

of marl are seldom more than a foot in thickness and usually do not have a lateral extent of more than 10 or 12 feet. Beneath the Pleistocene covering of the divides, no doubt, there are places where the Duplin covers the Castle Hayne over a larger area. South of the Cape Fear River the Duplin formation seems to rest directly upon Cretaceous beds. All the evidence that has thus far been obtained seems to indicate the almost complete absence of any Eocene strata in Columbus, Bladen, and Robeson counties, and there the Miocene is found in close contact with the underlying Cretaceous beds.

In most particulars the Duplin strata are similar in lithologic characteristics to those of the Yorktown formation. Fragmental shell beds are well developed in many places and consist almost entirely of broken molluscan shells in a matrix of fine sand in which are some small water-worn pebbles and occasional perfect shells that show no effect of wave action. The deposits were evidently formed in shallow water near the shore or perhaps on the beaches where the rising and falling tides reduced the shells to fragments. At times, however, perfect shells were washed into the same places, and if soon buried by the loose débris, were preserved intact. Thus these fragmental shell layers have long been known as excellent collecting localities and have yielded great numbers of beautiful fossils in an almost perfect state of preservation.

Fine quartz sand constitutes the major portion of the Duplin strata, as in the case of the other Miocene formations. There is a considerable admixture of argillaceous material in most places. The argillaceous sand is bluish-green in color when freshly exposed, but soon changes to a buff to white color, due to the leaching of the coloring material, which consists primarily of iron carbonate.

In the Natural Well near Magnolia there is a deposit of light green argillaceous sand cemented in certain places to form a sandstone. This lies immediately beneath the shell marl and has been thought by some investigators to belong to the Eocene. Sufficient evidence for such a correlation is lacking, and it is, therefore, referred to the Duplin.

In the vicinity of Lake Waccamaw an unusual phase of the Duplin formation is developed. Outcropping along the bluff on the north shore of the lake there is a compact fossiliferous limestone that contains many casts of Molluscan shells, *Crepidula* being especially abundant. This limestone is overlain by a loose characteristic shell marl and is underlain by yellowish-brown sand that at the base contains some phosphatic pebbles and water-worn casts of Cretaceous fossils. This phase of the Duplin formation is not known to occur elsewhere in the State, though it is well developed along the Pee Dee River in South Carolina, particularly in the vicinity of Bostick.