

logical periods (or metamorphic phases of the earth's crust) other substances dissolved in vapors have issued from the interior of the earth simultaneously with the eruption of granite, basalt, greenstone porphyry, and serpentine. This seems a fitting place again to draw attention to the fact that, according to the admirable views of modern geognosy, the metamorphism of rocks is not a mere phenomenon of contact, limited to the effect produced by the apposition of two rocks, since it comprehends all the generic phenomena that have accompanied the appearance of a particular erupted mass. Even where there is no immediate contact, the proximity of such a mass gives rise to modifications of solidification, cohesion, granulation, and crystallization.

All eruptive rocks penetrate, as ramifying veins, either into the sedimentary strata, or into other equally endogenous masses; but there is a special importance to be attached to the difference manifested between *Plutonic* rocks* (granite, porphyry, and serpentine) and those termed *volcanic* in the strict sense of the word (as trachyte, basalt, and lava). The rocks produced by the activity of our present volcanoes appear as band-like streams, but by the confluence of several of them they may form an extended basin. Wherever it has been possible to trace basaltic eruptions, they have generally been found to terminate in slender threads. Examples of these narrow openings may be found in three places in Germany: in the "*Pflaster-kante*," at Marksuhl, eight miles from Eisenach; in the blue "*Kuppe*," near Eschwege, on the banks of the Werra; and in the Druidical stone on the Hollert road (Siegen), where the basalt has broken through the variegated sandstone and graywacke slate, and has spread itself into cup-like fungoid enlargements, which are either grouped together like rows of columns, or are sometimes stratified in thin laminae. The case is otherwise with granite, syenite, quartzose porphyry, serpentine, and the whole series of unstratified compact rocks, to which, from a predilection for a mythological nomenclature, the term *Plutonic* has been applied. These, with the exception of occasional veins, were probably not erupted in a state of fusion, but merely in a softened condition; not from narrow fissures, but from long and widely-extending gorges. They have been protruded, but have not flowed forth, and are found, not in streams like lava, but in extended masses.† Some groups of dolerite and trachyte in-

* [Lyell, *Principles of Geology*, vol. iii., p. 353 and 359.]—*T*7

† The description here given of the relations of position under which