

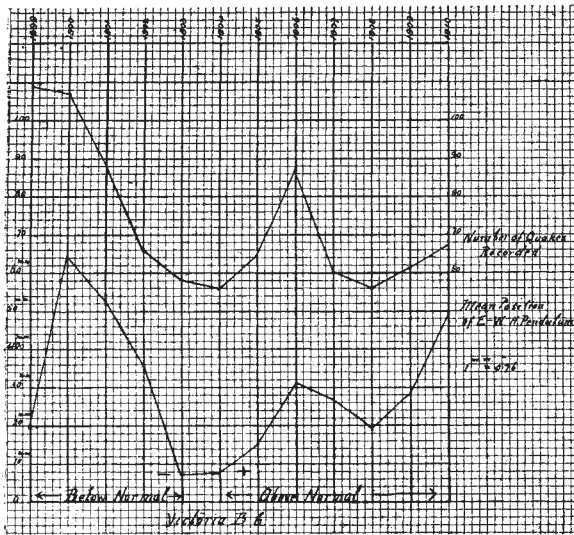
LETTERS TO THE EDITOR.

[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?

NO. 2192, VOL. 88]

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 100", 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 $50^2 : 2000 = 1.25$ 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-eighth 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 $15^\circ 36'$; it is some degrees nearer