

Taking  $T=211$  days from the outburst to the date of the photograph taken on September 20 and the angular distance  $\rho$  of the point ( $\alpha$ ) on Ritchey's photograph as equal to  $480''$ , the distance  $D$  is equal to 248 light years. The same point on the photograph of November 13 leads to  $D=265$ . The difference between these two values of  $D$  is, I believe, as Prof. Kapteyn also points out, due to the fact that the plane of the nebula is not normal to the line of sight. Ritchey also points out that, besides the radial expansion, there has been an apparent motion of the nebula round the Nova in position angle. From an examination of the photographs, the nebula seems to be evidently a spiral, and the observed shift in position angle would be caused by the gradual illumination of these spiral wreaths by the advancing spherical wave of light.

It can be shown that, if the sun were removed to the distance of the Nova, it would only be of the  $10\cdot24$  magnitude, so that, even at the present moment, the Nova is more brilliant than the sun. When the Nova was at its greatest brilliancy it was about  $0\cdot2$  magnitude. It must then have been 10,380 times brighter than the sun. If we take the light of the Nova at the earth as equal to a first-magnitude star and take Zöllner's estimate of this compared to the sun as  $\frac{1}{5 \times 10^{10}}$ , then the outer margin of the nebula with a radius of  $8'$  would be 430 times nearer the Nova than the earth, and would receive per unit area  $430^2$  times the amount of light, or  $\frac{430^2}{5 \times 10^{10}}$ , which is equal

to  $\frac{1}{270500}$ , of sunlight. This is about equal to  $2\cdot2$  times the light

of full moon. Of course, these figures are of very uncertain value and we must not place too much reliance on them, but if we take the above value of  $2\cdot2$  times moonlight as that received by the nebula, it at first seems too faint to be visible as reflected light. We must, however, recollect that the light reflected from the nebula at its brightest points cannot have an intrinsic brilliancy of more than an eighteenth-magnitude star, whereas the Nova was of the first magnitude. Hence it is only necessary for the nebula

to reflect light of an intrinsic brilliancy equal to  $\frac{1}{6,310,000}$ th

that of the Nova to seem as bright as it actually is, even assuming that the nebula has no inherent light of its own. The above figures will evidently require some alterations when the photographs available are carefully measured. W. E. WILSON.

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#### A Luminous Centipede.

IN your issue of January 9 (p. 223), an account of some observations of the *Geophilus* is given, from which it would appear that it used its power of emitting light as a means of protection. It might be well to point out that irritation or excitation of many luminous organisms has this result. Even in such low forms as the light-producing bacteria the same effect can be seen. In a paper on the "Physical Basis of Animal Phosphorescence," by S. Watasé, of the University of Chicago, published with the biological lectures delivered at Woods Holl, 1895, a very full account is given of the phenomenon as seen in the ordinary fire-fly, and the process is essentially the same in all light-producing organisms. In some the luminous product of cell metabolism is oxidised *in situ*, while in others it is thrown out in response to a stimulus as a liquid secretion.

J. E. BARNARD.

#### Birds Capturing Butterflies in Flight.

MR. LATTE still believes the capture of butterflies in flight by birds to be "exceptional so far as this country is concerned" (p. 273). Closer observation would assure him of the contrary, I think. Why is the case he mentions "probably to be regarded as a mistake on the part of the bird," when it is admitted that the captor "only relinquished its hold in consequence of a luckily-aimed stick"? Why assume that the thrower of the stick knew better what the house-martin ought to eat than the bird itself? In July 1900 I saw a house-sparrow in my garden attack a common brown butterfly on the wing (species unidentified). The chase lasted three minutes, by my watch, *in the air* the whole time, the butterfly doubling and turning again and again, and the sparrow after it, in a manner most remarkable for a bird without much hovering-power.

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Eventually both butterfly and sparrow went into a box hedge, and the sparrow came out immediately afterwards, eating the butterfly; he finished it with much apparent satisfaction on a branch of an apple-tree, and cleaned the scales off his beak on the twig. Sparrows are not, as a rule, insect-eaters, but J. H. Gurney gives, as a result of 694 dissections, under the heading "occasional food," these entries:—

"August.—Moth of *Crambus culmellus*."

"June.—Large brown cabbage-moth (W. Johns)," and adds: "I have notes of sparrows occasionally feeding on the yellow Underwing, Ermine moth, and a few other insects in the perfect state. . . . Everybody must, at some time or another, have observed their clumsy efforts to catch some common butterfly" ("The House-sparrow," Gurney, Russell and Coues, pp. 11-18). These notes have the greater value because they occur in a book written with the avowed object of convicting the sparrows of a diet injurious to the agriculturist!

If, therefore, attacks by "occasional" enemies are not infrequent, why imply that the toll taken by the vast crowd of insectivorous birds "must be very slight?" The question is, is it? Only specially directed observations can answer this.

LILIAN J. VELEY.

20 Bradmore Road, Oxford, January 26.

#### Extremes of Climate in the British Empire.

I HAVE just read the note on p. 87 of your issue of November 28 last giving an abstract of the "Summary of the Climate of the British Empire" in *Symons' Meteorological Magazine*; and I think that even though it is expressly said to be only "so far as it can be represented by reports for eighteen stations," such a summary is misleading. Thus, Adelaide is given as having the highest shade temperature, absolutely ignoring the fact that Lahore, with a population 50 per cent. more than Adelaide, has a maximum shade temperature for a month or more at a time rarely falling below  $116^\circ$ , and often well over  $120^\circ$ ; while in Jacobabad, a much less important place, it is true, but still a garrison town, the maximum shade temperature in June and July is more often over  $120^\circ$  than under it.

Again, for maximum rainfall, not to mention Cherra Punji, with an average of more than 400 inches, or many places on the west coast of India and Burmah with averages of 100 to 200 inches, the large town of Rangoon is far wetter than Calcutta. Being far from records here I can only give averages; but I do not think I am wrong when I say that the places mentioned in your paragraph are hardly typical of the extremes of climate exhibited by even the larger places in the British Empire, which, I take it, should be the object of such a summary.

Lalitpur, India, January 2.

CHAS. A. SILBERRAD.

#### A GALLERY OF ANIMAL ENGRAVINGS OF THE STONE AGE.

THE clever etchings on bone and ivory of the cave-dwellers of western Europe who lived towards the close of the Palæolithic period are well known to all who interest themselves in the pre-history of man. In 1895 M. E. Rivière published the first discovery of engravings and pictographs on the sides of a cavern. The second and quite recent similar record is published in the *Comptes rendus* of the Paris Academy of Sciences (December 9, 1901, p. 1038) by MM. Capitan and Breuil. These archaeologists had the good fortune to discover on the walls of the cave of Combarelles, in the neighbourhood of Eyzies (Dordogne), 109 engraved figures which date from the Magdalenian epoch. All the figures are engraved upon the vertical walls of the cave for a distance of 100 metres on each side of the passage. They reach to an average height of 1.50 metres, commencing at about 15 or 20 centimetres above the ground and often extending to the roof—which, in truth, is mostly low, being only one to two metres in height, but this has been curtailed by stalagmites.

The figures are mostly deeply graven in the rock, but some designs are merely scratched. Very often they have been coated by a layer of stalagmite which is