

§ 19. The serpentine of Brinton's quarry, near Westchester, Pennsylvania, is distinctly bedded, granular, and often finely laminated, with disseminated scales of a micaceous mineral, giving it a gneissoid structure and aspect. A black schistose hornblendic rock, with red garnet, is said to have been found in an excavation adjoining the serpentine, and fragments gathered in the vicinity showed thin interlaminae of black hornblende with greenish serpentine. The dip of the strata, of which several hundred feet are here exposed, is to the northwest at a high angle, approaching the vertical. They are traversed, nearly at right angles, by a vertical granitic vein, which has been traced for many hundred feet in a northwest course. This vein, which is generally from three to six feet in breadth, is white in color, and in parts may be described as a fine-grained binary granite, the feldspar of which is superficially kaolinized. In other parts, it becomes very coarse-grained, presenting large cleavage-forms of orthoclase. A banded or zoned structure, parallel to the well-defined walls, is observed in some parts, and in one case a lenticular mass of white vitreous quartz occupies the centre. This vein-stone, which carries black tourmaline, and is said to have afforded beryl, has all the characters of the ordinary endogenous granitic veins found in the gneissic rocks of the Appalachians, which veins I have elsewhere described in detail. \*

§ 20. The rocks in the vicinity of the serpentine near Westchester are, as already said, deeply decayed, but wherever seen in the cuttings are found to be mica-schist and micaceous gneiss. Such rocks, with a northwest dip, appear to underlie, at no great distance, the mass of serpentine exposed at Stroud's mill. Similar rocks are also found on the railroad between Westchester and Media, where they are exposed in a cutting near the latter station, about a mile from which is found a great outcrop of distinctly stratified serpentine, resembling that of Brinton's quarry, and with a steep northwest dip. It includes an interstratified mass, about twenty feet thick, of a fine-grained reddish gneissoid rock, approaching leptynite or granulite in character, divided into distinct beds generally from four to eight inches in thickness, between which are sometimes found layers of a few inches, of a soft serpentine, and, in one case, of a broadly foliated green chloritic mineral. Considerable differences in texture and aspect were observed between the serpentine-beds below and those above this quartzo-feldspathic mass, which is indigenous, and not to be confounded with the endogenous transversal mass described at Brinton's quarry.

§ 21. Serpentine-rocks also occur on Manhattan Island, in the city of New York, where they are still exposed between Fifty-seventh and Sixtieth streets, west of Tenth avenue, and are directly interstratified in gneissic and micaceous rocks, which may either belong to the older gneiss series of the Highlands, or to a newer group. Associated with the massive serpentine of this locality are found small quantities of a granular opicalcite, and near it is a mass of anthophyllite-rock. This locality was long since described by Dr. Gale, when the rocks were more fully exposed than at present. †

§ 22. Serpentine-masses are also found in the vicinity of the last, on Staten Island, and at Hoboken, in both of which localities the encasing gneisses, seen in New York city, are wanting, and the serpentine appears along the eastern margin of the triassic belt of the region. The serpentine of Staten Island is of much interest, as it presents many fea-

\* Amer. Jour. Science (3) i. 182-187, and Chem. and Geol. Essays, pp. 192-200.

† Mather, Geology of the Southern District of New York, p. 461.