

The greater part of the ascending vapor is mere steam. When condensed, this forms springs, as in Pantellaria,\* where they are used by the goatherds of the island. On the morning of the 26th of October, 1822, a current was seen to flow from a lateral fissure of the crater of Vesuvius, and was long supposed to have been boiling water; it was, however, shown, by Monticelli's accurate investigations, to consist of dry ashes, which fell like sand, and of lava pulverized by friction. The ashes, which sometimes darken the air for hours and days together, and produce great injury to the vineyards and olive groves by adhering to the leaves, indicate by their columnar ascent, impelled by vapors, the termination of every great earthquake. This is the magnificent phenomenon which Pliny the younger, in his celebrated letter to Cornelius Tacitus, compares, in the case of Vesuvius, to the form of a lofty and thickly-branched and foliaceous pine. That which is described as flames in the eruption of scorïæ, and the radiance of the glowing red clouds that hover over the crater, can not be ascribed to the effect of hydrogen gas in a state of combustion. They are rather reflections of light which issue from molten masses, projected high in the air, and also reflections from the burning depths, whence the glowing vapors ascend. We will not, however, attempt to decide the nature of the flames, which are occasionally seen now, as in the time of Strabo, to rise from the deep sea during the activity of littoral volcanoes, or shortly before the elevation of a volcanic island.

When the questions are asked, what is it that burns in the volcano? what excites the heat, fuses together earths and metals, and imparts to lava currents of thick layers a degree of heat that lasts for many years?† it is necessarily implied that volcanoes must be connected with the existence of substances capable of maintaining combustion, like the beds of coal in subterranean fires. According to the different phases of chemical science, bitumen, pyrites, the moist admixture of finely-pulverized sulphur and iron, pyrophoric substances, and the metals of the alkalies and earths, have in turn been designated as the cause of intensely active volcanic phenomena. The great chemist, Sir Humphrey Davy, to whom we are indebted for the knowledge of the most combustible metallic

\* [Steam issues from many parts of this insular mountain, and several hot springs gush forth from it, which form together a lake 6000 feet in circumference. Daubeney, op. cit.]—*Tr.*

† See the beautiful experiments on the cooling of masses of rock, in Bischof's *Wärmelehre*, s. 384, 443, 500-512.