip of india-rubber. The rubber is thrust into this groove with glue or any suitable cement, and then nailed or tacked in its place. The ends of the rubber project at least a quarter of an inch beyond each end, and the thickness, depth, or width of the rubber depends upon the size of the apparatus—an eighth of an inch to a quarter or three-eighths will be thick enough, and a projection of half an inch to one inch will bo sufficient for the rubber to project beyond the groove. The rubber and the axis of the handle are not in the same plane, but at an angle of about 40° or other degree wished, according to size.

2211. C. Johnson, for "Producing ornamental or other designs upon tin plates." *Provisional Protection only.*

The object of my present invention is to produce tin plates partly crystallized, but having ornamental patterns, letters, or other devices, which are not so crystallized, some portions of the surface of the plates being crystallized, and the remaining portions showing the tin surface either naturally bright, or illuminated in imitation of gold, or in one or more colours. In order to put my invention in operation I first prepare the tin plates for the crystallization process by heating them in any convenient way until their tin surface is almost fused, and then cooling them with water by a shower or plunge bath, and I then polish their surface. Upon the surface of the tin plates so prepared I print any desired ornamental or other design or device, either by direct printing in a press of any ordinary kind, or by transfer or offset, in one or more coloured or colourless varnishes, using preferably printing inks or varnish containing a sufficient proportion of gold size or other acid-resisting or quick-drying material or materials. When the pattern or other design has thus been printed or produced upon the tinned surface of the prepared plates, I immerse them in a bath of a suitable acid of the requisite strength as ordinarily used, and the surface of the tin will become crystallized upon those parts of the plate not protected by the printed design; whilst the parts so stopped out will retain the ordinary bright tin surface. The printing ink or varnish which forms the design may then be washed away by any suitable solvent or detergent such as turpentine or paraffin, or it may be allowed to remain. Where it is desired to remove the printed or other design after it has dried upon the plates, I place them after crystallization in a bath of cyanide of potassium in a state of ebullition, by which the printing ink is removed, and the design remains as clear bright tin having a silvery appearance. The cyanide of potassium, whilst dissolving the dried printing ink, does not develop the crystals upon the parts of the plate which the ink has previously protected, and these parts consequently remain bright and free from crystallization.

2264. T. R. Johnson, for "Chemically engraving copper or zinc surfaces."

My said invention relates to improvements in chemically engraving copper or zinc surfaces, such as plates for the production of maps, plans, pictures, and in general such work as is now produced with the graver or with the etching needle and etching fluid. It is also applicable for engraving copper printing cylinders, such as are used in calico printing and analogous operations. In carrying out the invention I take from a lithographic stone or from a zinc plate, by means of a lithographic press, an impression in greasy ink on what is called "Scotch retransfer paper," that is to say, paper which is coated with plaster of Paris and paste. This is simply called in "lithography" taking a transfer. This impression I transfer to a chemically clean copper or zinc plate by means of a lithographic or copper-plate press, having first slightly damped either the plate or the transfer. If the transfer is made to a zinc plate, I may slightly grain its surface with pumice powder. The back of the transfer is then damped, and, when the paper has absorbed the moisture, it is removed, and the plaster composition, being carefully rubbed with a wet sponge, comes off, leaving the greasy impression on the plate. The plate is then dried, and a weak solution of gum-arabic slightly alkalised is rubbed gently backwards and forwards over its surface; after which a larger quantity is floated over it to remove any air-bells or blebs which may have been formed thereon. The strength of the gum solution which I have found most desirable is as follows:—For copper, gum-arabic 1 ounce to 19 ounces water; for zinc, gum-arabic 1 ounce to 15 ounces water. The plate is then allowed to dry, and, when dry, the greasy ink is washed out with rectified spirits of turpentine, when the plate is left bare where the greasy impression was, and on all other parts is covered with a thin film of gum. A solution of perchloride of iron in alcohol is then poured on the plate, and this etches it without attacking the ground. The strength of the etching solution which I have found generally most desirable is as follows:—1 ounce dry perchloride of iron in 4 fluid ounces alcohol. But this etching solution can be used with more or less perchloride if the transfer originally on the plate was composed of thick lines or thin ones. Washing in water removes the gum, and leaves an etched plate. Isinglass, albumen, or any substance soluble in water and insoluble in alcohol, and that is repellent of grease, may be used instead of gum. Instead of taking an impression hereinbefore set forth from a lithographic stone or from a zinc plate, drawings in a greasy ink may also be made direct on the plate instead of transferred thereto, and afterwards treated in a similar way; or transfers may be taken from type or any substance capable of yielding a transfer in greasy ink. When using my invention for chemically engraving on cylindrical surfaces, I use the equivalent of a lithographic or copper-plate press for transferring the impression thereto. By my improved process anything already drawn on stone, or transferred to stone, or wood-engravings, or type, can, by simply taking an impression, and without the aid of photography, be converted into an engraved plate; and I would also observe that an essential feature in the working of the process consists in coating a plate with a certain strength of gum that will stand the etching solution, and yet be not so thick as to crack in drying, or prevent the greasy ink from being removed. Having now described and particularly ascertained the nature of my said invention, and the system, mode, or manner in or under which the same is or may be used or practically carried into effect, I would observe, in conclusion, that what I consider to be novel and original, and therefore claim as the invention secured to me by the hereinbefore part recited Letters Patent, is: the combined process of chemically engraving copper or zinc surfaces substantially as hereinbefore described.

Review.

Poitevin's Treatise on Methods of Photographic Printing. New edition, by Leon Vidal.*

We have here rather a detailed history of the patient labours of Poitevin, than a treatise or hand-book on photographic printing methods; but nevertheless, the work not only contains numerous practical directions calculated to materially assist the progress of the student in the somewhat difficult and thorny path of permanent printing in fatty inks, but also many matters of interest relative to early attempts at photography with sensitive emulsion.

When the wondrous discovery of Daguerre was published to the world, Poitevin, then a student at the *Ecole Centrale*, devoted himself almost exclusively to the study of the new art, but rather from a scientific than from an artistic point of view. He perceived at once that the great future of photography depended rather on the production of printing surfaces, than on the making of each individual picture by the special intervention of light, and accordingly he laboured long and patiently in endeavouring to transform the Daguerreotype plate either into a printing mould adapted for use by the copper plate printer, or into a block suitable for typographic printing; but although results of considerable pictorial merit were produced, these methods of photographing did not attain commercial importance.

An exposed and mercurialized, but unfixed, Daguerreotype plate will not receive an electrotypic deposit of copper on those parts which are covered by an unbroken film of bromo-iodide of silver, but the mercurialized parts (the whites of the picture) readily become covered with a film of copper. Such a plate, when cleared or fixed by sodium hyposulphite, presents an image in which the whites are reproduced as somewhat rough metallic copper, while the portions corresponding to the dark shades of the subject present a bright surface of polished silver.

Such a plate, if gummed and printed after the manner of lithography, takes the ink on those parts which have not been covered with electrotypic copper, and consequently positive impressions are obtained. If, on the other hand, the plate is subjected to the action of mercury, the tarnish copper refuses to amalgamate, while the bright silver readily unites with the mercury. Such a partially amalgamated plate takes ink only on those parts free from mercury, and consequently yields negative prints.

It seems that as early as 1849 Poitevin prepared sensitive gelatine plates by coating glass with a mixture of gelatine and silver acetate, and subsequently exposing these to the vapour of iodine, or of bromine and iodine together. The plates required about four times the

* Traité des Impressions Photographiques, par A. Poitevin. Suivi d'appendices par M. Leon Vidal. Paris, Gauthier-Villars.

exposure ordinarily necessary in the case of a Daguerreotype plate, and were developed by means of gallic acid; hyposulphite was used for fixing. Several other gelatine methods were afterwards elaborated by Poitevin, and gelatino-chloride plates were prepared about two years subsequently, and were found to give good results when developed with a solution of ferrous sulphate acidulated with tartaric acid. In 1860 he communicated to the Photographic Society of Paris a method of preparing a bromo-iodide of silver collodion by adding an alcoholic solution of silver nitrate to a normal collodion; but the plates were ordinarily dipped in a weak solution of iodide of potassium in order to de-sensitize the films. Mere washing and treatment with a very dilute silver salt now served to make the plates highly sensitive, and development was effected by gallic acid, pyrogallic acid, or sulphate of iron.

The well-known researches of Poitevin in connection with collotypic printing and other photo-mechanical processes are described in detail; also his printing methods founded on the sensitiveness to light of certain ferric salts; and the work is illustrated with an excellent collotypic portrait of Poitevin executed by *Berthaud Frères.*

A FEW HINTS.

BY J. H. SCOTFORD.

A very fine lubricator.—Sponge over the dry photograph cold water a few moments before burnishing. No other lubrication is needed, and no better or higher polish can be had.

If a gelatine negative refuses in the ferrous oxalate bath to develop sufficient intensity, raise it from the bath, and expose it to the action of the atmosphere for a moment; the improvement is very rapid. This will frequently be found to be very useful.

If too strong mercuric-iodide strengthener has been used, and the silver in the film has been converted to the white iodide of silver, thereby destroying the negative, it can be restored by flowing over the negative a weak solution of sulphide of potassium. This is sometimes useful with other negatives.

The best way to make the mercuric iodide strengthening solution is as follows. Dissolve iodide of potassium (amount indefinite) in water nearly to saturation. Dissolve bichloride of mercury the same. Divide the bichloride of mercury solution into two equal parts. Drop in the potassium iodide into one portion of the bichloride of mercury solution until it has redissolved the precipitate and becomes clear and colourless. Now add the other portion of mercury, which will exactly precipitate all the mercury in the solution. Now add drop by drop of saturated hyposulphite of soda solution, carefully shaking between each drop, till the red precipitate is exactly dissolved, when the solution should be perfectly colourless. This is your stock solution. To use, take seven drachms of water and one drachm of stock solution. This strengthens slowly but wisely, and no negative need ever be spoiled.

For silver developing and toning trays, get your tinman to make a pan of Russian iron, with a heavy iron rod around the edge to strengthen it. The best size for a full sheet of paper is 20 by 26 inches. Caution him to make the bottom as level as possible. Now paint it over inside and out, with two coats of pure asphaltum varnish. Such a dish will be the best and most desirable dish ever used. Small dishes should be made of tin plate.—*Philadelphia Photographer.*

Correspondence.

GREEN LIGHT FOR THE DARK ROOM.

Sir,—I am interested in Mr. Bradshaw's letter of last week. Some time ago, when I had occasion to photograph many hundreds of spectra of various metals by a Siemen's dynamo I noticed that we never obtained a line in the green, and the exposure was in some cases hours long. On the other hand, it was a common thing to photograph the sodium and calcium lines, although the latter were well into the red. This insensitiveness to green light was common to Wratten's, Swan's, Kennett's, and Fox's plates; it would most probably of course be common to all plates, though I cannot speak from experience. Swan made some plates especially for us, but we never got a line in the green even with these.

The inference from these results was of course that green glass can be used by photographers, and I had fully intended making the direct experiment, but other matters intervened.

The subject is of course a detail of considerable importance to photographers, and, if found to hold good, will be welcomed as a useful departure by many. I may add that the combination mentioned by Mr. Bradshaw is precisely that which spectroscopic experience would lead me to select, the region about the E line being undoubtedly extremely non-actinic.

I am not a photographer, and so possibly the use of green glass in the dark room may be an old idea; but I thought Mr. Bradshaw and others might be glad of the special information which I am in a position to give on the subject.—Yours faithfully, Alex. E. Tucker.

CHOCOLATE MOUNTS.

Dear Sir,—I fear Mr. Stanley is not the only one that has been victimized with bad quality chocolate mounts. With me the result of using them proved most disastrous, as, owing to a delay in the carriage, I got quite out, and had nearly a week's printing to mount when they arrived. This occurred in the best part of the season, and customers clamouring for their pictures. The next day I had the vexation of seeing them fading and turning grey, and no other cards in stock. Those that had been sent home and given out I had to get back—no easy matter, as I had nothing better to offer until I got others from London, which took another fortnight. The firm I got them from told me they were sending out thousands daily, and heard no complaint. I do not for a moment condemn all chocolate cards, as I am using the gold-bevelled Malverns, and cannot detect the least change.

I enclose what is left of a picture mounted on one of these cards only three months ago.—I am, yours truly,

Henry Holborn.

LANTERN SLIDES FOR THE SOUTH LONDON POPULAR EVENING.

Dear Sir,—The next meeting of the South London Photographic Society is to be a popular meeting, as it is called, which is an exhibition of lantern slides contributed by members and friends of the Society. It will be held on the ordinary monthly meeting night of the Society, Thursday, January 4th, 1883, at the Society of Arts, John Street, Adelphi, London; and as Mr. F. A. Bridge and myself have undertaken to exhibit any slides that may be sent, I wish to make a few remarks respecting the size of the slides. On a former occasion, when I undertook the task of exhibiting slides submitted, many were much too large to be exhibited in any lantern; some of the transparencies were whole-plate size. The best size for a lantern slide is $3\frac{1}{4}$ by $3\frac{1}{4}$ inches, or they must be $3\frac{1}{4}$ inches high; if they are a little longer it does not matter. I will also thank intending exhibitors, if they possibly can let me have the slides with a numbered list during the day—they can be addressed to me at the Society of Arts—and not leave them, and hand them up to me when the lights are turned out in the room. If the list could be sent to me at my private address before the day of meeting, I should feel obliged, so that I can arrange the different subjects in suitable order.

To those who are not in the habit of making lantern slides, I will just mention what a good slide ought to be. The extreme high lights should be bare glass, and only the deepest shadows opaque. Several slides that were handed to me last year were far too dense to get the light through them; the slightest deposit on the high lights is fatal to a good result on the screen. I trust all those who wish to exhibit will comply with the above conditions, so as to avoid anything like confusion, and that we may have an enjoyable evening. Mr. Bridge will also make arrangements for a little music, and any vocal or instrumental friends will be also welcome. We commence at eight o'clock. Any further information that I can give I shall be pleased to impart.—I am, yours, &c.,

Williams Brooks.

PHOTOGRAPHIC PRINTING BY ELECTRIC LIGHT.

Dear Sir,—I read with considerable interest your paper on "Photographic Printing by Electric Light," as it is but recently that I myself made a few experiments in this direction. I say experiments, but they were something more than that, for I wanted some prints in a hurry, and the sky was so dull that I had to use artificial light as a matter of necessity.

I can fully endorse your statement as to the comparatively feeble power of the electric arc for this purpose. Using commercial ready sensitised paper, my prints took considerably longer to obtain sufficient depth than they would have taken in the direct rays of the sun, although the frames were placed within twelve inches of the light; whilst had they been placed nearer, the negative would have been endangered by the heat. I cannot give exactly the candle power of the light I used, but I believe it was only about half the power of that with which your experiments were conducted. On dull days, printing by the electric arc is decidedly a convenience, but I experienced one very great drawback which you have not mentioned, but may possibly have noticed: the prints were very red in colour, and did not easily take a nice tone. In addition to this, any little defects in the plate showed far more prominently than in prints taken in the ordinary way; in fact, they seemed exaggerated.

I had previously used the electric arc for iron printing when copies of some diagrams were required in a hurry. Half-an-hour was the time required, but the frames were much nearer the light than in your experiments; the exact distance I do not recollect, as it was some time ago, but I believe it to have been about eighteen inches. As the diagrams were on ordinary writing paper, not rendered transparent, my results would in this case also coincide with yours.

C. Ray Woods.

STANDARD LIGHT FOR SENSITOMETER.

Sir,—At the last meeting of the Bristol and West of England Amateur Photographic Association, Mr. Edward Brightman gave an account of the effects of temperature on the luminosity of sulphide of calcium (*vide* Photographic News). He began his communication by a statement totally condemning the use of phosphorescent tablets as standard lights for sensitometers, giving the reason that luminous plates previously excited and subsequently submitted to the high temperature have their luminosity increased.

To consider such conclusion logical, I must admit that the author of it is unacquainted either with papers read by myself on phosphorescence, or with sensitometers, and very simple directions to use them.

Increase of luminosity of the previously excited phosphorescent plate by elevating the temperature is an elementary notion that cannot escape the notice of even a superficial observer. But the proposition for using it as a standard light was based on the observed fact that, provided the excitement and the subsequent use of the luminous plate as source of light is made at the same temperature the result practically is independent of that temperature.

My experiments were made at the temperature of from —15° C. to + 20° C. without showing any difference in the results. In the directions it is indicated that the operator must guard himself not to heat the plate between excitement and exposure, avoiding even to touch the plate with his fingers.

I cannot leave unnoticed a statement made, that high temperature can cause luminosity apart from the action of light.

This error is, however, easily explained by the fact that luminosity in phosporescent plates is very persistant, and, as some observers even say, is noticeable after one month.

Mr. E. Brightman (very likely) experimented on the plate (or powder) not totally extinguished, and submitting it to the high temperature observed only increased luminosity remaining from the last excitement, but not that newly-created by heat; if the phosphorescent plate is totally extinct, no amount of heating can excite it. The same applied to the low temperature. I have a phosphorescent plate on the door of my laboratory in St. Petersburgh; it is naturally frequently exposed to the severest cold, but its luminosity does not suffer by this.

L. Warnerke.

Proceedings of Societies.

South London Photographic Society.

The annual dinner of this Society took place at the Holborn Restaurant on Friday last, the Rev. F. F. Statham in the chair.

Dinner being over, the Chairman alluded to the work of the Honorary Secretary and Treasurer (Mr. F. A. Bridge), whose exertions had inaugurated a new period of prosperty for the Society; the balance now in hand being about equal to the deficit which existed when Mr. Bridge took the management of affairs.

Mr. Bridge said it was hardly fair to rely altogether on the Secretary, as the members should more thoroughly fulfil their duties of attending the meetings and bringing forward matters of interest.

Mr. Jabez Hughes referred to the work done by foreign photographers, and expressed a wish that closer bonds of union should exist between the photographic workers of all nations.

Mr. Warnerke, in responding for the foreign photographers, referred to himself as perhaps an Englishman in a truer sense than the natives, he being English from choice, while they were English from necessity.

Numerous other toasts were honoured, the memory of Monckhoven being drunk in silence, after a few words from Mr. Hughes regarding his manifold labours.

The toast of the evening was, however, in recognition of the amiable and genial qualities of the President of the Society, the Rev. F. F. Statham.

Edinburgh Photographic Society.

The second ordinary meeting of this Society was held in 5, St. Andrew Square, on Wednesday, 6th December, at 8 p.m., Mr. Lessels, president, in the chair.

The minutes of the annual meeting and subsequent meetings of Council were read, approved, and signed. The following gentlemen were unanimously elected ordinary members, viz.:—R. Stuart Dalzell, George Halliday, Alexander A. Inglis, David Grubb, G. Musitano, Arthur Murray Henderson, J. S. Fleming, Arthur Wyllie, and James Smart.

The President then said—In relation to the next part of the programme I shall have a motion to make; but before doing so, must ask your indulgence while I make some preliminary remarks. It will be in the recollection of you all the painful impression made on our minds at last meeting on being informed of the serious illness of our worthy secretary, Mr. Dobbie, by the thought of losing so valuable and esteemed a member of our Society. The members of Council have considered it a becoming duty on our part to place in the records of our Society the great loss we have sustained, and to send a letter of condolence to Mrs. Dobbie. The President then proceeded to give a short sketch of Mr. Dobbie's life, and continued:—His connection with the Photographic Society dates from Feb. 5, 1873, when he was proposed by Mr. J. M. Mackay. His business tact had evidently impressed the Council, as he was made a member of Council in November of same year. After serving his time as Councillor he was re-elected in 1877. He took an active interest in the management of the annual trip It was while exerting himself in the rooms of the Royal Academy, in connection with our great exhibition, that he caught a severe cold, terminating in erysipelas, laying him aside for weeks. Mr.

Dobbie was elected Secretary Nov. 6, 1878, and from this time he impressed his individuality on the billets. At great labour he collected and put in order the literary archives of the Society so far as obtainable, and through his energy new rules were compiled and passed. In November, 1880, he became engrossed with a new idea, which took shape in December of the same year in the publication of No. 1 of the "Transactions," of which he was naturally very proud. The members of the Society who interest themselves in its affairs are all aware of his untiring industry in everything tending to its success and prosperity, and with the enthusiastic sympathy with which he entered into every subject, even although he was not technically acquainted with its details. It is only necessary to say, in a word, that he did every duty thoroughly, and commanded the respect and esteem of the whole Society. At his funeral our Society was represented by about sixty members, including the President, Vice-president, Corresponding and Interim Secretaries, Treasurer, Curator, and Council. The gentlemen were arranged four abreast at Pilrig Church, and walked in front of the hearse to Rosebank Cemetery, thus paying the last tribute of respect for their departed friend. The President moved : "That the Society records in its minutes the great loss sustained by the death of Mr. Malcolm Gillies Dobbie, their Secretary, who for four years conducted their affairs with indefatigable zeal, and by his untiring labours did everything in his power to promote the usefulness and prosperity of the Society. His thorough business habits enabled him to place every matter in a properly organized form ; and he had the credit of originating the publication of the 'Transactions' in December, 1880, an important and useful feature of the Society's work. He was always at the post of duty, and by his kindly and genial manner contributed much to the harmonious working of the meetings, and his efforts to procure suitable papers for the benefit of the members were crowned with success. The Society begs respectfully to tender the heartfelt sympathy of every one of its members to Mrs. Dobbie on her sad bereavement, and to assure her that her husband's services will ever be held in grateful remembrance. The Society begs to express the hope that Mrs. Dobbie will be sustained by God's grace in her sore affliction, and that she will have some comfort in the knowledge that a large circle of friends, who hold his memory in loving regard, condole and sympathize with her in the great loss which is deeply felt by all." The President also moved that this motion be communicated to Mrs. Dobbie by the Interim Secretary.

Mr. W. T. Bashford, in seconding the motion, made the following remarks : It is perhaps appropriate that I should say a few words on this sad occasion, seeing that Mr. Dobbie and I were by a succession of coincidences brought into peculiar intimacy through this Society, being both elected members the same year, both elected office-bearers in the same year, both continuing to hold office till his death, with the exception of one year each. We were each identified with the same principles as to the management of the Society's affairs ; and in all sincerity I may say, no man ever had a more energetic, more honourable, more enthusiastic, more nobly-disinterested colabourer than he was. Mr. Dobbie was a prominent and much esteemed member of other organisations ; and while I am sure his nature would compel him to discharge faithfully all duties connected with them—while each would benefit by his courtesy, his business tact, his energy, his thoroughness—while each in its turn would occupy a prominent place in his active mind, yet of all his connections I believe I am right in saying that he cherished that of the Edinburgh Photographic Society as the one in which he had the most solicitous interest ; for which he underwent an incalculable amount of physical and mental labour continuously for years. Yet to him it was a labour of love. From the year 1876, when our Society passed through such a critical period of its history, till his death, the progress and general welfare of our Society became his hobby, and all matters (other than the business with which he was connected) were quite subservient to its interests. The Society has lost a devoted secretary who faithfully discharged the onerous duties attached to his most important office, often under very trying circumstances, and every member has lost a friend.

The recommendation of the Council was unanimously adopted.

The Interim Secretary read the extract minute of Council of date 1st December, recommending "That Mr. Bashford be appointed Secretary to do the whole work, with an honorarium of fifteen guineas, the arrangement to be for one year."

Mr. Turnbull moved in terms of this recommendation, which was seconded by Mr. Mathison, and carried unanimously.

The motion by Mr. Pringle, seconded by Mr. Horne, brought up from last meeting, "That an honorarium of ten guineas, with the thanks of the Society, be awarded to the corresponding secretary in recognition of the great amount of extra labour devolving upon him during the past year," was discussed, and finally, on the motion of Mr. Mathison, seconded by Mr. Turnbull, remitted to the Council with powers.

Mr. A. B. Stewart exhibited and described "A Flexible Window for the Dark Tent."

Mr. Tamkin considered the unmounted film shown by Mr. Stewart well suited to the purpose proposed, but feared that when mounted on the cloth it would obstruct too much light.

Mr. Mitchell said, when used in open daylight, he believed it would be sufficiently translucent.

Mr. Alexander Mathison, in proposing a vote of thanks to Mr. Stewart, asked if the material was suitable for a non-actinic lantern.

Mr. Stewart Smith seconded the vote of thanks (which was carried unanimously), and hoped that other members would be induced to follow Mr. Stewart's example, and bring forward matters of practical value.

Mr. Stewart said he had used the material for a lantern, and found it answer thoroughly.

Mr. J. M'Kean read a paper on "A New Departure in Alkaline Development," illustrated by the successful development of five negatives on plates by various makers. At Mr. M'Kean's suggestion it was decided that members should defer discussion, try the method proposed during the coming month, and bring up the results at next meeting of the Society. A hearty vote of thanks, on the motion of Mr. Tamkin, was accorded to Mr M'Kean.

Dr. Alexander Hunter, F.R.C.S.E., read an interesting paper entitled, "Canterbury, its Cathedral and Antiquities," illustrated by a fine series of photographs. The paper embraced a history of Canterbury from the earliest known records, and its rise to eminence as an archiepiscopal see, and included a history of the cathedral and its various architectural phases—each part, as far as possible, being illustrated with photographs.

Mr. W. Nielson, in graceful terms, proposed a vote of thanks to Dr. Hunter, which was unanimously accorded.

After thanks to the Chairman, the meeting terminated at a late hour.

London and Provincial Photographic Association.

At the meeting of the above Association held at the Mason's Hall Tavern on Thursday, the 14th inst., Mr. W. Cobb in the chair.

Mr. A. L. Henderson read a reply to some notes which have been published on the history of the ammonia process of emulsification, and it appears that the ammonia process, in a rudimentary form, was practised in 1876 by Mr. Johnstone, who advertised an ammonia nitrate of silver salt for use in emulsion making ; and Mr. Henderson said he did not even lay claim to originality as regards the use of ammonia, but merely gave a good working formula, in which alcohol and ammonia played an important part.

Mr. Hart showed a trough for washing negatives ; it was constructed of metal, and held about one gallon ; the plates rested in an inner tray, touching only at the extreme edges, which tray could be removed and placed in a current of air for the purpose of drying the negatives ; it possessed an ordinary syphon spout, the water playing in jets between each plate from a number of fine holes in a pipe running along the top of one side.

Mr. Prestwich had used a trough in which the water jetted from the bottom.

Mr. Cowan thought it would be improved by constructing the inner tray to hold various sized plates.

Mr. Debenham showed two prints illustrating how the eyes of a squinting sitter might be brought parallel by suspending a black thread in front.

Newcastle-on-Tyne and Northern Counties Photographic Association.

A special meeting was held (previous to the ordinary month'y meeting) in the College of Physical Science, Newcastle, on Tuesday, December 12th, for the purpose of revising and amending the rules.

The ordinary meeting was held afterwards, Mr. Downey in the chair.

Messrs. Fothergill and Hogg were elected members.

The nominations for the election of council were given in.

After a little discussion, it was resolved to hold a dinner in connection with the annual meeting.

The Chairman called upon Mr. A. L. Steaveuson to present to the authorities of the College of Physical Science an enlarged portrait of the late Professor Marreco, from the members of the Association.

Mr. Steavenson said Professor Marreco had been a most valuable member of the Association, and was ever ready to give the members his assistance, and the members of the Association trusted that by the presentation of his portrait to the College in which he had worked, his memory would be kept green.

Professor Aldis accepted the portrait on behalf of the College, and said it would be a great pleasure to all connected with the College to have such an excellent representation of their deceased friend. The portrait would be placed in the very best place the authorities could find in connection with the College.

The representatives of the College present were Professors Aldis, Herschel, Lebour, and Dunn, and Mr. Bunning (Secretary).

A paper on "Transparencies," with lantern illustrations, was then given by Messrs. J. Hedley Robinson and Dr. Williamson. The transparencies illustrating the paper (about sixty in number) were thrown on the screen by the aid of Hughes' lantern, and gave very marked pleasure and interest to the members present.

A hearty vote of thanks was carried by acclamation.

Manchester Photographic Society.

An unusually large meeting of this Society was held at the Manchester Mechanics' Institution, on Thursday, November 9th last, Mr. J. W. Leigh, President, in the chair.

The minutes of the previous meeting were read and confirmed. Mr. George Wood, Senr., and Mr. Alfred Bancroft were elected members of the Society.

The Chairman explained that since the last meeting Mr. Alfred Brothers had resigned office in the Society (for reasons unconnected with the Society), and the Council had conferred the honour of president upon himself. Although, personally, he would have preferred it had been otherwise, he would endeavour to fulfil the functions of the office to the best of his ability.

Mr. Joseph Greatorex said he had come across what to him was a curious chemical phenomenon when making up a ferrous-oxalate developer. He first mixed a solution of iron sulphate and made it decidedly acid (with hydrochloric acid) to litmus paper; next he mixed a solution of oxalate of potash, and made this solution also decidedly acid to litmus paper (with the same acid); upon mixing these two acid solutions together in the usual quantities, to his great surprise he found the mixture did not show any acid reaction to litmus paper.

Mr. John Dale said he had tested for himself, and found it exactly as Mr. Greatorex had stated. He had tried the experiment with various kinds of acids, the result being in all cases alike. He (Mr. Dale) brought two acid solutions with him to demonstrate the matter before the members. After showing their acid properties, the solutions were mixed in the proportion of one to three; but, upon applying litmus paper again, no acid properties were visible. He was unable to account for what had taken place.

Mr. E. Openshaw then gave a demonstration of the working of the platinotype process, developing about a dozen large prints, which were passed round to the members.

Votes of thanks were passed to the members who had taken part in the matters before the meeting, and the remainder of the evening was devoted to inspecting an exhibition of a large collection of photographs, the work of the members.

Mr. W. G. Coote exhibited a collection of views, amongst which were coast scenes and some interiors. Mr. J. W. Leigh (President) exhibited a large collection of both silver and platinotypes; Mr. J. Pollitt some interiors, printed in platinotype; whilst Messrs. Sefton, Brier, Wood, Wade, Chilton, Foldes, McKellen, Smith, Greatorex, Flowers, Openshaw, Dr. Sidebotton, and others also contributed to one of the finest exhibitions of members' work ever seen at any of the Society's meetings. Mr. A. Reston's portrait studies, taken with view lenses, reflected great credit upon the artist; and Mr. Percy Collis's opal pictures were much admired.

A table was set apart for apparatus and novelties. Altogether the meeting, which was attended by about 120 members and riends, was considered a decidedly successful one.

Another meeting of the same Society was held at the Manchester Mechanics' Institution, on Thursday, 14th inst., Mr. John Dale, Vice-President, in the chair.

The minutes of the previous meeting were read and confirmed. The ballot was declared in favour of the following gentlemen:—Messrs. John Harding, Benjamin J. Young, Wm. H. Baird, H. D. Herring, W. Whittaker, Henry E. Lees, John Greaves, and and Rev. H. V. Macdona.

On the motion of Mr. J. Pollitt it was resolved that a printed list of members' names and addresses be published, and issued to the members of the Society.

The Hon. Secretary said that doubtless many members of the Society, like himself, had a collection of photographic and scientific apparatus which they had now no use for, and would be glad to get rid of. He therefore proposed that a sale by auction be arranged for the next meeting (January 18th, 1883).

The idea was at once taken up, the details of the arrangement being left in the hands of the Secretary.

The remainder of the evening was occupied with an exhibition of lantern transparencies on the large screen. The lantern was manipulated by the Honorary Secretary. Over 300 slides were exhibited by Messrs. Percy Collis, W. G. Coote, T. Sefton, H. Smith, J. Pollitt, J. W. Wade, Dr. Sidebottom, and others.

Mr. Johnson exhibited some very beautiful photographs of microscopic objects, and subsequently promised to read a paper on micro-photography at the first convenient meeting.

The exhibition closed with a collection of slides by Messrs. Woodbury, Ferrier, York, Valentine, and Wilson.

The Photographic Section of the American Institute.

A meeting was held at New York, October 3, President Newton in the chair.

The reading of the minutes of the preceding meeting having been dispensed with,

Mr. Gardner related his experience regarding the combining of gelatine and gun-cotton, by dissolving the smallest possible quantity of the former in acetic acid, and then adding sufficient alcohol to cause it to flow nicely over the plate. He had followed the formula strictly, but found that the addition of alcohol precipitated the gelatine. Reversing the operation he dissolved it in acetic acid, and poured the product into alcohol; Precipitation of the gelatine ensued, however, if the solution was allowed to stand.

Mr. Jahr believed that, whenever gelatine was dissolved and alcohol added, the former was precipitated. He had never observed any chemical change. The alcohol only preserved the acetic acid in the solution; but nothing could be accomplished without the acetic acid.

Mr. Hoyt remarked that he had dissolved gelatine in strong acetic acid and alcohol, and had no difficulty. The solution left a clear fine film. He had added four to five times the quantity of acetic acid, and it set rapidly. The alcohol was added when cold. The acid must be very hot in order to hold it. Only two acids dissolve it—nitric and acetic.

Mr. Newton: Gelatine, when dissolved and immersed in a solution of alum and salt, three parts to two, became insoluble. By adding hydrochloric acid, it may be re-dissolved; but then it would dry hard, and to a great extent become insoluble.

The Secretary proceeded to discuss the advantages of a double flat dish, improvised from a few strips of hard wood grooved in the centre from end to end, and then cut into lengths for the size required. These were fastened by screws at the corners, and the sheet of glass introduced; either side could be used, and the ordinary photographic chemicals had no effect on it.

Mr. McGeorge intimated that another ingenious means of making a dish had been devised wherein the wood-work and the paraffin were utterly repudiated; all that was necessary being to take the same piece of glass, heat it, and turn up the edges.

Mr. Newton then spoke in reference to a developer with which different acids had been used—among them, he thought, oxalic acid. He was now satisfied that no bromide was necessary in the development of any of the commercial plates: the gelatine itself is a sufficient restrainer.

Mr. Gardner gave his method of intensifying negatives with mercury, as follows:—First, a solution of bichloride of mercury half-an-ounce; water thirty ounces. Secondly, a solution of bicarbonate of soda one and a-half ounces; liquid ammonia one ounce; water twenty ounces. Thirdly, a solution of citric acid one hundred and twenty grains; pyrogallic acid sixty grains; water twenty ounces. The plate, after removal from the solution of bichloride of mercury, when washed, should be flowed with an admixture of the bicarbonate of soda and ammonia and acid solutions, in equal parts, when the negative will presently turn black and become vigorously intensified. The use of hyposulphite of soda and ammonia ordinarily rendered the plate too weak for his purpose, but it was sometimes found useful where the intensification was too great.

Talk in the Studio.

The South London Photographic Society.—On Thursday week, Jan 4th, 1882, the Annual Lantern Meeting of the South London Society will be held in the large room of the Society of Arts, at seven o'clock p.m. Messrs. Bridge and Brooks have promised to lend their magnificent triplex lantern; and those of our readers who send slides should take care that they do not exceed 3¼ inches in height. The Lantern Meeting (first Thursday in January) and the Technical Meeting (first Thursday in November) are the red letter days of the South London Society, and it is the custom to send free admission tickets to those non-members who may apply to the Secretary. Applications, enclosing a stamped and directed post wrapper, should be made to Mr. F. A. Bridge (honorary secretary), 9, Norfolk Road, Dalston Lane, London, E.

Royal Polytechnic.—Mr. E. H. Farmer's next lecture will be on Saturday, Jan. 6th, when the gelatine process will be treated of.

Novelties in Portraiture.—

"'Beauties' rushed to various studios,
And demanded to be taken,
In a dozen new positions,
On a tricycle or donkey,
Making hay, or making mischief;
Dressed as 'Sisters' of a Convent;
Tending on a wounded Guardsman;
On a yacht, or playing billiards;
Or in a balloon ascending;
In a church, or in a kitchen
Making dainty apple-dumplings;
In a hammock, on a pillion—
Anywhere, so it was novel."

Truth—Christmas Number.

A Bad Example.—There are many curiosities in connection with advertisements of death, but one seldom meets with anything more curious than the announcement made in connection with the recent death of the child of a well-known Maori chief. The sorrowing parent was unkind enough to publish the names of no fewer than *eight* doctors who had attended the poor child in its last illness. Can we wonder at its death? Probably it was only intended as another way of saying "died of the doctors." We, most of us, find one doctor enough when we are out of sorts, but could any of us survive eight? Whether each of them attacked the poor child in turn, or whether they made a united onslaught, we are not informed, but in either case, the result was the same. One is reminded of the old story of the host who, when carving a pheasant, pleasantly remarked, "Doctor So-and-So killed that bird." "Dear me," said a grim guest, "what was he treating it for?" Similarly one's curiosity is somewhat excited as to the manner in which the eight doctors disposed of this unhappy little mortal whose death is so strangely accounted for. While on so grim a subject, I may as well reproduce a document which has been sent me as a unique specimen of advertising. It is said to have been prepared by a well-known firm of photographers, with a view to distribution among the relations of "dear departeds," and purports to be a verbatim copy:—"Dear Madam,—It is with great regret we hear of the demise of the late Mr. W——, your husband. Though not wishing to intrude unduly on your distress at the present time, we cannot help suggesting to you that the more pleasant the memories connected with the departed, the more easily would the condolence be effected (*sic*). We would respectfully suggest that nothing would bring the memory of the dear departed so vividly to your recollection as a life-like copy of the "original" (*sic*). This is easily obtained by sending us a carte-de-visite, which we enlarge to life-size in the highest style of art, for the sum of 25s. This is an opportunity which may not occur again.—In deepest sympathy, we remain, madam, yours respectfully, —— & Co." The idea is undoubtedly a brilliant one, and will no doubt be adopted by others than the original proprietors of it. The "melancholy pleasure" with which an undertaker waits on his customers, and the subdued grief of the "unmitigated woe department" in warehouses of mourning finery, are duly paralleled in this touching circular. That suggestion that the opportunity "might not occur again" is a touch of genius. Perhaps the circular won't be issued. The wide publicity given to it in this passing note may suffice to set inquiring minds searching for its enterprising authors. I am told it is a selection from several competitive designs.—*Otago Daily Times.*

To Correspondents.

*** We cannot undertake to return rejected communications.

F. H.—Either a fine pen or a sable brush charged with indian ink is ordinarily used, and a very little practice will enable you to write backwards. 2. Write on a piece of thin paper with a stylus or blunt point, smoke the face of this paper over a candle, and lay it back upwards on the negative. You can then easily trace over the lines again (the impression made by the stylus being visible at the back of the paper) so as to set off some of the soot on the varnished film. This set-off will then serve as a guide in writing.

S. J. Muir.—See our Year-Book, which was published last Wednesday. 2. We will post you the titles of a few foreign works on the subject.

W. T. Wilkinson.—In such a case we imagine that early registration would become absolutely imperative, and even then the case would be a little doubtful.

J. J.—The process is extremely troublesome, expensive, and uncertain when compared with modern methods.

Photo-Astronomograph.—Write to Mr. J. Joyner, 408, High Street, Cheltenham.

W. G.—Rub the surface over with a trace of the so-called encaustic paste.

A. Donald.—We will hand the note and specimens to the gentleman mentioned; and we shall be glad to have a paper from you, descriptive of your method.

J. C. L.—That which is second on your list will be more rapid than the first, but the exact ratio will depend on a number of circumstances.

W. A.—1. Quite right, a print from one would be a negative. 2. Yes, if you add a little ox-gall or Castile soap. 3 The very best results; only you must take care not to over-expose.

A. Harrison Hill.—Thanks.

Samuel Henburg.—1. It certainly gives a realistic air to the whole affair. 2. Nearly twice as strong as is really necessary, and in this case all over the quantity actually required is liable to do mischief.

Messrs. W. & D. Downey.—The information you give is highly interesting, and we shall not fail to make use of it at the proper time.

J. B. Holroyde.—A letter for you has been sent to our office.

Robert Afford.—You will see that we have done our best to meet your wishes.

H. O. Robson.—1. Like other organic bodies rich in nitrogen, it gives off ammonia when heated in a close vessel. 2. Insoluble in ether, but easily soluble in benzole. 3. The ends of the marginal lines will curve inwards.

M. I. T.—Doubtless you have very much over-exposed all the plates; try about one-twentieth of the exposure, and exercise the greatest care to exclude all trace of injurious light from the dark room.

Beginner.—The gelatine has become thoroughly altered by the long-continued action of heat and moisture. Recommence the whole series of operations.

*** Authors may have Reprints of their Articles at 3s. per page per hundred copies; but the order must be given when the proof is returned.

PHOTOGRAPHS REGISTERED.

Mr. F. Downer (Watford)—5 Photos. of Lord and Lady Clarendon.
Mr. R. Slingsby (Lincoln)—Photos. entitled "Meditation," "Lazy Nell," "Homeward," "Brambling," "Cornfield, Evening."
Mr. J. W. Blomfield (Hastings)—Photo. of Hastings Bicycle Depôt.
Mr. Whitcher (Romford)—Photo. of an American Aloe in Bloom.
Mr. F. M. Sutcliffe (Whitby)—Photo. of Hon. J. R. Lovell.
Messrs. Adams & Stilliard (Southampton)—Photo. Group of Members of British Association.
Mr. J. W. Tattersall (Accrington)—4 Photos. each of Rev. C. Williams and James Barlow, Esq., Mayor of Accrington.
Mr. W. McLeish (Darlington)—Photo. of Durham Cathedral seen through a Mist.
Mr. T. Erwin (Ballymena)—2 Photos, of Rev. W. Martin.

THE PHOTOGRAPHIC NEWS.

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CONTENTS.

THE WARMING OF THE STUDIO.

The photographic studio as usually constructed presents unusual difficulties as regards warming and the exclusion of damp, while the fact of the most exposed situations being perforce selected for the location of glass houses serves to considerably increase the difficulties of the situation.

When the general structure of the studio is brickwork, and an ordinary chimney with the usual open fire-grate are admissible, nothing can be better; but in cold weather a good fire must be kept to counter-balance the cooling influence of the considerable window area, and care must be taken that very large volumes of smoke do not issue from the chimney at such times as to occasion any obstruction of the light. It is quite true that the ordinary fire-grate is defective as regards the utilisation of a considerable proportion of the heat of combustion, but this waste of heat is more than compensated for by the collateral advantages, such as general comfort, non-obstruction of valuable floor space, and a cheerful aspect of affairs.

It very frequently happens, however, that no brickwork enters into the construction of the studio, and the only kind of chimney which can be used is an iron stove-pipe. In such a case the ordinary system of heating by means of hot water circulating in a system of cast iron pipes may be adopted, one of the potable annular boilers being used. Still the hot water pipes are not only unsightly, but, unless considerable expense is incurred in placing them, they prevent that free and unobstructed use of the wall space which is so essential to the photographer in making arrangements for group studies. Still more than this, the cast iron pipes are very liable to burst through the action of frost in winter, as the average studio cools very rapidly; and the interval between Saturday and Monday often serves to nearly equalise the internal and external temperatures. In the summer, hot water pipes are terribly in the way, and we know of more than one case in which this inconvenience became so great as to lead to their removal, a course involving a considerable expenditure.

Considering that artificial heat is only required in the studio for about five months in the year, we think that when the ordinary fire-grate cannot be used it is best to employ small cast iron stoves, fitted with the usual sheet iron flue piping. One or more of these can be placed in its cast iron tray or fender, fairly out of the range of the general work, and sheet iron safety-pieces can easily be set in the framing of the studio where the flue pipes pass into the open air. A material advantage of this system of heating is to be found in the circumstance that the whole affair can be cleared away or replaced in a very few minutes, so that no floor space need be lost when a fire is not required. A frame containing an enlargement can be used to cover the sheet iron shield which covers the exit hole of the stove pipe; but it is best to allow the outside bend and lengths of pipe to always remain in position. There are many advantages in allowing the smoke pipe to pass out horizontally rather than vertically, but as these will be obvious to all, we need not enumerate them.

Much taste and ingenuity have been displayed in the designing of potable stoves, the flat or American model being most generally approved of. These can generally be had with a hot water boiler and small oven, and a cast iron filigree dome, which, when placed over the stove, conceals everything but the glowing front of the fire, and gives to the kitchen stove a decidedly ornamental aspect.

The stove is as much required as a protection against the mischievous effects of damp as against cold, damp being especially prejudicial in many branches of photographic work. The conditions under which moisture is deposited from the atmosphere are so frequently misunderstood, and mistaken views are so often acted on, that some few words in explanation may be useful. Air will always dissolve or absorb a certain amount of water, and the amount of moisture which a given amount of air can dissolve depends on the temperature, the capability of air for dissolving or absorbing moisture increasing enormously as the air becomes hotter. Let us imagine a little water to be poured in a tin box, and the lid to be closed. In a very short time the enclosed air will absorb the maximum quantity which it is capable of taking up, provided, of course, that excess of water is present. Water thus saturated with aqueous vapour is ordinarily called moist or damp, and it is ready to deposit moisture or dew immediately it is cooled by contact with any substance colder than itself. If, on the other hand, the air in the box be heated, it becomes "dry" in the ordinary or popular sense of the term: that is to say, it becomes capable of taking up more moisture; and if the supply of water in the box holds out, the air will soon become again "damp," or saturated with aqueous vapour. The air being thus warm (*i. e.*, above the temperature of immediately surrounding objects) and damp, a film of moisture will be immediately deposited on any body at the surrounding temperature which may be placed in it. If the box be allowed to cool, moisture will be deposited on the sides of the box as the capacity of the air for moisture becomes reduced.

On a cold day in winter the atmosphere contains but little moisture, as the capability of the air for taking up aqueous vapour is reduced very much by the cold. Let us now imagine the case of a studio or room the contents of which have become reduced to or near the level of the external temperature. There is no special tendency to deposit moisture, and the contents of the room remain fairly dry; but when a thaw sets in, the external warm air speedily becomes saturated with moisture, the increased temperature enabling it to take up a considerable amount. This warm and moist air penetrates into the studio, and becoming cooled by contact with bodies much colder than itself, immediately deposits some of its aqueous vapour; this deposit taking the form of a dew on the solid body.

Those compact bodies which take a long time to change their thermic condition become most bedewed when a sudden rise of temperature occurs, and it is no uncommon thing to see such a mass of iron as an anvil covered with moisture for several days after the commencement of a thaw.

Damp thus deposited when a sudden rise of temperature occurs, often causes serious damage to photographic apparatus, but if the photographer take care to anticipate the thaw by thoroughly warming his studio when the external temperature is falling, there is but little danger of moisture being deposited on the objects inside; but it is when the external temperature is rising that there is especial need for artificial heat as a protection against damp.

As many of our readers are now likely to be contemplating the erection of new studios for the work of the coming season, we will before long publish a short series of articles on the principal points to be attended to in the selection of a site, and the construction of the building.

FRENCH CORRESPONDENCE.

Non-Success of Platinotype in France—Phosphorescent Plate for Lighting—Printing with Vitrifiable Ink—Ferrous Oxalate Developer—Phototype Process and Letterpress.

Non-Success of the Platinotype Process in France.—The platinotype process has not yet found favour among us. What is the reason? It is not known enough, and the industrial application of it, adopted and put in practice by the purchasers of Willis's patent, was defective—to my mind, at least. Platinotype prints, on being compared with silver on albumenized paper, show a want of transparency in the shadows, and the cold tone is opposed to the warmth of a silver print. It is said that the platinotype process is permanent, while silver only lasts a certain time. This is not in general an important reason for its adoption, as photographers are more anxious to satisfy their patrons at the moment, than to think of the future. The public ought to be chiefly concerned in the permanent quality of this process. A son, for instance, in ordering a photograph of his parents, wishes for a lasting image of them; the author of a book desires it to be illustrated in a stable manner; collectors of various reproductions can only admit prints as unalterable as engravings and lithographs among their treasures. Unfortunately, it is not brought before the public sufficiently to enable them to realise its durability. It usually happens that photographers impose upon their sitters and patrons the process which is in most frequent use—namely, the silver printing One reason which may have contributed to the rejection of the platinotype process with us, while it is so largely practised in England, Austria, America, Belgium, &c., is the method by which the working is organised. Licenses have been granted, and the sensitive paper is only sold to those who have licenses—surely a bad way of bringing forward a printing process but little known, by limiting the practice of it to certain restrictions. It would have been better to have sold the sensitive paper to whoever wished for it, and to have charged more, than to enforce an annual payment for the right of using the process. Since the fine publication of Pizzighelli and Hübl, it has been determined to set up its manufacture in Austria. It has been undertaken by the firm of Just, of Vienna. The publishing in France by Gauthier-Villars of this admirable treatise on platinotype will bring it more closely to public notice. The only difficulty offered will be the preparation of the paper; but, when that is overcome, there will be numbers who will eagerly avail themselves of its numerous advantages.

Phosphorescent Plates as affording Illumination. — Mr. Brightman does not think it possible to fix a standard of light obtained from the phosphorescence of sulphide of calcium, an opinion contrary to that of our learned friend Mr. Warnerke; and he bases his objection on the great influence temperature has over its luminosity. After reading what Mr. Brightman has written on this subject, I have made some experiments in temperatures varying between 20° and 30° C., and I came to the conclusion that Mr. Brightman had practically formed an erroneous impression. What appears more probable is, that from several samples of the phosphorescent substance they appear more or less luminous. whatever be the temperature, under the influence of the same source of exciting light. In my next letter I will report on the results of my experiments with phosphorescent surfaces purchased at various places. This objection is really serious if it is not confirmed by experience relative of differences to temperature. I have just perused Mr. Warnerke's reply, and as it fully re-echoes what I should say myself, I adhere to what Mr Warnerke says. Omitting the question of temperature, the question of luminosity remains to be solved, greater or less according to the stimulation of the same light on various specimens. In a word, it remains to be seen if the batches of sulphide of calcium are luminous in the same degree; for if not, all observations made upon them with a sensitometer would be useless.

Mode of Printing with Vitrifiable Ink.—As I am occupied in making an addition to the series of photographic publications (I am at work upon a photo-ceramic treatise), I have undertaken numerous experiments on the means of photo-mechanical printing with vitrifiable inks. The difficulty to be overcome is great when a direct collotype has to be printed. Not that it is impossible to use metallic oxides with the addition of the usual fatty varnish, but so little colour remains on the printed surface that the fire destroys a great part of the half-tint. Generally, lithographers who use traced impressions on pieces of porcelain, print their various monochromes with a fatty mordant, afterwards superposing the suitable colouring matter. The sticky mordant retains much more than if the colour were mixed with it. For coloured ceramics I advise a lithographic impression to be made first, as in my photochromic process; then, when fixed and burnt in, I apply a phototype image as highly charged with metallic oxides as possible, very hot, and again fired. It is needless to remark that the lithographic designs are prepared in their respective colours.

The Ferrous Oxalate Developer.—It is well known that the ferrous oxalate developer is excellent, but it also presents many advantages independent of its developing qualities. It does not soil the fingers, and, besides, may be regenerated by the addition of tartaric acid and exposure to light, as indicated by M. Andra. M. Borlinetto has just found another use for it in the Bunsen electric battery, where it acts perfectly. The pile is prepared with amalgamated zinc, water acidulated with 8 per cent. of sulphuric acid, and carbon reaching above the porous pot, and having its projecting part covered with paraffine. After a month M. Borlinetto found that the pile was not disturbed by the acidulated water, nor did the zinc present any exterior alteration. Our friend Major Waterhouse has recommended the use of this developer for intensifying wet collodion negatives. Two negatives fixed and washed are immersed in a ten per cent. solution of bromide of copper, which gives them a light citron yellow tint. After washing, they are plunged in the ferrous oxalate, when they assume a deep olive colour. This is one advantage over the pyrogallic developer.

Modification of Phototype Process combined with Letter-

press.—I have modified this process as follows. A plate after being rubbed with French chalk, is coated with normal collodion of $1\frac{1}{2}$ grammes gun-cotton in 50 grammes of alcohol, and the same quantity of ether. When dry, this receives a film of bichromated gelatine, and is allowed to dry in the oven. The gelatine can then be cut round the edges, and the pellicle is raised and exposed to light from the back before fixing to a block of the same height as the type. By this means a very solid film is obtained, which may be used as a typo-graphic negative, except that the prints are more delicate, and more care must be taken in the inking suitable to it than to that of the letter-press, as that is sure to go right.

I terminate this letter by wishing all my readers a happy New Year, and hope that the year 1883 may be rich in fresh and striking photographic progress.

LEON VIDAL.

PHOTO-LITHOGRAPHY AND PHOTO-ZINCOGRAPHY.

BY MAJOR J. WATERHOUSE, B.S.C.,
Assistant Surveyor-General of India.

CHAPTER V.—THEORY OF PHOTO-LITHOGRAPHY, AND GENERAL CONSIDERATIONS—*continued.*

THE general correctness of Swan's theory has been confirmed by Dr. Eder, who has made a most exhaustive examination of the reactions of chromic acid and the chromates on organic matter, in a paper which gained the gold medal awarded by the Photographic Society of Vienna, and is replete with matter of interest to the photo-lithographer. An abstract of it will be found in the NEWS, vols. xxii. and xxiii.

The generalresult of Dr. Eder's investigations appears to be as follows:—The change resulting from the exposure to light of a mixture of gelatine and bichromate of potash in a dry state depends primarily on the reduction of the excess of chromic acid of the bichromate, and an oxidation of the organic substance. Under the influence of light the yellow chromated gelatine turns brown, and by continued action of the light the brown parts become green, showing clearly the formation of chromate of chromium, and finally of chromic oxide. The first effect of the light is apparently to produce chromic oxide, and this again enters into a close combination with some of the chromic acid of the bichromate, which is always in excess, thus forming chromate of chromium; and it is this latter substance which, combining chemically with part of the gelatine, renders it insoluble. The remainder of the gelatine is decomposed by the liberated oxygen, and converted into formic acid and other oxidised bodies which are soluble, and do not contribute to the formation of the insoluble residue forming the picture, because analysis shows that this consists entirely of unchanged gelatine and chromic oxide.

The action of the bichromates upon gum is similar to that on gelatine, the insoluble substance formed being a compound of gum and chromic oxide. With albumen, however, it would appear that an oxidation of the organic matter really does take place, as albumen is not rendered insoluble by chromic oxide.

The decomposition which causes the insolubility of chromated gelatine, &c., may also be brought about without the influence of light by heat or by long keeping in the dark. The action in the latter case is slower, though heat and moisture, and particularly both combined, favour it. Sensitized papers or plates, &c., can therefore only be used within a few days of their preparation, and must be kept dry and in absolute darkness, for the action of light, though it may be slight, once set up, continues even in darkness. This fact is sometimes taken advantage of when light is dull and full exposure cannot be given. By keeping the under-exposed print in the dark for a few hours, the image may be developed of the same strength as if it had received a full exposure.

For the same reason sensitized paper should not be exposed to too great a heat in drying, which might render it insoluble, and liable to retain ink on the ground, whether washed off or inked up.

In most of the photo-lithographic processes depending on the use of chromo-colloids, the colloid material is by preference gelatine or a mixture of gelatine and albumen, especially for the transfer methods. The gelatine is easily applied to paper, and gives a good substantial coating, which is not penetrated by the transfer ink when inked in the press. Its insolubility in cold water gives it an advantage in those methods in which the photo-lithographic image is developed by inking-in with a roller on the damped gelatine surface.

On the other hand, gum and albumen are readily soluble in cold water, and the manipulations are simplified. Those substances are, however, generally used for coating stones or metal plates in the direct methods. For this purpose and also for coating paper, albumen is generally preferred to gum, as giving a more resisting coating, the images formed with gum being inclined to be broken and rotten. Albumen is, by some workers, preferred even to gelatine in the transfer methods for fine work, where great sharpness and delicacy are required. For working on the large scale gelatine will, on the whole, be found the most convenient.

As regards the quality of the gelatine suitable for photo-lithography, there is not much to be said; any good quality will answer. For photo-transfers it should not be too soft and soluble, otherwise the coating of the paper will be too thin, and the ground liable to be stained with ink. On the other hand, it should not be too hard and insoluble at moderate temperature, otherwise very hot water will be required for washing, and this may cause the ink to clog up and thicken on the lines. For general purposes I have found Nelson's opaque gelatine answer very well, but in hot weather the addition of a little of the harder fine cut of the same maker is desirable.

For transfers to be rolled up, or for the preliminary coatings of washed transfers on an insoluble basis, the gelatine may be somewhat harder.

The bichromate salts usually employed for sensitizing photo-lithographic transfer paper, &c., are the bichromates of potash and ammonia. The potash salt is the one most commonly used, and answers all purposes, though bichromate of ammonia is preferred by some as giving more sensitive films, owing to its greater solubility, and the consequently larger quantity that can be combined with the colloid material without its crystallising out.

Finally, with regard to the mode of applying the photographic image to the zinc or stone, either directly or by transfer, the choice is to be guided by much the same principles as rule in ordinary lithography, where the design may be produced on the stone either by transfer from a drawing made on prepared paper with the special resinous, soapy, so-called "autographic" ink made for this purpose, or by drawing directly on the stone with a similar ink or solid crayon. In the one case the drawing is made upon paper, in its correct position, and is in a convenient form for moving about. It is, however, liable to be made coarser, and thrown out of scale, by the operation of transfer. In the other, the drawing is made on the stone or zinc plate itself; it must be reversed, and the stone or zinc, if large, cannot readily be moved about; the drawing may, however, be made as fine as the draughtsman can make it, and be perfectly true to scale.

In photo-lithography, also, the transfer methods offer many conveniences in the greater facility and certainty of the manipulations, the power of joining up several sections of a subject, and they give a strong image on the stone or zinc, which will yield a large number of copies. This image is, however, as a rule, coarser than the image obtained by the direct methods, and is liable to distortion by the process of transfer, just as is the case in ordinary lithography.

In the direct methods, on the other hand, the scale of the original is accurately preserved, the work is cleaner, and the lines sharper than they can ordinarily be obtained from paper; there is also a considerable saving of time and material, the coating of the stone being very thin, and taking only a few minutes to dry.

In these methods, however, the size of the work is limited to a single negative, and this must be taken reversed specially for the purpose. With negatives on glass it is difficult to obtain perfect contact between the surface of the stone and the glass, and the latter is liable to be broken by the pressure required. This difficulty is much increased with large stones or plates, which are, further, very inconvenient to carry about in and out of the dark room. In some of the direct methods the printing ink is not in actual contact with the stone or plate, but separated from it by a film of gelatine, which is easily worn away in the press, and consequently the work will not give many good impressions.

The collo-chromate transfer methods, being in many ways the most convenient for all ordinary work, are the most generally used, and we shall therefore consider them first.

(*To be continued.*)

Notes.

Our little supplement, "Waiting to go on," will be remembered by many in the Pall Mall Exhibition of 1877. The *Pictorial World* of the same year issued an engraving of the photograph, by our permission, as their Christmas picture, entitled "Our Baby Clown," but it was scarcely a satisfactory reproduction. Of the present print, by the "ink-photo" process, we may say that, if not perfect, it has, at any rate, all the original merits and demerits of the photograph.

In our "By-the-Bye" last week we mentioned the circumstance that expression on the human face could be counterfeited by applying electricity to certain muscles of a "subject," thus causing them to move mechanically. Curiously enough, the subject was also alluded to last week by Mr. Preece, in lecturing before the Society of Arts on the subject of Electric Exhibitions in general, and that of Munich in particular. Touching the latter, the lecturer said:—"Among the curiosities exhibited there, I was able to secure only one. It is an instructive and amusing series of photographs, taken by Dr. Von Zeemssan, a celebrated electro-physiologist of Munich, of the face of the same man, who has involuntarily been compelled to assume expressions of various emotions by the application of currents of electricity to various nerves of the face."

We amused ourselves on the shortest day in making a few drawing-room pictures. Our room is favourably lighted from the east, and a pale tint on the walls helped the photographic operations materially. Ordinary commercial plates were employed, and a small rectilinear lens, and it says something for the quality of the former when we mention that fifty seconds proved too long an exposure with the normal developer recommended by the makers, but by adding water to the extent of one-third the volume of the developer—certainly the easiest plan of modifying a new formula—we secured some well-lit photographs, without a trace in any portion of them of under-exposure. This is doubtless a very ordinary feat to accomplish now-a-days, but at Christmas five years ago it would have been nothing less than phenomenal.

We spoke the other day of the Swan lamp employed as a star-light in a fairy's diadem at the Savoy Theatre, and we described the manner in which this striking novelty was evidently managed. We can now, however, speak with authority. As we opined, the battery is fixed on a plate between the wings of the fairy, and held by two straps round the arms. It is a secondary battery that is used, consisting of three cells, and weighing about four pounds. Consequently the tripping *coryphée* is a little handicapped in her movements.

Dr. Koenig, of Berlin, has re-discovered that by straining an incandescent lamp a highly actinic light, similar to that of the arc, can be produced; and his experiments also confirm our observation that a lamp thus strained gives very much more light in proportion to the current passing. This, as we stated last week, is just the way in which the star-lights in the fairy ballet are managed at the Savoy Theatre.

Another case of re-discovery. Our rough-and-ready method of making a screen with tinfoil, so as to partly cover the incandescent lamp, and at the same time act as a reflector, has actually been re-invented, and made the subject of a recent patent.

Mr. C. Ray Woods, in confirming our experiments with electric printing, mentioned, as a drawback to the operation, that the silver prints are red in colour, and do not easily take a nice tone. This is quite true, and we cannot help thinking the cause is to be traced to the lack of penetrating power of the electric light; it appears to have a more superficial action than sunlight, and although numbers are readily registered on a photometer scale, sufficient chloride is not reduced to yield a rich and vigorous tone.

We have made experiment with some "cherry" fabric, sent to us by Messrs. Law Brothers, of Foots Cray Mills. Being of a much lighter red than ruby, and consequently permitting the passage of more light, we were at first somewhat prejudiced against the new dark-room fabric; but, strange to say, a twofold trial proved it to be exceedingly advantageous. Taking two commercial plates at random, from one of the last packages to hand, and another pair from those longest in stock—about fifteen months—we tried the "cherry" against some ruby calico in use in our dark room. Each plate was put in a printing frame behind a Warnerke sensitometer and a single thickness of fabric, and then exposed for five minutes to a fish-tail burner some four feet off. On development with a standard ferrous oxalate solution, the two plates exposed under "cherry" showed but the squares Nos. 1 and 2, while in the other plates two rows of figures were more or less

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" WAITING TO GO ON."

legible. Still, as the fabric for the dark room is a matter of importance, and the testing of it is so easy, we recommend all photographers to experiment for themselves, and to remember also that whether the colour is cherry or ruby, it is liable to fade in time.

Mr. Belt and Sir Hardinge Giffard, in the recent libel action, were loth to permit the casting of the bust modelled in court, owing to the fact that the casting operations would materially alter the features for the worse. It never occurred to them that by photographing the bust with a stereoscopic camera from a few different points, it would be possible to secure reproductions, which, to the eyes of a spectator, would present all the relief and plastic character of the original. Views of the photograph seen in the stereoscope would at once show if the bust had suffered in casting.

The arrest of the Russian Prince Krapotkine on French territory has shown the existence of an International Police organization, of which a branch is said to exist in this country. Whether this is so or not, it is very certain that on the Continent the registry of outlaws and Nihilists is most complete, and with the aid of photography the secret police of every European capital is supplied with the most perfect information regarding suspects. When we visited the Paris Detective Department some eighteen months ago, we found the photographic staff in the *Rue de Jerusalem* very busy in printing and sorting portraits of such personages, the pictures being many of them copied from photographs received from St. Petersburg, Vienna, Berlin, London, and elsewhere.

As we looked over these portraits—to a man, almost, unshaven and unshorn, and in appearance very much like artists or German students run wild—it occurred to us how easy it would be for a Nihilist to disguise himself. These dark, hairy individuals in *negligé* attire would never be found by the police if they took but two precautions—a clean shave, and the assumption of the garb of respectable citizens, would at once make ordinary beings of them, and put the chance of recognition beyond all possibility.

By-the-bye, we see that many of our English newspapers speak of Thonon on the lake of Geneva, where Prince Krapotkine was arrested, as being in Switzerland. At the last exhibition in Pall Mall, we remember seeing a picture of the spot similarly labelled, while several photographers showed prints of Mont Blanc and Chamonix ticketed "Swiss Views." To show how deeply rooted in the minds of Englishmen is the idea that Chamonix is in Switzerland, we may mention that on the occasion of our last visit, all the letters in the hotel letter-box awaiting British tourists were thus addressed, with a single exception, which was in Dr. Vogel's handwriting, and bore the superscription, "Haute Savoie, France."

We notice that at the last meeting of the French Photographic Society, Colonel Sebert presented a note taken from the *Scientific American* of the 28th October last, concerning some photographs of the results of a submarine explosion secured by the United States Engineers. As a matter of fact, the note in question appeared originally in these columns some months previously, as our readers may remember. It is not this circumstance, however, but rather a remark of the gallant colonel's upon the information we gave, that causes reference to the subject once more. The height of the column or jet of water sent into the air by the violent detonation of the dynamite measured 180 feet, and during the period of the experiment, four photographs, it will be recollected, were taken at certain times fixed by a chronograph.

Colonel Sebert thinks there must be a mistake in the records of the times taken, for while one photograph showed the column at its full height, in another picture, taken two seconds afterwards, the column had disappeared. As it takes more than two seconds for a body to fall 180 feet, the gallant Colonel pronounces the exposures to have been *mal determinées*. Now we are not going to defend the scientific corps of the United States Army, although we may mention that a chronograph in practised hands is not given to making mistakes; but we simply confine ourselves to pointing out how Colonel Sebert himself may be mistaken when he says the figures quoted *sont certainement erronés*. We have witnessed many submarine explosions of the nature photographed by the United States Engineers, and we have always remarked that when a powerful explosive like dynamite or gun-cotton is employed at no great depth, and the water consequently thrown into the air to a very great height, the upper portion of the column consists of fine spray, which, if the spectator happens to be to leeward, may wet him to the skin. Two seconds would be ample, with the least air stirring, to convey this spray to a distance, and hence its absence in the field of the photograph is perfectly explained without any reversal of the laws of nature or mistakes on the part of the chronograph.

Patent Intelligence.

Application for Letters Patent.

6114. Stephen Henry Emmens, of Soho Square, in the county of Middlesex, Actuary, and John Munro, of West Croydon, in the county of Surrey, for an invention of "Improvements in photometric apparatus."—Dated 22nd December, 1882.

Patents Sealed.

3072. Gerard Wenzeslaus von Nawrocki, Proprietor of the firm of J. Brandt and G. W. v. Nawrocki, Patent Solicitor and Civil Engineer, of 124, Leipzigerstrasse, Berlin, Germany, for an invention of "A new or improved process for the manufacture of hyposulphite of soda."—A communication from the Verein chemischer Fabriken, of Mannheim, Germany.—Dated 29th June, 1882.

3491. Edward Gardner Colton, of Southampton Buildings, in the county of Middlesex, for an invention of "Improvements in the method of producing photographic images and an apparatus applicable therefor."—A communication to him from abroad by William Kurtz, of the city, county, and state of New York, United States of America.—Dated 22nd July, 1882.

Specifications Published during the week.

2277. H. J. Haddan, for "Producing pictures on glass, stone, metal, &c."—A communication from E. Godard.

This invention has for its object to reproduce images and drawings by means of vitrifiable colours on glass of any shade or colour. This process may also be applied to wood, marble, and other stone, on canvas or paper prepared for oil-painting and to other solids having polished surfaces, for instance earthenware, porcelain, and copper. The original drawings or images should be well executed and drawn on white or preferably bluish paper similar to paper used for ordinary drawings. In the patterns for glass painting by this process one marks the place to be occupied by the lead, before cutting the glass to suit the various shades which compose the colour of a panel, as is usually done in this kind of work, the operation changes only when the glass cutter hands these sheets over to the man who undertakes the painting. The sheets of glass are cut according to the lines of the drawing, and, after being well cleaned, they are placed on the paper on the places for which they have been cut out. If the window to be stained is of large size and consists of several panels, only one panel is proceeded with at the time. The glass is laid on the reverse side of the paper (the side opposite to the drawing) the latter having been made transparent by saturating it with petroleum. This operation also serves to fix the outlines of the drawing more distinctly, and to give more vigour to the dark tone of the paper. When the paper is thus prepared, and the sheets of glass each in its place, they are coated by means of a brush with a sensitizing solution on the side which comes into contact with the paper. This coating should be as thin and as uniform as possible on the surface of the glass. For more perfectly equalizing the coating a second brush is used. The sensitizing solution which serves to produce the vitrifiable image is prepared as follows:—As much bichromate of ammonia is dissolved in water till the latter is saturated, 5 grammes of powdered dextrine or glucose are then dissolved in 100 grammes of water, to either of these solutions I add 10 per cent. of the solution of bichromate as described above, and filter the resulting mixture. The coating of the glass takes place immediately afterwards in a dark room, the coated sheets are then subjected to a heat of 50 to 60 degrees in a small hot chamber, where they are laid one after the other on a wire grating situated 35 centimetres above the bottom. Care should be taken not to introduce the glass under treatment into the hot chamber before the required degree of heat has been obtained. A few seconds are sufficient to dry each sheet, and the wire grating should be large enough to allow of the dried glass being laid in rows on one side where the heat is less intense. For the reproduction of the pictures or images a photographic copying frame of the size of the original is used. A stained glass window being for greater security generally divided into different panels, the size of one panel is seldom more than one square metre. If the picture to be reproduced should be larger in size than any available copying frame, the prepared glass sheets are laid between two large sheets of plate glass, and part after part is proceeded with by sliding the original between the two sheets. A photographic copying frame, however, is always preferable, as it presses the glass sheets better against the original. The original drawing is laid flat on the glass of the frame. The lines where the lead is to connect the respective sheets of glass are marked on the drawing with blue or red pencil. The prepared sheets of glass are then placed one after the other on the original in their respective places so that the coated side comes in contact with the said original. The frame is then closed. It should be borne in mind that the latter operations must be performed in the dark room. The closed frame is now exposed to light. If the operations are performed outdoors, the frame is laid flat, so that the light falls directly on it ; if indoors, the frame is placed inclined behind a window, so that it may receive the light in front. The time necessary for exposing the frame depends upon the light and the temperature; for instance, if the weather is fine and cloudless, and the temperature from 16 to 18 degrees, it will require from twelve to fifteen minutes. It will be observed that the time of exposure also depends on the thickness of the paper used for the original. If, however, the weather is dark, it requires from thirty to fifty minutes for the exposure, in which case several frames may be proceeded with at the same time, which saves time, for while one frame is exposed, another one may be prepared, and so on. It will be observed that if the temperature is above 25 degrees the sheets of glass should be kept very cool and be less dried, otherwise, when exposed, the sheets are instantly metallised, and the reproduction cannot take place. The same inconvenience takes place if the temperature is beneath 5 degrees. In this case the sheets should be kept warm, and care should be taken not to expose the frame to the open air, but always behind a glass window at a temperature of from 14 to 18 degrees. The time necessary for the exposure can be ascertained by taking out one of the many pieces of glass, applying to the sensitive surface a vitrifiable colour, and observing whether the colour adheres well. If the colour adheres but slightly to the dark shady portions of the image, the exposure has been too long and the process must be recommenced ; if, on the contrary, the colour adheres too well, the exposure has not been sufficient, the frames must be closed again, and the exposure continued. To save time and trouble, the time necessary for the exposure may be ascertained by first proceeding with a small frame containing only two small sheets of prepared glass when the exact time for exposure can be ascertained and operations with the large frames can safely commence. When the frame has been sufficiently exposed, it is taken into the dark room, the sensitized pieces of glass laid on a plate of glass or marble, with the sensitive surface turned upward, and the previously prepared vitrifiable colour strewed over it by means of a few light strokes of a brush. This powder does not adhere to the parts of the picture fully exposed to light, but adheres only to the more or less shady portions of the picture. This operation develops on the glass the image as it is on the paper. I then add 30 to 40 grammes of nitric acid to 1,000 grammes of wood-spirit such as is generally used in photography, and dip all prepared pieces of glass into this bath, leaving them afterwards to dry. If the bath becomes of a yellowish colour, the same must be renewed. This bath has for its object to remove the coating of bichromate, so as to allow the colour to adhere to the glass from which it has been separated by the layer of glucose and bichromate which would prevent the vitrification. The bath has also for its object to render the light parts of the picture perfectly pure, and capable of being easily retouched or painted by hand. The application of variously coloured enamels and the heating are then effected as in ordinary glass painting. The same process may be applied to marble, wood, stone, lava, canvas prepared for oil painting, earthenware, pure or enamelled iron. The result is the same in all cases, and the process is the same as with glass, with the difference only that the above-named materials are not dipped into the bath, but the liquid is poured over the objects after the latter have been placed in an inclined position. Having now described the invention as communicated to me by my foreign correspondent, I wish it to be understood that I do not bind myself to the exact proportions of materials for the sensitizing solution as stated in the above specification, and that the details of the process may otherwise be varied without departing from the principle of this invention. *Claim*—1. The process of producing images in vitrifiable colours on glass, wood, marble, metal, and other surfaces, substantially as described.

2403. P. M. Justice, for "Frames for printing photographs."—A communication from G. S. Street.

This invention relates to that class of frames which are employed for photographic printing, and particularly to the frames for direct photography or blue printing. The invention consists in the means or arrangement of parts whereby the tracing cloth, paper, or other material may be readily arranged and held closely in position during the operation of printing. I effect this desirable result by the application of a water or other pressure cushion in the place of cross bars and set screws as ordinarily used, and by the improved arrangement and combination of parts all as hereinafter described and set forth. The advantages gained by the use of my invention are :—First, the pressure applied is uniform, and lessens the liability of breakage to the glass ; second, the pressure can be applied instantaneously ; third, the apparatus is entirely self-contained, there being no parts which it is necessary to remove to accomplish the work on hand.*

Patents Granted in France.

149,048. Brunot, for "An apparatus for obtaining instantaneous photographs by electric action, or a so-called 'lightning screen.'"—Dated 20th May, 1882. Class 17.

149,120. Street, for "A photographic press."—Dated 23rd May, 1882. Class 17.

149,221. Candeze, for "A revolving diaphragm for instantaneous photographs."—Dated 26th May, 1882. Class 17.

* From the detailed description which follows it is difficult to clearly understand the exact points of novelty claimed. Perhaps the most novel and extraordinary features are the adaptation of a *safety valve* to the air-cushion of a printing-frame, and the proposal to use water instead of air. Printing-frames with air-cushions as padding have not hitherto been received with much favour.

Review.

DIE PLATINOTYPIE, von Josef Pizzighelli und Arthur Baron Hübl. (*Dr. E. Hornig, Vienna and Leipsic*).

IT may be remembered that about a twelvemonth ago, the Vienna Photographic Society distinguished with the gold Voigtländer medal a memoir on the subject of platinotype printing by Captain Pizzighelli and Lieutenant Von Hübl. These gentlemen have pursued the investigation then published still further, and now give to the world, in the compass of a useful little volume, the whole history and process of platinotype printing. The earliest experiments with platinum salts by Herschel, which date as far back as 1832, are mentioned, as also those of Döbereiner and Johannsen, the authors quoting from Hunt's *Researches on Light* to show how much interested in these salts were the early photographic experimentalists.

Willis's later experiments and eminently satisfactory results are next discussed, for, as our readers are well aware, it is to him that we owe platinotype printing as a practical photographic process. The authors do not, however, content themselves with a description of Willis' beautiful method as it stands at present, but enter very thoroughly into the why and wherefore of the reactions that take place and result in producing the delightful engraving-like pictures, of which a magnificent specimen appears by way of frontispiece. To all photographers, who are German scholars as well, we warmly recommend *Platinotypie*, for it expounds well and thoroughly one of the most permanent, as it is one of the most pleasing and recent, printing processes.

THEORIE UND PRAXIS DER PHOTOGRAPHIE MIT BROMSILBER-GELATINE. Von Dr. J. M. Eder. Zweite Aufgabe. (*Dr. E. Hornig, Vienna and Leipsic*).

THIS recent edition of Dr. Eder's work on gelatino-bromide, although termed the second, may in some respects be considered the third, for "Modern Dry Plates" was published between the two German issues. Be this as it may, Dr. Eder has now, to all intents and purposes, given us a new work on the subject, for the book has been almost entirely re-written, and now contains no less than fifty-eight illustrations. A more perfect history of gelatino-bromide it would, indeed, be difficult to prepare, for we find therein a very succinct and complete account of all the improvements that have of late been contributed by photographic experimentalists in this country, no less than in other parts of the world. As one might expect, we find the PHOTOGRAPHIC NEWS laid under contribution pretty heavily, a most convincing proof that the worthy author keeps abreast of the times, and allows nothing to escape his keen eye and ever-recording pen.

Dr. Eder's volume—albeit it treats only of the gelatino-bromide process—now includes 250 closely-printed pages, and, on glancing through them, one knows not which to admire more—the author's wonderful power of observation, or his indefatigable efforts in seizing the salient points of all that comes under his eye. Moreover, a copious contents and exceedingly clear index make it possible for the reader to derive full value from the volume, in respect to which we wish the author every success.

AUSFUHRLICHES HANDBUCH DER PHOTOGRAPHIE. Viertes Heft. By Dr. Josef Maria Eder. (*Halle a/s, Wilhelm Knapp.*).

ANOTHER volume from the pen of Dr. Eder comes to us, forming the fourth part of that gentleman's great work on photography, which, so we are told, is to be complete in ten or twelve parts. The present volume, numbering nearly 150 closely-printed pages, treats more especially of the photographic camera, and aids to exposure, and it is the more interesting for being very copiously illustrated. Not only are there descriptions and drawings of the various kinds of cameras and dark slides that have been employed and imagined since the days of Daguerre, but of shutters, stands, and other apparatus connected with the camera, there are sketches innumerable. Some of these we have ourselves contributed from the PHOTOGRAPHIC NEWS, but these latter represent but a small proportion of the many interesting pictures scattered throughout Dr. Eder's pages.

In a word, we may say that Part IV. of Dr. Eder's Complete Photography—for this is, perhaps, the best translation of the title—fully sustains the reputation of the previous issues of his wonderful work.

Correspondence.

SOUTH LONDON PHOTOGRAPHIC SOCIETY.

DEAR SIR,—Please allow me to remind your readers that the Popular Lantern Meeting of the above Society, to be held at the Society of Arts, on Thursday next, January 4th, commences at *seven* o'clock; and also that I hope intending contributors will kindly send me a list of their slides as early as possible,—Yours truly, F. A. BRIDGE.

9, *Norfolk Road, Dalston Lane, London, E.*

[Mr. W. Brooks also writes in explanation of error as to time in his letter last week, and reminds our readers that the doors will be open at 6·30.—ED.]

Proceedings of Societies.

LONDON AND PROVINCIAL PHOTOGRAPHIC ASSOCIATION.

AT the meeting on Thursday, the 21st inst., Mr. LEON WARNERKE in the chair,

Mr. F. W. HART produced a negative from a batch from Honolulu, and most of which were marked over nearly all the plates the same, as shaded with an irregular yellow stain which quite destroyed the negative; the negatives were perfect at one edge, the colour being a blackish one; he attributed the discolouration to paper having been in contact with the film.

Mr. W. M. ASHMAN thought it was due to the hyposulphite not being thoroughly eliminated; he accounted for one edge being clean by presuming that had been uppermost when draining.

Mr. A. L. HENDERSON thought that the original colour of the negative had been yellow, the darker colour being the stain, and produced by oxidation.

Mr. DEBENHAM said if this were so, a yellow patchy-looking negative had by the action of the air been converted into the usual black deposit.

Mr. HENDERSON said sea voyages had been found to produce a very marked effect upon gelatine plates; Mr. Tunny, of Edinburgh, had found a voyage to New Zealand completely remove the image from some exposed plates, and none could be developed on them.

The CHAIRMAN'S experience was the reverse of Mr. Henderson's; he had developed in Russia plates exposed in California three years before, and found them as if just exposed.

Mr. A. J. BROWN thought that the fact of an image not staying on the plate was due to the presence of free bromine.

Mr. HENDERSON said that one of the largest plate makers left free bromide in his plates; he had prepared plates which could not be detected from those referred to by adding to the washed emulsion a small quantity of bromide of potassium.

Mr. BARKER had found that the haloid salts all had the property of removing the action of light from the film.

Mr. A. COWAN had prepared an emulsion according to a recently published formula, by which green fog was said to be prevented, and he produced two negatives on plates prepared from the same, one of which was badly green fogged, in the other there was no fog; this result had been obtained by diluting the developer for the latter to one-fourth; it would seem therefore that green fog could be produced by the developer, as well as by the emulsion.

The CHAIRMAN had prepared an emulsion from a solution of metagelatine, handed him by Mr. Henderson. After keeping a few hours he found the emulsion slow, but by heating it to 180°

and keeping the vessel containing it covered, thus causing it to take several hours to cool, he obtained a good quality plate, giving 21 or 22 on the sensitometer.

Mr. Henderson had noticed, on looking through one of Warnerke's sensitometers, that a higher figure could be read when one side was presented to the eye than with the other, and that when a sensitive plate was exposed from the wrong side, two numbers less were shown than when used in the regular manner: and he passed round plates showing that this was so; he attributed it to the colour of the glass.

Mr. Debenham thought it was due to the fact that the higher numbers were very faint, and could only be seen by their sharp definition against the covered part, and the plate being reversed, this sharpness was blurred sufficiently to remove the faint image which was scarcely visible when sharp.

The Chairman thought that the light diffused by the dead surface of the gelatine might account for the variations in the indications.

Talk in the Studio.

Christmas, 1882.—

The strides of Science travel fast,
Our Art has through a crisis passed,
In four short years, 'tween sun and ice;
Our Banner bears the strange device—
Emulsion.

Though we've to work in gloomier light,
Our Studio floors are always bright;
Though in dark-room no sunshine's shone,
Yet from our lips escapes no groan—
Emulsion.

The Nitrate Bath's a cloud beneath,
Our Silver Dipper's in its sheath,
The death-knell of Collodion's rung;
We all now speak the well-known tongue—
Emulsion.

Leave not the Bath, Collodion said;
Be sure there's danger overhead.
Exposure's latitude's not wide.
Let's try, at any rate, replied—
Emulsion.

Oh stay! Collodion said, and rest
Thy head contented on my breast;
New fangled things are all my eye.
Still came the answer, with a sigh—
Emulsion.

We know not how this tree will branch
That's come down like an avalanche;
The Bath may fairly say good night.
The voice still cries, far up the height—
Emulsion.

Sometimes it proves a faithless hound,
Its weak points are in summer found;
But, with a good supply of ice,
We still can make our strange device—
Emulsion.

So in the Twylight, cold and gray,
Our friend Collodion must lay.
We look upon him from afar,
Bewail his fate—a Fallen Star—
Emulsion.

With apologies to Longfellow.—A.C.

Celestial Phenomena for the Year 1883.—The coming year will have no very great attraction for the astronomical world. There will be four eclipses, two being of the sun, and two of the moon. One of these only is to be visible in England, and that only partially. Of the meteoric showers the brightest displays are to be seen in April, August, and November; these will prove an interesting study for the amateur as well as the practical astronomer. The first heavenly phenomenon of any note in the forthcoming year is a partial eclipse of the moon while in zenith on April 22, which will be a very small affair, for at the time of the greatest phase a portion equal to only about one-tenth of the moon's diameter will be obscured. This eclipse may be observed from the western parts of North America and in Australia, but will not be perceptible at any point throughout the British Isles. The second will be a total eclipse of the sun, commencing on May 6, but will not be visible here. The central line of this eclipse passes across the South Pacific Ocean, thus rendering this phenomenon visible in the eastern parts of Papua and Australia, New Zealand, Central America, and the north-western parts of South America. The next eclipse, part of which will be observable here, occurs on Oct. 16, when the earth comes between the sun and the moon, thus partially covering the latter and hiding it from the sun's light. The first contact with the earth's shadow occurs at about six o'clock in the morning, and the last about an hour and fifty minutes later; but as the moon sets at Greenwich at thirty-one minutes past six a.m., only a very small portion of this eclipse will be visible here. The last phenomenon of this description occurring next year is an annular eclipse of the sun on October 30 and following day. Although not visible here, it will be generally perceptible throughout the whole of the North Pacific Ocean, Japan, China, the Corea, the most eastern parts of Siberia, Russian America, British Columbia, California, and the more western provinces of the United States of America. Other beautiful celestial phenomena may be seen in the meteoric showers, which are exceptionally fine in 1883, the following being the days on which the brightest displays will be observable:—January 2 and 10, February 6 and 28, April 17, May 16, June 14 and 18, July 15, 18, and 27, August 1 and 5 to 11, September 8 and 29, October 21, November 7 to 9, 11, 17, 26, and 29, and December 6 to 12.

To Correspondents.

*** We cannot undertake to return rejected communications.

*** Contributors' Copies of Year-Book.—There are several contributors to our Year-Book who have not yet received copies, owing to the circumstance that we have not their addresses. The publishers will be glad to hear of any omission of this nature, in order that it may be rectified as soon as possible.

W. L. Berry.—Burslem, Staffordshire, is sufficient address.

W. E. Dailla Jones.—They are Edison's lamps, not Swan's. It would probably involve an outlay of about two hundred pounds, after which the cost might perhaps be about the same as gas. Perhaps, however, the company will supply the plant on the hire system: write to their office on the Holborn Viaduct.

W. E. Crag.—1. It interferes to a certain extent, but all you have to do is to allow more time for the precipitate to settle down. 2. Certainly; run it into an old pan, and add a few grains of protosulphate of iron to each batch. 3. He is not right, as the gold is actually deposited in the prints. 4. A decomposition is liable to take place when very hot water is used.

Combination.—The pamphlet is no doubt out of print, but you might be able to meet with a copy by chance.

W. Richards.—The additional slots would be cut for you by any philosophical instrument maker.

F. K. Thompson.—Our Year-Book contains full and practical directions.

Arthur Klosterer.—1. The initials simply signify that the gentleman is a member of the Chemical Society, and is considerably proud of the circumstance. 2. Our impression is that it was communicated to the Royal Society about 35 years ago. 3. No doubt it can be more thoroughly separated by the second method, but this advantage is probably counter-balanced by the length of time required for the completion of the process.

H. G. H.—1. The paper is of a very bad quality, and largely adulterated with sulphate of lime. 2. A mere trace of chrome alum will harden it to the required extent—say half a-grain dissolved in a drachm of water, and then added to your usual batch of the mixture.

Fred Ambrose.—1. The cleaning of the glasses must have been very carelessly carried out, as a microscopic examination revealed fragments of old and discoloured collodion film under the stratum of gelatine. 2. Vogel's mixture of bichromate of potash and sulphuric acid is as effectual as anything we have used, the proportions being one ounce of bichromate, 2 ounces of sulphuric acid, and a pint of water. Soak the plates in this for a few days.

Oxford Street.—The pyroxyline has decomposed so far as to be absolutely useless. If kept loosely in paper it may be preserved without change for many years, but it rapidly changes even when preserved in a stoppered bottle. 2. We have never found it necessary, the commercial article answering well in our hands.

Doubtful.—1. Certainly not. Some of the most interesting and valuable appliances now in general use by the photographer were first shown at those meetings. 2. There is only one in each year.

Harrison James.—Daylight is not only better, but more convenient, and there are not ten days in the year when such work is impracticable, excepting as far as the extremely large plates are concerned.

Several answers are unadvoidably crowded out this week.