LETTERS TO THE EDITOR.

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Coral Reefs.

WITH reference to Captain Moore's two difficulties, I have to say:—(1) The position of banks around islands depends, in my opinion, on the nature of the rocks; loose material, or easily disintegrated rock, may be found either on the lee or weather side of an island. There are many examples of these banks in all positions around islands where there are no coral reefs. (2) I do not think it is the case that corals reach the surface simultaneously on all sides. What Captain Moore refers to as sunken reefs is good evidence that they do not. The great uniformity in the breadth of the reefs in some regions is, according to my view, due to the play between the forces secreting and depositing carbonate of lime, and those engaged in its disintegration and solution whenever the organisms have died. Reefs are very often non-continuous, as Captain Moore himself points out in the case of the Barrier Reef of Australia. This, too, I have explained in the same way, but taking into account local conditions. I cannot admit Captain Moore's supposition about the filling up of the lagoon around Solo, nor his explanation of the bank to the west of Ono. I have no charts with me here, so cannot at present refer to the other illustrations he has given.

Grangemuir, Pittenweem. JOHN MURRAY.

An Earthquake?

ON Friday, July 5, the inhabitants of Lyme Regis were much astonished by some noises, which took place at intervals between 11 and 11.15 p.m., and which there seems good reason to believe were caused by an earthquake. In three houses the occupiers thought that heavy pieces of furniture were being moved about, which was of course found not to be the case; and in another the inmates thought at first that something was wrong with the kitchen boiler. The noises observed consisted of a distant rumble which grew nearer till at last the windows of the houses rattled, and in some cases distinct vibrations of the houses were felt. Some have supposed that these noises were caused by guns at sea, but this seems impossible, because (1) the rattling of the windows occurred after the distant rumble, and not simultaneously as would have been the case with guns; (2) a gentleman who has had much experience in guns and firing, has declared that the noise was not like guns; (3) after making enquiries we have been unable to discover that any firing at sea took place that night; (4) although the night was still, a heavy ground swell was observed. These phenomena have not received any notice as far as we know in the public press, and it seems a pity, if an earthquake, as we believe, really took place, that there should not be some record of it.

Lyme. A. R. SHARPE.

The Excursion to the Volcanoes of Italy.

THANKING you for noting the intended excursion of geologists to the active and extinct Italian volcanoes under the auspices of the Geologists' Association and Geological Society of London, I would like to draw the attention of your readers to the remarkable changes at Stromboli which have lately occurred. New eruptive mouths have opened, and there has been an outflow of lava, a phenomenon so far unknown (so far as recorded) from 2000 to 3000 years. There is an uncertain reference to such an occurrence, but the change at Stromboli from Strombolian to Vesuvian activity is remarkable. I am also informed that the eruption of Vulcano still continues with paroxysms of greater activity. Thus the excursionists will have the advantage of seeing changes that, even for a constant resident in such a region, are rare. H. J. JOHNSTON-LAVIS.

Naples, July 15.

Seismology in Italy.

I WAS glad to see that Prof. Grablovitz had laid claim to attention for some of his other memoirs which I had not at that time seen, and which are of much value. I would especially draw the attention of seismologists to his study of the relationship of temperature and outflow of a thermo-mineral spring at Porto d'Ischia to the tides and barometric pressure.

In my article I only reviewed those memoirs placed in my hands by the Editor of NATURE, or sent to me privately. I may, however, say that as near as possible a complete review of all the papers on seismology and vulcanology published during 1888 is being prepared by me for the *Annuaire Géologique Universel* of this year. I should therefore be glad to receive any other papers on those subjects, that have not been sent to me, as soon as possible. H. J. JOHNSTON-LAVIS.

Naples, July 15.

The Earthquake of Tokio, April 18, 1889.

READING the report on this earthquake in NATURE (June 13, p. 162), I was struck by its coincidence in time with a very singular perturbation registered by two delicate horizontal pendulums at the Observatories of Potsdam and Wilhelmshaven. These instruments, which represent, with some modification, Prof. Zöllner's horizontal pendulum, were established in March 1889, for studying the slight movements of the ground. The motion of the pendulum, which is left to oscillate freely whenever its equilibrium is disturbed, is registered by the same photographic method as that employed for magnetic observations. The pendulum is in the plane of the meridian, so that any shock, the direction of which is not in this plane, will produce oscillations of the pendulum, diminishing gradually, if it is left undisturbed after the shock. The pillars supporting the instruments are fixed in a depth of 1 metre below the ground of the cellar which was chosen as a suitable place for the erection of the instrument.

During the three months from April to June, the disturbance of April 17, 18h. G.M.T., was the most remarkable which occurred The following readings of Greenwich mean time, which are best explained by the accompanying figures, are taken from the original photographs; it must, however, be mentioned that the small scale of 11 millimetres per hour does not allow a very accurate determination of time, and that an error of one minute or two is quite probable.

(1) *Potsdam.*—1889, April 17. From 5h. until 17h. 21m., great steadiness of image.

h.	m.	
17	21	First traces of disturbance.
17	39	Beginning of small oscillations.
17	54·3	Motion *suddenly* increases and reaches its maximum at
18	1	Amplitude of oscillation 154 millimetres. The amplitude then suddenly diminishes.
18	43	Maxima of oscillation.
18	58	
19	45	
20	0	Perfect steadiness of image.

(2) *Wilhelmshaven.*—Here, also, the image is perfectly steady until 17h. 30m.

h.	m.	
17	30	Beginning of small oscillations.
17	48 – 17	51 A short interval of perfect steadiness.
17	51	The movement *suddenly* increased, and as the light is not strong enough to mark the single oscillations, the image disappears until
18	38	when the principal disturbance reaches its end.
18	51	Maxima of small oscillations.
19	6	
19	22	
20	2	
20	7	Perfect steadiness.

If we compare these dates, it seems most probable that the moment which shows a sudden increase of motion, and is best marked on the curves, may be considered as the beginning of the principal disturbance. We thus have—

For Potsdam ... ... 17h. 54·3m.
For Wilhelmshaven... 17h. 51m. } Mean, 17h. 52·7m.,

which, considering the error of the readings, may be taken as one and the same moment.

The beginning of the earthquake of Tokio was observed at 2h. 7·7m. Tokio M.T. The difference of longitude (taken from a map) being 9h. 19·3m. E., we find that the shock occurred at 16h. 48·4m. G.M.T. on April 17, and thus it took 1h. 4·3m. to travel across the body of the earth.