If the earth movement took place at the Cape as an absolutely *perpendicular* vibration, would the seismograph have recorded it?

Can sudden and abnormal change in atmospheric pressure cause volcanic or other disturbance on the earth?

August 19. F. C. CONSTABLE.

IN NATURE, August 14, p. 371, it is stated that "at 7 o'clock on the morning of May 8, Mr. Ferdinand Clerc observed the needle of a large aneroid barometer pulsating violently." Above this there is, however, another note which says that "nothing unusual was observed in the barometer." But even supposing barometric perturbations to have taken place on May 8 in St. Pierre, what connection could these have had with phenomena which happened twenty days later at the Cape of Good Hope?

The Milne horizontal pendulum installed at this latter place will record disturbances originating at its antipodes, but will not respond to the rapid elastic vibrations of local shocks. You may hear seismic sounds, windows and doors may rattle, but the instrument in question will remain at rest.

The movement of an earth particle at the time of an earthquake is in all azimuths and at varying angles with the horizon. A strictly perpendicular movement seems an impossibility.

Abnormal changes in atmospheric pressure may act on a region in a state of excessive seismic or volcanic strain much in the same way as the last straw is said to act upon the camel's back; the relationship, however, is far from being pronounced. This and other questions referred to by Mr. Constable are discussed in the volumes on "Seismology" and "Earthquakes" published in the International Scientific Series. J. M.

August 26.

Larva Stage of Heliocopris Isidis.

IN the month of March last, I discovered at a depth of a few cm., among the roots of the tree *Albizzia lebbek*, several large balls of earth, varying in diameter from 5·0 to 8·5 cm. These on being broken open were found to be hollow spheres, the thickness of the wall being about 1·5 cm. This wall was composed of concentric layers of mud and bits of vegetable matter mixed, having the composition and appearance of native unburnt bricks.

Inside the sphere was a coleopterous larva about 2·0 cm. in diameter at its thickest part, about 9·0 cm. in length measured along the dorsal line, and about half that length measured along the ventral line; the larva lay on its side and assumed a curved position. A few days ago, an imago of *Heliocopris Isidis* emerged from one of the balls by boring a hole in the roof of its cell just large enough for it to pass through.

If any of these facts are new in the life-history of this beetle, they might interest your readers. FRED. FLETCHER.

School of Agriculture, Ghizeh, Egypt, August 14.

THE LAVA-LAKE OF KILAUEA.

THE recent destructive eruption in Martinique has revived interest in the question of the causes of volcanic action. Only lately have I become sensible of the peculiar value of some observations of my own as evidence of the *primary* force which impels the ascent of lava from its interior habitat, as distinguished from the explosive violence caused by steam generated by the encounter of the ascending lava with ocean and other surface waters.

I have long believed the primary force to reside in the expansion of the gases originally occluded in the magma, ever since its first condensation from the nebula. Whenever released from solidifying pressure by disturbances of the superincumbent crust, the intensely hot magma bursts into a viscid foam and pushes upwards. In a quiet volcano like our Kilauea, meeting no water to generate explosive steam, the lava wells up continuously and steadily in a comparatively gentle fountain, which displays effervescence only on the surface.

In support of this opinion I beg to offer positive evidence contained in certain facts observed by myself in Kilauea during April 8–14, 1892, and on August 28, 1894. The volcano had been in very steady and uniform action for nearly two years before the earlier date, and so continued until a short time after the latter date, or nearly five years in all of a quiet, continuous and rather copious welling up of lava, wholly unattended by any explosive action.

On the earlier date I carefully observed the then existing lava-lake during six successive days. This lake occupied the centre of the inner crater, called Hale-a-mau-mau, or Fern-hut. The main crater called Kilauea is nine miles in circumference, averaging 400 feet in depth, and rather unevenly floored with recent lava. South-west of the centre is the inner pit of Hale-a-mau-mau. This pit was at that time nearly circular

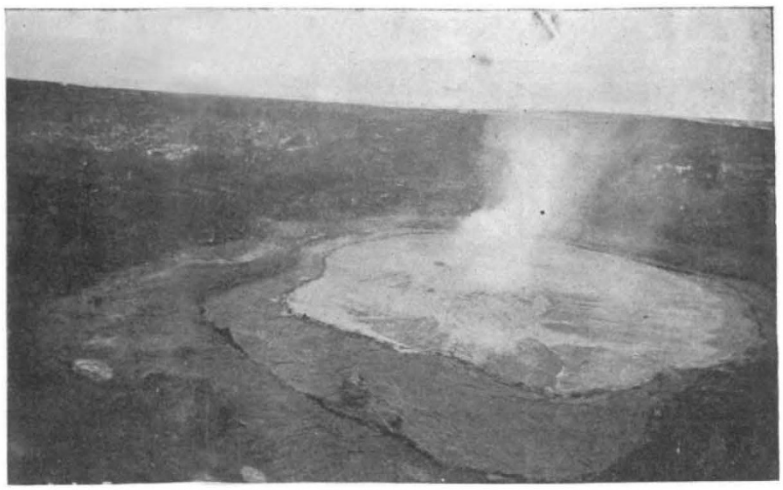

FIG. 1.—Fire-lake as seen in 1891–2.

and 2400 feet in diameter, with vertical sides averaging 150 feet down to the talus. Before the welling up of lava began in 1890, the pit had been about 700 feet deep. In two years the lava had risen 400 feet, and stood within 300 feet of the rim and main floor.

A lake of liquid lava, covered by a thin, spongy film, occupied the centre of the pit. This lake was nearly circular, averaging 850 feet in diameter. It was bordered by a low dyke, which partially restrained its frequent overflows. Outside of the dyke, freshly congealed lava sloped away to the talus. By day the crust-film was grey to the eye, but by night a deep red. It was traversed by numerous fissures of white fire. During the whole time three fountains of lava were welling up with somewhat regular intermittence, and three smaller ones at irregular intervals. There was no explosive action whatever.

The largest fountain was about 120 feet south-east of the centre of the lake. It played with great regularity about three times in a minute, rising in a round billow 25 feet high and 50 feet in diameter, bursting at the top and falling back to level, its discharge moving in a broad stream towards the centre of the lake. The fling of spray from its summit rose to 40 or 50 feet above the level.