

rocks of the oolitic system, can scarcely, upon good grounds, be admitted as originating in volcanic eruptions: they are mostly unerupted lavas.

In tertiary periods of geology, traces of eruptions became frequent. According to Lyell, the oldest volcanic rocks of the Limagne d'Auvergne belong to the eocene tertiary period, being associated with freshwater strata at Pont du Château near Clermont, and in the Puy de Marmont near Veyres. None of the volcanic eruptions of Central France had, however, commenced when the older subdivisions of the freshwater groups originated.

The newer portions of the Mont Dor and Plomb du Cantal are stated by this author to be of meiocene date, as well as some cones which stretch from Auvergne, through Velay, into the Vivarais, where they are seen in the basin of the Ardèche. Finally, Etna, which commenced its operations during the newer pleiocene era, has continued them down to recent times with undiminished energy.

Had we included in this review the cases of *unerupted lavas* (basaltic and porphyritic dykes and interposed masses), there would have been an unbroken series of igneous products, cooled in subterranean, submarine, or subaërial situations, from the earliest primary eras down to the present day; and from the whole we should clearly see how very probable, or rather certain, it is, that granitic and other plutonic, as well as volcanic, rocks are not so much the products of the particular times as of the particular circumstances in which igneous action has been manifested.

#### *Volcanic Eruption Forces.*

The degree of mechanical pressure under which lava is effused, and ashes are ejected, from volcanic vents, is of importance in the theory of their action; and when combined with indications of the same kind in earthquakes, enters among the data requisite for comparing