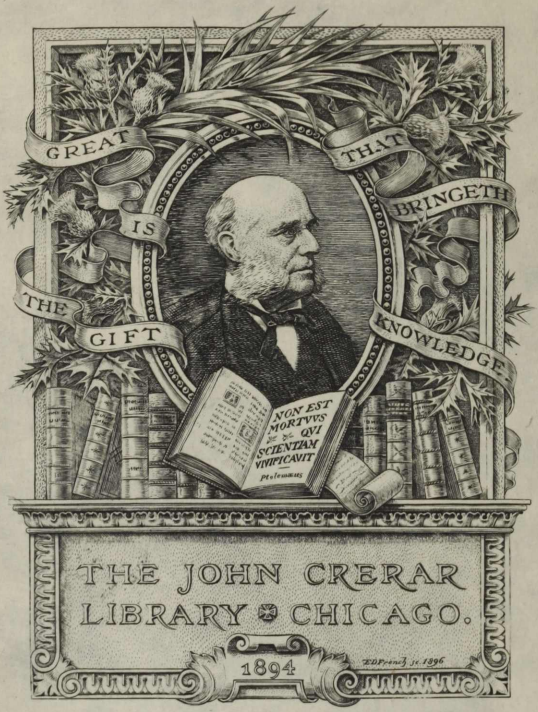

GREAT IS THE GIFT THAT BRINGETH KNOWLEDGE
NON EST MORTVVS QVI SCIENTIAM VIVIFICAVIT
THE JOHN CRERAR LIBRARY CHICAGO.
1894

A TREATISE

ON

PHOTOGRAPHY.

Containing

A DESCRIPTION OF, AND INSTRUCTIONS IN

DAGUERREOTYPE,
TALBOTYPE, & CALOTYPE,
COLLODIOTYPE,
KEROOTYPE,
ALBUMENIZED CALOTYPE,
ON
GLASS & PAPER.

ALSO

A FEW GENERAL HINTS, AND NOTES,
ON OBTAINING
CHROMATIC PICTURES.
&c. &c. &c.

BY

Mr. W. H. STANLEY. CRAWFORD. M. P. S. L.

BOMBAY.
PRINTED AT THE "DUFTUR ASHKARA" PRESS.
1853

PREFACE.

For any demerits in the following pages I beg, in the outset, to crave the kind forbearance of my Photographic readers—while, on the other hand, I have to say the merit of much of the information they contain is due to the valuable Writings and Notes of eminent Photographers,—viz. Messieurs TALBOT,—CLAUDET,—LEREBOURS,—SIR JOHN HERSCHELL,—HUNT,—BINGHAM,—THORNTHWAITE,—BECQUEREL,—NIEPCE,— FIZEAU,—FRY,—MOSER,— LEGRAY,— MAYALL,— &c., also of distinguished amateurs resident in India.

My chief aim has been to embody and condense, in an easily available form, as much practical information bearing on tho Photographic Art as possible, without wandering away from the direct course, or introducing irrelevant matter likely to bewilder and mislead beginners.

Besides the usual routine of Manipulation, &c. will be found such information as my experience in India has led me to suppose would be useful—differing as it does in very essential points from that conveyed in the writings of manipulators in England, France, and Germany. Some new processes, also, are introduced,—one or two at least of which promise, I think, to prove of much general utility.

Trusting my labours to further the advance of the interesting and most useful science of Photography will be of service to beginners, and a handy reference to those more proficient—and thanking those of my friends who have so kindly and liberally subscribed for copies of this work. I subscribe myself, their humble servant.

W. H. STANLEY. CRAWFORD.

CONTENTS.

Fig. 1

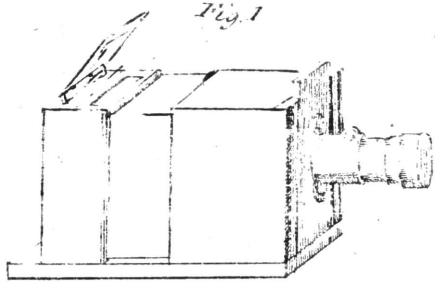


Fig. 2.

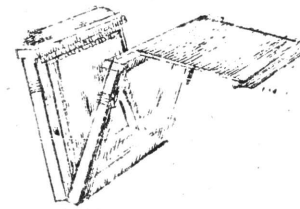


Fig 3.

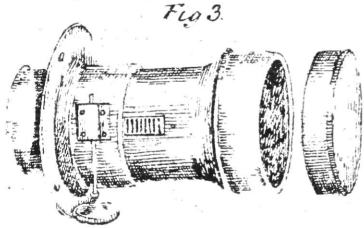


Fig 4.

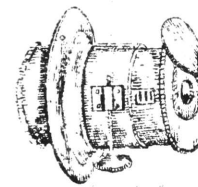


Fig 6.

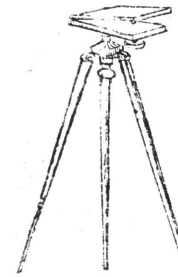


Fig 5.

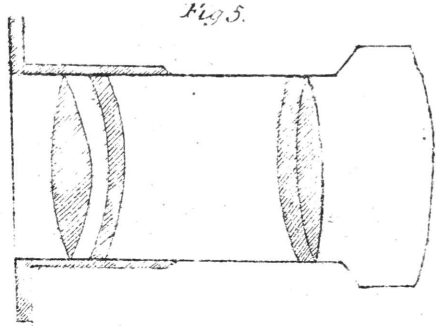
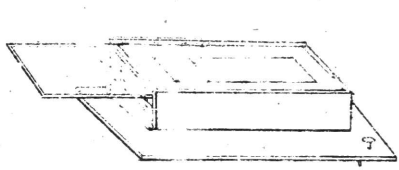


Fig 7



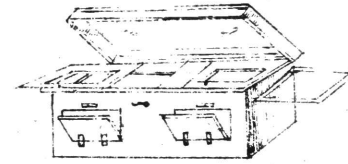


Fig 8

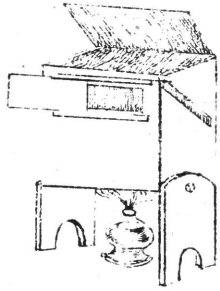


Fig 9

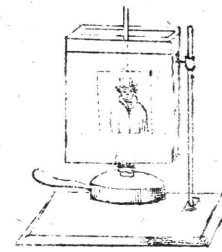


Fig 10

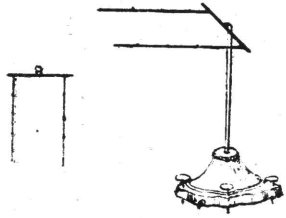


Fig 11

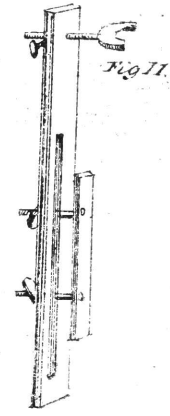
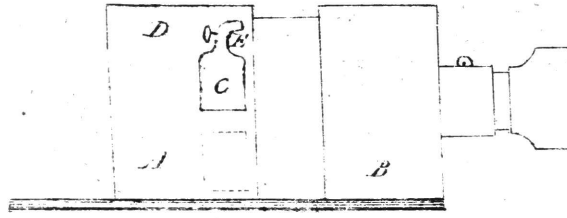


Fig 12



PHOTOGRAPHY.

INTRODUCTION.

THE ART by which reflections of VIEWS, FIGURES &c. have been as it were seized, fixed and unfadingly depicted on Metalic Plates, Paper, Glass &c. has, since its first discovery, been called by various designations, but all have been more or less incorrect, unless we except those peculiar processes called after the names of their Inventors, such as DAGUERREOTYPE from M. DAGUERRE,—TALBOTYPE from Mr. FOX TALBOT—&c.; these, however, in no way denote the *rationale* of the science.

SIR JOHN HERSCHELL, while pursuing a course of investigation into the curious changes effected by the prismatic spectrum on surfaces prepared after peculiar modes, discovered that there are two invisible Fluids or Agents accompanying that *which had previously been looked upon and accepted as simple Light*—viz. HEAT, and another, under whose influence the greatest amount of chemical change takes place, (in fact, subsequent experiments have led us to infer that it is *solely to the presence of this Agent* that any chemical change is effected); this Agent, he proposed before the British Association should be called ACTINISM. His proposition was accepted, and the term has now come into general use.

It follows then, as a natural sequence, that the Art now under consideration could be called by no better or more appropriate name than ACTINOGRAPHY. The term ACTINOGRAPHY, of course, would apply to the Science generally as now known, and in no way interfere with the names given by different inventors to their peculiar processes; but the terms PHOTOGRAPHY and HELIOGRAPHY, being confessedly misnomers, should be exploded. However, while I thus record my opinion, and a protest against the so long accepted, but erroneous appellation, "PHOTOGRAPHY," I fear at the same time the Public are now too generally accustomed to the former nomenclature to adopt that which I suggest, however manifestly correct.

By a casual retrospect for information, bearing on the subject under consideration we find that, so far back as the middle of the sixteenth century, a compound substance was known to those pursuing the study of Alchymy, which, on exposure to non-artificial light, and air, blackened; and it appears that this knowledge was, to some small extent, turned to account, yet I cannot just now give any explicit record of the fact.

In the beginning of the nineteenth century, however, the subject appears to have been taken up with a great degree of spirit, especially by the eminent chemist Scheele,—and by Ritter of Jena;—the former discovered that the different rays of the spectrum had unequal effects in blackening paper prepared with the substance above referred to, (Chloride of Silver); that under the Blue rays the effect was very marked, while under the Red and Yellow rays it was quite the reverse: the latter, following up this discovery, found that a still more marked effect took place beyond the visible rays, at the Blue, or more refrangible end of the spectrum.

The experiments of these two Gentlemen led to numerous others, which have resulted, as above said, in the knowledge that what had previously been looked upon as a simple agent,—called LIGHT, in reality consists of *three*, to wit, LIGHT,—HEAT,—and the Chemical Agent just spoken of,—now called ACTINISM.

From a variety of very interesting experiments it would appear, with reference to the apparent Solar Spectrum, thrown by means of

a prism on a plane surface, that the points of greatest intensity of each of these agents is as follows; of LIGHT, in the centre of the Yellow ray, lessening gradually towards either extreme of the spectrum; of HEAT at the point of the deepest Red ray; of ACTINISM, at the other extreme of the spectrum, beyond the Blue rays, in that having the Lavender tint. The last agent has however another point of intensity, with reference to the other parts of the spectrum, though in a considerably less degree, which is, about the centre of the Red ray.

For these deductions I believe we are chiefly indebted to Sir John Herschell, and Mr. Robert Hunt:—but doubtless much praise is also due to numerous other parties, whose experiments have thrown much elucidation upon the subject, but of whom space will not allow me to make special mention: M. Niepce and M. Daguerre cannot however be passed over, nor can Mr. Fox Talbot. The former gentlemen were the first to obtain highly satisfactory results, in the shape of Pictures on Silver Plates, and that process was called, after M. Daguerre, DAGUERREOTYPE. They communicated their knowledge to the French Government, who very liberally gave each a handsome pension, in order that their secret, of so much importance to the scientific world, might freely be divulged. The latter gentleman met with equal success on Paper prepared after a peculiar mode, and he took the precaution to protect his discovery by Letters Patent. Since that time (about 1839) the art has steadily and rapidly progressed, both in theory and practice, and we now obtain more perfect and beautiful results in a fraction of a second, than we could by M. Daguerre's first processes in several hours; and moreover, instead of pictures in mere Lights and Shades, we produce them in all the charm of Chromatic* beauty.

* I make here but a simple allusion to Chromatic Pictures, as the Art, by which they are produced, is now but in its infancy, and I doubt whether *it* could be treated of under the nomenclature Actinography—I am disposed to think that Photography may, for Chromatic Pictures, be a proper appellation, as Actinography is for that now generally known.

DAGUERREOTYPE.

As the object of the present work is to afford beginners a source of information on all points of the Art, which, at same time, I desire should be placed in a form readiest and handiest for reference, I shall touch upon each portion of the whole process in rotation, as it would occur were a person conversant with the art to resolve to make a picture. I take it for granted then that the student has an apparatus complete; nevertheless I shall, as I proceed, throw out such hints as would guide him in the choice of materials, were the reverse of what I suppose the case. I purpose also going at once through one mode *of one of the simple processes,* reserving for an after page the complicated and various other processes, as well as description of the articles or instruments in use, with the improvements that my experience would suggest as advisable.

CLEANING THE PLATES is the first process, and I shall premise that they are new. New Plates are sold of two sorts, (as speaking of their surfaces) ; one kind in the rough, as they appear after the hammering and planishing processes in their manufacture ; the other with the surface polished down even, nearly ready for use. To clean these two kinds a like process is necessary, but the former would of course require a greater amount of labour, until a perfectly smooth and even surface is obtained.

To proceed ;—having three cleaning Buffs,* commence with No. 1, by sprinkling evenly, on the right hand end of it, a small quantity

* In an after page will be found a description of the Buffs, and all the other apparatus ; also of the chemicals, and the modes of making the necessary mixtures &c. any of which may be readily found by reference to the Iudex.

of prepared Tripoli, and on this pour, drop by drop, Alcohol (diluted with one third, to one half, of water) until the whole of the powder appears well moistened; the Plate should then be laid silver side down on it, and rubbed briskly with a circular motion, pressing *not* too heavily, and taking care that the fingers make an even and equal pressure on every part of the Plate; in the course of about five minutes the Plate should be nearly done, and it may be gradually edged off to the centre of the Buff, keeping up all the while a circular motion—after a few rubs the Plate should be examined, and breathed upon, and, as the vapour clears off, any imperfection will be readily detected; if the Plate has a uniform grey appearance it may be inferred that Buff No. 1 has done its duty. Buff No. 2 is now brought into requisition;—this is used dry, with either fine Rouge or Rouge and Charcoal mixed, or Lampblack,—I recommend the first.* On the right hand end sprinkle a little of the powder selected, and proceed as before described, finishing off at the left hand end; the Plate should now have a dark steel like polish, and is ready for the Iodizing Process, and may be kept thus in a clean Plate box or frame. If, however, it happens that the Plates are old or have been used, and are perhaps stained with Mercury, or otherwise, or very much scratched, and the mode first shown appears after trial insufficient to clean them, it will be necessary to have recourse to some volatile oil, say of Lavender or Bergamotte—I recommend the former. To proceed;—lay the Plate on a sheet of clean paper, sprinkle on it some tripoli, and in the centre let fall a drop or two of the Lavender oil, (or the tripoli may be previously mixed with the Oil in a Phial)—take a pledget of clean or prepared cotton, and rub briskly, but not heavily, with a circular motion for a few mi-

* Since the above was written my opinion is somewhat shaken; it has been suggested by some experimenters that Rouge (an Oxide of Iron) is apt to be attracted to the surface of the Silver Plate, and itself take a high polish, instead of imparting that to the silver; if this be correct, I am disposed to think that it may satisfactorily account for the spots which sometimes appear on a plate in the fixing process.

nutes, and finish off with a fresh pledget of cotton ; do this until the Plate seems pretty clean, and then go through the Buffs as before;—instead of using Cotton a separate Buff might be used, I would however strongly recommend a beginner to avoid, as far as possible, the use of Oil, preferring rather a little extra labour with the Buff and Alcohol; in some *very obstinate cases*, however, it is perhaps absolutely necessary.

In large Portrait taking establishments turning Lathes are used ; these are fitted with circular Buffs, and, by a peculiar arrangement with metal holders, which revolve on a metal spindle, Plates are beautifully, and most expeditiously cleaned, —but it requires much practice to enable a person to use the instrument with advantage. It should be borne in mind that the object to be attained is to give *a perfectly even and clean surface* to the silver, and *that* with a high polish, and free from scratches,—so that, after a little experience, the student had best follow some course of his own with this end in view. I have merely given the mode by which I have effected the best results most readily.

When about to Iodize, take the Plate in the left hand, and with Buff No. 3 give it a dozen or so smart rubs, pressing very lightly, this gives a very high polish, and slightly warms the Plate, which much assists the next process of:—

1st Iodizing. Immediately, *while the Plate is yet warm* from the Buff, lay it on the frame over the Iodine Box; draw out the slide, *count seconds*, and, if the Pan is well arranged, in about 12 to 14 seconds a perceptible colour should be on the Plate, and, the slide being run in, it should be examined. In this process the bright silver surface is attacked by the vapour of Iodine, forming thus an Iodide of Silver, which assumes various colours at different stages of the operation first—a *Pale Straw*, then *Light Yellow, Gold Yellow, Orange, Rose, Red, Blue, White, Pale straw*, and so on again over the same series. The colour my experience has led me to think the best is *the Yellow* or *Golden tint*, but any of the first series will do, bearing only in mind that, in the following Bromine process, the

colour *next in rotation* to that got by the Iodine must be obtained.

Broming. Bromine water I take to be about the best and simplest accelerating substance at present known—or the Bromide of Lime—but, as I shall offer some remarks on this subject hereafter, I shall go through with the first named. Having put sufficient of the mixture in the Bromine Pan to cover the bottom, and, having adjusted the apparatus to a true level, allow a minute or two to elapse—then place the Plate over it; the time for exposure required should be from 8 to 16 to 18 or 20 seconds, and great care should be taken to obtain the relative colour in the mode above described; for instance, if Iodized to the *golden tint*, the plate should over the Bromine be brought to an *Orange approaching Rose.*

2nd Iodizing. The Plate must now be transferred again to the Iodine Box, and brought, if of the last colour, to a *full pale Rose*; a more correct mode of determining the necessary exposure for the second Iodizing, however, is to allow the Plate to remain over the Iodine Pan exactly *one third* the time allowed over the 1st Iodine, which it will be remembered the student was desired to note. Thus far allusion has been made in the working, *to the colour;* the Plate has consequently to be examined, and this may be done by broad day light, without in any way injuring its sensibility; but, when the Plate has been fully prepared to the proper colour by its second exposure to Iodine, it should be placed again over the Iodine, and the slide drawn out for *one* second, after which the Plate must be slid, without allowing the least particle of light to get at it, into a frame of the camera slide, and it is ready for being impressioned in the Camera.

Exposure in the Camera. If a Portrait is to be taken, the sitter should, if possible, be placed in the open air, in shade, with a good diffused light surrounding, and the Camera directed in such a way that a good, clear and distinct Image may be reflected on the ground glass—many directions might here be given, but, as it is quite natural to suppose that a beginner will seldom obtain quite perfect re-

sults in his first attempts, I think it better to leave him to his own experiments, which with care will instruct, only offering general hints to guide him into the simple plain course. The focus properly obtained, the glass should be withdrawn, and replaced by the slide holding a prepared Plate, the cap of the Lens must now be taken off, and,—if the light is good, and the Lens a double achromatic of from 2 to 3 inches diameter,—*one second* will be found sufficient, but if the Lens be smaller, or the Light indifferent, a proportionately longer time will be needed ;—if in a room, 15 to 20 seconds would be required. When a time judged sufficient has elapsed, the cap should be expeditiously but carefully replaced, and the slide taken to the dark room where the Mercury Box is kept.

Mercurializing, or bringing out the latent picture by vapour of Mercury. When a Daguerreian Plate is taken from the Camera there is no picture visible on its surface ; but the parts on which light has fallen, have had the Iodide of Silver decomposed, and are in a state capable of being affected by the vapour of Mercury. According as the Mercury Box is fitted, either the slide with a Plate, or the Plate alone, is placed in it, (supposing, of course, that Mercury has previously been placed in its cup therein) ; a spirit lamp is held under the cup of Mercury, say for the space of 12 seconds, by which time the Mercury is about at a temperature of 90° to 120° Fahrenheit, or, if the French Box is used, say 45 to 60 degrees centigrade; or, the temperature may be judged of by touching the metal cup, which should be of a heat unpleasantly warm to allow of the finger being retained there. It is better to bring out the picture *by a gradual heat,* as the details are by so doing more perfect; the time varies from 5 to 20 minutes, however, after a period of 5 or 6 minutes, the lid in front may be opened, and a lamp, shaded with yellow glass, carefully brought up, when the picture will be seen being gradually developed,—the deepening tints should be carefully watched, and when it seems that the details are as complete as they can be, the Plate should be taken out; for a few seconds delay beyond the proper time would cause the Mercury to

attack * other parts of the Plate, and thus entirely spoil the Picture.

Perhaps it would not be out of place to say here a few words on the process thus far, *as this is the last stage to which an experimenting beginner* need proceed; reserving the trouble of the *washing* and *fixing processes* until he becomes an adept in taking pictures.

On taking a Picture from the Mercury Box it should be carefully examined; if it appears that all details of the picture are *exceedingly clear, proper, and well depicted,* it may be inferred that the process throughout *has been properly conducted;* but if, at same time, the picture was somewhat long in being impressioned in the Camera, or, in other words, if the prepared surface was not very sensitive, a few experiments—reducing or increasing the time of exposure over the Bromine—would probably enable the student to improve in this point. If, on the other hand, only the well defined, or well illuminated parts of the picture have been produced, it is a sign that the exposure in the Camera was *too short.* If, again, the lights have been brought out to extreme, the whites of the picture would, on the Plate, have a bluish appearance (which is technically termed *Solarization*) and it would signify that the exposure in the Camera had been *too long.* If the Picture has been well produced, *but has apparently a haze or film over the whole of it,* it might be inferred that *rather too much Bromine had been used.* It must be borne in mind that the vapour of Iodine alone is sufficient to enable the student to make a picture, and the Bromine vapour is used merely *as an accelerating Agent.* Bromine vapour in conjunction with Iodine, *up to a certain quantity,* gives a *most sensitive surface;* but this quantity must bear *a relative* proportion to the quantity of the Iodine vapour previously got upon the Plate, and *that can only be judged of by experience and practice.* When the proper proportions are exactly hit the surface is *most sensitive* and *the results are perfect;* but, in the course of my practice, I have found

* In alluding to Iodine, Mercury &c. attacking the Plate, it will be understood that the effect of their vapour is meant in these cases.

that, by giving the Plate a second or two *less of Bromine*, the contrasts between lights and shades in the resulting picture are *much more marked*,—and, to my taste, preferable.

I would recommend the student to proceed only thus far, until he becomes an adept, when he may proceed to wash and fix his *good pictures*.

Washing. The object in this operation is to remove the Iodide, or Bromo-Iodide of Silver, remaining on the Plate, which has been unaffected by the exposure in the Camera;—to do this, a solution of *Hyposulphite of Soda* has been found to answer best. For the strength of this solution numerous recipes have been offered,* but I think 1 to 2 oz: dissolved in a quart of distilled water about the best, and the solution should be filtered before being used. For a beginner experimenting, this solution may be used several times, provided it be filtered each time before use,—but, in washing pictures which it is desired to keep, I would recommend *a fresh* solution to be used.

In the first place, take the Plate to be washed in the left hand, and on it pour Alcohol sufficient to be diffused evenly all over its surface, without allowing any to touch the fingers holding it,—then plunge the Plate into a small pan having clean distilled water, and agitate till the Alcohol is washed off. In another pan have sufficient of the Hyposulphite of Soda solution to cover the bottom to the depth of about 1-8th of an inch;—with a piece of silver wire lift up the Plate, and plunge it into the Hyposulphite of Soda bath, and agitate well; the whole of the coloured coating of Iodine and Bromine will be promptly removed: after a few seconds, (agitating the Plate in the wash all the while) it should be taken out, and again washed in clean water,—and may then be either dried, as shown hereafter, or the student may proceed to the,

* M. Lerebours recommends a very strong solution, in the proportion of two ounces of the Salt to a pint of Water. I find the weaker solution answer very well—but, one of a medium strength might be adopted.

FIXING PROCESS. The picture is *fixed* by the aid of HYPOSULPHITE of GOLD. If the double Salt of Hyposulphite of Gold be used,—15 grains of it are to be dissolved in a pint and a half of distilled water and used.

The mixture I have found most efficacious is made thus,—Dissolve 15 grains of Chloride of Gold in 15 ounces of filtered distilled water, and 60 grains Hyposulphite of Soda in 15 ounces of filtered distilled water ; *add the former to the latter gradually, stirring or shaking up the mixture all the time* with a silver or glass rod. * The mixture is at first slightly yellow, but, if properly done, soon becomes perfectly clear and limpid. I usually keep the two solutions ready mixed apart, and, when required, mix the quantity needed. The mixture should be filtered previous to use.

The Plate, taken from the washing tray, is laid, face up, on a fixing stand, and the levelling screws adjusted—pour on it enough of the Hyposulphite of Gold mixture to diffuse itself evenly all over the surface to the depth of nearly † 1-8th or 1-10th of an inch. Take a spirit lamp, with a good flame, and hold it under all parts of the Plate successively—the image soon assumes a deeper intensity, and, as the heat increases, to the production of small air bubbles in the liquid, the greatest intensity has, in all probability, been attained, the lamp should now be removed, the liquid poured off, and the Plate again washed. It is sometimes necessary to go through this process twice *to fix* the picture *well*, experince is the

* Messieurs Fizeau and Bingham recommend 15 grains Chloride of Gold dissolved in 1 pint of water, 45 grains Hyposulphite of Soda dissolved in 1 pint of water ;—mix.

Mr. Thornthwaite recommends either, 15 grains Chloride of Gold dissolved in 16 ounces of water, 60 grains Hyposulphite of Soda dissolved in 8 ounces of water ;—mix :—or, 8 grains Chloride of Gold dissolved in 16 ounces of water, 32 grains Hyposulphite of Soda dissolved in 4 ounces of water ;—mix.

† It will be found that 4 drams of the mixture are sufficient for the 1-4th size Plate—3 drams for the 1-6 size,—and 2¼ drams for the 1-9 size.

best guide however ; care must be taken not to use too great a heat as thereby exfoliation takes place, probably by the oxidation of silver in conjunction with the Hyposulphite of Gold, under an influence of too much heat. Another mishap likely to arise from a too strong and continued heat is the appearance afterwards of minute black spots. I have known some Daguerreotypists ascribe this to dust. Dust *may* have such an effect, but I think it is more satisfactorily accounted for by supposing that the sudden heat, causing an uneven action of the Hyposulphite of Soda and the Gold, or the Salt of Gold, decomposes minute points on the surface, which afterwards assume the appearance complained of. Again, I have been at times inclined to think the black spots referred to originate in particles of Oxide of Iron (if Rouge has been used in the cleaning process) being loosened, or further decomposed by a too intense heat;—we now come to the,

Drying process, which needs very careful handling. With the small size Plates proceed thus—seize one corner with a pair of pliers, pour over its surface some filtered water— then hold it over the spirit lamp at an angle of 45°, gently blowing down from the upper part, the film of water will gradually dry down to the bottom, where the drop remaining may be absorbed by bibulous paper. For quarter size Plates it would be desirable to use boiling water, instead of cold, in this process ; hot water heats the Plate, and assists the drying materially. For half and full sized Plates I recommend the drying apparatus described in another page.

Colouring. To colour a Daguerreotype *well* requires the skill of an Artist; and, unless it is done *well*, the picture is, in my opinion, spoilt—the colours used are prepared with Spirits of Wine, and evaporated to an impalpable powder. They may be laid on as required, after the picture has been well fixed with the Salt of Gold, in a *dry* state, and, when the desired tint is obtained, may be fixed

by breathing on the Plate;—or, the colour used may be mixed with Spirits of Wine.

CARMINE,—CHROME YELLOW,—and ULTRAMARINE,—will, by combination, form any desired tint, and may be used with great effect. An Indian Rubber bottle is of some service to blow off any superfluous colours,—it is not safe to trust the breath, inasmuch as particles of saliva are liable to be thrown on the Plate, which would inevitably destroy a picture.

These are the modes in general use; but, for an Artist, I would recommend using a solution of five grains of Isinglass dissolved in one ounce of distilled Water, to which has been added two drams Spirits of Wine;—pour this mixture over the picture,—after a few minutes, drain off superfluous moisture, and let dry; afterwards, make a thorough painting of the picture as in water colours;—the Plate may then be put through the,

ENAMELLING PROCESS. Having a thin Mastic Varnish, carefully filter it through bibulous paper; slightly warm the Plate to be operated upon with the flame of a Spirit lamp, and, while warm, pour upon it a small quantity of Varnish—when thoroughly diffused over its surface, tilt up the Plate carefully, and allow all the superfluous Varnish to drain off,—care being taken to keep it free from dust. When nearly dry, lay the Plate on a fixing stand, and gently heat it with a Spirit lamp till perfectly dry, taking care not to heat too much, nor to ignite the Varnish. Pictures, protected in this way, will bear handling without injury.

APPARATUS USED IN PHOTOGRAPHY.

CAMERA. Cameras used for Photographic purposes are formed and used in a variety of shapes—but I shall merely describe the one of that variety which I conceive to be best adapted for all purposes for the Photographist. The form is that represented by Figure 1; it consists of a Box in two portions, one sliding into the other, and is called an EXPANDING CAMERA;—it is adapted for lenses of either short, or long focus; and, consequently, for taking either Portraits or Views, or copying. It should have two sets of Lenses fitted to it;—*a double achromatic*, of somewhat short focus, for Portraits;—*a single achromatic*, of long focus, for Views;—and, for Calotype purposes, a *simple meniscus lens* may also be kept.—The front of the Camera, holding the Lens, should be made to slide in a groove upwards, so as to admit of a vertical adjustment in taking Views, Buildings, &c., and the hinder portion of the Camera should have two grooves for adjusting either the long or short focus lens;—and the slides for the same may be made either *single* or *double*, as shown at Figure 2.

This description of Camera is sometimes made with hinges at convenient places to allow of its folding flat, and I have known such to be recommended, but the simpler form of instrument is I think the better; and there is but little gain to the Traveller in the space which one occupies over the other.

A frame with ground glass is made to fit the grooves in the Camera, by means of which the Lenses are properly focussed, with respect to objects to which the Instrument is pointed. In purchasing

a Camera, care should be taken to ascertain that the *ground side* of this glass occupies *exactly* the same place in the groove of the Camera as, the polished surface of the Plate will, in taking a Picture; the reason for this must be very obvious.

The Camera above described is a *Refracting* one; there is also the *Reflecting* Camera, in which a concave reflector is arranged to produce the picture, but, as pictures thus obtained are so small in proportion to the size of the apparatus or reflecting disc, it is but seldom used. This description of Camera has however been patented by Mr. Beard, proprietor of one of the principal Photographic establishments in London.

In travelling, or in packing up Photographic Apparatus, *the Camera* (also *Mercury Box*) should *never* be placed where there is the least chance of the vapours of *any of the Chemicals, especially* of *Iodine* or *Bromine*, getting into it; neglect of this precaution would inevitably, (until the Instrument, by time, was perfectly purified) prevent the delineation of any pictures in it, besides also having a very injurious effect on the Lenses, of which *the most delicate care* should be taken.

Lenses. Good and true Lenses are of the utmost importance to the Photographist;—with indifferent ones very great disappointment will be experienced in the results, even tho' most minute attention be devoted to all other details;—the greatest safeguard against being supplied with a bad set is to purchase *only* from parties whose standing and reputation would ensure their selling none but the best; *my experience enables me, with much confidence, to recommend the Lenses manufactured* by Voigtlander & Son of Vienna; of A. Ross, 2 Featherstone Buildings, Holborn; Horne & Co. 121 Newgate Street, London; and George Knight & Sons, Foster Lane, London.

It is not my intention to enter into a dissertation upon Optics; I shall therefore merely direct attention to such Lenses as are best suited for the general student's purpose. The Lenses used should have always rack and pinion adjustment for focussing readily.

For PORTRAITS of the quarter size (or 4¼ by 3¼ inches) I recommend Double Achromatic Lenses of 2½ or 3 inches diameter, and 5 to 6 or 7 inches focal length. A lens of shorter focus would assuredly act more quickly, but this advantage is more than counterbalanced, in the description I recommend, by the correct proportions preserved in all parts of the picture—which, with the former description, even with great care in adjusting, are sure to suffer.

For VIEWS, and inanimate objects, a Single Achromatic Lens of 2½ inches diameter, and 8 to 12 inches focal length, would answer.

For VIEWS in CALOTYPE about 12 inches square, a Meniscus Lens of 3 inches diameter, and 15 inches focal length, might be used.

For Portraits from life, double Achromatic Lenses are chosen on account of their speedy action and correctness of detail.

For Views, and inanimate objects,—as speed of action is not so necessary, in fact at times objectionable,—a single Achromatic Lens is preferable.

The Meniscus lens is recommended by some Photographists as answering best for Calotype Pictures.

Each set of Lenses should be fitted with two or more diaphragms of smaller opening than that of its tube;—their use is to cut off the most divergent or superfluous rays of Light, by which arrangement a very sharp and well defined picture is produced; but, in proportion as the opening of the diaphragm is lessened, the time for exposure in the Camera will need to be increased, inasmuch as less Light will be available;—the use of these diaphragms can only be learnt to advantage by practice.

It is the custom with many Opticians to adapt Diaphragms to the front of the foremost Lens;—this is undoubtedly incorrect,—some have improved the mode so far as to fit the diaphragm (for a double Achromatic lens) in the tube, between the outer and inner Lenses; neither is this plan however what it should be—the proper position for a diaphragm, or stop, is *in rear* of the hindermost lens, the advantage of this position consists—firstly in allowing the whole power of the Lenses to come into play—and secondly because a dia-

phragm of larger opening will there have the same effect as one of smaller opening in front, and consequently admit more Light—while the desired flatness and sharpness is equally preserved. A well fitted Lens—either double or single Achromatic, or Meniscus,—should always have a projecting tube *beyond the foremost Lens*, at least 3 to 4 inches long, and of a diameter one half larger than the outer lens; for taking Views this tube might, with much benefit, be lengthened to 6 inches; its utility consisting in its thoroughly preventing any extraneous (and I may call them useless) rays impinging on the Lenses.

Mirror. As Pictures taken in a Camera are reversed,—that is to say, objects on the right hand are reproduced on the left—it is, in some cases, essential to re-reverse them,—and it is effected by means of a Mirror or Prism, fitted in such a way that it may be screwed on to the tube, close to the outer lens, at an angle of 45°. By using a Mirror, however, the time for exposure in the Camera is lengthened nearly one half as much again. Mirrors *encased* in wood, or metal, are the best description, tho' more expensive than plain open reflectors.

Camera Stands are also made in variety;—the most convenient, perhaps, is that represented by Figure 6,—its height should be (for Portraits) about 3 feet,—to 3 feet 6 inches,—or higher for Landscapes; its 3 legs move on screw sockets in a shoulder;—on the shoulder is a board 18 inches long by 12, through which and the sockets a pin with a screw end passes; the board may be thrown round in any direction on this pin, and, when adjusted, can be fixed by a nut; on the board is a similar one having a small ledge all round—and one end hinged, so as to allow of its being elevated by means of a screw; these contrivances give the operator a power of adjustment in any direction, without moving the legs, which should at the commencement be firmly fixed, so as to bring the supporting board perfectly horizontal.

PLATES. The Plates used for Daguerreotype purposes—are made thus;—a thin sheet of Silver is laid on a much thicker one of Copper, perfectly flat; both are then enveloped in a sheet of thin Copper; the whole is afterwards subjected to a cherry red heat, and finally passed between two steel rollers, turning inversely. This operation, which is technically termed *the laminage*, reduces the metals now united to extreme thinness; other rollers are employed till a proper thickness is attained, when the Plates are cut to any size required.

Plates may be had of either English or French manufacture; the latter are supposed to contain generally purer Silver; but, where of equal purity, English Plates are preferable, especially for beginners, as they are thicker and stand a deal of polishing and rubbing: French Plates are numbered 10m: —20m: —30m: —40m: —the numbers signifying how much of Silver each contains, thus 1-10th, 1-20th, 1-30th, 1-40th; the last description should only be used by an adept who is certain to get a picture at one trial, for they bear little or no rubbing; the other grades are relatively superior, but proportionately dearer. Subjoined is a list of the sizes manufactured, both English and French.

English and French	*Ninth size*	2½	in.	by 2	Inches.
„ „	*Sixth size*	2¾	in.	by 3¼	„
„ „	*Quarter size*	4¼	in.	by 3¼	„
„ „	*Half size*	6½	in.	by 4¾	„
„ „	*Full size*	8½	in.	by 6½	„
English size.		4	in.	by 3	„
„ „		5	in.	by 4	„

As a very pure surface of Silver is beneficial, some persons prefer preparing their own Plates with Plates of Copper and an Electro-silvering apparatus,—thus,

ELECTRO, SILVERING DAGUERREOTYPE PLATES. Charge an ordinary Smee's Battery with a mixture of one part of Sulphuric Acid and seven or eight parts of distilled Water; and the depositing cell with Argento Cyanide of Potassium, (made by dissolving two to four drachms of Oxide of Silver in a mixture of one ounce of

Cyanide of Potassium, and eight ounces of distilled Water); a piece of Silver foil, (about the size of the Plate to be silvered,) is to be placed in the depositing cell, attached, by means of a Silver or Copper wire, to the Platinized Silver Plate of the Battery;—a similar wire is fastened to the Zinc of the Battery, and the other end fixed by means of a binding screw to the Plate. The Plate, which must be perfectly clean and free from grease, is now immersed in the depositing cell directly opposite to, and about half an inch from the Silver foil;—in about 8 or 10 seconds a sufficient coating of Silver will be deposited, and the Plate may be removed, well washed in pure water, and, after drying with cotton wool and tripoli, it may be polished ready for Iodizing.—Every amateur should be provided with such an apparatus—most useful and inexpensive, compared with its utility.

Iodine Box and Bromine Box. The apparatus required for applying the vapours of either Iodine or Bromine are similar, indeed some have the Boxes, (now about to be described) made in one. I prefer having each separate as being more convenient.

For Plates of the quarter size, and downwards, a pan the size of a 1-4th plate should be had,—and about 3 inches in depth; it may be of either glass or porcelain, the former is better, but the upper edges must be so evenly and accurately ground that a piece of glass laid on top should keep it air tight;—a great deal depends upon this.

These pans are fitted into square boxes, as represented at Fig. 7, so arranged that a frame of the Camera Slide, which contains the Plate, may be substituted for the lid; and, when the ground glass cover is pulled out, the vapour of Iodine or Bromine (as the case may be) rises and attacks the Plate;—when the operation has gone far enough, the cover is slid in again and the Plate examined.

These will be found very convenient; but, for the accelerating substance, I have used a higher box, fitted in the same way, only having that portion above the cover made about 2 inches higher, and lined with glass, over which again is *another air-tight cover*, and the plate above all. To operate,—both the slides ibeing shut in—I pull

out the lower one for a minute or two, and then shut it, by this action the upper casing is filled with vapour, which should be the exact proportion necessary for a Plate;—the upper slide is now drawn out, and the Plate above allowed to absorb the whole of the vapour. Underneath the pans small coils of wire springs, say 4, 6, or 8 in number, may be placed to keep the pans in close contact with their covers.

The Mercury Box, is made of Wood or Metal, and has a cast iron cup or cistern in the bottom, to hold about 4 to 8 ounces of Mercury,—so fitted that the bottom may be drawn out to pour in, or take out, the Mercury; in front is a plain glass window with a sliding door;—on the left hand side is a small yellow glass window; and, in the the right hand side, a groove is cut to take the Camera Slide which holds the Plate (or instead, the frame containing it may be put into the Box by the upper lid); inside, there are ledges to keep the Plate at an angle of 45°, for convenience of inspecting the operation, otherwise any other position, either vertical or horizontal, would do. See Fig. 8.

The Mercury Box, *when in use, should be in a dark room*, or, what would answer the same purpose, in a corner screened off with a yellow or any opaque curtain,—and, as far as possible from the Bromine and Iodine apparatus; for, if in the same room, and the least quantity of vapour of either was to get into the Box,—or even pass the plate in transmission to it,—the picture would be irrecoverably destroyed;—so, (altho' I have known the apparatus to be used in the same room where Iodine and Bromine were kept, without ill effects) it would be far preferable to have the Mercury Box away altogether in another room. In packing up the apparatus also, *neither the Camera nor the Mercnry Box shonld be placed where any vapour of any of the Chemicals can get at them.*

The Spirit Lamp should be of glass, and of the capacity of one or two ounces; in using it for the Mercury Box the flame should be small, and applied directly under the cast Iron Cup.

WASHING APPARATUS. Every operator should have a good supply—say 4 to 6 (*or at least a couple*) of shallow pans, made of either Glass, Porcelain, Brass or Copper, large enough for the largest size of Plates, he may have in use,—and they should be fitted with glass covers; also a SILVER WIRE fitted in handle, used for lifting Plates from the pans when washing.

DRYING APPARATUS. The apparatus shown at Fig. 9, is most useful for drying Plates of a large size;—it is made of Brass or Copper, and tinned inside; the size should be somewhat larger than the largest Plate, and about half an inch wide. When to be used, it is filled with water, which is boiled by means of a Spirit Lamp placed below it, and the heat kept up: the Plate is put into a holder, made for the purpose, and submerged; after a few minutes, it is gradually withdrawn, and the surface blown on downwards, as before described; Plates are readily dried thus. The screw and slide serve to keep the apparatus at a proper height from the lamp.

FIXING STAND is described best by a reference to Fig. 10; the upper part is an arrangement to support a Plate *on points*; the lower part is a heavy stand with screws for levelling.

PLIERS. Iron or Steel ones would do, but it would be advisable to *electro plate* them, or, at least, *the tips* which are used to seize the Plate.

YELLOW SHADE LAMP, is a burner fitted with a Yellow Glass, for the purpose of viewing the Plate in its progress, while in the Mercury Box; and is useful also for Talbotype purposes. A box of good lucifer matches should be at hand.

PLATE BOXES. The student should be supplied with *at least* three boxes of each size Plate he uses, having a dozen grooves in each; and these, for compactness sake, should be of a size to take conveniently two Plates placed back to back. I say *three boxes*,

viz. *one for clean Plates,—one for used Plates,*—and *the other for good Specimens* of pictures; these should each be kept separately.

HEAD REST. In taking Portraits it is necessary to have some arrangement for keeping the head perfectly steady, unless the picture is taken *instantaneously,*—in which case it would not perhaps be requisite. The representation at Fig. 11, is a simple and cheap form of the article, adapted for the back of an ordinary chair. There are some forms of more extensive adaptation, but proportionately more expensive.

CLEANING BUFFS—are boards covered with clean thick Cotton Velvet, padded, underneath the Velvet, with a layer or two of Woollen Cloth or Flannel. Those I use are two in number, 18 Inches long, by 9 Inches broad,—quite flat, and made like a box with a lid; No. 1 BUFF is used with Tripoli, and diluted Spirits of Wine, *for cleaning* the Plate.—No. 2 BUFF is used with Rouge or Charcoal, or Lampblack, *for polishing.*—No. 3 BUFF should be 18 to 24 inches long by 3 broad, *covered with White Silk Velvet,* and it should be used, *without any auxiliary,* to give the last—or it might be called the *dusting* and *warming touch ;*—some sort of cover should be made for it, as it is of the *greatest importance to keep all the Buffs just described perfectly free from grease, and any foreign substance.*

Another Buff, similar to Buff No. 1, may be kept for use with Oil of Lavender and Tripoli, for cleaning Plates stained with Mercury,—or that have been put through the Gilding process,—instead of using pledgets of Cotton, which, with the greatest care, will frequently make very annoying scratches.

PLATE HOLDER. This is an implement for conveniently holding a Plate while buffing; its surface is fitted with an adhesive preparation. There are several modifications of Plate Holder,—the best perhaps is that having a block the size of the Plate, for with it the Plate is less liable to be bent.

PLATE BENDER—is an instrument for slightly bending, or turning the edges of the Daguerreian Plate, to obviate the Buffs being scratched or cut, which might otherwise sometimes happen.

FRAMES AND CASES—for mounting Daguerreotype Pictures, are made of all sizes and shapes,—with Oval, Cushion, or Dome Mats, —and may be ordered as required, and of any pattern. Fixing pictures in these is quite simple, and will be easily understood on looking at them.

CHEMICALS USED IN DAGUERREOTYPE.

Iodine—for Photographic purposes, as sold, appears in the form of small scales of a bright metallic lustre, and of a leaden colour,—is very volatile, and has a very disagreeable smell;—it dyes the skin, by contact, of a yellow colour. It is obtained from the ashes of a seaweed, called Kelp, prepared after a peculiar mode. For the Daguerreotype Art it is used in various ways; some make of it a a saturated solution in Sulphuric ether,—which is poured over a card or thin board at the bottom of the Iodine pan; others use a solution of Chloride of Iodine, in the same way as Bromine Water,—hereafter to be described; but perhaps the best mode is as follows, and which I have adopted. On the bottom of the pan lay a thin layer (1·8th of an inch thick) of clean Cotton Wool, over it sprinkle evenly the pure Iodine in scaly crystals, till the whole surface is thinly covered;—this done, throw a few more crystals about the centre; over all, place another very even layer of cotton about half an inch thick, and, over that, about three to half a dozen folds of Bibulous Paper, or say a very thin soft wood board. Iodine being very volatile, the object is to get the vapour thrown from a perfectly even surface, and the use of Cotton is simply to prevent the crystals from being shaken out of their places, as well also as to concentrate the Vapour.

Iodine, when vapoured to a deep Golden Yellow on a Silver Plate, is capable *alone* of being impressioned very favorably in the Camera; the process however takes longer than when it is assisted

by either of the accelerating substances hereafter described. (Say in the proportion of 10 or 15 to 1.)

BROMINE—is a thick, dark red liquid, very Volatile, and exceedingly deleterious;—it is extracted from the Water of Saltpits, after all the Salt has been withdrawn, (called BITTERN). It is best preserved in a glass stoppered phial, with a small quantity of water in it. As an accelerating agent, simple Bromine water has proved, in my experience, to be the best,—and it is prepared as follows;—of a saturated solution of Bromine, take half an ounce, to which add twenty-five to thirty ounces of distilled water;—this makes a liquid of a bright golden colour, and it should be kept in a well stoppered bottle, away from the direct action of light, especially the Sun's rays. The great utility of this preparation, besides its active accelerating qualities, lies in the fact that *it is always uniform in its action;*—by using a fresh quantity for each experiment, the time for exposure, to obtain a certain amount of vapour on the Plate, will always be known after one trial. For the quarter size pans *one ounce* of the mixture will be found sufficient to cover the pan to a proper depth. When a solution has once been made and found to work well, *it would be advisable to keep a sample bottle of the correct colour well sealed up,*—so that afterwards, in making fresh solutions, a standard colour is ready to mix by, without reference to measures at all;—the old liquid may too be strengthened up to a proper colour by the addition of a few drops of the saturated solution. This last however, should not be done *as a rule.*

CHLORIDE OF BROMINE—is perhaps equally effective as the above;—it is used in the same way,—and is made by mixing one ounce of Saturated solution of Bromine with one dram of strong Hydrochloric (Muriatic) Acid, and diluted with fifty to sixty ounces of distilled water;—(a few drops of Nitric Acid are added by some practitioners.)

Bromine has been also combined with LIME, and with CHLORINE, making dry preparations called BROMIDE OF LIME, CHLORO-

Bromo-form of Lime &c.,—the advantage in these lies in their exhaling *dry vapour*, which is not always the case with solutions; it is also said that a small quantity of these (a drachm,) strewed over the bottom of a pan, will last with equal effect for a fort-night.

Bromide of Iodine—is made by adding to a dram of Bromine, in a small phial, Iodine piece by piece till it will dissolve no more; this should be diluted to a deep straw colour, and is used as the Bromine water, but *as it contains Iodine*, a second exposure over the Iodine pan *is not necessary.*

Iodide of Bromine—is made by pouring into Bromide of Iodine, an Alcoholic solution of Iodine, until a precipitate is produced, having the appearance of Iodine; this should be diluted to a golden hue, and used without either Iodine or Bromine; the Plate being brought to the requisite colour over it alone.

The Hungarian Solution,—a mixture remarkable for the uniformity of its results,—is a preparation introduced by Mr. Guerin, who has retained its recipe a secret. It seems however to bear some similarity to a mixture of Bromide of Iodine with Chlorine.

To use the preparation as sold, it should be diluted with eighteen to twenty-five times its volume of distilled water; the Plate, having previously been Iodized to a clear Yellow,—should be brought over it to a Rose tint; or, it may be used alone, and it gives very excellent results.

If, in the course of operation, small white specks form on the Plate, it is a sign that the mixture is too strong,—and it should be further diluted with water.

Hyposulphite of Soda—is a crystalized salt; and, if good, is perfectly clear and pellucid :—an inferior description has a dull milky appearance, and is very objectionable, its effect is to dissolve the Iodide, or Bromoiodide of Silver, produced by an action of the vapour of Iodine—or Iodine and Bromine on a silver plate :—great

care is necessary to keep this salt, either in crystals, or solution, from the Bromine or its solutions,—for the least particle would decompose, and cause to evaporate, all the Bromine.

Mercury or Quicksilver,—a liquid metal, is found, in a natural state, in a reddish mineral called Cinnabar;—it vapourizes at rather a low temperature, and emits a fume of a reddish yellow, or somewhat orange hue. In vapour, or in its natural state, it affects the human body; and, in its natural state, acts upon Gold and Silver;—great care is therefore necessary in its use:—in large quantities it amalgamates with, and liquifies Gold and Silver; in small quantities it simply has on these the appearance of a stain, which may be got rid of by heat, upon application of which the Mercury will evaporate;—in the former case it is possible to separate the metals, so that care should be taken of the amalgam.

Calcined Tripoli,—for cleaning Daguerreian Plates, should be in a state of impalpable powder, and perfectly free from any gritty substance, which would scratch the Plate; it should be kept in a low, wide mouthed bottle,—the mouth tied over with a piece of fine muslin,—and a loose wooden lid to cover all.

Prepared Lampblack—is made by bringing the ordinary material to a red heat in a crucible till vapours cease to arise from it,—the crucible may then be removed from the fire, and,—closely covered up—allowed to cool. Thus burnt, it should be reduced to a fine powder in a porcelain mortar, and kept for use in a bottle similar to the tripoli.

Rouge—is an Oxide of Iron, and should be the finest washed that can be obtained, and may be kept for use as the above.

Prepared Charcoal—is made by finely pulverizing the best Charcoal, and sifting it through very fine muslin; used as above.

TAKING PORTRAITS, VIEWS, &c.

For Portraits,—or for animate objects, speed of operation is essential for the best results; the Lens of the Camera should be on about a level with the face. The sitter should, if possible, be in the open air, but not in the direct rays of the sun,—and so placed that too much light may not fall upon the crown of the head or brow;—indeed it would be better to have a Canopy over head, at such an elevation, that light might stream in on the sitter's face at an angle of about 15° to 20° ; he should be so arranged as to show to best advantage on the ground focussing glass,—should be in an easy, natural position, with all parts of the body as near as possible in one plane,—that is to say, the feet and hands should be kept as near in a line with the face as practicable,—so that each may bear its true proportion in the reflection.—The same remarks apply to any articles of Furniture that it is desired should be introduced. A good back ground sets off a picture much,—and the student should have a Screen, with a couple or four painted drop scenes to represent say, a Library, Terrace, Landscape, Ship, &c.—Black, Drab, and Light Brown, or *the colour of a Blanket*, are found to produce the most pleasing effects, as colours for Backgrounds.

As regards the arrangement of the Sitter, and the Camera, with respect to the Sun, or source whence the greatest amount of Light proceeds,—I think *the smaller* the angle formed between the lines of the light's incidence with the sitter, and the Camera with the sitter, the better.

Care should be taken that the *strongest light*, or the *Sun's rays do not in any way impinge on the Lens.*

If a Portrait is to be taken *in a room*, the Camera should be placed close to the wall, by one side of a large window, and the sitter so arranged that a clear strong light may illumine the features &c.; and, if by chance the sun's rays unavoidably strike in, a *thin blue curtain* should be hung up to soften their force. In this position it might perhaps happen that one side of the sitter next the window would be strongly illuminated, while the other would be comparatively in deep shade;—a state of matters which would give results by no means pleasing; this must be remedied, by placing on the side in shade, opposite the window, a white screen,—the reflection from which would equalize the effect of the light.

VIEWS, BUILDINGS, &c. The same general remarks apply here also; only, if any parts are very markedly more illuminated than others, an opaque object should be held before the Lens to shade such parts for a short period of the exposure. That part of the View or Building most wanted should be focussed more particularly.

ENGRAVINGS, AND PICTURES, &c.—should be placed in a good light, perfectly parallel with the Lens, and on a flat even surface; they should not be covered with glass, as its reflection is apt to injure the effect.

RECAPITULATION OF THE PROCESS.

The amateur is recommended to purchase the best Instruments, and Plates, &c., from a Manufacturer of *known respectability*; for altho' the outlay may thus be heavier at first, it may be relied on that it will serve the purposes of economy most effectually in the end, besides placing the operator in the most favorable position to learn, and work out the best results. The Plates, before being iodized, should be *most carefully* cleaned, and it would be much wiser to clean a Plate over and over again, than to attempt to use it improperly prepared. When iodizing a Plate, it should be examined frequently, and its position altered by turning, so that a uniform color may be obtained,—and when the desired tint has been produced, the operation should be stopped:—if, in this operation, the Plate shows a greenish tint,—or the surface appears otherwise stained,—it would indicate that the cleaning had not been properly executed ; that process should therefore be gone through with again.—After a plate has been cleaned, the utmost care should be taken in the after process to prevent the least atom of dust, or any foreign substance, falling on it. The directions previously given for the use of the accelerating solution must be carefully followed. Altho' when preparing a Plate over the Iodine and accelerating mixture it may be freely examined by broad day light, to ensure the proper tint being obtained,—yet, when that *is* obtained, it is *imperative* to expose it for one, or a few seconds more over the Vapour;—and then, the greatest care must be taken

that no ray of light reaches it in conveying it from the vapour Box to the dark slide of the Camera.

The time requisite for exposure of the prepared Plate in the Camera,—as it depends chiefly upon the quality of the Lens, and the amount of available Light, exclusive of the preparation of the Plate,—can only be determined by experience and practice. The focus should be adjusted with great care by examining the reflected image on the ground focussing glass, (fitted to the Camera for that purpose); and, if the picture to be produced is very unequally acted upon by light, it will be necessary to screen the more luminous parts from the Lens for a portion of the time of exposure; here again experience, and practice, must be the guide.

The exposition in the Mercury Box should be carried on rather slowly than otherwise,—for, by gently heating the Mercury, and repeating that again and again if necessary, much finer results may be obtained than by heating too quickly, and producing the picture very rapidly;—all fine detail would, in the latter case, probably be lost:—from five to ten minutes to half an hour should be about the time taken. No ray of light should be allowed to fall on a Plate after its removal from the Camera until the picture is fully developed by Mercurial Vapour. The Washing and Fixing processes should be conducted with strict attention to foregoing instructions.

MR. TONY GAUDIN'S FIXING PROCESS.

Dissolve one gramme of Chloride of Gold in half a litre of ordinary water, and thirty grammes of Hyposulphite of Soda in another half litre of similar water; then pour the solution of Chloride of Gold into that of Soda by little and little, agitating it exactly as in Mr. Fizeau's preparation, of which this is but a variation.

When you wish to use it,—pour some into a pan, or any other vessel of the same kind sufficient to cover the proof; then, after having added to it a drop of Ammonia, immerse the Plate in it as soon as taken from the Mercury Box, (first having wiped its back and edges) and agitate the mixture quickly from right to left, so as to dissolve rapidly the coating of Iodide of Silver, as usual. As soon as the Plate appears White, cease all rapid motion—but continue to give it a slight undulating one,—for if it were allowed to remain still for only a few minutes the proof would be clouded. By little and little the surface of the Plate takes a Yellow tint, which darkens more and more, approaching to Bistre;—you stop therefore at the colour you wish, and when the proof has been washed and dried in the usual way, it will be found to be fixed without any stain, with a limpid surface, and an extraordinarily warm tone. If the proportions of Ammonia or Chloride of Gold are augmented the operation will progress much more quickly, but then the middle of the proof would be always much clearer than towards the border.

The mixture may be used several times without being renewed; it does not however give such a beautiful colour to the impressions as when it is newly prepared. By communicating to the vessel containing the solution a continual motion—the impression, when once immersed, will be fixed. During that time, and whilst attending to any thing else, watch its colour, and at the end of ten minutes or a quarter of an hour, take it out of the bath and dry it.

TO OBTAIN COPIES OF DAGUERREOTYPES.

By Transfer in Electrotype. The proof, having been carefully fixed by Mr. Fizeau's process, must be kept two or three days; the back and edges are then varnished, and copper is to be deposited on the surface in the usual way; this process occupying from 12 to 20 hours. If the plate has been well fixed, and the operation conducted properly, the deposited plate will easily split off, having an exact copy of the picture with every grade of light and shade, and tint, as in the original;—further copies may be made from the original, and also from the copies themselves, and the picture consequently multiplied ad infinitum.

By Transfer on Paper. Having spread over a sheet of black paper a coating of gelatine, place on it, ere it be quite dry, the proof to be copied,—and submit them thus, between folds of cloth or paper, in a press for about half an hour; at the expiration of that time, let them be dried in the sun; the paper will then separate from the Plate, having a faint copy of the proof on its surface.

By the Camera. The picture to be copied should be placed in a good light before a Camera, perfectly perpendicular, and parallel with the Lens, and the operation proceeded with as in taking a Portrait or View.

CRAYON DAGUERREOTYPE

By Mr. Mayall.

Take the Daguerreotype Image on a prepared Plate in the usual way, and, before mercurializing, place on it a piece of thin plate glass the size of the Plate in use, on the upper surface of which, in the centre, has been gummed a disc of thin Zinc or Lead, of the size of Picture required; expose the whole to broad day-light for 15 to 30 seconds, the parts unprotected by the opaque disc will be strongly affected by the light; and, at the edges of the disc, from the Light refracted through the thickness of glass, the tints will be softened in upon the impressioned image; the plate must now be mercurialized, and the operation proceeded with in the usual way. There is a very peculiar charm about these pictures, if the process has been well conducted,—and they may be modified in numerous ways according to the taste of the operator.

A NEW DAGUERREIAN PROCESS.

(Communicated to the Photographic Society of London June 20, 1853, by Mr. W. H. Stanley Crawford.)

Some ten years ago it was the recorded opinion of Messrs. Choiselet and St. Ratel "that the coating of Iodide of Silver, formed on the surface of a Daguerreian Plate by exposure over the vapour of Iodine, is reduced in volume under the influence of white Light, so as to give rise to the formation of a Sub-iodide on the parts so acted upon. The formation of this Sub-iodide cannot take place without setting free a certain quantity of Iodine,—which tends, on the one hand, to combine with the Iodide thus reduced in volume,—and, on the other, to attack the Silver of the Plate. It is therefore only at the end of a certain time, which may be longer or shorter, that this Iodine becomes entirely absorbed by the Plate, and that the latter may be withdrawn from the Camera without fearing that the action of the free Iodine will destroy the effect produced by Light."

They were also of opinion "that the only means of accelerating the formation of the Daguerreian image would be to abridge the time during which the absorption of the free Iodine takes place."

"Adopting this theory, it is easy to form an idea of the accelerating action of Bromine,—Chloride of Iodine,—and Bromide of Iodine;—these substances, *having a very great affinity for Iodine*, unite intimately with the Iodide which covers the Plate, and absorb

the Iodine as fast as it is liberated; only there is reason to apprehend that the combination thus formed may be decomposed when coming in contact with the Silver Plate, by giving rise to compounds which impede the action of Light, and alter the vigour of the Image, thus rendering it necessary to subject the Plate immediately to the action of Mercury."

"This also explains why exposing the Plate too long a time in the Bromine Box gives a clouded image; for, when that happens,—instead of merely impregnating the coating of Iodide,—the Bromine reaches the Silver of the Plate, and produces a Bromide of Silver, which is very injurious to the distinctness of the Image."

"Lastly, they come to the conclusion that if, by the addition of new substances, the affinity of the accelerating vapour of the Iodine can be augmented, the acceleration will become yet more considerable."

The foregoing remarks,—that is to say the facts named, upon which the conclusion is come to,—I have in practice found perfectly correct; it might however be added that from the surface of the Daguerreian Plate, prepared in the usual way with Iodine and Bromine, *a constant* slight evaporation takes place, even before exposure to Light; so much so, that if a Plate be prepared, and allowed to remain some days, its sensitiveness will be totally impaired;—and, moreover, even if it be used an hour after, its action cannot be depended upon without a preliminary trial;—it sometimes happens in the latter case that the surface is *more sensitive* than when first prepared,—*that* however only corroborates what I have advanced as to the *unequal action;* it may be *more* sensitive, or *less so,* and it will always be *less so,* if in the first instance the Plate was prepared *properly;* for, in the evaporation, the *proportions* between the Iodine and Bromine are destroyed, and *that,* we are aware, is a principal point in getting an active surface.

Messrs. Choiselet and St. Ratel, it strikes me, looked rather to the cure than to the prevention of an evil. Instead of complicating the process by searching for combinations to absorb the Vapours set free by the action of Light,—and which, acting again upon the

plate, militate against the speedy formation of a picture, would it not have been better to have tried some mode by which the retarding action could be nullified ? This I think I have succeeded in doing, and simply by bringing the action of Mercurial fumes to bear upon the Plate simultaneously with the action of Light. Pictures are produced by this mode more expeditiously than by the old one, in the ratio of 1 to 5 ; the outlines and details are most clearly defined, and marked,—and the Picture very firmly set on the Plate, so much so, as to give much trouble to rub off, even before fixation.

I have now constructed a Camera which simplifies the operation much,—and which, for a travelling Daguerreotypist, is a great improvement, as it does away with the necessity of a Mercury Box, and saves all the time and trouble of changing the Plate from one box to another,—pouring and repouring the Mercury &c. It is formed thus, (see Fig. 12.) A. B. is the ordinary expanding Camera, with the hinder part drawn out ;—C. is a cast iron bottle screwed on it at a conventent height to allow of a Spirit lamp being placed to heat it,—it is connected by a pipe E. with the interior, and has an air tight cock D., near its neck, to admit or exclude the Mercurial fumes. The Bottle should be capable of holding four to eight ounces of Mercury.

The working must be obvious,—the Camera being adjusted to the object, and the Plate ready prepared, and placed in the Camera, the bottle is heated to the usual degree ;—the door of the Plate slide is then opened, also the cock of Iron bottle,—so as to admit the Mercurial fumes. All being ready, the Lens is uncovered an instant, (or the necessary time, more or less) and then closed; the other arrangements should be allowed to remain for at least five minutes,—after which the Plate may be carefully examined, (by means of little windows on each side of the Camera, protected by yellow glass, indicated by the dotted lines near A., but they are not absolutely necessary) and the operation continued or stopped, as circumstances require.

With regard to this process, it might probably be urged that the Mercurial Vapours, would injure the Lenses ;—I have not found mine suffer,—but, to obviate such a mishap, I would suggest that an air tight partition of Blue glass be fitted immediately in rear of the Lenses, so as to prevent the advent upon them of any Vapours.*

---

* Another advantage in this process,—which I have hitherto omitted to mention,—is, that the Plate may be, in the preparation, charged with double the usual amount of Bromine;—the effect of this is to equalize, to a great extent, the force of the various colours —and consequently, in a large measure to prevent *Solarization*.

GENERAL HINTS ON PHOTOGRAPHY.

A person bent upon pursuing the study of Photography with the view of advancing the Science—if his means allow of it—should have a suitable room or Studio erected, surrounded with glass windows, so that a strong clear light may be available,—or, if that cannot be managed, windows with a northern or southern frontage. The arrangement of the windows should be such as to allow Light to stream in to the centre of the room at an angle of from 20 to 30 degrees; the glass should either be Blue, or slightly tinted of that colour with some transparent pigment. This might be styled THE PORTRAIT ROOM,—and it should be, if possible, about 30 feet long by 15 feet broad, or even larger.

There should be a separate Room for all the Chemicals, and *Bromine and Iodine Boxes &c.;*—and, not only separate, but so situated that not the slightest vapour or fume of any of the Chemicals could penetrate to the Portrait room. The size of this room, (which might be termed THE LABORATORY) is not material,—half a dozen feet square would do, but it would be better if larger; as regards Light, it would not be necessary to have much,—but, in any case, the windows should be fitted with thick yellow hangings,—so that light might be excluded at pleasure, to make it available for the Talbotype and Collodion processes.

A small room,—or closet,—or place screened off in the Portrait Room,—should be set aside for the Mercury Boxes; *it is essential that no Vapours of Chemicals reach this apartment.*

These pages having reference chiefly to the Daguerreotype process, the following remarks bear mostly upon it.

Prior to commencing a day's work, it is absolutely necessary to clean all the Apparatus. For instance, Lenses are always liable to get dim,—either from dampness in the air, or dampness engendered by inequality of temperature. A soft piece of silk would be excellent for cleaning the Lenses did it not, by friction, incite in the glasses Electricity, which causes them to attract particles of dust, despite the utmost care;—it would be advisable, therefore, to keep *exclusively for this purpose* a piece of exceedingly clean and *perfectly soft* Wash Leather. The Mercury Box should be carefully dusted, both inside and out,—also the Camera,—and the tops of the Iodine and Bromine Boxes. The Mercury should be freed from Scum, or Oxide on its surface, by causing it to run through a cone of clean Paper, having at its lower end a very minute opening;—and it would be as well afterwards to heat up the Mercury, as a preparatory measure, ere exposing an impressioned Plate to its vapours. For developing a Daguerreotype Picture, the Mercury should never be raised to a Temperature more than 50° to 60° centigrade, or 90° to 100° Fahrenheit.

It is necessary not only to have perfectly clean and smooth *surfaces* to the Plates, but the edges and backs should also be thoroughly wiped and cleansed.

The Plate, in its clean state, reflects White Light;—but, on receiving films of Iodine and Bromine Vapour, it reflects—at particular stages—all the Colours, both primary and intermediate, of the Spectrum;—the following appear to be the gradations, in the succession they take,—which it will be of service to note particularly;—viz:—

White,—Pale Straw,—Full Straw,—Yellow,—Gold Yellow,—Orange,—Rose,—Red,—Red, *having a Blue bloom*,—Blue,—Slate Colour,—White, &c.

While Iodizing a Plate, it matters not how strong a light falls on it,—for it is known that a subsequent instantaneous exposure over the

vapour of Iodine, or Bromine, or Chlorine, will renew its sensitiveness. The knowledge of this fact is very useful,—for instance, if, when taking the Portrait of a Child, it moves during the operation, it is simply necessary to re-expose the Plate a second over Iodine or Bromine Vapour,—and it becomes in a state capable of being again impressioned.

It follows therefore that a number of Plates may be Iodized, and placed in an ordinary Plate Box, and their sensitiveness renewed afterwards, as above described, at any time of the day.

This is very convenient for a person going out for several hours, for the purpose of taking a number of Views; he requires only a Camera, fitted with a Mercury Bottle according to my plan,—and an Iodine Box, to renew the sensitiveness of the Plate immediately before use.

Plates, whether in the cleaned or Iodized state, should always, in the Plate Box, be placed in opposite grooves *face to face*—not face to back;—this does not interfere with the plan of placing two Plates back to back in one groove.

As Wood, no matter how carefully varnished, is apt to absorb Chemical Vapours, it would always be an advantage to have the Frame Plate holders made of *thin Metal, varnished*;—indeed it would be desirable, if proper care were bestowed on the manufacture, to have *the dark slide of the Camera entirely of Metal.*

It is a matter of argument with some Photographists whether the interior of Cameras should be *White* or *Black*;—the former I have not given a fair trial, but am disposed to accord to it the preference.

With regard to the Hyposulphite Washing Solution, some practitioners affirm that there may be an excess of the Salt without any bad effect,—and recommend at least twelve to sixteen drachms of the Salt to a pint of distilled water; but, if the solution be too weak, they state that *bluish* and *milky spots* are likely to be produced on the Plate after the fixing process;—this, however, I think erroneous,—for I have found, if the solution given in a former page (viz.

one to two ounces per quart) be used, and the Plate,—while in the bath,—well agitated, and not allowed to remain quiescent, no difficulties, such as those complained of, will be encountered.

When distilled Water cannot readily be had,—common or rain Water, filtered, may be used, slightly acidulated with Nitric Acid,—about eight drops to a quart of Water.

Very good Pictures may be obtained on Silver Plates by modes other than those already mentioned; the following are a few examples,—

Over a small quantity of either IODIDE, OR DEUTO IODIDE OF COPPER, in an ordinary pan, vapour a Plate till it assumes a brownish Yellow surface; in this state, an exposure of twenty or thirty seconds in a Camera will produce a picture, (visible without the aid of anything extraneous) of a bistre tint,—and very warm tone.

A Plate vapoured, over Iodine, in the usual way, to a golden hue, is capable of receiving in the Camera a Picture, visible without the aid of anything extraneous.

A Plate vapoured, in the usual way, over either Iodine alone,—or Iodine and Bromine,—and impressioned in the Camera, may have the picture developed by Mercury in any form,—for instance, as Quicksilver,—Protochloride of Mercury or Calomel,—and Iodide, and Deuto-iodide of Mercury &c,—the two last producing pictures of a reddish, and brownish tone.

The Actinic Agency is not, at all hours of the day, of equal force;—the difference between the Morning's Light and Noon's, is not so marked as it is between the Noon's and Evening's:—for instance, supposing three Plates to be Iodized precisely alike,—and, at Noon, it required *one second* to impression a Picture;—an hour after Sunrise it might require *three to six seconds*;—while at Sunset, *ten to twenty seconds*, or perhaps more, would be requisite.

Again, all colours have not an equal Actinic effect on the prepared Plate;—for instance YELLOW,—VERMILLION,—GREEN,—and BLACK,—the three first forming the most brilliant colours known,—

have but a tardy action;—while, on the other hand, BLUE,—VIOLET, —LAKE,—LAVENDER,—and WHITE,—*have a most energetic one.* These facts are worthy of particular attention.

The following Notes may be of service as showing the resulting tendency of each colour.

BLACK—is tardy of action, and produces a dark or black shade.

WHITE—is energetic—being usually produced *in one fourth the time* requisite to depict correctly an object of a Red Colour; a prolonged exposure produces a *milky blue tone*, technically termed *Solarization.*

RED—is tardy of action—and produces a black shade;—it requires an exposure four times as long as for *White objects*, to be correctly reproduced;—and a rather longer exposure effects a brownish, or bistre tint.

PINK—is somewhat tardy of action,—and has a darkening tendency; but a slightly increased exposure produces a whitening effect, and leaves on the Plate a brownish white.

ORANGE, and YELLOW. The same remarks apply to these colours as to the Red.

GREEN. The same remarks apply as to the Red, with the exception that a prolonged exposure has not, in this case, the browning effect alluded to as being produced by the Red,—but merely develops more markedly the gradations of shade.

BLUE,—INDIGO,—VIOLET,—LAVENDER. These colours have a very energetic actinic action, are rapidly reproduced,—and have, after the dark shades (which are common in the first stage to all colours) a tendency to a slatish hue.

N. B.—It is to be borne in mind, however, that the above notes refer to Plates which have not been prepared *in the most sensitive manner*;—for, if they be Iodized so neatly and carefully as to admit of a Portrait being taken, in shade, in a fraction of a second, or even say one second, the effect is—strange to say—that *all* colours are reproduced in Lights and Shades, in their true force,—no part

over done, but each thing and every detail clear, marked, and distinct.

Mr. Moser has recorded the following, with reference to the progressive alteration in the Iodized coating of a Plate, and he divides the period of alteration into distinct sections :—during the first, he says, the *Violet* and *Blue rays* are the *only active* ones,—they produce a commencement of alteration which, though not visible, exists,—but becomes apparent, by the action of Mercurial vapour, when the alteration has arrived at a certain point. At *the end* of the first period, it is so far modified that *the Red* and *Orange rays act* as well as the *Blue* and *Violet*;—but the *Yellow rays* do not act,—for, if the Plate be withdrawn too soon from the Camera, the *Yellow rays* will be found to have been *quite inactive* : at *the end of the second period,* the *Green* and *Yellow rays act* in their turn;—and the Plate is then very near the point at which the whole picture can become visible under the influence of Mercurial Vapours

When a Plate has been prepared with Iodine and Bromine, and exposed in the Camera,—we are aware, under the usual mode of operation,—the Picture is not visible till developed by the fumes of Mercury; this fact led many, at first, to suppose that Mercury,—rising in extremely minute globules,—attached itself to those parts of the Plate which had been acted upon by light, or the Actinic Agency. The fallacy is now however nearly exploded, tho' there remain still some sceptics.

Precisely the same results, (as effected by Mercury,) may be brought about by covering the Plate, (prepared in the usual way) after its exposure in the Camera, with a Yellowish Red, or Orange coloured glass, and exposing it to the direct rays of the sun for some minutes; the Picture will be seen gradually appearing, and the operation may be stopped at any desired point, as the development can be distinctly seen through the glass.

For a Plate prepared with Iodine, alone, a Yellow Glass is found to act better than an Orange or Red.

On after examination with a powerful microscope, Pictures, developed by either of the foregoing modes, would show an appearance precisely similar to that produced by the fumes of Mercury.

Now, as it is known that the *Colour of the fumes of Mercury* is of a *Reddish Yellow hue*, the deduction naturally follows that a Plate, prepared with Iodine or Bromine, having had its surface excited by White Light, is capable of having the effect continued under rays of peculiar colours, to the development of the object by whose emanations of Light it had been excited.

With M. Becquerel, I believe, originated the idea of dividing, into two distinct classes, the Rays composing our apparently White Light;—these he designated under the denominations of EXCITING RAYS, and CONTINUATING RAYS;—under the former head may be ranked, I think, WHITE, PINK, BLUE, INDIGO, VIOLET, and LAVENDER, and under the latter, BLACK, RED, ORANGE, YELLOW and GREEN.

Some time ago, I made numerous experiments with coloured glasses in the above modes;—and, from the variety of tints obtained in the resulting Pictures, by super-position, I was sanguine of being able to produce true Chromatic pictures; unfortunately, however, my various engagements have not allowed me leisure to prosecute these researches.

I may record, nevertheless, that I think Lenses,—ground, as at present, to catch the *actinic focus*,—are not so well adapted for these last experiments as they would be if manufactured to represent the visual, or chromatic focus of objects.

ON PRODUCING CHROMATIC PICTURES.

After much scepticism, the possibility of producing Chromatic Pictures is now generally admitted. That Pictures *can* be produced in all the beauty of Natural Colours is beyond doubt, but the art is in its infancy;—no mode has yet been discovered whereby to fix these beautiful representations, and they consequently fade away in a short time.

Some Metallic Salts, Acids &c., if heated or ignited, throw off coloured fumes, or flames; now it has been found that, if a bath be formed of such in liquid Chlorine, and a highly polished silver plate—connected with the positive pole of a Voltaic Battery,—be immersed in it, and allowed to remain a few minutes, then taken out, washed in water, and dried over a Spirit Lamp—it is capable, after a prolonged (one to three hours) exposure in the Camera, of being impressioned with colours, such as the metallic salts used would have emitted if heated or ignited. It is a difficult matter to determine the proper proportions of these salts to use; for, if indiscriminately used, one colour is apt to overcome another, and so on. Some approximation may, however, be made by attention to the subsequent remarks as to the value of different colours of the spectrum, and the Colorific properties of various salts.

M. Niepce De St. Victor, after numerous experiments, found that metallic plates were absolutely necessary for this process;—paper not answering at all.

It would seem, therefore, that Electricity has much to do with

the success of this operation, and also with the subsequent fading of the Picture; and, it strikes me, that were a Plate,—after having the Chromatic Picture fairly impressed,—rendererd a non-conductor by a complete coating of Glass, or fine Enamel, (I mean of course on both sides, not simply the upper surface) the Colours might absolutely be fixed. I regret much not being able to test this point ere publishing these pages; but, at present, I have neither time nor means at my disposal.

M. Niepce's mode of operation is to make a Bath, in liquid Chlorine, of the metals required; immerse in this bath, for a few minutes, the silver plate *thoroughly cleaned and well polished*;—then wash copiously in water;—and finally dry with a spirit lamp;—the surface will then have an almost black appearance,—and, if the heat be continued somewhat longer, it will assume a reddish hue, which is supposed to indicate its most sensitive stage. In this state it should be exposed in the Camera, and may probably take as long as three hours to be properly impressioned.

In using Chlorides, one fourth (by weight) to three fourths water is the best proportion. If Muriatic Acid be used with a salt of copper, one tenth of water should be added.

If the bath is composed of several substances, it is essential to filter the solution, so as to have it perfectly transparent;—and it shoul l be kept in a glass stoppered bottle.

A good bath may be made of equal parts Chloride of Copper, and Chloride of Iron, and three or four parts of Water.

RECORDED EXPERIMENTS IN THE FOREGOING PROCESS.

A bath containing			Chloride of Strontian	produced	Purple & Violet hues
,,	,,	,,	of Calcium	,,	Orange hues
,,	,,	,,	of Uranium	,,	Yellow hues
,,	,,	,,	of Sodium	,,	Yellow hues
,,	,,	,,	of Potassium	,,	Yellow hues
,,	,,	Hypochlrorate of Soda		,,	Yellow hues
,,	,,	Boracic Acid		,,	Green hues
,,	,,	Chloride of Nickel		,,	Green hues
,,	,,	Salts of Copper		,,	Green hues

A bath containing Double Chloride of Copper and Ammonia. } Blue & Indigo hues
„ „ Deuto Chloride of Copper produced ALL COLOURS
„ „ Chloride of Iron „ Do. *but feeble.*

A bath composed of Chlorine gave a sensitive surface, and produced all colours, but Yellow predominant.

RELATIVE VALUES OF THE COLOURS OF THE SPECTRUM.

SIR ISAAC NEWTON maintained that the solar spectrum consists of *six primary colours;* and, assuming the whole at 360°, he determined *the width of each band,* as follows:—

	RED.	ORANGE.	YELLOW.	GREEN.	BLUE.	VIOLET.
	45°	27°	35°	56°	108°	89°
and FRAUNHOFER.	56°	27°	27°	46°	95°	109°

SIR DAVID BREWSTER, however, proved that *there are but three primary colours,* viz. RED,—YELLOW,—and BLUE;—and the width of each band *equal;* but, assuming the value of White Light to be 100, *their colorific values,* in relation to it, are *not equal*—but as follows:—

RED 20, YELLOW 30, BLUE 50,

COLOURS PRODUCED BY VARIOUS METALS &c.

Blue flame,	by Powdered Sulphur.
Blue flame,	by Powdered Selenium.
Green flame,	by Phosphorus with Oxide of Copper
Red flame,	by Chloride of Mercury and Barium.
Blood Red flame,	by Strontium.
Pale Blue flame,	by Bismuth.
Pale Blue flame,	by Arsenic, strongly heated.
Bluish Green,	by Zinc.
Purple,	by Strontian.
White vapour,	by Phosphorus.
Green gas,	by Pottassium.
Yellow vapour,	by Mercury.

Blue or Violet vapour, by Iodine.
Red or Violet vapour, by Bromine.

WITH BORAX IN THE BLOW-PIPE.

	In the oxidating flame.	*In the reducing flame.*
Chromium,	Green,	Green.
Copper,	Green,	Red Brown.
Cobalt,	Blue,	Blue.
Iron,	Red,	Green.
Manganese,	Violet,	Colourless.
Nickel,	Red,	Grey.
Uranium,	Yellow,	Green.

Five parts Chloride of Strontium, with one part Nitrate of Copper mixed with Alcohol, kindled, give a brilliant cloud of variegated fire.

CHLORINE, with OXYGEN, and METALS, forms the salts termed CHLORATES.

CHLORINE, with HYDROGEN, forms MURIATIC ACID.

CHLORINE, with Metals, forms the compounds, or Salts termed CHLORIDES.

AQUA REGIA is NITRIC ACID with MURIATIC ACID in excess.

TALBOTYPE OR CALOTYPE.

Is the Art of producing pictures ON PAPER after a peculiar mode, discovered and patented by MR. FOX TALBOT, from whom, on that account, it has taken its name of—TALBOTYPE.

The different stages in this process must all, excepting the exposure of the Paper in the Camera, be carried on in a Dark Room, by the Light of a candle shaded by means of a Yellow glass;—or, where light is admitted in a very partial degree through a Yellow medium.

SELECTION OF, AND IODIZING THE PAPER.—There being now so great a demand for Paper for Talbotype purposes, a manufacture of that commodity has sprung up, and good qualities may readily be had on demand. Should it by any mischance, however, not be obtainable, paper of a compact, uniform texture, and as smooth and transparent as possible, may be selected; it should also be free from flaw, or water mark, or any black specks.

For Iodizing,—the following appears to be the most simple mode. In one ounce of distilled water dissolve twenty grains Nitrate of Silver in crystals,—add to this, in small quantities, a solution of twenty to thirty grains of Iodide of Potassium in an ounce of distilled water, until the precipitate which it occasions appears to cease. This precipitate is an—IODIDE OF SILVER. Pour off from it the supernatant liquid, and wash the precipitate two or three times in warm distilled water, and afterwards drain off the water. The Iodide of Silver must now be mixed

with one ounce of cold distilled water, and Iodide of Potassium added, crystal by crystal, and allowed thoroughly to dissolve, until the liquor, gradually getting clearer, has become perfectly limpid; this forms a—DOUBLE IODIDE OF SILVER.

Lay a sheet of selected Paper (*having previously marked the side to be prepared, to distinguish it easily*) on a slab of clean Plate glass,—and on it pour some of the Double Iodide solution, which is to be diffused carefully and evenly over its surface by means of a Glass Rod: this done, pour off the superfluous liquid, and allow the paper to dry; When dry, or nearly so, the paper must be carefully washed in pure plain water in a flat pan, (two or four of which should be kept for that purpose): the washing should be continued nearly half an hour, and the water, during that period, changed five or six times. As a guide to the operator, I may mention that if the paper has been *properly* washed, its surface will be *of a pale Yellow Colour*, and a drop of the water from its surface will, in a solution of Nitrate of Silver, fail to occasion a precipitate. It should now be hung up to dry, and afterwards kept in a close Portfolio until required. If the operation has been *properly* conducted, the Paper is not at all sensitive to Light, and will keep any length of time.

APPLYING THE SENSITIVE COATING. In two ounces of distilled water dissolve one hundred grains Nitrate of Silver, to which add one sixth its volume (two and two thirds of a drachm) of strong Acetic Acid (in crystals), and preserve the mixture in a stoppered bottle protected from Light. In another bottle make, with cold distilled water, a *saturated* solution of Gallic Acid and filter it. (N. B. To keep the last solution good for a considerable time, the bottle containing it should be placed for a few minutes in boiling water.) When a Picture is to be taken, five drops of each of these solutions are to be mixed with one ounce of distilled water, and form thus—GALLO-NITRATE OF SILVER. A small quantity of this Gallo-Nitrate is to be poured on a clean level slab, and, with a glass rod, diffused over its surface; the prepared side of the Iodized Paper is then placed on it, and, by a slight pres-

sure above, any air bubbles excluded. As soon as the surface of the paper has been thoroughly wetted, it should be removed and placed, face upwards, in a dark drawer or box until the excess of Gallo-Nitrate has been absorbed from its surface, and then placed damp between the glasses of the Camera slide. In this state, if carefully excluded from light, and previously properly prepared, it will keep from twelve to twenty hours, preserving all its whiteness and sensibility.

As a general rule, *if a very sensitive surface is required*, the dilution of the Gallo-Nitrate should not be more than three or four times the bulk of the mixed liquids; but, if the paper is not to be used till some time after the sensitive surface has been given, the dilution should be increased in proportion.

The Acetic Acid used, should be *the best* and *strongest*, (which is in crystals); its tendency appears to be to keep the white parts of the Picture clean and white; too much however impairs the sensitiveness of the paper. If the paper becoms discoloured, when every care otherwise has been taken, it would indicate that the solution had not sufficient Acetic Acid.

Exposure in the Camera. This part of the process is conducted much in the same way as that described for Daguerreotype. The *time* of exposure will of course depend upon the size and quality of the lens,—the size of opening used,—the amount of Light availa ; &c.,—and can alone be determined by the judgment of the operator; who, if a new hand, must just make several experiments, and deduce from them the necessary knowledge.

When a picture has been taken, there is seldom or ever any visible trace of it on the Paper—until subjected to the next process, viz :—

Developing the Impression. On a slab of glass, previously well cleaned, pour a small quantity of Gallo-Nitrate of Silver *(formed of equal quantities of the former solutions of gallic Acid—Aceto Nitrate of Silver*—and *water)*, and apply the paper with the picture

as before, until the surface is thoroughly wetted; it must then be placed, face upwards, on a flat glass, when the picture will be seen gradually appearing. It is necessary during the development to keep the surface moist,—so, if needed, a further quantity of Gallo-Nitrate of Silver must be applied.

If the process is tardy, it may be accelerated by a moist heat, from the steam of boiling water in a dish. (There are small steam apparatus made for this purpose.)

If the paper, while still wet with the Gallo-Nitrate solution, begins to assume stains before the picture is fully developed, it would be advisable to remove quickly the Gallo-Nitrate, and substitute instead a small quantity of the Gallic-Acid solution, which will most probably bring out the picture correctly.

When the picture has attained its greatest intensity, it should *immediately* be put through the next stage of the process, viz :—

Fixing. Having several washing pans, cleaned and supplied with pure water, the picture is to be passed through them all, (at least three,) and well washed for about ten minutes; then taken out, gently dried between folds of white bibulous paper,—and afterwards placed in a strong and slightly warm solution of Hyposulphite of Soda (three or four ounces to a pint of distilled water) The object is to dissolve out, and remove all the Yellow Iodide of Silver; when this is accomplished, the Picture must be washed *copiously* in common water as before, to remove the Hyposulphite, and afterwards, —to ensure this end fully,—be allowed to remain in a fresh bath of water for several hours. On removal, it may be dried between folds of bibulous paper, and will be found perfectly fixed.

If not convenient to operate at once with the Hyposulphite wash, the picture may be temporarily fixed, for a few days, by a single wash with a solution of ten grains of Bromide of Potassium in one ounce of water—it should afterwards be dipped in water, and dried between folds of bibulous paper, and kept there until the Hyposulphite wash can be used.

MULTIPLYING PICTURES. Pictures obtained by the foregoing process are, what is technically termed, "NEGATIVES,"—that is, having their Lights and Shades throughout *reversed;* these, however, superimposed on paper, prepared as described in the foregoing pages for the Camera, and exposed to Light, would leave on it a "POSITIVE" picture,—that is, with lights and shades as they are in Nature; tbe reason for which must be obvious. Calotype Paper, however, is not generally chosen *for Positives;* a Paper prepared as follows being preferable, and having many advantages.

Dissolve ten grains Muriate of Baryta in one ounce of distilled water.

In a two ounce stoppered Bottle, dissolve fifty grains crystallized Nitrate of Silver in one ounce of water,—add, drop by drop, strong solution of Ammonia, shaking well after each addition;—the whole at first becomes of a dark brown colour, from the formation of a precipitate of Oxide of Silver—but, as soon as the proper quantity of Ammonia is added, the Oxide of Silver is dissolved, and the solution becomes perfectly clear,—a few crystals of Nitrate of Silver should then be added, so as to produce a slight turbidity and it is ready for use.

Having marked the Paper on one side, apply on it the solution of Muriate of Baryta, (this may be done by day light) and allow to dry;—in this state it will keep any length of time without deterioration, and is ready at any time for receiving the sensitive Ammonio Nitrate solution.

When required, a sheet of this paper is to be washed over, on the marked or prepared side, with the solution of Ammonio-Nitrate of Silver, and then hung up in a dark room or cupboard to dry:—when dry, it should be smoothed with a piece of glass, and carefully preserved from Light in a close Portfolio till wanted:—but, between this last operation and its use, a longer period than eighteen to twenty-four hours should not be allowed to elapse,—or the surface will not be pure.

The sheet thus prepared is very sensitive, and will rapidly darken if exposed to a strong light. The Negative Picture to be copied

should be placed, face down, on the prepared surface of this sheet, —and the two opposite, or all four corners, secured with gum or wafer,—aud the two sheets, thus joined, placed in a REVERSING * FRAME;—taking care that the Negative sheet is that next the glass. The Frame should now be exposed to Light,—which, permeating through the unshaded parts of the Negative matrix, darkens the sensitive sheet below. This operation should be continued till a desired intensity in the Positive has been obtained,—which may easily be ascertained by carefully opening the Frame, and examining by raising slightly one corner of the Negative.

To FIX the *Positive Picture*, make a solution of one ounce of Hyposulphite of Soda in one pint of distilled water;—wash the Picture first in cold plain water for a few minutes, agitating all the while;—then wash a few minutes in hot water,—or rather, having laid the picture, face up, on a slab of glass, allow hot water to run over it: this done, the superfluous moisture should be absorbed by gently pressing a few folds of clean white bibulous paper on it. The Picture may then be placed, face up, in the solution of Hyposulphite of Soda till quite soaked through—and afterwards repeatedly washed in pure plain water, till it comes off tasteless. The Picture may now be dried, and is perfectly fixed, and will bear exposure to light without injury.

* REVERSING FRAMES are of various forms;—I have had mine formed thus,—Procure a stout board, in length and breadth about two inches larger than your paper in general use,—and, to cover it, a piece of stout plate glass, (quite white and free frem imperfections,) in length equal to the board, but two inches less in width;—at the four corners have holes to admit, from the lower surface, four screws with flat heads, and of a length to project above the surface one and a half inches;—to fit across the ends of the board, have two battens,—an inch broad, and of suitable thickness,—in the ends of which are holes to admit readily the screws just described, and let the screws be fitted with Nuts;—the upper surface of the board may be covered with cloth or velvet. By means of these Nuts and Battens the Plate glass may be pressed most closely to the board—and a very close contact obtained with the Negative to the Positive Picture.

It may here be remarked that the Negative picture, having generally a woolly appearance from repeated washings, should,—ere being used to make a Positive,—be burnished with a smooth steel, glass, or agate burnisher; and,—if it is desired to soften off the outlines or lights and shades,—a thin, pure, white sheet of paper may be interposed in the Reversing Frame, between the Positive and Negative sheets; or,—which will answer the same purpose nearly,—the Negative may be placed with its back to the Positive sheet. It is sometimes found necessary to make parts, or the whole of a Negative Picture transparent—this may be done by scraping carefully virgin wax on its back,—laying a fold or two of bibulous paper over it, and heating all with a flat iron;—this operation not only melts the wax, but causes the bibulous paper to absorb any excess.

PRINTS,—PICTURES,—LEAVES,—LACE,—or ought else flat, may be copied in the foregoing way.

POSITIVE CALOTYPES. To PROFESSOR GROVE we are indebted for a very ingenious mode of obtaining Positive Pictures by the Calotype process. He directs that ordinary Calotype paper be exposed to Light until it assumes a dark brown, or nearly black appearance;—it is then to be redipped in the ordinary solution of Iodide of Potassium, and dried: when required for use, it is drawn over a solution composed of two parts Nitric Acid mixed with five parts of distilled water. This Paper, when exposed to Light, will have the illuminated parts rapidly bleached; while those not illuminated will remain unchanged. *The fixing* is accomplished, first by washing in water, and afterwards in a bath of Hyposulphite of Soda, or Bromide of Potassium, as before described.

He states also, that—if, after an ordinary Calotype picture has been developed with Gallic Acid,—it be drawn over Iodide of Potassium and dilute Nitric Acid, and exposed to full sun-shine, the Negative will be transformed to a Positive Picture.

CALOTYPE.

By Mr. W. H. S. Crawford.

Selection of Paper. For either *Negatives* or *Positives* I am disposed to give the preference to Turner's Paper, with which I have generally obtained the best results. I have tried *Whatman's*,—and *Canson Frere's &c.*,—but never with such success. Let the paper selected be pure,—clear, and of a smooth hard surface, free from black specks. By holding a sheet up before a strong light any flaws or imperfections will readily be detected,—if any appear, the paper should at once be rejected; and, if the sheet contain a stamp, or water mark, it must be cut off.

Solutions required. *Obtain five glass stoppered Bottles* of the capacity of *about four ounces each.* Label these—No. 1,—No. 2,—No. 3,—No. 4,—and No. 5.

In No. One make the following Solution.

In *two ounces of distilled water* dissolve *sixty-five grains Nitrate of Silver* in crystals;—when *perfectly dissolved,* add *Iodide of Potassium,* until the precipitate which is formed is *just* dissolved;—particular care must be given to this point.

In No. Two dissolve *one hundred grains of Nitrate of Silver in Crystals in two ounces of distilled water.*

In No. Three have *two ounces of strong Glacial Acetic Acid.*

In No. Four put *three ounces of distilled water,* and *saturate* it with *pure Gallic Acid,*—agitate and allow the mixture to settle.

Into No. Five filter *two ounces* of the *clear Saturated Solution* from No. 4.

All these Bottles should be protected from Light by a Black covering of Paper or Cloth.

To Iodize the Paper. The Paper must be iodized on a *particular side*,—viz. on the *reverse of that on which the web or rough appearance* is *most apparent*;—the proper side should always be marked with Pencil, so that it may easily be known in the after Processes.

Having a perfectly clean slab of Glass or Marble of the size of your Paper, placed on bibulous paper,—pour on it some of the Solution from bottle No. one, and diffuse it with a glass rod evenly over all the surface;—on this lay the sheet of Paper, marked side on the solution, until every part has been evenly wetted, taking care that no air bubbles intervene. The best mode to do this is to seize the sheet of Paper *by diagonal corners*—bend up on the opposite diagonal,—lay it thus, evenly, on the slab, and bring down both corners accurately and gradually;—no air bubbles will intervene if the operation is neatly performed, which practice will soon enable an operator to do.

When the surface has been *evenly* and thoroughly moistened, the paper must be taken carefully off from the slab, and laid *face up* on a clean board to dry:—when dry, or nearly so,—the Paper must be washed in four or six baths of clean water, and finally suspended to dry. When dry, the sheets should be flattened by pressure,—and kept in a close Portfolio ready for use.

Before being used, this Paper should be exposed to full sunshine from ten to thirty minutes,—which appears to induce on its surface an increased state of Chemical activity, highly beneficial,—nay even necessary for a *perfect* result.

To Excite the Paper. I use *the exciting wash* of various strengths, having various objects in view;—for instance, for Portraits of children, or moving objects, a highly sensitive surface is preferable;—for the Portrait of an adult, likely to sit steady without much trouble,—or when there is a large amount of illumination,

a less sensitive surface should be taken—as, in such way, details are more minutely developed;—for Views again, for the same reasons, a less active surface is desirable. I give therefore directions for three exciting mixtures, to be employed at the discretion of the operator.

Very sensitive Wash for Portraits—Mix together equal volumes of Bottles No. 2,--No. 3,—and No. 5.

Less sensitive Wash for Portraits—Mix together two drams of Bottle No. 2,—four drams No. 3,—six drams No. 5,—and six drams of distilled water.

Slow Wash for Views—Buildings &c.—Mix together two drams of Bottle No. 2,—four drams No. 3,—ten to thirty drams of No. 5, and ten to thirty drams of distilled water, (according to the amount of Light available.)

It sometimes happens, either from the heat of the atmosphere, or other causes, that the Gallic Acid solution decomposes;—when this happens,it would be fruitless to use it,—and it had better be dispensed with altogether in the exciting liquid,—and simply a solution of *Aceto Nitrate of Silver* adopted viz.

For Portraits—Mix together one dram Bottle No. 2, and five drams No. 3.

For Views—Mix together—one dram Bottle No. 2 and ten drams No. 3,—and, if found necessary to weaken the solution—five to ten drams distilled water.

The application of either of these washes is to be effected in a mode similar to that described for iodizing;—when the surface of the Paper has been equally wetted, it will adhere flatly to the slab,—in this state a piece of bibulous paper should be placed lightly over it, and, by a gentle and gradual pressure, all superfluous moisture absorbed. The prepared Paper must now be placed between the glasses of the Camera slide, and exposed, or kept ready for exposure,—but this should be done *as soon as possible after exciting,*—the Paper, in its damp state, being more *impressionable.* If the glass slab, employed for applying the solution, be that used also in the Camera, it will only be necessary to

wipe its lower surface, without removing the paper,—and place it in its proper place in the Camera slide.

Exposure in Camera—I can only give *an approximate time* for this operation,—as it is influenced in many ways. With a Lens of broad diameter (about 3 inches), and Paper prepared with *the sensitive Portrait Mixture*, and a strong diffused light, (tho' in the shade) *half a second, or less* would do;—reducing these capabilities, a *proportionately longer exposure* would be requisite;—and, for Paper prepared with the *slow wash for Views &c.*, from *two* to *five minutes, or more*,—according to the amount of illumination—might be needed.

To Develop the Picture—The developing solution must be modified, to accord with the nature of the exciting liquid used.

For a Picture taken on *the sensitive Portrait wash*—use one dram of Bottle No. 2 mixed with three drams of No. 5.

Where *the slow wash for Views* has been used—mix one dram of Bottle No. 2 with eight drams No. 5.

The developing solution must be applied to the impressioned surface as described for the other washes;—or, as a bath,—and the Picture closely watched during development. When developed to a proper intensity,—proceed to the next operation—viz.

To Wash the Picture. Having several flat pans or dishes filled with *tepid water*, wash the picture in each,—using four or six changes of water.

To Fix the Picture. Having a solution, made of one ounce Hyposulphite of Soda dissolved in sixteen ounces of distilled water, make it warm by dipping the Bottle, which contains it, into a Jug of hot water. Place sufficient in a Pan to cover to the depth of a quarter of an inch, and in this bath put the Picture *face down*,—until all the Yellow Iodide has been removed, which may be ascertained by holding the sheet up to Light. The Picture must then

again be washed as before, in two or three baths of tepid water, and finally in two or three baths of fresh water, *at blood heat.* If,—when it is deemed that the washing has been sufficient,—the water is *tasteless,* the Paper may be taken out and dried between sheets of bibulous Paper:—if, however, the water retains a *sweet taste,* (peculiar to Hyposulphite of Soda with Iodide of Silver) it will be necessary to repeat the baths. A Picture thus obtained is a NEGATIVE,—and to make it serve as a Matrix for Portraits, if of a dark tone,—or the Paper is somewhat thick,—it should be *Waxed,* to render it transparent:—if, on the contrary, clear, it may be allowed to remain as it is.

To WAX THE NEGATIVE. Either a Metal Plate— or Glass slab, of the size of the Picture to be operated upon—also a flat Box Iron, are required in this operation.

Having levelled the Metal Plate, or Slab,—heat it with a spirit lamp sufficiently to melt Wax,—then rub over its surface pure white Wax till evenly covered,—and apply upon it the *back of the Negative,*—and cause a close contact;—after which, remove and place the Negative between sheets of clean bibulous Paper, and Iron, (with the Box Iron) at a heat as intense as practicable, without burning the paper. This removes all excess of Wax, and leaves the Negative clear and transparent, and quite ready for use as a Matrix.

Any modification of the above may be adopted at the pleasure of the operator, so long as the desired end is attained.

POSITIVE PICTURES. For Positive Pictures it is not so necessary to have a thin Paper;—care however must be taken to have a good quality, with a pure, hard, and even surface,—I have found Turner's Paper answer remarkably well.

TO PREPARE PAPER FOR POSITIVES. Having examined, and marked *the proper* side of your Paper,—soak it, sheet by sheet, for *one minute* in a bath, composed of one Drachm Chloride of Sodi-

um (common salt) dissolved in one pint of distilled water;—then take out and, placing it on *a clean* slab or board, absorb off from *both sides*, with a linen cloth, all superfluous moisture;—after which allow the sheets to repose, face up, to dry. When perfectly dry, flatten the sheets by pressure, and lay them by in a Portfolio for use.

To EXCITE THE PREPARED PAPER. Make the following solution, —taking great care that the glass measures,—bottles &c., are *quite clean.*

Dissolve in one ounce of distilled water fifty-five grains Nitrate of Silver in Crystals;—when *thoroughly dissolved,* add three minims of Nitric Acid, diluted with thirty minims of distilled water;—after which, throw in to the mixture forty minims of strong caustic Ammonia.

Apply the Solution just described to the prepared side of the Positive Paper by means of a slab;—when evenly wetted, the sheets may be laid, *face up,* on bibulous paper to dry. When dry, flatten by pressure, and be careful to keep them from Light,—The surface being so sensitive as to be liable to instantaneous darkening on exposure. This paper should be used as soon after drying as possible; —it will not keep well beyond twenty-four hours.

To PRINT, or MAKE THE POSITIVE. Lay the Excited Paper, *prepared side up,* on the Board of the Reversing Frame,—and, on it, place the Negative, *face down ;*—secure them together at two, or more corners, with pieces of Wafer or Gum. Now lay on the Glass slab, and screw down the binding screws with as strong a pressure as the glass will bear;—then expose all to broad day-light,—or—if the light be not very strong, or the Negative has *not* been waxed,— to direct Sun-shine;—the unprotected portions of the Positive Paper will soon darken. When the desired shade has *about* been obtained, the Reversing Frame should be taken to the Dark Room, and opened, and the Picture carefully examined,—without disturbing the relative positions of the Negative and Positive—if the Positive is

not quite done,* a further exposure must be instituted till it be complete.

Washing and Fixing Positive Pictures. As soon as the Positive Picture is completed, it must *at once* be washed in four or five changes, or baths, of tepid water—and then in a † Hyposulphite of Soda Bath,—the same as used for the Negative (viz. one ounce of the Salt dissolved in sixteen ounces of distilled water). When the Paper has become clear and transparent, it must be washed in two or three baths of tepid water, and finally in water, *at a blood heat*, till all the Hyposulphite of Soda has been dissolved out;—damp off superfluous moisture with bibulous paper, and dry as before.

N. B. The Hyposulphite of Soda Bath used for washing the Negative Picture is found very efficacious for washing the Positive.

To Varnish Positive Pictures. Make a weak solution of Gum Arabic—or Isinglass—flood the surface of the Picture, and suspend by a corner to dry.

Very good Positives may be made thus. In two ounces of distilled water dissolve sixteen grains Hydrochlorote of Ammonia, to which afterwards add two ounces of the transparent white of egg; —beat all into a froth,—strain,—and allow to settle one night. On a bath of this mixture soak *the marked* side of your paper four or

* It is better always to allow the darkening to go a litle further than what the appearance might indicate as correct; for, in the washing and fixing processes, a slightly lightening effect takes place in the shades.

† French Photographers employ a solution of Gold to produce an improved depth of tone in the Lights and Shades of Calotypes—as follows:—Dissolve one grain Chloride of Gold in two ounces of distilled water, to which add twenty minims strong Muriatic Acid. The Picture must be immersed in this bath, and afterwards well washed in water—previous to being fixed with the Hyposulphite of Soda bath.

five minutes,—after which suspend to dry;—when dry, (protecting with folds of Paper,) iron it with an iron as hot as the paper will bear without singeing.

Exciting. In one ounce of distilled water dissolve seventy grains Nitrate of Silver, to which add thirty minims of Glacial Acetic Acid;—apply this solution to the marked side of the paper, and suspend to dry. Make a Picture in the Reversing Frame in the usual way.

Fixing. *Dissolve* eighty to one hundred grains Nitrate of Silver in distilled water,*— to which add, drop by drop, a saturated solution of Chloride of Sodium, (common Salt) until it ceases to precipitate a whitish deposit;—then allow the whole to repose till the precipitate has settled,—pour off the supernatant liquor. The precipitate should be exposed to Sun-light, stirring frequently with a glass rod, and, when dry, it forms a black powder (Chloride of Silver). In six ounces distilled water dissolve one ounce of Hyposulphite of Soda, and add to it the black powder just described—dissolve carefully,—filter,—and keep the solution in a well stoppered bottle.

The Positive to be fixed must be immersed in a bath of this mixture, and allowed to remain in it from forty to seventy minutes, or longer,—according to the shade of colour desired,—it must then be passed through several baths of clean water, and finally *well* soaked,—even a day or two, if the nature of the paper will admit of it;—dry, and flatten between folds of paper.

* A Saturated Solution.

KEROOTYPE, OR WAXED PAPER PROCESS.

Choose with care your Paper, which should be even,—not too thick,—and free from specks. Mark all the sheets with a letter, so that the right side may readily be distinguished. Procure some of the purest White or Virgin Wax,—and, with it, wax the Paper; —this may be done in various ways—for instance, a dish may be made to fit upon a vessel containing boiling water (kept boiling by a spirit of lamp)—the Wax, placed in the upper dish, will soon liquify; the Paper may be dipped in,—and, when thoroughly saturated, taken out,—the superfluous wax drained off, by holding it before a pretty strong fire,—and any remaining excess may be absorbed out by laying the sheet between folds of bibulous paper and ironing the whole, till the sheet appears perfectly transparent,—free from patches of wax,—and even; or a copper or silver plate,—the size of the paper required,—may be placed on a Tripod, and heated just sufficiently to melt the wax, which should then be rubbed over it; the paper afterwards applied, and so on as before.

The Iodized Paper. Boil gently in an earthenware vessel four ounces of Rice, in four pints of water (to which have been added three drachms of Isinglass) until the grains begin to break.

The liquid, when nearly cool, should be strained through fine linen.

* In two pints of this Rice water dissolve,

700 grains Sugar of Milk.
240 „ Iodide of Potassium.
12 „ Cyanide of Potassium.
8 „ Fluoride of Potassium.

filter, and keep ready for use.

When required, pour sufficient into a Dish to thoroughly immerse the paper, which may be laid in, sheet by sheet, to the amount of fifteen or twenty sheets; allow the whole to soak for forty to sixty minutes, according to the thickness of the paper. (When the paper has been soaked long enough it generally assumes a Violet hue,—and, if this tint be not attained, it would perhaps be well to throw into the solution two or four grains of Iodine;)—then, turning the whole mass, take the sheets out singly, hanging each by a corner to dry on a tape stretched across the room (by means of a pin, bent like a letter S.) When dry, the sheets may be flattened in a Portfolio, and kept for use. It is not absolutely requisite to keep these in the dark,—but it is advisable, as a very prolonged exposure *would* affect them. The liquid remaining, *after being filtered,* is again fit for use.

Sensitive Coating. In the dark room, dissolve in a stoppered bottle, containing three ounces of distilled water, fifty grains Nitrate of Silver in crystals;—then add one hundred and twenty grains

* The following is a preparation used by Vicomte Vigies,—a very eminent Photographer. Thirty-five ounces, by measure, of Whey, which has been boiled with the Whites of two eggs to clarify it—and filtered:—

385 grains of Iodide of Potassium.
61 „ „ Bromide of „
30 „ „ Cyanide of „
23 „ „ Fluoride of „

Paper prepared with the above, being slow of action, is suitable only for Views and inanimate objects,—but, it has a very great advantage *in being capable of retaining its sensitiveness for as much as two months after preparation.*

Acetic Acid in crystals. If it is desired to keep the paper five or six days, this mixture is recommended;—but, if to be used at once, or in a day or two,—or if great sensitiveness is needed, as for a Portrait, the quantity of Nitrate of Silver should be increased to one hundred grains. This solution is termed the—ACETO NITRATE OF SILVER SOLUTION, and should be protected from light by surrounding the bottle with black paper.

Into a flat dish, large enough to take the paper, pour sufficient of the above solution (*of either strength desired*) to cover to the depth of about a quarter of an inch; and, in a similar dish, place distilled water. Immerse the Iodized paper, and allow it to soak from four to six minutes until the violet hue has disappeared; then remove, and immediately place it in the water bath, where it must be left *at least* four minutes,—lengthening the period the longer you wish to keep the paper before use. Ten or twenty sheets may thus be prepared at one time. *This paper must not be hung up to dry*,—but placed between folds of *new, clean, white bibulous paper.* The whole of this operation must be conducted by the faintest light possible of a candle, protected by a Yellow glass shade, and the Paper afterwards *carefully* protected from Light.

EXPOSURE IN THE CAMERA. It is impossible to name any precise time,—however, it is a remarkable fact with this paper that the most brief exposure is found to impression it; but, if exposed in the Camera too short a time, with reference to the amount of available Light, the developing process would occupy an increased time, even as much as in the ratio of seventy hours to one. The operator, therefore, after taking each material point into consideration,—for instance, diameter and power of his Lens,—the amount of Light available,—and the nature of the object to be taken, (for it is known that the green foliage of a Landscape will take thirty to forty times longer to be produced than a White, or Light coloured Building),—should perhaps permit a somewhat *shorter* exposure, than run the risk of a too prolonged one.

DEVELOPING. Make a solution of sixteen grains Gallic Acid in ten ounces of distilled water, and, having poured sufficient into a flat dish, plunge the impressioned paper in; if the exposure in the Camera has been well managed, in about two to ten minutes the Picture should be attaining a great intensity; if the exposure has not been correct it will take as long as two or three hours, or even days. To accelerate this operation four or six drops of the Aceto-Nitrate solution may be added,—which sometimes produces very intense blacks,—but, the action being so much accelerated, it is requisite to use much watchfulness to stop it at the proper point. When sufficiently developed, the Picture must be well washed in several baths of clean waters, the back being gently rubbed to remove any of the crystalline deposit, which would otherwise produce stains.

FIXING. Immerse the Picture in a bath of Hyposulphite of Soda, of the strength of two ounces to a pint of filtered water;—*immediately* the Yellow Iodide appearance has vanished, the picture should be well washed in plain pure water, and eventually allowed to soak in a good supply of fresh water for half an hour; it may then be dried by suspension, or between folds of bibulous paper.

TEMPORARY FIXING, as in Talbotype, may be effected by an immersion of the developed picture in a solution of one hundred and eighty to two hundred grains of Bromide of Potassium, in a pint of distilled water;—it should however be fixed by Hyposulphite of Soda as soon after as possible.

Only one picture at a time should be placed in the Hyposulphite wash,—but, the same bath will do for ten or fifteen in succession; it is not advisable, however, to retain the solution afterwards, tho' some do,—simply filtering before again using it.

LAST PROCESS WITH THE NEGATIVE. In the foregoing operations the waxed paper has lost much of its transparency, besides having

probably in several places a cloudiness, or seeming stains;—to remedy all this, it is simply necessary to hold the Picture before a moderate fire,—or, having superposed a sheet or two of bibulous paper,—pass a moderately heated Iron over all—but be careful not to over-do this operation.

Positives—may be made from the Wax paper Negative on paper prepared as for Positives for the Talbotype, and by a similar mode.

COLLODIOTYPE.

This is a process for getting Pictures on a film of COLLODION,* evenly diffused over the surface of a Glass Plate, perfectly smooth, and free from imperfections.

* COLLODION. The following is COUNT DE MONTIZON'S mode of making Collodion.

Into a basin of clean water put ten drams of Sulphuric Acid, one ounce and a half of Nitrate of Potass, and forty grains of clean carded Cotton Wool. Stir with glass rods for about six minutes, till the Cotton is thoroughly saturated,—then wash in seven or eight changes of clean water,—and, finally, in two washes of distilled water;—dry in cloth and blotting paper;—then, pull out the fibres with the hands, and dry thoroughly by a fire. When quite dry, to one ounce of good Sulphuric Ether add eight grains of this prepared Cotton;—if well prepared, it dissolves completely (sometimes the addition of a small quantity of Alcohol is necessary.) This should either be allowed to settle till clear, or filtered through clean linen.

The following six plans for Iodizing Collodion are by the same gentleman:—

1*st.* Into one ounce of Collodion put a little Iodide of Silver, and then shake it well up. The Collodion becomes very turbid,—but, on being left for some hours, it gradually clears up beginning from the bottom. When quite clear, pour off the liquid into another bottle.

2*nd.* To one ounce of Collodion, add two grains of Iodide of Ammonium. This will give very beautiful gradations in the half tones;—but not so vigorous a picture as the first.

3*rd.* In eight drams of pure Alcohol dissolve perfectly, eight grains Iodide of Ammonium, or Iodide of Potassium, and half a grain of Iodide of Silver,—then add 24 drams of Collodion. The Iodide of Silver ought to be freshly made, or the resulting Nega-

Cleaning the glass plate;—to do this, any mode may be adopted which will leave a surface clean and free from grease;—but, perhaps the best plan is to use a few drops of Ammonia combined with Alcohol;—rub the plate over on both sides with it,—rinse well in clean water,—dry with a clean linen cloth,—and polish with soft wash leather; unless the plate is thoroughly clean the Collodion film will not adhere.

Coating. Hold the plate in the left hand by the extreme corner,—(or by some other convenient means) perfectly horizontal;—with the right hand, pour on its centre a small quantity of the Collodio-Iodide,* sufficient to diffuse itself over the surface. To do

tive will be of inferior quality. The Iodide of Ammonium, too, ought to be newly made. This Collodion is one of the most sensitive, but the half tones produced by it are inferior.

4th. In eight drams of Alcohol, dissolve eight grains of Iodide of Potassium, four of Iodide of Ammonium, and half a grain of Iodide of Silver—then add 24 drams of Collodion. This forms a very sensitive medium.

5th. In two and a half ounces of Collodion,—five drams of Alcohol,—and five minims of liquid Ammonia, dissolve fourteen grains of Iodide of Ammonium. This forms a very good Collodion—very sensitive, and colourless.

6th. In two drams of Alcohol, dissolve six grains of Iodide of Potassium and add six drams of Collodion.

* Collodio-Iodide is made thus.—Dissolve one hundred and sixty grains Nitrate of Silver, in crystals, in four ounces of distilled water, and one hundred and sixty-six grains Iodide of Potassium in two ounces of distilled water; on the addition of the Iodide of Potassium to the Silver solution a precipitate of Iodide of Silver is formed; this must be well washed in distilled water. The precipitate of Iodide of Silver is then to be dissolved in a saturated solution of Iodide of Potassium, the precipitate being also added to saturation. This solution is now to be added to the Collodion, till a turbidness is apparent, which indicates that sufficient has been added. The Iodized Collodion,—or Collodio-Iodide—is now completed, and should be left to get clear and bright,—when it should be of a light straw colour, if darker it indicates the presence of Acid either in the Ether, or Gun Cotton.

this well requires some little practice, but afterwards it becomes easy enough;—directly it is diffused over the plate, the superfluous liquid should be repoured into the Bottle. If the Collodion becomes too thick, it may be thinned with a little good ether.

Exciting. This must be conducted in a dark room. In a dipping trough, the size of the plate in use, prepare a bath of thirty-two grains Nitrate of Silver dissolved in one ounce of distilled water—filtered. In this, by means of a glass holder, the plate should be at once dipped—and allowed to remain about forty seconds,—then taken out for three or four seconds;—this operation should be repeated five or six times; when done, allow all the excess of moisture to drain off without letting the surface dry,—and place it in a dark box of the Camera slide.

Exposure. The plate, if properly prepared, is very sensitive; a well illuminated View may be taken in a fraction of a second;—but, if less illuminated, a proportionately longer time would be needed;—a few experiments will determine the proper time,—for instance, if, in the after process (developing), the parts of the Picture least illuminated develop directly the solution is applied, it may be inferred the exposure has been too long, and vice versa.

Development. The Plate must be taken to the dark room, and carefully placed (with the least amount of fingering possible) on a levelled stand; then, of a solution composed of five grains of Pyrogallic Acid, ten ounces of distilled water, and forty minims of Glacial Acetic Acid, (first filtered), take (for a plate 5 inches by 4 inches) about half an ounce, to which add eight to ten drops of a fifty grain solution of Nitrate of Silver;—pour this steadily on the plate, *(not all in one place,)* and assist it to diffuse over the surface by blowing gently. The picture will now gradually develop,—and, by holding a sheet of white paper or a Light underneath the plate, the degree of intensity may be ascertained,—and the operation stopped at the desired point. The liquid should now be thrown off, and the

plate well, but carefully washed with water,—this is best done by allowing a stream to run over its surface,—taking care to hold the plate horizontally,—for, if held vertically, the Collodion Coating is apt to rend.

Fixing. This operation may be conducted in day light;—and, as the object is to remove the Iodide from the plate,—it must be laid in a bath of Hyposulphite of Soda, of the strength of about four ounces to a pint of distilled water, and gently agitated. The Iodide will gradually disappear, leaving the whites of the Picture perfectly clear and transparent. It is then only necessary to wash the plate in clean water to remove the Hyposulphite of Soda,—which should be carefully but thoroughly done,—after which, it may be dried before a fire, or stood up to dry in a place free from dust.

Positive Pictures. By the foregoing operations a Negative Picture is the result, from which Positives may be made, by the same mode as in Talbotype, on paper; but, to get a Positive Picture at once on glass, the operation should be proceeded with thus. Having prepared the plate in the just described way,—let the exposure in the Camera be *shorter* than directed for a Negative, then develop with a solution of ten or twelve grains of Protosulphate of Iron dissolved in one ounce of distilled water, and two drops of Nitric Acid;—or one part of Proto-Nitrate of Iron with three of distilled water,—taking care that the development be not carried too far. The rest of the process is the same as before, and the result a Positive Collodiotype.

Mr. Fry,—an eminent Collodiotypist,—uses Gutta Percha mixed with Collodion, and his mode of preparation not only strengthens the film,—but increases considerably the sensitiveness of the plate. To two parts of thick, strongly charged, Collodio-Iodide, add one of a saturated etherial solution of Gutta Percha, and allow it to stand thirty to forty hours to clear, before using it. The plate should be coated as usual,—and, as the Ether evaporates, a peculiar

white film forms,—it should then, at once, be immersed in the bath as before described.

Mr. Fry,—for the developing of the Negative Picture,—recommends the Pyrogallic solution one grain to the ounce stronger than before given, and an extra quantity of Acetic Acid,—and also to *redip* the plate in the Nitrate of Silver bath, instead of adding silver solution to the Pyrogallic. In fixing these, as the Iodide is held with greater tenacity, it is necessary to prolong the immersion in the Hyposulphite bath;—otherwise the rest of the process is the same.

Varnishing Collodiotype Plates. The film of a Picture in its present state is very tender,—and, for protection ere using it for taking Positives, it should be subjected to one of the following Varnishing processes:—Make a thin Varnish of either Mastic or Gum Dammer;—pour some on the film of the Picture, and let it spread evenly all over its surface;—pour back the superfluous varnish, gently heating the plate to assist it in running off; a very thin coating will thus remain; the plate may now be stood up in a protected place, free from dust, to dry and harden the Varnish.

A plan adopted by Mr. S. Buckle, (an eminent Photographist) is to use the ordinary pale Spirit Lacker in the same way as above, but first slightly heating the plate;—when as much of the varnish as will run off has been taken away,—continue to heat the plate, (taking care not to ignite the varnish,) the Spirit will be speedily evaporated, and an even hard surface formed; this, with care, is an excellent plan, as it may be completed in a few minutes.

Another Varnish,—for which we are indebted to Dr. Diamond,—is made by dissolving finely powderod Amber in Chloroform;—the solution is effected in a few days. This Varnish flows readily over the plate,—and dries speedily, leaving a hard, transparent, glaze on the plate.

ALBUMENIZED GLASS PROCESS.

By Mr. Fox Talbot.

1*st.* An even and spotless glass plate must be carefully cleaned as described for the Collodion process.

2*nd.* Take the most liquid portion of the white of an egg, and mix with an equal quantity of water;—spread the mixture thus obtained evenly on the plate and dry before a fire;—a tough, uniform, and nearly transparent film will be formed.

3*rd.* In six drams distilled water, dissolve three grains Nitrate of Silver, to which add two drams pure Alcohol.

4*th.* Into the foregoing solution dip the prepared plate, and allow it to dry spontaneously;—then, wash in clean water and again coat the plate with the Albumen mixture *(2nd)*,—but be careful not to use a strong heat in drying.

5*th.* To an Aqueous solution of Proto-Iodide of Iron add, *first* an equal volume of Acetic Acid, and then ten volumes of Alcohol;—Allow the mixture to repose two or three days.

6*th.* Into the Iodide solution *(5th)* let the plate be dipped for a few seconds,—(a strong light should be avoided in these operations.)

7*th.* Make a solution of seventy grains Nitrate of Silver in one ounce of water, to which add five drams of Acetic Acid. Into this solution let the plate be dipped two or three times;—this makes it very sensitive,—and, if placed at once in the Camera, a Picture may be had in a fraction of a second.

8th. With seven drams of distilled water mix three drams of a saturated solution of Protosulphate of Iron,—and, into it, dip the plate taken from the Camera;—the Picture will be seen developing rapidly. When the proper intensity has been obtained, wash in clean water.

9th. In two ounces water, dissolve one dram Hyposulphite of Soda,—and, in this bath, immerse the plate, and gently agitate; the Picture in a minute or two becomes beautifully distinct, owing to the removal, by the Hyposulphite, of the Iodide film. The plate should next be well, but carefully washed in clean water,—dried,—and then coated with Amber Varnish to protect the film.

By Mr. Malone.

1*st.* To the white of an egg, add an equal bulk of water, beat up, and strain through linen cloth. On a glass plate, previously well cleaned, pour sufficient of this mixture to be equally diffused over its surface, and return any excess ; let dry.

2*nd.* Having a pan charged with Iodine in Crystals,* expose the prepared surface of the plate (previously heated to about 100° Fahrenheit) to its vapours, until a uniform Yellow colour has been obtained.

3*rd.* In the dark room, the plate is now to be immersed vertically and rapidly in a bath composed of one hundred grains Nitrate of Silver, and fifty minims of Glacial Acetic Acid, diluted with five ounces of distilled water ; allow it to remain until the Yellow tint disappears, and is succeeded by a milky looking film;—wash in water;—and then expose at once in the Camera.

4*th.* On the plate, when taken from the Camera, pour a saturated solution of Gallic Acid, a Negative Picture is developed, which may be washed and fixed (as described at 5*th*) ; but, if it be desired to a have a Positive picture at once—a small quantity of a strong solution of Nitrate of Silver should be poured on the plate,—when, after some curious changes, a Positive Picture will be the result.

5*th.* Now immerse the plate (whether Negative or Positive) in a bath of Hyposulphite of Soda, having one dram of the salt to two ounces of water; gently agitate for a few minutes until the Iodide has been dissolved, when the plate should be copiously washed in clean water,—dried,—and varnished as described in previous pages.

* Muriatic Acid, Chlorine, or Bromine,—may be used with the Iodine, if desired, to give increased sensitiveness to the film, as in Daguerreotype.

By Mr. Bingham.

1*st*. Beat up two eggs for about ten minutes, cover, and allow the froth to resume a fluid state.

2*nd*. On a levelled glass pour sufficient of this mixture to cover the whole plate; take off any excess, and allow the remaining layer to dry: then, for two or three minutes, submit it to a heat of 212°.

3*rd*. Immerse the Plate wholly and rapidly in a bath composed of fifty grains of Nitrate of Silver, in one ounce of distilled water; —then, take it out, and wash for a minute or two in clean water.

4*th*. Immerse the plate, for about a minute, in a bath composed of ten grains Iodide of Potassium dissolved in one ounce of distilled water;—then wash well for about ten minutes in clean water.

5*th*. Immerse the Plate in a bath composed of one dram of the Gallo Nitrate of Silver (described in page 68.) mixed with twenty drams of distilled water; let the plate remain quiescent for three or four seconds,—after which take it out, and shake off any superfluous liquid.

6*th*. Expose in Camera. The plate is now very sensitive, and will retain its sensibility for ten or twelve hours.

7*th*. Develop—by pouring on the plate a little Gallo-Nitrate of Silver; and gently warm it;—when sufficiently developed, wash in clean water.

8*th*. Fix with a solution of Hyposulphite of Soda,—two ounces in sixteen ounces of distilled water;—when the Iodide has disappeared, wash copiously in clean water,—dry,—and varnish.

By Mr. Thornthwaite.

1*st.* Beat up into a firm froth the whites of four eggs, to which have been added forty drops of a saturated solution of Iodide of Potassium, and four drams of distilled water,—and allow the mixture to settle for one night.

2*nd.* On a *clean* glass plate, supported at diagonal corners by means of wire forceps, and properly adjusted, pour sufficient of the above to cover it thinly; by a string, attached to the wire forceps, cause the plate to revolve, at a moderate speed, before a gentle fire.

3*rd.* Dip the plate, prepared side down, into a bath composed of seventy grains Nitrate of Silver in one ounce of distilled water, to which have afterwards been added one and a half drachms of crystallized Acetic Acid;—then wash in pure water by dipping it three or four times.

4*th.* Expose in the Camera ; under ordinary circumstances three or four minutes exposure would be necessary,—but, for a Landscape *having much green foliage*, a longer time would be necessary.

5*th.* Develop well with a solution of Gallic-Acid;—after which pour on the Picture a little more Gallic-Acid solution, to which has been added a few drops of Nitrate of Silver:—wash with clean water.

6*th.* Fix with a solution of two ounces Hyposulphite of Soda in twenty ounces of distilled water,—then wash copiously in clean water;—dry—and varnish.

ALBUMENIZED PAPER PROCESS.

By Mr. Le Gray.

Negative Paper.

1*st.* Pour into a flat dish a mixture composed of white of eggs,

Two fluid ounces and a half
Iodide of Potassium.....56 grains.
Bromide of Potassium..... 15½ „
Chloride of Sodium..... 4 „

Over this mixture draw the marked side of the paper,—and allow it to imbibe the mixture for about one minute;—then take out, and hang it up to dry.

2*nd.* Having in this way prepared as many sheets as desired; place them, one over the other, between folds of white paper and pass over them a very hot iron,—taking out each time the uppermost sheet. The Albumen, it will be found, has been rendered insoluble by heat.

3*rd.* Excite by means of an Aceto-Nitrate bath, such as used for the Kerootype.

4*th.* Develop as described for that process.

5*th.* Expose and fix in the same way, also.

Positive Paper.

1*st.* Take white of eggs, to which add one fifth part, by volume, of a saturated solution of Chloride of Sodium;—beat into a froth, and, after settling one night, decant the clear fluid:—wash the marked side of your Paper with this.

2*nd.* Excite with a strong solution of Nitrate of Silver.

By M. Niepce de St. Victor.

Negative Paper.

Beat into a froth the whites of eggs, to which saturated solutions of Iodide of Potassium and Bromide of Potassium have been added, in the proportion of thirty drops of the former and two drops of the latter for the white of each egg. Let the mixture stand till the froth returns to a liquid state;—filter through muslin,—and collect the Albumen in a large flat vessel. On this mixture lay the paper to be prepared, and allow it to remain there for some minutes. Drain off, and hang the paper up to dry.

The subsequent preparation with Aceto-Nitrate of Silver is similar to that described at page 84, but the prepared sheet *should not* be dried between folds of bibulous paper until it has become perfectly transparent.

The time necessary for exposure will be four or five minutes.

The developing &c. may be conducted as in Talbotype.

The Albumenized Paper, just described, will keep in good order for an indefinite period;—but, after being excited, not longer than twenty to twenty-four hours.

Positive Paper.

To four parts of white of eggs add one part, by weight, of distilled water saturated with Chloride of Sodium—beat into a froth, and filter as before.

Place the marked side of your paper on this mixture,—but allow it to remain in contact only half a minute,—then hang it up to dry.

Excite the Paper by a six minutes' contact on a solution of twenty-five parts Nitrate of Silver dissolved in one hundred parts of distilled water; then place it on a Plate to dry.

By Mr. Blanquart Evrard.

Negative Paper.

1*st.* Beat into a froth the whites of eggs, to which a saturated solution of Iodide of Potassium has been added, in the proportion of thirty drops for each egg. Let this mixture stand until the froth returns into a liquid state; filter through clean muslin, and collect the Albumen in a large flat vessel; on this lay the Paper to be prepared, and allow it to remain there some minutes;—when sufficient Albumen has been imbibed, lift up by one of its corners, and allow it to drain; and, lastly, suspend it to dry.

2*nd.* Cover a slab of glass with Aceto-Nitrate of Silver,—composed of one part Nitrate of Silver, two parts Glacial Acetic Acid, and ten of distilled water; on this solution the Albumenized paper should be carefully laid,—beginning at one corner of the Paper it should be depressed on the solution by an even, regular motion, not stopping a moment, otherwise there will be a stain. After the paper has become quite transparent, (which may be ascertained by lifting it up, and looking through it at a lighted candle,) it must be dried between folds of bibulous paper, and placed between the glass of a Camera frame.

3*rd.* The Picture is developed by a saturated solution of Gallic Acid.

4*th.* Fix with a solution of Hyposulphite of Soda, of a strength of two ounces in one Pint of distilled water.

Positive Picture.

To four ounces of the clear liquid of white of eggs, add sixty grains of common salt, dissolved in one ounce of distilled water;—beat up into a froth and allow it to liquify; strain through muslin into a flat dish. On this mixture, very carefully give the paper on

the marked side, a half minute's contact; drain and hang it up to dry. If several sheets are prepared they should be submitted to a strong pressure between sheets of clean Paper—to flatten them. Excite by a two minutes' contact on a solution of one hundred and twenty grains of Nitrate of Silver in one ounce of distilled water; allow the paper to drain—and dry before a gentle fire. The sheet may then be exposed. Fix in the usual way.

WEIGHTS, MEASURES, &c.

Correspondence of English & French Weights & Measures.

English Weights.	*English grains.*	*French Grammes.*
2.2055 Pounds Avoirdupois 2.6083 „ Troy... ...	15438.....	1000... = 1 Kilogramme.
1 Pound Avoirdupois....	7000.....	453.4
1 „ Troy.....	5760.....	373.096
1 Ounce Troy.....	480.....	31.091
1 „ Avoirdupois....	437.5....	28.338
1 Drachm Apothecaries.	60.....	3.8864
1 „ Avoirdupois....	27.344.	1.7711
1 Imperial grain.....	1.....	0.065
	15.438.	1. =1 Gramme.
	1.5438	0. 1 =1 Decigramme.
	.1544	0.01 =1 Centigramme.
	.0154	0.001=1 Milligramme.

English Imperial Measures.	*French Litres.*
1 Gallon.....	4.5455
1 Pint=20 fluid ounces.....	0.5682
1 Decigallon=16 do.....	0.4545
1 Fluid ounce, being the bulk of an avoirdupois ounce of Water at 62° Fah.	0.2841
1 Fluid Drachm.....	0.0355
1 Septem—being the bulk of 7 grains of water at 62° Fah. or the $\frac{1}{10000}$ of a gallon	0.000455
0.22 Gallon.....	1.000
1.76 Pint.....	
2.20 Decigallon.....	
2.2 Septems.....	0.001=1 Centimetre Cube.
15.4 Grains of water, at 62 ° Fah.....	

Apothecaries Weight & Measure.

60 Drops or Minims.....1 Dram.
8 Drams or 480 Drops.....1 Ounce.
16 Ounces.....1 Pint.

---

20 Grains.....1 Scruple.
3 Scruples.....1 Drachm.
8 Drachms.....1 Ounce.
12 Ounces.....1 Pound.

---

20 Ounces.....1 Imperial pint.
16 Liquid Ounces.....1 Pound.
1 „ „ .....480 Grains.

NOTES.

DAGUERREOTYPE.

By Captain H. B.

Cleaning the Plate. My process for cleaning the plate is as follows:—1st Olive oil, Cotton, and Pounce.—2nd. Pounce and dry Cotton.—3rd. Dilute Nitric Acid, and Cotton.—4th. Alcohol, Cotton, and Pounce.—5th. Velvet Buff, and prepared Lampblack. After having used this, I place the Plate over the Iodine frame, till it arrives at a good gold colour;—I then expose it to full Sun-light,—and, when blackened, I use the plain Velvet Buff, and obtain a very pure, and well polished surface. The Theory of this, I presume, is—the Iodide of Silver Coating, formed by the exposure over Iodine, is removed by the buff, and leaves a perfectly pure surface of Silver.

Sensitive Coating. I have tried very many accelerators,—such as—*Bromine water*,—*Chloride of Iodine*,—*Hungarian Liquor*,—and *others*,—but, for this Country, have found none that can compare, both for sensitiveness, and depth of effect, with *a weak solution* of Chloride of Bromine.

Having cleaned the Plate, as above described, I bring it to a *pale gold colour* over Iodine,—then, for a few seconds, over the Chloride of Bromine, which changes the colour to a slightly *rosy tint*. I then give it from 12 to 15 seconds over the Iodine,—which makes it ready for the Camera,—and I find, with anything like a good light, I can obtain perfect pictures *in from* 6 *to* 10 *seconds*.

Bringing out the Picture. I have had a Camera so constructed that I can apply the Quick-silver fumes to the Picture during the time of its exposure to the object. My plan is to heat the Cup, containing the Mercury to about 180° Fah. *before* I open the dark slide, and to allow the Plate to be subjected to the fumes of the Mercury after I have closed the Cap of the brass tube containing the Lens, till the Cup of Mercury is nearly cold. I have found this plan to succeed well,—and I think the results prove that you get the smaller details of the picture with more distinctness than by the ordinary method.

Fixing the Picture. After taking the Plate from the Mercury Box—and without washing it in any way—I find the simplest and most expeditious way of fixing it is *by the Battery Process.*

I use a small Smee's Battery, excited with dilute Sulphuric Acid—(1 of Acid to 8 or 10 parts of water). In the Precipitating trough I use either Auro,—or Argento-Cyanide of Potassium,—(a weak solution),—to the one pole of the battery I attach by a wire a small piece of pure Gold (half an inch square will do), and, to the other, I attach by a wire, and small binding screw, the daguerreotype plate. After making the connections, and placing the Gold in the solution of Cyanide, I plunge the Daguerreotype plate *at once* into the trough—taking care that, in immersing it, I cover the whole plate as quickly as possible;—I then allow the arrangement to stand undisturbed for about 20 seconds, when I remove the plate and plunge it at once into a vesssel of distilled water. If the Gold coating is not sufficient, I again plunge it into the precipitating trough,—carrying the operation to that point at which I find the impression bright,—strong,—and clear. I then wash—first in cold distilled water, and finally place the plate for a few seconds in a vessel of boiling distilled water—which heats it sufficiently to dry it spontaneously—aided by gently blowing down on the surface to remove the small globules of water that may chance to rest thereon.

LIGHT.

In the course of my practice of the Art, in Bombay, I have always observed that, in the Months of APRIL and MAY, altho' the Sun has apparently the greatest power, yet there has been greater irregularity in the effect of the Light, than at any other season, especially when operating during the middle of the day.

KEROOTYPE.

BY MR. W. JOHNSON.

In pursuing the Wax paper process, I have found a proportion of Whey (made from milk) equally effective as sugar of milk—this fact may be of service to beginners in India, where it is so difficult to obtain Chemicals—or aught out of the common.

LIST OF PURE CHEMICALS &c. FOR PHOTOGRAPHIC PURPOSES,

(WITH THEIR APPROXIMATE ENGLISH VALUE.)

Acid Acetic Glacial	£ 0	1	0	per Ounce.
„ Arsenious	0	1	0	„
„ Gallic	0	3	6	„
„ Nitric	0	3	0	per Pound.
„ Sulphuric	0	2	0	„
„ Pyrogallic	1	10	0	per Ounce.
„ Succinic	0	4	6	„
Ammonia pure	0	2	6	per Pound.
„ Muriate	0	0	6	per Ounce.
Barium Chloride	0	0	6	„
Bromine	0	4	6	„
Bromide of Lime	0	6	0	per Bottle.
„ of Iodine	0	1	6	per Ounce.
Chloro Bromide of Lime	0	6	0	per Bottle.
Charcoal, prepared	0	1	0	per Packet.
Cotton Wool, prepared	0	3	6	per Pound.
Collodion	0	2	0	per Ounce.
„ Iodized	0	2	3	„
Copper Sulphate	0	0	3	„
Ether Sulphuric	0	1	0	„
Gold Chloride	0	4	0	per 15 Grains.
Ditto.	0	13	0	per Drachm.
Gold Salt of, (Sel d'or)	0	5	0	per Bottle.

Iodine Pure	0	2	0	per Ounce.
„ Tincture	0	0	6	„
„ Chloride	0	3	0	„
Iron Ammonio Citrate	0	1	0	„
„ Bromide	0	6	6	„
„ Protonitrate	0	0	6	„
„ Protosulphate	0	0	3	„
„ Iodide	0	2	0	„
Isinglass	0	3	6	„
Lampblack, prepared	0	1	1	per Packet.
Mercury, pure distilled	0	5	6	per Pound.
Naptha, for spirit lamp	0	2	0	per Pint.
Potassium Bromide	0	4	6	per Ounce.
„ Cyanide	0	0	8	„
„ Iodide	0	2	6	„
„ Ferro-Cyanuret	0	0	6	„
„ Chlorate	0	0	3	„
„ Fluoride	0	2	0	„
Potash Nitrate powdered	0	0	3	„
Rottenstone, prepared	0	0	6	„
Rouge, prepared	0	0	6	„
Redman's solution of Gold for fixing	0	1	6	per Bottle.
„ sensitive solution	0	2	6	„
Silver Solution (Argento Cyanide of Potassium)	0	2	0	per Ounce.
Silver Nitrate, in Crystals	0	5	0	„
„ Iodide	0	3	6	„
„ Oxide	0	10	0	„
„ Ammoniacal Nitrate	0	1	0	„
„ Double Iodide	0	4	6	„
„ Aceto Nitrate	0	1	0	„
Soda Hyposulphite pure	0	3	6	per Pound.
„ Fluate	0	2	0	per Ounce.
„ Muriate pure	0	0	3	„
Sodium Fluoride	0	2	0	„

Sugar of Milk	0	0	4	per Ounce
Tripoli fine	0	0	9	„
Wax White	0	3	0	per Pound.

APPROXIMATE PRICE LIST,

OF PAPER—GLASS—AND SILVER PLATES, FOR PHOTOGRAPHIC PURPOSES.

Whatman's Paper	£ 0	3	6	per Quire.
Stout hard rolled	0	7	9	„
Turner's	0	3	6	„
Canson Frere's—Negative	0	3	6	„
„ Positive	0	4	9	„
White bibulous Paper	0	1	6	„

Glass Plates.

3¼ inches by 2¾ inches	0	4	0	per Dozen.
4 „ „ 3 „	0	5	0	„
„ „ „ 3¼ „	0	5	6	„
5 „ „ 4 „	0	6	6	„
6½ „ „ 4¾ „	0	8	6	„
8 „ „ 6½ „	0	12	0	„

Silver Plates.

Size.	*English best.* per Doz. £	*s.*	*d.*	*French No. 30* per Doz. £	*s.*	*d.*	*Electro-Plated.* per Doz. £	*s.*	*d.*
2½ in. by 2 in.	0	12	0	0	8	0	0	6	6
2¾ in. by 3¼ in.	1	0	0	0	10	0	0	9	6
4 in. by 3 in.	1	8	0	0	16	0	0	13	6
4¼ in. by 3¼ in.	1	12	0	0	17	0	0	15	0
5 in. by 4 in.	2	5	0	1	7	0	1	3	0
6½ in. by 4¾ in.	3	6	0	1	15	0	1	11	0
8½ in. by 6½ in.	7	10	0	3	10	0	3	0	0

INDEX.

A

B

C

D

E

F

G

H

I—J

K

L

M

N

O

P

Q

R

S

T

V

W

NOTICE.

Mr. Crawford,—having effected arrangements with Manufacturers and Agents in Europe,—is now enabled to undertake confidently the execution of orders for all descriptions of Photographic and other Philosophical Apparatus,—Chemicals *(of the purest Manufacture) &c. &c.*

Articles, *if not of a bulky nature*, will be had out per Overland Route, at a charge of *ten annas per shilling* of the English price,—or, viâ the Cape, at as low a rate as practicable.

Cash to be paid on arrival of Goods in Bombay.

For Cash, accompanying an order (in anticipation of receipt) a reduction of 5 per cent *will be allowed in the account.*

N. B.—Mr. Crawford has generally on hand a supply of Photographic Apparatus.

ORDERS SOLICITED.

which, it is desirable, should be worded as concisely and specifically as possible, to obviate mistakes and disappointments.

Address, post paid—Mr. W. H. Stanley. Crawford,—Messrs. Crawford & Co. Marine Street—Bombay.

Portraits taken—either Plain,—or Coloured.

Instructions in Photography *on reasonable terms.*