Taking T=211 days from the outburst to the date of the photograph taken on September 20 and the angular distance ρ of the point (*a*) 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 10·24 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 0·2 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 $\frac{1}{5\times10^{10}}$, 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 $\frac{430^2}{5\times10^{10}}$, which is equal to $\frac{1}{270500}$, of sunlight. This is about equal to 2·2 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 2·2 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.

Daramona, co. Westmeath, Ireland.

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. LATTER 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. 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°, and often well over 120°; 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° 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 archæologists 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

sufficiently thick in some places to more or less completely obliterate the figures. In some figures the incisions have been reinforced by black pigment, which occasionally replaces the cuts. Sometimes, more especially about the head of certain animals, the surface of the rock is scraped away around the contour of the figure so as to throw it into a slight relief.

The style of the engravings is in complete accord with those etchings on bone and antler which occur in the Magdalenian stations, and their character proves that

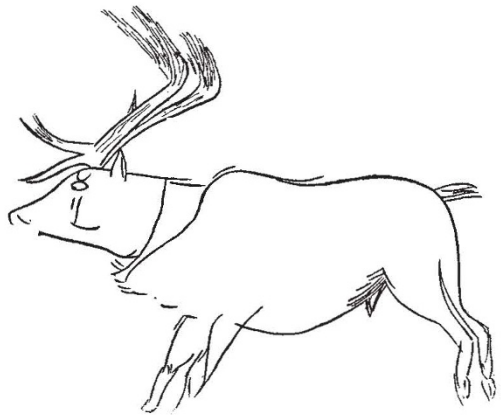

FIG. 1.—Running Reindeer, Cave of Combarelles.

they were drawn by artists who were perfectly familiar with the living animals. As in the earlier finds, the animals may be represented separately, or intermingled, or in definite groups.

Among the forty representatives of horse-like animals, at least two distinct types are recognisable. One has a massive head with a convex nose, the mane is short and stiff or long and flowing, and the tail is similar to that of our own horses. Some of these horses were domesticated ; several very clearly show a halter and others a cord round the

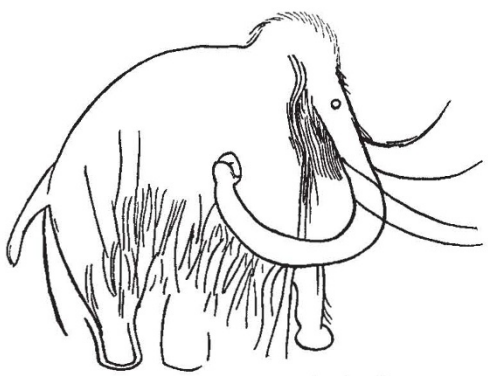

FIG. 2.—Mammoth, Cave of Combarelles.

muzzle ; a covering of some sort appears to be thrown over the back of two of the horses. This new evidence, in addition to the several representations of haltered horses from the cave of Mas d'Azil, seems to prove beyond question that the horse was domesticated at this early period. Certain Equidæ are represented of a more elegant shape, with a small head, slender legs, short and always erect mane, and with a tail that arises low down and is bare save for a terminal tuft of long hair.

The representations of the Bovidæ are less frequent. Three appear to represent bisons ; one is not unlike the domestic cattle of to-day ; a third, with erect mane, slightly incurved horns and a dewlap provided with long and abundant hair, recalls certain African antelopes. Two heads may be attributed to the saiga antelope, and one large head suggests that of an eland, but it is without horns. There are only two entire figures of reindeer ; the one which is represented as running is here reproduced. The artists have clearly indicated the differences between the reindeer and the wild deer of Europe, of which there are three examples.

The drawings of the mammoth are of interest second only to that of the horses. Of the fourteen examples, some are represented as entirely covered with hair and look like fluffy balls ; others have less hair, but are provided with a fleece on the under side of the body, on the head and occasionally around the mouth, as shown in our illustration. The trunk, the tusks, which are always strongly recurved, and the great characteristic feet are very distinctly drawn ; only in two figures are indicated the details of the form of the ears.

The only approach to a representation of a human face is a kind of irregular circle with an indication of two eyes and some marks for the nose and mouth. Among other simple signs were three roof-like fairly complicated designs, a double-contoured lozenge in the middle of the body of a horse, several M-like marks, semicircles, &c., which may be related to the script-like paintings found in the Mas d'Azil cave, and, finally, a group of very distinct small cups.

As only a preliminary paper has been published by the French savants, we are unable to give any further particulars of this most interesting and important find. The publication of all the particulars will be eagerly awaited by archæologists, as doubtless fresh light will be thrown upon these very remarkable troglodyte artists, who

"Pictured the mountainous mammoth, hairy, abhorrent, alone—
Out of the love that he bore them, scribing them clearly on bone."

A. C. H.

THE UNIVERSITY OF LONDON.

THE Drapers' Company has come forward with a generous offer in order to secure the incorporation of University College with the University of London. The offer is contained in the following resolution, which was brought before the Senate of the University on January 22 :—"That the Drapers' Company, believing that it is for the good of the higher education in London that University College should be incorporated in the University of London, and that for this purpose it is desirable to place the site, land, buildings and endowments of the college at the complete disposal of the University, are willing to facilitate this object by making themselves responsible for the debt on University College to the extent of 30,000*l*., provided that the Senate of the University and the corporation of University College can, before February 28, 1903, agree upon a scheme for the incorporation of the college in the University, and such scheme be approved by the company."

At first sight it seems difficult to imagine how such an incorporation can be effected. Committees appointed by the University and University College will consider the matter, and it is to be hoped that the bearings of the proposal will soon be published. An additional inducement for the realisation of this scheme lies in the announcement made by Sir Michael Foster that a gentleman is prepared to give to University College 1000*l*. a year, redeemable either by himself or his executors by payment