

of bitumen which it contains : by any other mode of formation, the bitumen would have been consumed. By some former writers it has been supposed that the tuffa is an alluvial bed of sediment and water worn fragments ; but the bituminous nature of this bed excludes the probability of this mode of formation ; and at Montadoux, the upper part of the tuffa may be clearly seen, passing into basalt. In some situations, however, the tuffa has been transported from its original place and intermixed with fragments of more ancient rocks.

The dome-shaped hills without craters, composed of volcanic porphyry or trachyte, have given rise to much speculation respecting their origin. Some geologists contend that they are only the remains of one vast bed of trachyte, of which the other parts are washed away. Others maintain that they are merely portions of the granite on which they rest ; and that this granite has been wholly or partially fused, and upheaved, by the expansive force of subterranean fire. This mode of formation is rendered probable, by what may be observed at the Puy de Chopine, which is a mountain standing within a crater ; this mountain is composed partly of unaltered granite and sienite, and partly of volcanic trachyte, and appears to have been upheaved, before the fusion of the granite had been effected.

The Puy de Dôme, near the summit, is chiefly composed of whitish trachyte intermixed with unaltered granite ; the lower part of the mountain is covered with scoriaceous and compact lava. The dome of this mountain rises 2000 feet above the elevated granitic plain on which it stands, and 4797 feet above the level of the sea : it has no crater or opening on the top ; but Dr. Daubeny says, two streams of lava appear to have pierced the sides of the mountain, and to have descended into the valleys. In this respect the Puy de Dôme resembles the enormous dome of trachyte on the summit of Chimborazo, twenty thousand feet above the level of the sea, which, according to Humboldt, acts mechanically on the neighbouring country, fracturing the strata, and changing the surface of the soil ; but it has no permanent opening, either on its summit or sides. In some of these dome-shaped hills, the action of subterranean heat appears to have been so intense, as to reduce the whole into a spongy pulverulent mass ; but, what is remarkable, in the middle of this spongy mass, lumps of scoriaceous lava, are sometimes found. It has been objected to the formation of trachyte or volcanic porphyry from granite, that it contains a very small portion of quartz ; but in this respect it resembles many granite rocks in Auvergne, in which the quartz is scarcely perceptible.

In the volcanic districts south of Clermont, the porphyry becomes more compact, and assumes the hardest state of that rock ; the base of the stone is sometimes green, and the crystals of felspar are white : it will receive a fine polish, like the green porphyry of the ancients.