

trates through the very pores of the rocks. The presence of nitrogen among the gaseous discharges of volcanoes may indicate the decomposition of water containing atmospheric gases. The abundant sublimations of chlorides are such as might probably result from the decomposition of sea-water. To some extent surface-waters doubtless do reach the volcanic magma.

Whatever may be its source, we cannot doubt that to the enormous expansive force of superheated water (or of its component gases, dissociated by the high temperature), in the molten magma at the roots of volcanoes, the explosions of a crater and the subsequent rise of a lava-column are mainly due. The water or gas dissolved in the lava is retained there by the enormous overlying pressure of the lava-column, but when the molten material is brought up to the surface the pressure is relieved and the water vaporizes and escapes. Where the relief is rapid the effect may be to froth up the lava into a pasty mass of pumice, while where it is sudden and extreme the escape of the water-vapor may be by an explosive discharge.

It has been supposed that, somewhat like the reservoirs in which hot water and steam accumulate under geysers, reservoirs of molten rock receive a constant influx of water from the surface, which cannot escape by other channels, but is absorbed by the internal magma at an enormously high temperature and under vast pressure. In the course of time, the materials filling up the chimney are unable to withstand the upward expansion of this imprisoned vapor or water-substance, so that, after some premonitory rumblings, the whole opposing mass is blown out, and the vapor escapes in the well-known masses of cloud. Meanwhile, the removal of the overlying column relieves the