

also on Staten Island. It includes the clay-beds of northern Long Island, which are well displayed at Glen Cove, and at various points between this place and Huntington and farther to the eastward; and also part of the clays of Fisher Island, Block Island, and Martha's Vineyard. Gay Head, the west cape of Martha's Vineyard, owes its name to the variously colored clay-beds.

The several beds of *greensand*, or *marl*, consist of common sand and blackish to olive-green grains of *glauconite* — a silicate of iron and potash made chemically within the cavities of the shells of Rhizopods, Corals, and other marine organic materials. The bluffs after a rain often look black or greenish black. They are called marl-beds because the material is useful as a fertilizer. The fertilizing properties of the marl, according to G. H. Cook, are not due to the potash of the glauconite, but to the presence of some lime phosphate.

The fresh-water origin of the New Jersey clay-beds is generally recognized. The absence of lamination and the thickness indicate, not river action, but the existence of quiet fresh-water areas parallel with the New Jersey seacoast and that of southern New England from New Jersey eastward as far as Cape Cod, or about 300 miles. The coast-line may have been some miles distant to seaward. Rivers were not the transporters, for they do only coarser work. No river in New England, where feldspathic rocks abound, is now making such non-laminated clay-beds. Only small streamlets and rills could have been concerned; and the feldspathic rocks must have been near by. For New Jersey the Triassic granitic sandstones may have been the feldspathic rocks at hand; and for Long Island and the islands to the eastward crystalline rocks were not far away to the northward. The bleaching of the deposits in the case of the white clay-beds required the action of carbonic acid or organic acids proceeding from the decomposition of beds of peat or leaves underlying the Raritan or intercalated with its layers; for the clays from granitic rocks always derive a tinge of iron oxide from the black mica and other iron-bearing minerals among their constituents. The origin of the clay-beds in all these particulars was very much like that of those of the coal-formation (page 665).

After the making of the Raritan beds, the sea regained access, as the marine shells evince, to the shore region of the Atlantic border; and this was the first submergence of the border since the close of the Lower Silurian. The geanticline, which was probably increasing through the Paleozoic, at last had disappeared.

The beds of greensand are supposed to have been formed in moderately deep waters off the coast. The least depth required for the production of greensand is not known.

Ehrenberg, who first discovered that the grains of glauconite often have the shape of casts of Rhizopod shells, also detected them in the bones of the Zeuglodon of the Alabama Tertiary, which were probably in shallow water when the formation took place. J. W. Bailey reported in 1856 their occurrence in the cells of recent Corals and Rhizopods,