

as shown on the map, page 292, and that Kauai, the western island of the group, was one of the earliest, if not the earliest, to become inactive.

But Hawaii, the easternmost, is, on the contrary, the island of most recent activity. Here are the active volcanoes. Further, the northwestern and the northern volcanoes of Hawaii were the first to become extinct. The largest and highest volcanic island of the whole group is Hawaii, that on which action has continued the longest. In the Samoa group, south of the equator, the order of extinction was the reverse of that at the Hawaiian, or from east to west — Savaii, at the west end, a broad and lofty cone of lavas recent in aspect, answering geologically to its (dialectic) namesake, Hawaii, of the Hawaiian group.

4. *Other methods of work in a volcano.* — Besides the action of vapors, there are contractional effects from heat, exhibited in columnar forms, and irregular fracturing; for each lava-stream has cooled down from a temperature above 2000° F. There are fusing effects; often a remelting of the lavas of a lake that had become solidified; and a fusing also of floating masses in the lakes; and sometimes an extending of the bounds of a lava-lake, or an opening of new lakes.

There are also large bulgings made in a lava-stream, while it is cooling, through the vapors that are generated from moisture underneath it.

There is also hydrostatic and other gravitational pressure arising from the height of the lava-column in a lava-lake, or in the mountain.

5. *Eruptions.* — (a) *Preparation for an eruption.* — The crater, as at Vesuvius or Hawaii, after it has been emptied by a great discharge at a time of eruption, often has, at first, a period of apparently extinguished fires, and something like the conditions of an incipient solfatara in the lazy escape of vapors from the fissures and the lining of fissures with sulphur crystals. Next, little outflows of lava take place from apertures or fissures in some part of the bottom or floor of the crater, or dribblets of lava or jets of cinders build a small cone about a vent. In the case of basaltic lavas, pools of boiling lava often appear in the crater, which frequently overflow and spread lava-streams over the floor, thus making small eruptions. In the case of the less liquid lavas the ejections at the bottom of the crater are mostly of cinders, and one or more cinder-cones are made thereby over the bottom; but now and then escapes of lava take place through fissures. The process is one that puts new material over the bottom of the crater and raises its level; and it goes on at an increasing rate until the eruption commences. In Kilauea, such overflows from the large lava-lake may have a length of two miles on the floor of the crater.

But this raising of the bottom by overflows and deposits of cinders is accompanied by another action, — the *upward thrust of the lavas of the lava-column through the ascensive action already mentioned.* Owing (1) to this lifting action, and (2) to the ejections, the solid floor of the crater keeps rising; and sometimes, perhaps generally, the larger part of the floor is lifted or shoved up bodily by the lavas from the lava-column that are forced in beneath it. After the eruption of 1840, the floor of Kilauea was raised bodily between 300 and 400 feet before a new eruption took place. By the