

4. LARAMIE EPOCH. —

Unrepresented? Possibly here the *Upper Greensand*, Manasquan group of W. B. Clark: 15 to 20 feet thick of greensand, with above, sandy clays and blue marl; fossiliferous.

3. MONTANA OR RIPLEY EPOCH. —

2. *Middle Greensand*, Rancocas group of Clark: about 45 feet of marl, with as much of yellow sand above; fossiliferous.

1. *Lower Greensand*, Navesink group of Clark: 30 to 45 feet of greensand, and above this a red-sand stratum, 100 feet thick; with below *Clay marls*, 250 to 300 feet.

2. COLORADO EPOCH. —

Unrepresented? or perhaps the *Clay marls*.

1. DAKOTA EPOCH. —

Raritan group or Plastic clays: thick beds of plastic clay with some interstratified sand-beds; more sandy above; 350 feet; fossil leaves and lignite, especially toward the base (one third of the thickness from its base in New Jersey); shells rare, and these freshwater of the genus *Unio*, or brackish-water Gastropods.

The Raritan group is proved by its remains of plants to be the probable equivalent of the Dakota of the Continental Interior; and the Lower Greensand group, by its fossils, as well brought out by Whitfield, to be the equivalent of the Ripley group of the Gulf border. Whitfield refers to the same group, but doubtingly, the nearly unfossiliferous Clay marls which lie below it. The Upper Greensand group graduates, without a break in the stratification, into the overlying Eocene Tertiary, as if its formation were, like the Upper Laramie, the closing work of the Cretaceous period. If not so, the Laramie epoch is not represented on the Atlantic border.

The Lower Greensand is the most fossiliferous of the series. Whitfield has described from it 19 species of Cephalopods, 127 of Gastropods, 155 of Lamellibranchs, and 2 of Brachiopods, or a total of 303 species, against 47, under the same tribes, from the Middle and Upper Greensand groups. Notwithstanding the unbroken passage of the Upper Greensand group into the Eocene Tertiary, out of the 79 Eocene species of Mollusks described by Whitfield, none occurs in the underlying Cretaceous.

The clay of the Raritan group is partly pure white clay, but it varies to gray, yellow, and red in color, owing to traces of iron oxide, and in some places to black in consequence of disseminated fragments of lignite which had been gathered from some lignitic bed. In general, it is not laminated clay, like that of nearly all river valleys, but a massive clay free from lamination and of remarkable purity. The best of it has great value for the manufacture of fine pottery and other purposes.

The Raritan formation, with its massive clays of various colors, occurs