

had flowed upon inclined surfaces it could not have preserved the uniform surface and constant thickness which it generally exhibits.

VOLCANIC OR LAVA FORMATIONS.

The *lava* formations comprehend both extinct and active volcanoes. "The term," says Lyell, "has a somewhat vague signification, having been applied to all melted matter observed to flow in streams from volcanic vents. When this matter consolidates in the open air, the upper part is usually scoriaceous, and the mass becomes more and more stony as we descend, or in proportion as it has consolidated more slowly and under greater pressure."*

The formation of extinct volcanoes is represented in France by the volcanoes situated in the ancient provinces of Auvergne, Velay, and the Vivarais, but principally by nearly seventy volcanic cones of various sizes and of the height of from 500 to 1,000 feet, composed of loose scoriæ, lava, and pozzuolana, arranged upon a granitic table-land, about twelve miles wide, which overlooks the town of Clermont-Ferrand, and which seem to have been produced along a longitudinal fracture in the earth's crust, running in a direction from north to south. It is a range of volcanic hills, the "chain of *Puys*," nearly twenty miles in length, by two in breadth. By its cellular and porous structure, which is also granular and crystalline, the felspathic or pyroxenic lava which flowed from these volcanoes is readily distinguishable from the analogous lavas which belong to the basaltic or trachytic formations. Their surface is irregular, and bristles with asperities, formed by heaped-up angular blocks.

The volcanoes of the chain of *Puys*, represented on opposite page (PL. III.) are so perfectly preserved, their lava is so frequently superposed on sheets of basalt, and presents a composition and texture so distinct, that there is no difficulty in establishing the fact that they are posterior to the basaltic formation, and of very recent age. Nevertheless, they do not appear to belong to the historic ages, for no tradition attests their eruption. Lyell places these eruptions in the Lower Miocene period, and their greatest activity in the Upper Miocene and Pliocene eras. "Extinct quadrupeds of those eras," he says, "belonging to the genera mastodon, rhinoceros, and others, were buried in ashes and beds of alluvial sand and gravel, which owe their preservation to overspreading sheets of lava."†

* "Elements of Geology," p. 596.

† Ibid, p. 677.