

ceived as probable, apart from the effects of crushing. The connection of volcanoes with lines of elevation, and consequent weakness in the earth's crust, is what might have been anticipated on the view that the nucleus, though practically solid, is at such a temperature and pressure that any diminution of the pressure, by corrugation of the crust or otherwise, will cause the subjacent portion of the nucleus to melt. Along lines of elevation the pressure is relieved, and consequent melting may take place. On these lines of weakness and fracture, therefore, the conditions for volcanic excitement may be conceived to be best developed, whether arising from the explosive energy of water dissolved in the magma or from water descending to the intensely heated materials underneath the crust. The periodicity of eruptions may thus depend upon the length of time required for the storing up of sufficient steam, and on the amount of resistance in the crust to be overcome. In some volcanoes, the intervals of activity, like those of many geysers, return with considerable regularity. In other cases, the shattering of the crust, or the upwelling of vast masses of lava, or the closing of subterranean passages for the descending water, or other causes may vary the conditions so much, from time to time, that the eruptions follow each other at very unequal periods, and with very discrepant energy. Each great outburst exhausts for a while the vigor of the volcano, and an interval is needed for the renewed accumulation of vapor.

But besides the mechanism by which volcanic eruptions are produced, further problems are presented by the varieties of materials ejected, by the differences which these exhibit at neighboring vents, even sometimes in successive eruptions from the same vent, by the alternation or recur-