

# THE EARTH'S THREE HUNDRED VOLCANOES

NEW YORK, May 31.—"Vulcanologists" of today are as much at a loss to define the volcano as were the geologists and astronomers of the days of Darwin. "Vulcanity" is as much a stupendous mystery to the students and observers now hurrying to the scene of the unparalleled disaster at Martinique as was the new coined word of heathen origin to the Latin survivors who gazed in awe upon the ruins of Pompeii. Similar were the conditions; similar the ignorance of the spectator.

Among the first and best equipped of special students to leave for St. Pierre was Dr. E. O. Hovey, curator of the department of geology in the American museum of natural history. I found him rushing to make ready for his departure the next day on the government relief ship Dixie.

There was only time for him to speak in a general way of the previous investigations of leading geologists. He was mindful mostly of the large opportunity opening to him for personal observation, but he outlined certain salient results of the studies of such men as Dana, Russell, Judd, Bonney and Hill, the last named having prepared a monograph on volcanic conditions in the West Indies. From Dr. Hovey's suggestions and other sources this sketch of the known facts about volcanoes has been carefully compiled.

The number of great habitual volcanic vents upon the globe is estimated at between 300 and 350. There is only one on the whole continent of Europe, Vesuvius, though elsewhere in the Mediterranean there are six—Stromboli and Vulcano in the Lipari islands, Etna in Sicily; Graham's island, a submarine volcano off the Sicilian coast, and Santorius and Nisyros in the Aegean sea. The African continent is known to contain ten active volcanoes, four on the west and six on the east coast, and there are about ten others on neighboring islands. In Asia there are twenty-four active volcanoes, but no less than twelve of these are situated on the peninsula of Kamchatka. There are no volcanoes in Australia.

The American continent contains more than the countries of the old world—twenty in North America, 25 in Central America and thirty-seven in South America. Thus, taken altogether, there are about 117 volcanoes on the great continents and nearly twice as many on the islands scattered over the several oceans. These volcanoes usually assume in their distribution a linear arrangement, and nearly all of them have been thrown up along three well marked bands and the branches proceeding from them.

The whole eastern coast of both the Americas was thought to be entirely free from volcanoes of anything like recent date, and, just as Prof. Judd a few years ago complacently asserted, "as a matter of fact the actual amount of damage to life and property which is effected by volcanic eruptions is small," so Prof. Bonney declared that the whole western border of the Atlantic is destitute of volcanic activity, "were it not for the long island chain of the Lesser Antilles which separates that ocean from the Caribbean sea."

R. T. Hill made a special study of the conditions in the Windward Islands. It has been well known that many of the West Indian islands are of limestone, chiefly coralline; that some contain crystalline rocks, while others are volcanic. Quite recently it was noted that seven craters still gave signs of life by emitting steam, and that the curving line of volcanic vents occurred on a submarine plateau between the deep basin of the Central Atlantic and that of the Caribbean sea. The activity of the Soufriere of St. Vincent was remarked years ago.

But a year or two back, Prof. T. G. Bonney found himself unable to formulate any "complete theory of vulcanicity." Geologists, he admitted, had

ascertained certain important facts, but they were only "getting warm." Their successors, he hoped, might get much nearer to a solution of the problem by the end of the first quarter of this century.

It is 4,000 miles to the center of the globe, and the deepest mines do not penetrate to much more than half a mile from the surface, while the deepest borings fall far short of a mile in depth. The geologist knows that volcanoes are found on "rising areas," and not depressions of the earth's surface; he suspects the influence of sea water in the fissures of the "crust of the globe," that is, the exterior film of its immense mass, and he has found the means of drawing inferences as to the nature of the rocks at depths of ten or fifteen miles, but that is the utmost limit of the portion of the globe which has been made the object of his direct observation and study.

The entire globe is equal in weight to five and one-half globes of the same size composed of water, but the density of the materials on the crust itself is much less, varying from about two and one-third to three times that of water. It would consequently appear that the great mass—the interior—of the globe is composed of materials having twice the density of the rocks exposed at the surface and these materials are of a different kind.

Many geologists and astronomers reject the hypothesis that the earth consists of a great fluid mass surrounded by a comparatively thin shell of solid matter. The astronomer finds it inconsistent with the established laws governing the motions of the earth; the geologist knows that lavas of a totally different character have been extruded in Hungary and Bohemia during the Miocene period and that there have been igneous ejections in

Hawaii from a crater 14,000 feet high for which no "sympathy" was shown by an adjoining open vent 10,000 feet on a lower level.

Whatever the cause of a volcanic action may be, it seems clear that it does not originate in a universal mass of liquefied material situated at no great distance from the earth's surface. The globe may be solid both at the center and the surface with an interposed layer of fluid or semi-material between. Or the deep seated solid incumbent weight, be of a "potential fluidity," the comparatively slight changes on the surface bringing about the liquefaction of the crust. The vulcanologist is inclined to believe, however, that the earth is solid to a great distance, if not to its very center.

Certain facts he knows of a surety. He knows there is such a thing as "liquid basalt," that floating islands of solid lava may exist in the volcanic

## THE ROBES THE KING HAD HOPED TO WEAR



Photograph by special artist, London, England.

The above is an authentic photograph showing exactly how King Edward VII had planned to appear on June 26th when the venerable Archbishop of Canterbury was to place upon his royal head the crown of St. Edward, by virtue of which he derives his right to rule. The king, however, was suddenly stricken, compelling the indefinite postponement of the coronation ceremony. The crown of St. Edward is a circle of gold, with four gold crosses and four fleurs-de-lis. From the four crosses rise four arches which meet in the middle and upon which is a golden ball with another gold cross upon it. The whole is set with diamonds, rubies, emeralds, sapphires and pearls.