the 27th Dec., 1838, I observed, at the same place, with the same Instruments, the two following occultations, viz:

γ Pleiadum Im.	7h. 29m. 19.80s.	} Mean time.
f " Im.	8 15 3.00	

The clock was regulated in the same manner as for the eclipse, and the observations are likewise satisfactory. These are all the observations made in Dover; I have two more made in Roscoe, but as I have not yet determined the latitude, I defer sending them at present. They were on b Pleiadum, Sept. 26th, 1839, and on τ Sagittarii, Oct. 14.

Respectfully,

J. BLICKENSBERGER, JR.

Practical description of the process called the Daguerreotype, which consists in the spontaneous reproduction of the images of natural objects, in the Camera Obscura; not with their colours, but with great delicacy in the gradation of the tints. By DAGUERRE.

TRANSLATED FOR THE JOURNAL OF THE FRANKLIN INSTITUTE, BY J. F. FRAZER.

Description of the Process. The drawings are made upon thin sheets of silver, plated upon copper. Although the copper serves principally to support the plate of silver, the union of these two metals promotes the perfection of the result. The silver should be as pure as possible; as for the copper, its thickness should be sufficient to maintain the plane of the silver in order that the images may not be deformed, but we must avoid giving it more thickness than is necessary to attain this end, on account of the weight resulting from it. The thickness of the two metals should not exceed that of a stout card.

The process is divided into five operations.

The first consists in polishing and cleaning the plate, so as to render it fit for receiving the sensitive coating.

The second, in applying this coating.

The third, in submitting the plate thus prepared, to the action of the light in a camera obscura, in order to receive upon it the picture from nature.

The fourth, in causing this picture to appear; it not being visible when first taken from the camera obscura.

Finally, the fifth has for its object, the removal of the sensitive coating which would continue to be modified by the light, and would tend necessarily to destroy the impression altogether.

First Operation. This requires a small flask of olive oil; very fine carded cotton; pumice ground exceedingly fine, tied up in a piece of muslin sufficiently thin to suffer the pumice to pass through it easily, when shaken; a bottle of Nitric Acid diluted with water in the proportion of one part (by measure) of acid, to sixteen parts (by measure) of distilled water; a frame of iron wire upon which the plates are put in order to heat them by means of a small spirit-lamp; and finally a small spirit-lamp.

As was before mentioned the drawings are made upon silver-plate. The size of the plate is limited by the size of the apparatus. It must in the first place be well polished. For this purpose, it is sprinkled with pumice (shaking it without touching the plate) and is rubbed gently, in a circular di-

rection, with cotton soaked in a little olive oil. In this operation the plates are laid upon a sheet of paper which must be renewed from time to time.

The pumice is re-sprinkled and the cotton renewed several times. The mortar employed for pulverizing the pumice should be neither of cast-iron nor of copper, but of agate; it should then be levigated upon ground-glass with a glass muller, using very pure water, and should not be employed until perfectly dry. It may be conceived how important it is that the pumice should be so fine as not to scratch, since it is upon the perfect polish of the plate, that the beauty of the picture, in a great measure depends. When the plate is well polished it must be freed from the oil, which is done by sprinkling it with pumice and rubbing it dry with cotton, rubbing always in curves; a good result cannot be obtained by rubbing otherwise. A small plug of cotton is then made, which must be wet with a little acid diluted with water as above mentioned. To accomplish this, the plug is placed in the mouth of the bottle, and the whole turned upside down, pressing lightly upon it, so that the centre only of the plug may be wet with the acid, without being deeply impregnated with it; very little is wanted, and care must be taken to avoid wetting the fingers. The plate is then rubbed with the plug, taking care to spread the acid perfectly over the whole surface of the plate. The cotton is changed, and the plate again rubbed, always in circles, so as to spread completely the film of acid, which should, however, merely touch, as it were, the surface of the plate. It will happen that the acid when applied upon the surface of the plate will separate into globules which can only be destroyed by changing the cotton, and rubbing so as to spread the acid very evenly; for the places where the acid has not taken will cause blurs. The acid is known to be very equally spread, when the surface of the plate is covered with a regular veil over all its extent. The plate is then sprinkled with pumice and rubbed very lightly with fresh cotton.

The plate must then be submitted to a high heat. For this purpose it is placed upon a frame of iron wire, raised to a proper height by legs, the silver above, and the spirit-lamp is passed backwards and forwards along the under surface of the plate, so close that the flame may be broken upon it. After having passed the lamp for at least five minutes under every portion of the plate, a light, whitish coating forms upon the surface of the silver.—The action of the heat is then withdrawn. The heat of the lamp may be replaced by that of a charcoal furnace, which is even preferable, as the operation is sooner finished; in this case, the wire frame is useless, since the plate is laid upon the tongs, the silver above, and moved backwards and forwards over the furnace so as to heat every part equally, until the silver becomes coated with a light, whitish, surface as has been explained. The plate is then quickly chilled by placing it upon a cold surface, such as a marble table. When it is cold it must be again polished, which is quickly done, since it is only necessary to remove the whitish coat which has formed upon the silver. For this purpose the plate is sprinkled with pumice and rubbed dry with a cotton plug; the pumice is frequently resprinkled, taking care to change the cotton often. When the plate is well burnished, it is rubbed, as above mentioned, with the acid diluted with water, sprinkled with a little pumice, and rubbed very lightly with a plug of cotton. The acid must be renewed three times, taking care each time to sprinkle the plate with pumice, and to rub it dry, very lightly, with very clean cotton, taking care that the part of the cotton touched by the finger shall not touch

the plate, since the transpiration would cause blurs upon the drawing. The humid vapour of the breath must also be avoided, as well as drops of saliva.

When it is not intended to operate immediately, the acid is used but twice after the operation of the heat, by which means we may prepare our work before hand, but it is absolutely necessary, when about to commence a drawing, to renew the acid at least once, and to pumice lightly as described above. The pumice dust which is on the surface and edges of the plate is then brushed off with very clean cotton.

Second Operation. For this operation we must have,

The box figured in fig. 1.

A rectangular frame of wood.

Four small metallic strips of the same nature as the plate.

A small hammer and a box of small nails.

A little Iodine.

After the plate has been fixed upon the frame by means of the metallic strips and small nails which are driven with the hammer designed for that purpose, the iodine must be placed in the capsule which is at the bottom of the box.

The iodine must be divided in the capsule in order that the focus of emanation may be larger, otherwise, an iris would form at the centre of the plate which would prevent the obtaining an uniform coating. The wooden frame is then placed, the metal downwards, upon the small brackets fixed at the four angles of the box, and the cover is shut. In this position it must be left until the surface of the silver is covered with a perfect coating of a golden yellow colour. If it be left too long, this golden coating will pass to a violet colour, which must be avoided since the coating is then not so sensitive to the light. If on the other hand the coating be not sufficiently yellow, the image would be produced with great difficulty. So that the yellow must be of a well defined shade, this being the only one which is favorable to the production of the effect. The time necessary for this operation cannot be determined, for it depends upon several circumstances; in the first place upon the temperature of the room, for this operation ought always to be left to itself; that is, it ought to go on without the addition of any heat, other than that which may be added to the temperature of the room in which the operation is performed, provided it be too cold. It is very important in this operation that the temperature of the interior of the box shall be the same as that of the exterior of it; were it otherwise the plate in passing from the cold to the warm air would be covered with a slight coating of moisture very injurious to the results. In the second place, the oftener the box is used the less time is required, because the wood inside of the box absorbs the vapour of the iodine, and this vapour tending always to disengage itself, and rising from all parts of the interior of the box spreads itself much more equally and quickly over the whole surface of the plate, which is an important advantage. On this account it is a good plan always to leave a little iodine in the capsule which is at the bottom of the box, and to preserve the box from humidity. It is thus evident that the box becomes better the longer it is used, for the operation is thus performed in a shorter time. Since, from the causes just mentioned, the time necessary for obtaining the golden yellow coat cannot be

accurately fixed (it may vary from five to thirty minutes, rarely more, unless it be very cold) it may be conceived that it is indispensably necessary to examine the plate from time to time, to see whether it has reached the requisite degree of colour, but it is at the same time important that the light should not strike directly upon it. It sometimes happens that the plate will be more deeply coloured on one side than on the other; in this case, in order to equalize the coating, in replacing the frame upon the box it is turned, not upsidedown, but end for end. The box must be placed in a dark room, into which no light penetrates excepting through the door which is left a little open; and when we wish to examine the plate, after removing the cover of the box, we take the board in both hands, by its ends, and turn it up quickly. It will be enough that the plate reflects a slightly illuminated spot as far off as possible, in order to see whether the yellow tint is sufficiently deep. The plate must then be quickly replaced in the box, if the coating has not attained its proper colour; if, on the contrary, it has gone beyond it, the coating cannot be used, and the first operation must be recommenced from the beginning.

This operation may, in the description, appear difficult, but with a little practice, we are able to judge very nearly the time necessary for the attaining the yellow colour, as also to examine the plate with great quickness so as not to give the light sufficient time to act upon it.

When the plate has attained the proper colour it must be placed in a frame which fits into the camera obscura. The light of day must be prevented from striking upon the plate; for this purpose, therefore, we use a candle, the light of which has much less action; this light must not, however, be suffered to strike too long upon the plate, upon which it will leave marks.

We pass then to the third operation, which is that of the camera obscura. We should pass as quickly as possible from the second operation to the third, or at all events we should not leave more than an hour's interval between them; after this time the compound of iodine and silver has not the same properties.

Observations.—Before using the box it is necessary to clean the interior, and to turn it upside down so as to shake out of it all the small grains of iodine which may have fallen out of the capsule, taking care not to touch the iodine, which would soil the fingers. The capsule should be covered with a piece of gauze stretched upon a ring; this gauze serves to equalize the evaporation of the iodine, and at the same time to prevent the compression of the air, which results from shutting the box, from causing the particles of the iodine to fly about; some of which might rise to the plate and would make deep stains upon it.

On this account the box should always be shut very gently, so as not to cause the rising of any dust within it, which might be charged with the vapour of iodine.

Third Operation. No apparatus is necessary for this operation except the camera obscura, fig. 2. The Third operation is that in which the picture is obtained by means of the camera. Objects illuminated by the sun must be selected, as far as possible, because the operation is under these circumstances much more prompt. It may easily be conceived that as the result is caused by the light alone, the action will be quicker, in proportion as the objects are more strongly illuminated, and are naturally whiter.

After placing the camera obscura opposite to the landscape, or whatever other object, we may desire to copy, the important point is to arrange the focus so that the objects may be defined with great clearness; which is easily done by drawing out, or pushing in, the frame of the ground glass which receives the image. When great precision has been attained, the movable part of the camera obscura is secured by means of the screw adapted for this purpose, and the frame of the glass is then withdrawn, (taking care not to derange the camera) and replaced by the apparatus which contains the plate and which fits exactly into the place of the glass. When this apparatus is properly adjusted, by means of the small copper buttons, the opening of the camera is closed, and the interior doors of the apparatus opened by means of the two semi-circles. The plate is then ready to receive the impression of the view, or object, which has been chosen. Nothing remains but to open the diaphragm of the camera, and count the minutes by the watch.

This operation is one of great delicacy, because nothing is visible, and it is utterly impossible to determine the time necessary to produce the effect, since this depends entirely upon the intensity of the light from the objects which we wish to copy; this time may vary, at Paris, from three to thirty minutes.

It must be remarked also that the season of the year, as well as the time of the day, exercises a strong influence on the quickness of this operation. The most favourable time is from 7 until 3 o'clock; and, at Paris, what we obtain in three or four minutes in June or July, will require 5 or 6 minutes in May or August, 7 or 8 in April or September, and so on, in the same proportion as we advance in the season. This is, of course, but a general result for objects strongly lighted, since 20 minutes is oftentimes necessary in the most favorable months, when the objects are entirely of a demi-tint.

We see, from what has been said, that it is impossible to state with precision the time necessary for obtaining the impressions; but with a little practice, we easily learn to guess at it.—It is evident, that in the south of France, and generally in all countries where the light has a great intensity, as in Spain, Italy, &c. &c., the impressions will be made more quickly. It is also important not to leave the apparatus for a longer time than that necessary for the production of the effect, for the lights will no longer be white, they will be blackened by the prolonged action of the light. If, on the other hand, the time has not been sufficiently great, the impressions will be very vague, and without any detail.

If we have failed in the first impression by withdrawing it too soon, or leaving it too long, we commence another immediately with almost a certainty of success; it is of advantage, even, to make some experimental impressions in order to acquire practice.

The same remarks are now applicable, as upon the termination of the second operation; we must hasten on to subject the plate to the fourth operation as soon as it leaves the camera. Not more than an hour's interval must be allowed, and we are much more certain of success, when we proceed immediately.

Fourth Operation.—For this we must have,
 A bottle of mercury containing at least 2 lbs.
 A spirit lamp.
 A glass funnel with a long neck.
 The apparatus, figured in fig. 3. 4.

Enough mercury is poured, by means of the funnel, into the capsule placed at the bottom of the apparatus, to cover the bulb of the thermometer. This requires very nearly two pounds. From this time we can use no light except that of a candle. The board upon which the plate is fixed, is withdrawn from the frame, (the cover of which, preserves it from the contact of the light,) and slid into the grooves of the black plate (fig. 3.) This black plate is then replaced in the apparatus upon the brackets, which retain it at an angle of 45° , the metal below, so that it can be seen through the glass; the cover of the apparatus is then gently closed, so as to prevent the concussion of the air from causing the particles of mercury to fly about. When every thing is thus arranged, the spirit-lamp is lit, and placed under the capsule containing the mercury, and there left until the thermometer, (the bulb of which is plunged into the mercury—and the tube passes outside of the box) indicates a heat of 140° Fahr. (60° Cent.); the lamp is then quickly withdrawn; if the thermometer has risen rapidly, it will continue to rise without the assistance of the lamp; but we must be careful not to let it rise above 167° Fahr. (75° Cent.)

The impression of the image exists upon the plate but is not visible; it is not for some minutes that it begins to appear, of which we may assure ourselves by looking through the glass, using the light of a candle, and being careful not to let the light strike upon the plate for too long a time, since it would leave its marks upon it. The plate must be left until the thermometer has again descended to 113° Fahr. (45° Cent.); it is then withdrawn and this operation is terminated. When the objects have been strongly illuminated, and the plate has been left rather too long a time in the camera obscura, this operation may be completed before the thermo-

meter has fallen to 130° Fahr. (55° Cent.); we may observe this by looking through the glass.

It is necessary after each operation, to clean the interior of the box carefully, and remove the thin coating of mercury which forms all over it. The black plate must also be cleaned with care, so that no trace of the mercury may be left upon it. When the apparatus is packed for a journey, the mercury in the capsule must be replaced in the bottle, which is done by inclining the box so that it may run out of the small stop-cock placed for that purpose.

The impression may be examined by a feeble light to see whether it has succeeded. It is detached from the board by removing the four small metallic strips which must be carefully cleaned with pumice and a little water, after each impression. It will be seen that this cleaning is necessary, since, not only are these strips covered with a coating of iodide, but they have also received a part of the impression. The plate is placed in a grooved box until it can be made to undergo the fifth and last operation, which need not be performed immediately, for the impression may be preserved in this state, for several months, without undergoing any alteration, provided it be not often examined in a strong light.

Fifth Operation.—The object of this operation is to remove the coating of iodide, which would otherwise, when the impression had been too long exposed to the light, continue to decompose and destroy the picture.

For this operation we must have,

A saturated solution of common salt, or a weak solution of pure hyposulphite of soda.

An inclined plane or frame.

Two tinned copper pans.

A kettle of distilled water.

To remove the coating of iodide, common salt is introduced into a jar, or wide mouthed bottle, until it is one fourth full, it is then filled with pure water. The bottle is from time to time shaken to assist the solution of the salt. When the water is perfectly saturated, that is, when it can dissolve no more salt, it is filtered through unsized paper so that the solution may be free from dirt, and perfectly limpid. This saturated solution of salt is prepared beforehand in sufficient quantity and kept in well corked bottles; by this means we avoid the trouble of making it, at each experiment. The salt water is poured into one of the basins to within about one inch of its edge; the other is filled with ordinary pure water. These two liquids must be heated, but not to boiling. The solution of common salt may be replaced by a solution of pure hyposulphite of soda, this is even preferable, because it removes the iodide entirely, which the solution of salt will not always do, especially when the impressions have been made for some time. In other points, the operation is the same with either solution; that of the hyposulphite need not be heated, and less is needed, since it will be sufficient that the plate be covered by it, when at the bottom of the pan. The plate is first dipped into the pan containing pure water; it is merely dipped and withdrawn immediately, since it suffices that the surface of the plate be covered with water; then, without suffering it to dry, it is plunged into the salt-water. If the plate be not dipped in the pure water before plunging it into the solution of salt or hyposulphite, these will make ineffaceable stains. To facilitate the action of the saline or hyposulphite solution, which takes up the iodine, the plate is agitated by means of a small hook of tinned copper, which is passed

under the plate, which is thus lifted, and suffered to fall again, several times. When the yellow colour has altogether disappeared, the plate is removed, by pressing both hands upon its edges, so that the fingers shall not touch the impression, and plunged immediately into the first pan of pure water.

We then take the inclined frame, and the kettle, which must be very clean, and in which distilled water has been boiled. The plate is taken from the pan of water, and placed at once, upon the inclined plane; then, without giving it time to dry, distilled water, very hot, but not boiling, is poured upon the surface of, and from above, the plate, so that, in descending, the water may form a sheet over its whole surface, and carry with it the whole of the solution of salt or hyposulphite, already much weakened by the immersion of the plate in the first pan.*

At least a quart of distilled water must be used for a plate of ten inches square. After pouring such a quantity of water upon the plate, it is but seldom that one or two drops do not remain upon it. We must then drive them hastily off, before they have time to dry, for they may contain some particles of salt, or, even of iodide; they are removed by blowing strongly with the mouth upon the plate.

It is evidently important, that the water used for washing should be pure; for in drying upon the surface of the plate, notwithstanding the rapidity with which it dries, if this water contained anything in solution it would form numerous and ineffaceable spots.

To test whether the water is fit for this washing, we put a drop upon a burnished plate, and if, when evaporated by means of heat, it leaves no residuum, it may be employed without fear. Distilled water will leave no trace. After the washing, the picture is finished, nothing remains but to preserve it from dust and from vapours which might tarnish the silver. The mercury which causes the image to be visible, is partly decomposed, it adheres to the silver, resists the water poured upon it, but cannot sustain any rubbing.

To preserve the impressions, they must be put under glass and cemented in; they are then unalterable, even in the sun.

As on a journey it may be impossible to attend to the framing of the impressions, they may be equally well preserved in a box with grooves. For greater security, small strips of paper may be pasted over the joints of the cover.†

It must be remarked, that the plates of silver upon copper may be used

* If the hyposulphite solution be used, the water should be less warm than with the common salt.

† The author endeavoured to preserve the impressions by means of different varnishes, obtained from amber, copal, caoutchouc, wax, and several resins; but, he remarked, that by the application of any varnish whatever, the lights in the picture were considerably lessened, and the strength at the same time reduced. To this inconvenience is joined that of the decomposing the mercurial surface by its combination with the varnishes tried. This effect, which was not developed for two or three months, in the end, destroyed the image entirely.

However, it sufficed to induce the author to reject the use of the varnish entirely, that it destroyed the intensity of the lights; since the most desirable improvement upon the process, would be the means to increase them still more.—AUTHOR.

According to M. Arago, M. Dumas has found that the plates may be varnished by pouring upon them a boiling solution of one part of dextrine in five parts of water.—

TRANSLATOR.

several times, so long as the copper is not exposed. But it is very important that the mercury should be removed each time, as before explained, by pumice and oil, frequently changing the cotton; otherwise, the mercury will finally adhere to the silver, and the impressions obtained upon this amalgam, are always imperfect, wanting both vigour and cleanness.

Franklin Institute

Sixty-third Quarterly Report of the Managers of the Franklin Institute.

The Board of Managers respectfully present their report for the past quarter.

This quarter, including the summer months, is one of the least active of the year, and its operations are chiefly confined to preparations for the busy season which follows it. The lectures and schools of the Institute have, as usual, occupied much of the attention of the committee having charge of them. The regular lectures on general chemistry, on mechanics and natural philosophy, and on technology, will be again given by Professors Mitchell, Cresson, and Booth, whose services have heretofore been so highly appreciated by the members of the Institute. An arrangement has also been made, by which it is expected that a brief course of lectures on architecture may be added to the regular lectures. The regular course will begin on the fourth of November next. The drawing school will open on the twenty-second instant, with the usual arrangements, as far as the department of miscellaneous drawing is concerned, and under the charge of the former able teacher, Mr. William Mason. It has been deemed advisable, chiefly with a view to prevent interference on the part of our school with that of the Carpenters' Society, to suspend the instruction in the architectural department. It is, however, due to the former teacher, Mr. J. McClure, to state, that previous to coming to this determination, it had been ascertained that his engagements would prevent him from continuing in the charge of the school.

The monthly meetings have been resumed, and the first of the season, which was held on the fourth Thursday of September, was well attended, and supplied with objects of interest. The committee who have charge of the arrangements for their meetings, are active in endeavouring to bring before the members new objects of mechanical or scientific interest.

The committee of science and the arts have, by direction of the managers, reported the number of Scott's legacy premiums awarded under the authority conferred by the City Councils. These are eleven in number, distributed as stated in the report hereto appended. While the committee desire not to hold the premium so high, as not to be attainable by ingenious inventors for whom it was intended by Mr. Scott, they do not feel justified in awarding it without such scrutiny as shall show that the invention for which the award is made, has real merit.

During the past quarter, exhibitions of domestic manufactures have been held at New York, by the Mechanics' Institute, and by the American Institute, and at Boston, by the Massachusetts Charitable Mechanical Association, to all of which delegates have been sent from this Institute. The display of articles at these fairs, has been represented as very creditable to our country, embracing specimens of the useful arts in a high state of