

later Tertiary, ages as signalized in the history of the world by outflows of molten lava—primarily from fissures, but secondarily building up small and moderate sized cones in great abundance, and not a few stupendous mountain piles reaching to eighteen thousand feet.

In remote geologic ages lava eruptions were of frequent occurrence—but less frequent and less copious than in later ages. During the Triassic Age (see Table, p. 73) many eruptions of lava occurred, both in Europe and America. The Palisades of the Hudson; the cliffs of Meriden, Connecticut, and East and West Rock, New Haven, are ancient lavas of this age. Much farther back in geological history, in Cambrian time, or as some think before Cambrian time, vast and repeated outflows of lava took place which remain to-day uplifted in Keweenaw Point and Ile Royale. The native copper is found imbedded in these ancient lavas.

A fissure filled with rock-material solidified from a state of fusion, is a dyke. Sometimes the formation containing the dyke is more friable than the lava, and weathers away more rapidly. The dyke then projects above the surface like a vertical wall. Certain varieties of lava called basalt possess the peculiar property of assuming a columnar structure while cooling. The longer axes of the columns are ranged at right angles with the cooling surfaces. Thus, when the basalt cools in a fissure, the columns lie transversely from wall to wall. In most cases, the columns are vertical. This is thought sometimes to result from cooling under the sea; but probably when a sheet of basalt rests on the surface of the earth, the atmosphere above and the earth below are cooling surfaces of the requisite efficiency to develop vertical columnar structure. The columnar structure induced to an imperfect extent, in basaltic rocks of Ile Royale may be conceived as produced in the bottom of the sea; but the columnar structure in the cañon of the Columbia must have been acquired upon the land. The columns, in some cases, rest with their ends directly on a bed of pebbles and sand not over a hundred feet thick, and bearing the evidences of torrential action—