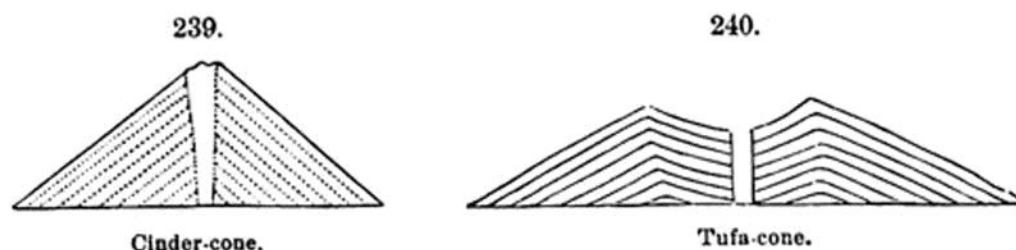


Kilauea are thus elongated and eccentric, and have lines of fissures extending far to the southwest in the direction of the longer axis; moreover, the former has the larger part of its more recent eruptions either to the north-northeast or south-southwest of the crater. The two craters of Maui are also elongated and eccentric. The position of the present vent of Vesuvius with reference to the original Mount Somma is eccentric, according to Johnston-Lavis, and perhaps for a like reason.

3. *Causes influencing the forms of cinder- and tufa-cones.* — Cinder-cones have their forms varied in height, breadth, and slope, on the different sides, by the winds. Moreover, alternations of cinder and lava ejections make a cone of steeper slope than lava alone. Summit ejections of cinders may increase the height without adding much to the mass of a mountain. Mount Kea owes its superior height over Mount Loa to a final spurt, when it was becoming extinct, cinder-cones at the top having been then thrown up.

Flowing volcanic mud, from which tufa and tufa-cones are made, necessarily produces broad-topped cones with a saucer-like crater, as explained on page 270; but the winds often carry cinders far away to make horizontal deposits, which sometimes attain great thickness. By making an outline of a section of a cone and drawing lines parallel to the sides, as below, sections representing in a general way the structure of a lava-cone, cinder-cone,



and tufa-cone are easily made. But it is to be noted that such sections are incorrect, since lava streams and cinder deposits are, to a large extent, strips or patches over the surface of the cone and not a series of seamless coats.

4. *Relations of glassy lavas to the stony.* — Glassy forms of lava (see page 77) occur with each of the three kinds, but make no cones. With basaltic lavas they constitute merely a crust on a lava stream, or the scum of a lava lake; but in a trachytic volcano, the glass, called obsidian, sometimes flows in streams.

"Obsidian Cliff" in the Yellowstone Park is a remarkable example of an obsidian outflow. It has the columnar forms of Fig. 224. The glass is connected with vast eruptions of rhyolite (quartz-trachyte) at and about Mount Washburn, which have a thickness of thousands of feet, and succeeded to andesite eruptions (Iddings, Hague). Another locality has been reported by Russell near Mono Lake, in western Nevada. On the trachyte islands, north of Sicily, Lipari (1601 feet high) and Vulcano (1978 feet), the obsidian streams bear evidence of sluggish twisting flow (Judd, 1875). With the glass occurs pumice, and that of Lipari is the pumice of the arts. The northern island of the group, Stromboli (3090 feet high), is basaltic in its lavas; the islands intermediate between Stromboli and Lipari have lavas of intermediate kinds.