XX. Description of the diacatoptron

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phrases which have not been used, and to seize upon them as a subject of ridicule. This is the case with some proposed *elegant* changes, and with my supposed recommendation to transfer chemistry to the "fire-side of the drawing-room:" expressions which I have not used, and yet upon which Dr. Pearson has thought proper to be extremely jocular.

I have only further to add, that should Dr. Pearson again write upon the subject, I shall not easily be induced to resume the controversy. I am sorry, therefore, to see it intimated at the conclusion of his paper that he proposes to continue his observations in your next Number; and as it appears that those intended remarks are meant as a return for the notice which I have taken of his papers, I regret the more that he should take so much trouble. For praise, when used as the vehicle of irony, is the worst kind of censure. The discovery of truth ought to be the only object of philosophical discussion. There are, doubtless, many errors in my humble attempts at chemical analysis; but unless Dr. Pearson points out those errors, or brings forward new facts connected with my inquiries, I confess that I had much rather he would not again honour them with his notice.

"Quicquid id est, timeo Daiaos et dona ferentes."

I remain, sir, &c. &c.

Russel Square, Feb. 21, 1812.

ALEX. MARCET.

XX. *Description of the Diacatoptron. Communicated by Dr. GIBBES, of Bath.*

VARIOUS optical instruments have been applied to the purposes of drawing and copying, and have been carried to a great degree of perfection. The Camera obscura, the Delineator, and Camera lucida, have severally been justly celebrated for the facility of tracing outlines, and the rules of perspective have been correctly illustrated by these representations of natural objects on a plain surface.

The great simplicity of the instrument now about to be described, may entitle it to rank among the most useful of the kind, as, to the advantage of its simple structure and applicability without straining the eyes, it adds a degree of truth not to be exceeded. Without the aid of additional reflecting surfaces, this instrument represents its objects as an ordinary mirror, at the same time that it allows sufficient transmitted light to pass for the guidance of the hand behind it. Thus, by a very little management, both the
hand

hand directing the pencil, and the object to be traced, may be equally well defined and clear. Another advantage possessed by this apparatus is, that very little light is lost, as is the case where many glasses intervene between the object and its representation. The application is also immediately obvious to the most careless observer.

Take a perfectly clear piece of glass, a foot square, well polished and quite even, and parallel throughout; place this in a frame (Pl. III. fig. 1.) about one inch and a half wide, and one inch thick, and instead of wood at the bottom of the frame place a brass wire or narrow and thin plate which will hold the three sides together, and prevent the glass from falling out, as it must rest on the wire or plate, which should be fastened tight to the feet of the frame.

The feet must be exactly at right angles with the frame, so that when the plate is placed upon an even table, it will stand perpendicular. In the upper part of the frame at *b*, make a long groove, in which insert the brass sight an inch broad (fig. 7.) having the small eye-hole *c*: this is to be fastened at top by the screw *d*, which may be screwed up or loosened at pleasure.

Divide the frame (fig. 5.) into two equal parts, beginning at the upper part from the groove *b*, to the bottom of the feet *a*, or of the brass wire. Divide again the lower part from *e* into eight equal parts, and on each side of the frame bore holes, taking great care to place them exactly at the eight measured points.

A board (fig. 6.) is called the table, of the breadth of the frame, in which two brass pins are fastened of such size that they may exactly pass into the holes to raise the table to different heights corresponding with the holes in the frame; otherwise you cannot magnify or diminish objects correctly according to the size you may wish to obtain. On the opposite side of the table are supports at each corner, so placed that they may be conveniently pushed up or down. The supports pass through two holes in the table, and in each are eight small holes of the same size as those in the frame, so that by means of a brass wire under the table it may be kept fast in a horizontal position.

The blind (fig. 2.) is made of a piece of wood, bevelled, one foot long, one inch and a half wide, and one inch in thickness. A brass or iron rod is bent in such a manner as to form a square, and the wood serves as a support to it. This frame is then covered with writing paper, which should be of moderate thickness. When you make use of the apparatus, place the object *h* upon a flat table on a level with

with the window ; on the right hand lay some blank paper, upon which a person may draw ; and between the two place the *Diacatoptron* or transparent reflecting plate of glass in its frame ; place the blind *k* at right angles with the glass on the right hand, so that the drawing paper may lie in the broken shade, and a person looking through the glass from the left side will observe the object exactly designed upon the paper. If the figure is not sufficiently distinct, you may darken the blind by hanging a paper upon it ; if it should darken too much, you place it a little further from the glass.

It is of much consequence that the proper degree of shade should be thrown upon the paper ; for, if it is too dark, you will neither see distinctly the lines of the drawing which you copy, nor the point of your pencil : if, on the contrary, it is not sufficiently dark, you will work at random, and the representation will be faint. In copying after this manner you do not make use of any eye hole, because the eye is easily kept in the proper direction, as the drawing remains in its appropriate situation ; but in the following experiments, where the objects are diminished or magnified, whether a picture or prospects in perspective, the eye hole must be always used, since it is necessary to look exactly and constantly at the same point of view.

The diminishing of an object is effected by raising the height of the table. Since the object placed on the left side of the glass is always represented on the right side, although the surface of the table should not be of an uniform height, it will be found that, if you take a fixed point of view, the object will be diminished the nearer the reflected image approaches to this point, and will be magnified as the reflected and transmitted image is made to recede from the eye. Or rather, the image will appear larger than the object when it is removed further from the fixed eye than the object itself, and *vice versâ*.

This may be seen clearer by fig. 5. The parallel lines 1, 2, 3, 4, 5, 6, 7, 8, represent the different heights of the table. If now the line *h* were to be diminished, it would be reduced $\frac{1}{8}$ upon the table at 1, $\frac{1}{4}$ at 2, $\frac{2}{8}$ at 3, and at 4 $\frac{3}{8}$, as is shown by the lines of sight where the parallel lines intersect.

Fig. 3. represents the Diacatoptron when the letter *B* is diminished $\frac{1}{4}$; the table with the paper is placed in the fourth hole.

Fig. 4. represents the magnifying of an object when the table is on the left side.

In both cases you must look at the object through the

eye hole which is on the left. By this method of diminishing with the Diacatoptron, it is easy to take in prospects and objects in perspective.

Make a board (fig. 8.) $2\frac{1}{2}$ feet long, and bore two holes six inches from one end of the board at the width of the Diacatoptron, so that the supports of the table may pass through and may be placed upright. Fasten behind two perpendicular pieces of wood *a*; and also at the upper part two props which may pass into the holes of the table, into which the feet were before fixed, so that the table may be secured both at the top and bottom, and all shaking prevented.

Bore holes in the board from *c* to *a*, that you may place there the sight-piece *e*, which is either made of brass or wood, about six inches high, and has at the top a round brass plate one inch in diameter, in which is the eye hole.

When you make a trial of it, fix the paper fast on the table according to fig. 9. Place the Diacatoptron about six or eight inches from it, upon the board, and parallel with the table; the blind, (fig. 10.) which is made of wood, pasteboard, or paper, then covers the space between the Diacatoptron and the table, so that the opening *g* may be on the right hand: the sight-piece *e* is then so placed in one of the holes that you may have the desired power of diminishing, taking care that your head may not intervene between the object and the glass, and you may easily draw upon the perpendicular paper the objects diminished. In this way you may with ease draw plants, and in short all objects, even academy figures, &c., and under circumstances in which the Camera obscura could not be conveniently employed.

XXI. *Proceedings of Learned Societies.*

ROYAL SOCIETY.

Thursday Feb. 6. **T**HE Society again met, when a short paper by Dr. Wollaston was read on the primitive form of calcareous, bitter, and iron spar. The composition of these three kinds of spar being essentially different, although their primitive form has hitherto been admitted to be the same, seemed to militate against the truth of the crystallogical system. Haüy himself having rather hastily allowed that the angle of the rhomboid of calcareous spar, magnesian spar, and iron spar, being $101^{\circ} 27'$, formed an exception to the general principle that a difference of constituent parts produced a difference of form, Dr. W. with his goniometer was induced to examine these spars with greater attention.

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