

vertical or horizontal movements or by both. Lawson in his paper, "The prediction of earthquakes," draws his deductions mainly from measured horizontal movements in California. Over a large part of any region where there is a change in the vertical there usually is a deflection of the plumb line. Exceedingly small deflections can be measured from the tilting of sensitive pendulums. Jaggar² has shown the connection between tilt at Hawaiian Volcano Observatory and fluctuations in the lava column of Halemaumau. It is probably less reliable to make earthquake predictions from the tilt records of one station on the brink of an active volcano than from the records of a station more remote from a volcanic vent. So far at the Hawaiian Volcano Observatory there have been no measurements of horizontal movements. Steps were taken by Dr. Jaggar in cooperation with the U. S. Geological Survey to locate accurately several points near the volcano so that both horizontal and vertical movements might be detected. Tilt is also measured at Kealakakua, Kona, where a seismograph is maintained by the Hawaiian Volcano Research Association. It is a part of the program of this observatory to extend tilt measurements to other parts of the island. The amount of movement on the island of Hawaii is so great that it is possible to supplement the continuous records of a few stations by occasional measurements of accumulated tilts at other places with a precise level.

It is presumably not incorrect to say that if the movements, either vertical or horizontal, or both, that are occurring in probably all seismic regions of the world could be measured continuously few serious earthquakes would be likely to occur unheralded.

At the Hawaiian Volcano Observatory, on the north brink of Kilauea crater, there was a southerly tilt during most of March. On March 29 a northerly tilt set in that continued until the evening of April 2. From April 3 to April 8 there was a southerly tilt amounting to about six seconds of arc. The tilt accumulation of six seconds in such a period of time is by no means uncommon, especially during times of rapid changes in the lava level in the fire pit, half of the above amount sometimes occurring in one day. With these rapid fluctuations of the molten lava and large tilts there are, as a rule, but few perceptible earthquakes. During the period in question, however, there was no molten lava in the fire pit. At times of little or no tilt whether there be lava in the pit or not there are but very few local shocks. The connection between tilt and earthquakes at such times has long been noticed here.

² Jaggar, T. A., *Bull. Seis. Soc. Amer.*, Vol. 10, No. 4, Dec., 1920.

Accordingly, on April 8 the following statement was sent to Hawaiian newspapers: "There is strong likelihood of one or more perceptible earthquakes within a few days." At 10:46 P. M. April 10 an earthquake occurred that was felt all over southeastern Hawaii, and the following day at 11:24 A. M. another shock of a little less intensity occurred.

R. H. FINCH

VOLCANO HOUSE, HAWAII,
MAY 1, 1924

A NEW FORMATIONAL NAME

IN 1912 I described in the *Journal of the Academy of Natural Science of Philadelphia* (pp. 23-112, pls. 5-13), the occurrence of true basal Eocene beds on the Island of Soldado, off the southwestern coast of Trinidad, in the Boca de Serpiente, and I described and figured the fossils.

This fauna, which is that of bed No. 2 of the Soldado section, showed extremely interesting analogies on the one hand with the northern fauna of the Midway, basal Eocene of Alabama, and on the other hand with the southern basal Eocene of Pernambuco, Brazil.

The subsequent work of various geologists in the Antillean and northern South American field has strengthened and corroborated the age of this Soldado horizon, which has been traced upon the mainland of Trinidad. Beds of similar age are also on the Island of Margarita.¹

But the Soldado horizon has become historic as the first discovery of the true basal Eocene in the entire Antillean and northern South American region. It is fitting that it should receive a distinctive name, and I propose that it should be known as The Soldado Formation and stand as the type of northern South American and of Antillean basal Eocene deposits.

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QUOTATIONS

THE ENCOURAGEMENT OF BASIC RESEARCH

THE National Union of Scientific Workers has issued a report on the encouragement of basic research, in which it discusses the value of research to the community, the motives of research workers, the financial encouragement they should receive, and the obligations of their work. The views expressed in this report are of peculiar interest because they represent the opinions of people actually engaged in scientific investigations, who are themselves familiar, therefore,

¹ Maury, *American Journal of Science*, in press.