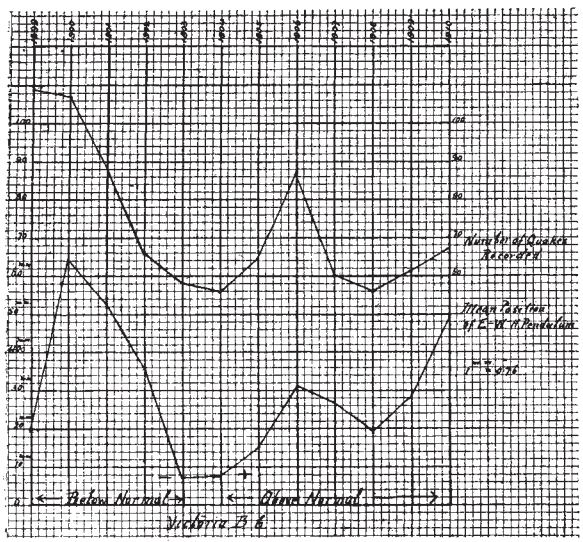
LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

Irregular Long-period Changes in Level.

AT the Portsmouth meeting of the British Association Mr. F. Napier Denison contributed a paper on changes in level observed with a horizontal pendulum at Victoria, B.C. Observations commenced in January, 1899, and extended over the next eleven years. For the most part these refer to changes in level in an east-west direction. Like observers in other parts of the world, he found diurnal, annual, and other changes, all of which can be referred to epigenic influences.

Over and above these Mr. Denison pointed out that the pendulum did not annually return to its normal position; for irregular periods varying between twelve and thirty months the zero might travel eastwards, after which it would make a greater or less excursion towards the west. But here comes the interesting point. A curve of these wanderings very closely agrees with one representing the annual frequency of world-shaking earthquakes, which



have been most numerous when the pendulum was farthest removed from its normal position, whether this was to the east or west. The accompanying curves by Mr. Denison are self-explanatory.

With the object of throwing further light on these observations it would be of interest to learn whether these long-period changes in level, and, I may add, in azimuth, have been recorded at observatories which have piers on rock foundations, particularly in districts where there is reason to suppose rock folding may still be in progress. Such observatories may perhaps be found in Switzerland, Italy, the Balkans, North India, and the American and Asiatic shores of the Pacific. I have not, however, been able to find a catalogue which gives information about the foundations of astronomical observatories.

An excellent *résumé* relating to changes in the vertical is given by Sir G. H. Darwin in a report to the British Association (1882). What is now required is a *résumé* since 1899, from which date we possess a fairly complete catalogue of world-shaking earthquakes, each of which, there is reason to suppose, may be regarded as the announcement of a general relief in seismic strain, and as one earthquake may beget another, they frequently take place in widely removed districts at about the same time. If a megaseism means a relief of strain in the crust of our world, can astronomers throw any light upon its growth?

All who are interested in earth physics would like to know whether evidences of long-period changes in the vertical exist, particularly in the direction of the dip of strata on which their observatories are situated.

Shide, Isle of Wight, England. JOHN MILNE.

Solar Eclipse—April, 1912.

A FEW years ago I read a short paper before the British Astronomical Association, in which I suggested that certain eclipse observations should be made, not at the centre line of the path of the shadow, but as near as possible to its two edges; and seeing that the forthcoming eclipse is unsuitable, on account of its short duration, for the usual observations, I hope that the astronomers of Europe will devote their attention to determining the position and width of the shadow. If they can do this with the exactitude which I anticipate, then, in a single day, full information will have been collected with which a profile of the earth's surface can be drawn along a line extending from Portugal through Spain, France, Belgium, Holland, Germany, and Russia to Siberia, which profile would have the advantage that it would be unaffected by local variations of gravity.

My suggestion is that enlarging cameras should be attached to the observing telescopes, and that images of the northern and southern edges of the sun and moon should be thrown on sensitive films, which would have to be moved in a north and south direction (say at the rate of 1 mm. per second). An observer stationed outside the shadow would obtain a negative image consisting of a black band with one gap at either edge; the horizontal (east and west) distance between the edges of these gaps would be the width of the chord on the sun's disc which is traversed by the moon's north or south edge; the vertical (north and south) distance between the gaps would represent the time taken in traversing this chord. An observer stationed inside the moon's shadow would obtain a negative image, which would be a black band crossed by a white "bend," the horizontal width of which would represent the length of the chord on the moon's disc traversed by the edge of the sun, and the vertical distance would represent the time taken in traversing this chord.

The length of the chord being known either by measurement or by calculation from the time, the overlapping of the northern or southern edges of the sun and moon could easily be calculated. The moon's apparent semi-diameter is about 1000″, and its actual semi-diameter about 1000 miles. If the enlargement be such that 1 mm. = 1″, then if one of the observers should find that the length of the chord is, say, 100 mm. on the film, equal to 100″, or 100 miles, then the amount of overlap is $50^2 : 2000 = 1{\cdot}25$ mm., ″, or miles, and he will know that he was stationed one and a quarter miles, or 2 kilometres, from the edge of the shadow. A more fortunate observer, who may obtain a length of chord of only 10 mm., would know that he was stationed at one-eightieth of a mile from the edge. If, as seems likely, the photographic records can be measured with an accuracy of one-fifth millimetre, then the latter observer will feel sure of his position to within one two-thousandth of a mile, or, say, to within 1 metre.

As the angle at which the shadow strikes the earth will nowhere be less than, say, 50°, it is evident that a small difference of level of only a few metres between two observers would make a perceptible difference in their photographic records, and these would, therefore, afford the means for accurately fixing their relative heights along a line extending from Portugal to Siberia. Future eclipses, both total and annular, would enable a network of such profiles to be determined not only across continents, but also across oceans. C. E. STROMEYER.

"Lancefield," West Didsbury, October 25.

Khartoum for an Observatory.

AT a time when search is being prosecuted in northern Africa (NATURE, September 21, p. 393) for an observatory site, it may not be out of place to direct attention to the merits of the Khartoum vicinity, so far as this can be done by one who is not an astronomer. Its features may be enumerated as follows:—

Position.—Latitude 15° 36′; it is some degrees nearer

the equator than Salisbury in Rhodesia. The importance of a low latitude has been illustrated by the success of Helwan Observatory in obtaining the earliest photograph of Halley's comet, owing to the longer night near Cairo in summer as compared with Greenwich or Heidelberg. This advantage would be still further marked in the case of Khartoum, some 14½° south of Helwan, or relatively about as far as Barcelona is from Edinburgh.

Altitude.—Precise determinations have been made by levelling, and the land near the river has been found to stand about 385 metres above sea-level.

Climate.—So far as I am aware, the "seeing" qualities of the atmosphere have not been tested. Ordinary experience shows that it is remarkably clear, and it is no uncommon thing near the Italian boundary in these latitudes to see Jebel Kassala (4400 feet) and some of the Eritrean hills at distances up to a hundred miles. These districts are at no great height above sea-level, and the clearness of vision must in large measure be due to the pureness and homogeneity of the air.

Relative humidity is a factor presumably of great importance as regards the "seeing" qualities of the air; and those interested may refer to Captain Lyons's "Physiography of the Nile and its Basin," where they will find the data for Khartoum and many other stations concisely summarised. More recent data are available in the annual meteorological reports, &c., published by the Egyptian Survey Department. Suffice it to say that the mean annual relative humidity is 31 per cent., and this figure is only exceeded for three months in the year. The Khartoum observations have been made within a short distance of the river, and no doubt the humidity results are higher than would have been obtained at a station a mile or two away. The air is often dry enough, even near the river, to desiccate moist calcium chloride. There are very few cloudy nights.

During the summer months violent dust-storms occur, but these are generally of short duration. Situated on the southern edge of the desert, it has a rainfall of about 6 inches a year, almost confined to the months of August and September. Temperature conditions are extreme, but owing to the intense dryness heat is seldom oppressive to the individual.

Communication.—Several mails a week carry letters to London in nine or ten days, and the outward journey can be done in eight and a half days. The railway to the Red Sea enables goods from outside to reach Khartoum with only a single handling at Port Sudan.

It seems improbable that there is any other locality in an equally low latitude offering the advantages of a clear, dry atmosphere combined with a fair altitude and such ready means of communication with European centres of learning. As an actual site in this vicinity the Abu Meru Hills may be suggested, as rising about 100 metres above the river at a distance of some eight miles north-west from Omdurman. The place is far enough to avoid any local humidity due to the river, as well as the dust-raising traffic converging on the towns. The prevalent winds are from the north and north-west, and traverse hundreds of miles of unbroken desert before reaching the hills.

In conclusion, I have to thank Mr. Rolston for directing my attention to the search being undertaken by the French Geographical Society. Our friends across the Channel have extensive possessions in northern Africa, and no doubt these have first claim for consideration; but if they are unable to exploit Khartoum, perhaps it may be kept in view and tested when munificence can be found to provide for the equipment and maintenance of a new observatory.

G. W. GRABHAM.

Khartoum, Sudan, October 15.

The Scientific Misappropriation of Popular Terms.

I ENTIRELY agree with Dr. Harmer (NATURE, October 26) that the extension of priority to groups larger than genera is undesirable, and the use of the word insect should be judged solely by practical convenience.

If the restricted use of the word insect were as generally accepted as that of deer there would be no objection to its use. I understand, however, that the use of deer for small mammals was abandoned in Middle English, and that the phrase "mice and rats and such small deer," quoted by Dr. Harmer, was intended by Shakespeare and later authors to be a joke, like the railway porter's classification of the tortoise as an insect.

The same explanation is not available for the remark in Prof. Adam Sedgwick's "Text-book of Zoology" (vol. i., p. 502) that "all spiders are predaceous and suck the juices of other insects."

I cannot agree with Dr. Harmer that the word insect is, or ever has been, generally used in the restricted sense either in popular literature or in technical works other than zoological. For example, agriculturists always seem to speak of insect in the wider sense, and agricultural literature generally does the same. Nor do I find any agreement on the subject among zoologists, and the tendency seems to be for them to abandon Insecta as a class name in favour of Hexapoda. Sir Ray Lankester expresses the matter admirably in the new edition of the "Encyclopædia Britannica." He rejects Insecta as the class name of the "so-called 'true insects,'" and regrets that Lamarck, who invented the "very appropriate name Hexapoda," did not insist on it; and "so the class of Pterygote Hexapods came to retain the group-name Insecta, which is, historically or etymologically, no more appropriate to them than it is to the classes Crustacea and Arachnida." He refers with obvious disapproval to "the tendency to retain the original name of an old and comprehensive group for one of the fragments into which such group becomes divided by the advance of knowledge, instead of keeping the name for its logical use as a comprehensive term, including the new divisions, each duly provided with a new name" (Sir Ray Lankester, "Encyclop. Brit.," vol. ii., 1910, p. 673).

Those, therefore, who use the word insect in its older and etymologically more correct sense have the support of high zoological authorities.

J. W. GREGORY.

4 Park Quadrant, Glasgow, October 28.

The Colour of a Donkey.

ON October 5, at 7 p.m., the moon being high up and almost obscured by a thick high haze, giving a diffused ground light with no shadows, I was crossing an open field by a footpath. The field is about a quarter of a mile across, and the hedges all round it, with tall elms, were marked out in broad dark masses. The grass, dried by the hot summer, is straggly and grey, with short green undergrowth. There were a number of cows—red and red and white—scattered over the field, visible in the dim light up to 80 yards by measurement. One could apparently see everything within that radius.

I was brought to a halt by hearing an absolutely invisible animal noisily cropping the grass a few feet away. On going nearer I found a grey donkey. On his starboard quarter at 4 yards' distance his dark head appeared as a moving blur, but "stern on" at that distance he was completely invisible—an "airy nothing"—though, like Polonius, "at supper." It was most extraordinary to hear the animal feeding and to be unable to see a vestige of him. At 2 yards' distance he was a mere ghost. The lighter under-colour of the ventral surface certainly diffused what light there was, after the manner of the vanishing duck in the Oxford Museum. That may be partly the explanation.

Returning by the same path at 7.30, I tried by walking across the field in every direction to find the donkey, but failed, though the cows were all plainly visible, feeding or lying down, and the donkey was in the field all night.

The striped zebra, invisible in the moonlight, is cited as an example of protective coloration. I merely record the above facts without venturing upon any explanation of them.

There is an old rhyme describing the palpitations of a villager followed at night across a field by an invisible creature with audible footsteps—

> "And much he feared that dreadful ghost
> Would leap upon his back."

That was also a donkey, and the rhyme, like Gilpin's ride, may be the jocular record of a fact. My donkey was ghostly enough, and suggests possibilities.

Waterstock, October 24.

E. C. SPICER.