both play similar *rôles* in the ceremonies, and apparently both equally need excitation for coition to take place. Here mutual, instead of one-sided, excitation occurs.

It will be evident that wherever mating displays and ceremonies, and the colours and structures associated with them, have this purely stimulative function they cannot be supposed to stand in any relation to sexual selection, but resemble copulatory organs in being solely subservient to efficiency in securing union of the gametes. Copulatory organs will arise only when a certain level of general physical complexity is reached; stimulative displays, colours, and structures only at a certain level of sensory and nervous (mental) complexity.

The problem of their genesis is therefore no more difficult than that of copulatory organs, or, indeed, of any other adaptive structures—which is not to say that it is easy, but that at least it does not demand special evolutionary agencies.

When polygamy obtains, true sexual selection may, of course, occur, and from observations such as those of Selous on the ruff and blackcock (Selous, *Zoologist*, 1906 and 1909–10), does definitely seem to be operative.

To denote characters which are secondarily concerned with bringing about mating or copulation we may use the term "epigamic," first coined by Poulton. It is necessary to have such a term, since "secondary sexual" cannot be applied to epigamic characters occurring in both sexes, and can be applied to non-epigamic characters such as mammæ. Characters effective in the act of copulation itself (copulatory organs) come under the head of "accessory sexual characters." Epigamic characters are then either "accessory," when they stimulate to coition, or "sexually selected," when they stimulate to the selection of mates. In certain cases they may be both. There is, however, good reason for believing that the great bulk of sexual displays, with their associated colours and structures, are accessory epigamic characters, and that the problem of their evolutionary origin is therefore simplified.

JULIAN S. HUXLEY.

New College, Oxford, December 7.

Terrestrial Magnetic Disturbances and Sun-spots.

REFERRING to Father Cortie's letter on this subject (NATURE, October 27, p. 272), the sequence of magnetic disturbances following at 27-day intervals the storms of May 12–21, 1921, was recorded also at Kodaikanal, but those storms recorded in England as "very great" on September 2 and 28–29 were classed here as "moderate" only. There were also recorded here "great" storms on March 21–22 and April 18–19, which appear to belong to the same sequence, the whole interval from March 22 to September 29 giving a mean period of 27·29 days. Assuming this to be the synodical period of the sun, the equivalent sidereal period is 25·42 days, closely agreeing with Carrington's mean value of the rotation for spots.

Our spectroheliogram records show that the spot disturbance originated on the invisible hemisphere of the sun shortly before May 8, when it first appeared on the east limb as a condensed mass of bright calcium flocculi. As is usually the case, the area of disturbance became extended; in July the flocculi were more or less scattered, and the last visible remnants of these are seen in the photographs of August 1–8.

The magnetic disturbances seem therefore to have both preceded and followed the spot disturbance as recorded in calcium light, the flocculi lasting through three synodic rotations and the magnetic effects through seven.

Except during May, there were no striking manifestations of prominence activity recorded here near this group of spots. On May 9 we photographed on the east limb a group of circular interlacing arches such as are occasionally seen over newly formed spots, and during the passage of the group across the visible hemisphere there were very brilliant metallic reversals and other manifestations of eruptive activity, besides innumerable absorption markings in Hα light intertwined throughout the group. All this activity appears to have subsided during the following month.

Another more striking instance of the persistence of magnetic effects long after every trace of solar disturbance has disappeared occurred in the year 1920. The "very great" storm of March 22, 1920, was associated with a very large spot group passing the central meridian on that date. This group and its associated flocculi were observed during five synodic rotations from January 1 to April 18, and each meridian passage was accompanied by a magnetic storm of "great," "very great," or "moderate" intensity. The spot disturbance and its surrounding flocculi completely subsided during May, yet the magnetic disturbances continued to recur at 27-day intervals for seven more periods; the last disturbance to be identified in this sequence was recorded on November 21 as a "moderate" storm. The interval January 1 to November 21, 1920, is 325 days, or twelve periods of 27·08 days. Allowing for the earth's orbital movement during this interval the equivalent solar period is 25·22 days, or Carrington's rotation period for spots in latitude 10°. The slight difference of period compared with that obtained from the 1921 series does not make the evidence for these sequences less convincing; in his discussion of a very large number of such sequences Maunder has shown that the sidereal period derived from them may vary from 25 days to 26·5 days (Monthly Notices, R.A.S., vol. 65, p. 553).

J. EVERSHED.

Kodaikanal, November 28.

Microscope Illumination and Fatigue.

THE further letter from Mr. H. J. Denham in NATURE of December 15, p. 496, does not in any way alter my opinion that the method of varying the intensity of illumination in the microscope described by him is not the best or the most convenient at present available. The use of a monochromatic light-filter does not affect the question, as such an accessory is used or not as may appear desirable in any given circumstances. At this institute several sources of light are installed, the one that is regarded as the most useful in high-power work being the mercury vapour lamp. It is obvious, therefore, that if light-absorbing screens of known opacity are available, nothing further is needed whether the light is monochromatic or otherwise. As I have already stated, such screens as we use here alter the intensity, and not the character, of any visible light which they transmit. If Mr. Denham regards the change of quality of his light as an advantage, I do not think that many microscopists will agree with him or adopt his methods while more efficient ones are at hand.

As to my experience of the value of variable illumination, it is, in my opinion, an essential feature of any good microscopic outfit. In use it is second only in importance to the proper adjustment of the light and sub-stage condenser. Apart from its advantage to the observer in reducing fatigue, it is often possible to use a larger cone of illumination by reducing the