

The outflow from fissures may take place at any height on the mountain, and also beneath the sea level. If at the latter, the eruptions are *submarine*; if at the former, *surficial*, that is, subaerial. The map of Hawaii shows the courses of seven of the great lava streams of the summit eruptions, with their dates. They all commenced some distance from the crater; and the two to the south, those of 1868 and 1887, at points 17 and 12 miles from it, and 12 and 17 from the coast. Only one lava stream from Kilauea is shown, that of 1840, on the eastern point of the island; all its later discharges have been subterranean.

The fissures for the discharge of lavas are often so wide in some places that they pour out the lavas there for weeks, and make cones of lava over each wide place; or if the lava ceases to flow out, there may be projectile discharges for a time and cinder-cones may be made. In either case a line of cones (Fig. 234) may be formed over the fissure. Such cones while in action are true volcanoes in all their characters. They are distinguished as the *lateral cones* of a volcano or volcanic mountain. The lateral cones of a submarine eruption often stand as islands, or make shoals, off a coast.

*Lavas and other igneous rocks.* — The kinds of igneous rocks have been described on pages 84 to 89. There are many of them, but petrology makes distinctions, based on texture and accessory minerals, which have importance, but are not always of fundamental value. These rocks consist ordinarily of a kind of feldspar, or occasionally of some other related alkali-bearing mineral, usually with some additional mineral, as pyroxene, hornblende, chrysolite (olivine), quartz, mica, and a few other species. But hornblende when fused turns to pyroxene; chrysolite may form from fused pyroxene; and mica may be derived at a high temperature from feldspar. Further, all textures from that of glass to granite-like may exist in the igneous sheet or mass of a single ejection — the differences depending on rate of cooling.

The distinctions between granite, granulyte, rhyolyte, and quartz-felsyte, between trachyte and felsyte, between gabbro and doleryte, between chrysolitic gabbro and basalt, between andesyte and dioryte, between dacyte and quartz-dioryte, are differences chiefly in texture — a character of inferior value geologically, although a sufficient reason for their having names in petrology. The minerals pyroxene and hornblende are essentially the same in composition, and they are also mutually convertible under certain heat-conditions, as explained beyond, and hence pyroxenic and hornblendic rocks are very closely related; but the distinction, notwithstanding the degree of resemblance, is often of great geological interest.

Igneous rocks are fusible kinds. No lava streams or dikes have been found about volcanoes consisting of the "infusible" minerals quartz, hematite, magnetite. But grains of these minerals are common in the rocks.

Besides, there are often minute grains of native iron in some igneous rocks, especially in the basaltic; and large masses of iron have been found in the basalt of Disco Island, Greenland, and of copper in the related igneous rock of the Lake Superior copper region in Michigan. The copper probably resulted from the reduction, by the heat, of copper ore