

Wider geographical and geological knowledge has shown the earth's volcanicity to be a phenomenon of universal occurrence which cannot be explained as a result of occasional local catastrophes.

Descartes had in 1644 suggested that the friction of inthrown rock-masses might induce processes of fusion, and Franke in 1756 attributed volcanic outbreaks to local shearing in the earth's crust. More recently, conversion of mechanical work into heat was made the basis of a hypothesis by Volger in his book entitled *The Earth and Eternity*, published in 1857. Volger suggested that both earthquakes and volcanoes were caused by partial collapse and inthrow of rock-material superincumbent upon subterranean cavities. A mechanical theory of a somewhat different character was proposed in 1866 by Mohr. He supposes that certain deep-lying strata in the earth's crust have lost their original consistency either by means of chemical decomposition or from other causes. If these weaker layers be subjected to the pressure of a considerable thickness of overlying rock-deposits, and if, as in the submarine areas, they have to bear in addition the weight of a vast column of water, they may be crushed, heated, and even in some cases melted and ejected at lines of crust-fissures. Mohr referred more particularly the submarine tuffs to this mode of origin. Pfaff wrote in 1871 a paper on "Volcanic Phenomena," in which he opposed Mohr's theory, and said that thermo-dynamic action alone could not generate sufficient heat to fuse rock-masses.

The English physicist, Robert Mallet, made the most successful attempt to found a mechanical theory of volcanicity. He assumed that the earth's crust, in consequence of a slow and protracted cooling of the globe, is now of considerable thickness. During the earth's cooling the masses contracted as they solidified, and their contraction created tangential pressures through the crust. According to Mallet's theory, the hotter internal mass of the earth cools and contracts more rapidly than the crust, which is in consequence liable to recurring accidents of incrush and inthrow. Tangential pressure is resolved into vertically-acting forces, and folds and corrugates the earth's crust, forming larger and smaller mountain-chains. Fissures develop along the lines of greatest weakness in the crust, and it is chiefly at these that the rocks give way for long distances and are crushed and