of many active volcanoes, does not produce clouds of fine dust. The collision or friction of millions of stones ascending and descending in the dark column above the crater must doubtless cause much dust and sand. But the explosive action of steam is probably also an immediate cause of much trituration. The aqueous vapor or water-gas which is so largely dissolved in many lavas must exist within the lava-column, under an enormous pressure, at a temperature far above its critical point (p. 332), even at a white heat, and therefore possibly in a state of dissociation. The sudden ascent of lava so constituted relieves the pressure rapidly without sensibly affecting the temperature of the mass. Consequently, the white-hot gases or vapors at length explode, and reduce the molten mass to the finest powder, like water shot out of a gun.[62]

Evidently no part of the operations of a volcano has greater geological significance than the ejection of such enormous quantities of fragmentary matter. In the first place, the fall of these loose materials round the orifice of discharge is one main cause of the growth of the volcanic cone. The heavier fragments gather around the vent, and there too the thickest accumulation of dust and sand takes place. Hence, though successive explosions may blow out the upper part of the crater-walls and prevent the mountain from growing so rapidly in height, every eruption must increase the diameter of the cone. In the second place, as every shower of dust and sand adds to the height of the ground on which it falls, thick volcanic accumulations may

[62] Messrs. Murray and Renard (Proc. Roy. Soc. Edin. xii. (1884), p. 480) concluded that the fragmentary condition and the fresh fractures of the dust particles of the Krakatoa eruption were due to a tension phenomenon, which affects these vitreous matters in a manner analogous to what is observed in "Rupert's drops."