SUGGESTIONS TO OBSERVERS OF THE SOLAR ECLIPSE OF DECEMBER NEXT

AN analysis of the observations made at the recent eclipse seems to show that it would be desirable that three or four observers should be stationed some 10 miles to the north or south of the limits of totality to watch for—

1. *Shadow bands* passing along the ground, and to note carefully the direction of their motion and their velocity. If possible this should be done upon any three planes at right angles to one another, say the ground, an east and west wall, and a north and south wall.

2. *Direction and velocity of the wind*, and also the direction and velocity of the drift of the clouds. This should be done by observers associated with those employed on (1).

3. *Rays or brushes of light* from the thin cusps of the sun, and whether they alter their position and intensity.

4. *Spurious red prominences* from the thin crescent, noting carefully their position and size.

The following instruments might be used with advantage for polariscopic observations:—

1. A polarimeter, consisting of a Savart's polariscope mounted behind four plates of crown glass movable on an axis, perpendicular to the plane of polarisation, which is furnished with a graduated circle and pointer, to register the position in which the depolarisation of the plates neutralises the polarisation of the object. This should be used with a telescope having a diaphragm in the common focus restricting the diameter of the field to about 10'. The attention of the observer should be confined to the centre of the field (when the bands are made to disappear by rotating the plates).

2. A plate of right and left-handed quartz attached in front of a positive eye-piece, so as to lie in the common focus of the telescope and eye-piece, with an analysing Nicol placed between the lenses of the eye-piece, which should have a field about 1° in diameter.

The bi-quartz should be fixed so that the line of junction marks the plane of polarisation, giving the two halves purple alike.

The following polariscopic observations are suggested:

1. To determine the plane and measure the amount of atmospheric polarisation at at least three points, about 8° or 10° away from the sun's place. The points to be chosen round the sun, say N., N.E., and E., considering the sun as a map. (It would be well if three observers could be appointed each to take one fixed spot for atmospheric polarisation and to note the changes which take place during totality—both in the plane of atmospheric polarisation and in its intensity.)

2. The intensity of polarisation should be carefully measured with the polarimeter at different points of the corona, the observer taking care to notice when the Savart's bands disappear in the centre of his field as before stated.

3. The dark moon and corona should be bisected by the line of junction of the bi-quartz polariscope, and the colours upon the corona should be carefully noted, not only near the line of junction, but also round the whole circumference of the dark moon. Any sudden transition from one colour to another should be especially recorded. Should any ray, or rift, or sector of colour with sharp edges be observed, it would be well to place the line of junction across such sector or rift, and note the colours upon its edges; the telescope carrying with it the line of junction might then be slowly withdrawn along the sector or rift from the limb of the moon outwards until all indications of the rift or its edges are lost—the observer, of course, noting the plane of polarisation within the rift, and whether it differs from that of the air polarisation in the neighbourhood of the sun.

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NOTES ON ECLIPSE PHOTOGRAPHY

ECLIPSES of the sun occurred in 1860, 1868, and 1869, when photography was employed chiefly to obtain evidence as to the nature of the red prominences, and in all cases a telescope of some kind was used, the image being taken at the principal focus.

It is, however, preferable that instead of a telescope an ordinary photographic lens of *long* focus be employed. Such a lens may be a portrait combination, or single or compound lenses, adapted for landscape or copying work; the conditions are that the image shall be as large as possible, and the lens quick-acting. These requirements were found to be combined in the lens I used at Syracuse, and which was made by Mr. Dallmeyer, and lent to me for the purpose of the expedition. The lens is 4in. in aperture, and has a focal length of 30in, the image of the sun or moon being three-tenths of an inch in diameter. It is scarcely to be expected that there will be many lenses of this exceptional class available in India; but no doubt, there are many good landscape lenses of long focus which may be used, and if the images they give are not so large as those taken by the 4-inch "rapid rectilinear," the pictures obtained may have scientific value, although small. It is an interesting fact that at Oran Dr. Huggins had arranged with a local photographer to attempt some pictures with a small lens, giving an image of about $\frac{1}{16}$ th of an inch in diameter.

In all cases it is strongly to be recommended that the best instruments be used. Instead of Dallmeyer's 4 inch

lens, it is suggested that lenses of the "rapid rectilinear" make, of still larger aperture, be used, as the focal length will be increased, and consequently a larger picture will be obtained, allowance, of course, being made for the increased exposure required, if the focal length of the lens has been made greater in proportion to the aperture.

It will be convenient to assume in what I have now to say that a lens of at least four inches aperture and thirty inches focal length will in all cases be used, and that it it will be corrected for the chemical rays.

Now an instrument of this kind, if used to photograph the sun's corona, will be useless if not mounted so as to follow the sun's apparent motion. The camera must, therefore, be mounted on a stand having clockwork motion. The stand of an equatorial telescope is what is required. The telescope may be removed, and the camera fixed in its place—this for convenience only—or the camera may be fixed on the top of the telescope. It will, however, be better to remove the telescope.

In the observatory and dark room as used at Syracuse, the framework was of wood, as slight as possible consistent with stability, and was covered entirely with waterproof cloth, the dark room being lined with yellow calico, in some parts double. The floor was also covered with the waterproof cloth to keep down the dust. Instead of the cloth for the sides and the roof I should prefer very thin boards, and the roof only need be made watertight, the edges of the wood being made, if necessary, to overlap. If wood be used, one thickness of yellow calico will be sufficient. The