the microscope image. But, fruitful as that theory immediately was in so many respects, it led Abbe in the first instance, as we now know, to undervalue the importance of the substage illumination in certain aspects, for which statement the fact that only a chromatic form of condenser was originally supplied is sufficient evidence. Further, as is well known from the controversies at the time, it led Abbe at first to favour a narrow cone of light from the substage condenser. Thus the latter became merely a tool by which the object might be studied by means of a beam or pencil of light impinging on it at various degrees of obliquity and in different azimuths.

The Continental substage was designed for this purpose; indeed, it has been explicitly stated by Prof. H. Ambronn[1] (*Zeitschrift für Wissenschaftliche Mikroskopie*, January, 1905) that the construction of the illuminating apparatus named after Abbe, and of which the arrangements connected with the diaphragm carrier constitute the chief novelty, was really only designed by its originator for the testing of objectives and for experiments on the effects of diffraction.

Strange to say, although it is a long time since the utility of achromatic condensers and wide illuminating cones for general microscopic observations has been recognised on the Continent, most Continental makers still cling to the old form of substage construction, preferring to modify other arrangements to adapt them to this construction rather than change their model.

In England, substage illuminators were in general use long before this was the case on the Continent; originally they were looked upon—as the name "condenser" implies—simply as a means of concentrating light on the object; but at the time when Abbe brought out his theory of microscopic images, the value of precise centring arrangements for the condenser and the use of wide-angled cones of light had been so well recognised by Nelson and others that the new theory did not induce English microscopists to recede from their previous experience in these respects. On the contrary, it led in this country to a campaign on behalf of the wide-angled cone of light from the condenser, and the mechanically moveable iris diaphragm was not adopted by English makers. The simpler method of the shallow carrier above the iris diaphragm, into which stops for dark-ground illumination, for oblique illumination, or various stops for experimental purposes could be dropped, was found to render all the service necessary. Hence the general lines on which the construction of the present-day English substage arrangements have developed.

Those who have worked with both forms will be in little doubt as to which is the more convenient.

JULIUS RHEINBERG.

London, December 30, 1911.

The Photography of Hα during Solar Eclipses.

WITH regard to Mr. Butler's letter on this subject (NATURE, vol. lxxxviii., No. 2199, p. 244), I may say that I was unaware that Hα had been photographed in the "flash" spectrum in former total solar eclipses. As I have also been, so far, unsuccessful in my search in the preliminary reports of the eclipse observers of 1893 and 1898, in the Proceedings and in the Philosophical Transactions of the Royal Society, in finding any specific mention of Hα, would Mr. Butler kindly supply the needed references? I may add that in the photograph taken by Father Pigot under my direction in the last eclipse, Hα does not appear as an isolated arc, such as might be recorded on an isochromatic plate, but as the strongest impression crossing a continuous band which extends from Hα well into the ultra-violet. A modification of my original statement in this sense might meet Mr. Butler's criticism.

A. L. CORTIE.

IN reply to Father Cortie's note, I give the detailed references he requires, abstracted from the papers mentioned in my previous letter:—

(1) *Total Eclipse of the Sun*, April 16, 1893.
Phil. Trans., A, 187, pp. 551–618, 1896.

P. 574.—On negative 17 the image of Hα was obtained even at mid-eclipse, although the plates were not specially sensitive to red.

P. 617.—The line Hα is indexed in the table of chromospheric lines as having been recorded on three photographs, Nos. 17, 18, 19. On No. 19 it is given as intensity (3) on a scale of 10, which is quite remarkable considering that the plate employed was not specially red-sensitive.

(2) *Total Eclipse of the Sun*, January 22, 1898.
Phil. Trans., A, 197, pp. 151–227, 1901.

P. 199.—The line was so prominent that it was utilised for wave-length determinations.

"For the purposes of reduction the spectrum has been divided into two parts, one extending from Hα in the red to λ 3900 in the violet. . . ."

P. 226.—In the table of chromospheric lines determined from photographs, the line Hα is given as intensity (5) on a scale of 10. The plates on this occasion were isochromatic, but still not specially red-sensitive, and the greater relative intensity of the image of Hα compared with that on the 1893 plate is probably due to this.

Plate 6, spectrum strips *a* and *b*.—Inspection of these two strips will at once show the presence of Hα as a strong line; in fact, the best description of it is exactly similar to that given by Father Cortie for the impression on Father Pigot's plate. It is the strongest impression (in that region) crossing a continuous band which extends from (beyond) Hα well into the ultra-violet.

One of the other results to which I referred is that given in the report by J. Evershed, "Wave-length Determinations, &c., at the Solar Eclipse, January 22, 1898."
Phil. Trans., A, 197, pp. 381–413, 1901.

P. 410.—Hα strong on No. 7 plate.

P. 413.—Spectrum No. 7 (Hα).

Plate 11, Fig. 5, Spectrum No. 7.—Hα shown and lettered as a strong line.

CHARLES P. BUTLER.

Meteor-showers.

THE following meteor-showers become due during the remaining part of January:—

Epoch January 11, 20h. 30m., twentieth order of magnitude. Principal maximum, January 13, 21h. 20m.; secondary maximum, January 12, 1h. 45m.

Epoch January 15, 9h. 30m., second order of magnitude. Principal maximum, January 14, 21h. 50m.; secondary maximum, January 14, 3h. 30m.

Epoch January 15, 4h. 30m., approximately fourth order of magnitude. Principal maximum, January 15, 12h.; secondary maxima, January 16, 16h. 10m., and January 17, 7h. 25m.

Epoch January 21, 18h., approximately eleventh order of magnitude. Principal maximum, January 20, 19h. 30m.; secondary maxima, January 19, 0h. 5m., and January 21, 3h. 35m.

Epoch January 22, 8h., thirteenth order of magnitude. Principal maximum, January 23, 14h.; secondary maxima, January 23, 2h. 50m., and January 24, 3h. 50m.

Epoch January 26, 11h., approximately eleventh order of magnitude. Principal maximum, January 27, 13h. 15m.; secondary maxima, January 24, 14h. 20m., and January 27, 10h. 30m.

Epoch January 26, 19h. 30m., thirteenth order of magnitude. Principal maximum, January 28, 1h. 5m.; secondary maximum, January 28, 8h. 40m.

Epoch January 30, 0h., approximately twenty-eighth order of magnitude. Principal maximum, January 30, 8h. 40m.; secondary maximum, January 31, 11h. 20m.

There is a considerable degree of meteoric activity in the latter half of January. The most important days during the period January 9–31 are January 14–15, January 16–17, January 20–22, January 24–28, and January 30–31. The most noteworthy epoch of this period is that of January 26, 19h. 30m., as it resembles in type that of November 17, 1911, 3h. 30m., to which attention has previously been directed. The epoch January 15, 9h. 30m., comes next in importance as a slight variant of the same type, though its intensity is apparently much greater.

Dublin, January 8. JOHN R. HENRY.

[1] *Vide* also Journal of the Quekett Microscopical Club, 1905, pp. 157–8.