

admitted, and it is desirable to separate theoretical views from a description of facts. This, however, cannot always be done: circumstances which indicate the mode of rock formations, will deservedly force themselves on our attention; and in stating them fairly, and the inferences which may be drawn from them, we relieve geology from much of its dryness, and stimulate succeeding observers to a strict investigation of nature.

Dark-coloured recent lava does not differ essentially from basalt; it is generally more porous. Probably the compact state of basalt was the result of refrigeration under pressure; it may, however, be frequently observed in Auvergne, passing into the state of scoriaceous lava. Some of the recent lavas from Vesuvius are compact, and have a glistening lustre, but they are more commonly porous. In some volcanic eruptions, lava appears to have acquired the most perfect fluidity. According to Professor Bottis, who was an eyewitness of the eruption of Vesuvius in 1776, the lava spouted from three small apertures, precisely like water, forming beautiful fountains of fire, which described curves of different dimensions as they fell. In the same year, a current of lava from the summit of Vesuvius flowed with the velocity of a mile and a half in fourteen minutes; it struck upon the lava of 1771, and rebounded into the air, congealing in figures of various shapes. The length of time which currents of lava retain their heat is truly remarkable: the current which flowed from *Ætna* in 1669 is two miles in breadth, fifteen miles in length, and two hundred feet in depth; it retains a portion of its heat to the present day. Ferrara says, when this lava was perforated at Catania in 1809, flames broke out; and it continued to smoke at the surface after rain, at the beginning of the present century, or 130 years after its eruption.

Stones of enormous size are frequently projected from the craters of volcanoes; but the quantity of matter which they throw out in the state of scoriæ, sand, and powder, often exceeds that erupted in the state of lava, and is spread over distant countries. By the percolation of water it becomes agglutinated, and forms beds of volcanic breccia, and tufa. Sometimes the tufa is sufficiently solid to be used for building-stone; the Roman pepperino is a volcanic tufa. Pozzolana consists of minute particles of scoriæ, which have been partially decomposed: when mixed with lime, it makes a water-setting cement.

Some volcanic rocks decompose rapidly, and form productive soils; others resist the process of decomposition so effectually, that, after the lapse of some thousand years, they present all the freshness of the most recent lavas.

*Age of Volcanic Rocks.*—Nothing precise can be determined with respect to the relative age of volcanic rocks, except in those districts where they occur together, one covering the other. Humboldt, who has attempted to trace the different ages of volcanic formations, ob-