

over the sea bottom near Cape Hatteras, at depths of 40 or 50 fathoms. Similar facts were obtained abundantly by the "Challenger" Expedition, as mentioned by Murray. But glauconite grains have been observed also as a covering of stones and in their clefts, and sometimes as the coloring material of concretions of silica in the form of opal (Cayeux). The ingredients for making glauconite must be derived from the sea water or sea bottom, or partly from organic matters at hand. It has been suggested that the silica may, in some cases, have come from minute sponges that had previously grown in the cells which it occupies.

The equivalency of the Raritan clay-beds of New Jersey and those of Staten Island and Long Island was announced in 1843 by W. W. Mather, on the ground of their resemblances. It was *proved* for Staten Island and Long Island from the fossil leaves, by Newberry in 1874, and for Martha's Vineyard by C. D. White in 1890. Since the latter date the number of known Cretaceous plants has been increased by the discoveries of A. Hollick. Newberry pointed out the identity of some of the Raritan plants with those of the Dakota group.

Northern Gulf Border.

The Upper Cretaceous beds of Alabama and Mississippi, in the northern Gulf border west of the Florida peninsula, comprise the following groups: —

4. LARAMIE EPOCH. —

Not represented.

3. MONTANA OR RIPLEY EPOCH. —

Ripley group: hard white limestone 200 to 300 feet thick, often sandy, with but little greensand or glauconite in the beds.

Also the upper part of the *Rotten limestone*.

2. COLORADO EPOCH? —

Lower part of *Rotten limestone*: hard or soft chalky limestone; total thickness of *Rotten limestone* 500 to 1200 feet.

1. DAKOTA EPOCH?; possibly Lower Colorado. —

Upper Eutaw beds of Alabama; *Tombigbee sands* of Mississippi.

The limestones on the Gulf border diminish in thickness to the eastward and fail wholly in Georgia, where, according to J. W. Spencer, the Florida axis probably determined the eastern limit of the Cretaceous belt. The beds in that state consist of mixed clays and sands, and are about 1385 feet thick, with few fossils. They look, according to Spencer, as if made from sediments of fluvial origin.

The Ripley group, as brought out in Whitfield's paleontological report, is the equivalent of the Lower Greensand group of the New Jersey Cretaceous, and of its continuation through Delaware, Maryland, and North Carolina. In view of the much better preservation of the fossils on the Gulf border, Stanton speaks of the *Ripley fauna* as having this wide range. The number of identical species along the Atlantic and Gulf borders is large, as shown in the lists of species given beyond.