

5. *Sizes of some of the larger craters.*—Kilauea has diameters of 14,000 and 9800 feet; the depth in 1840 was about 1000 feet, but now it is less than 450 feet. The crater of Haleakala, east Maui, is 23 miles in circuit and 2500 feet in greatest depth. The crater of the peak of Teneriffe is 8 miles by 6 in area, and has a depth in some parts of 2000 feet. Mauritius has a crater which measures at least 13 miles in its longest diameter. On Java, Papandayang, 7084 feet high, has a crater whose diameters are 15 and 6 miles. The crater of Aso-san, of the island of Kiusiu, Japan, has diameters, according to Milne, of about 10 and 14 miles.

3. Volcanic Action and its Causes.

Volcanic action involves the continued supply of liquid lava from depths below the earth's surface to the crater, to keep up heat and action. It comprises (1) work within the crater by means of escaping vapors, by the fusing and contractional effects of heat, and by gravitational pressure; and (2) discharges of lava, either in streams or as cinders.

1. *The supplying of lava.*—The supply-channel, or *conduit*, of a volcano must reach down to a region of great heat and fusion. For the liquid column loses heat from contact with the air and cool rocks, and from the expansion of vapors or vaporizable material within the lava. This supply of liquid rock presupposes some upthrusting force. If the level reached by the upthrust lavas is much below the earth's surface, the heat of the melted rock might make hot springs or geysers, or, at a higher level, produce a region of escaping vapors. But, for volcanic action, the ascensive force must be sufficient to restore the lava-column to its mean height in the crater, sooner or later after every eruption; for failure here is the beginning of decline in volcanic activity. When a volcano ceases action entirely, not even vapors escaping, it is said to be extinct; but it may not be so dead that a century later it will not break out anew.

The conduit of lava beneath an active crater probably has nearly the diameter of the crater, judging from facts observed at Kilauea. This would give for the Kilauea conduit a breadth of two to three miles.

2. *The escaping vapors.*—The work done in a crater is largely owing to the making and escaping of vapors. For if all vaporizable material were absent, the lavas would lie quiet. The liquid lavas in sight in a crater are always in constant activity; and if below but out of sight, there is usually considerable noisy action from escaping steam, and from the movements which the steam occasions.

The vapors of a volcano are 99 per cent *vapor of water*, as has been ascertained by investigation. For the supply of water the sea is one probable source; the rains, another; and vapors coming up from depths below, with the lavas, a third source. Vapors from the "depths below" are from the subterranean source of the lavas, and this source may be either a perpetual lava-sea of large extent, if such exists, or the rocks of the crust that