for more than part of the difference. It is probable that with the elevation of the Gulf and Florida coasts, which closed the deposition of the cold-water Miocene on those shores, the changes in ocean currents which made the water warmer and invited the return of the subtropical fauna, banished at the end of the Oak Grove epoch, extended at least as far north as North Carolina. To this change I ascribe part of the new aspect of the Duplin fauna, which would thus be due to the combination of two factors."

WACCAMAW FORMATION.

The Waccamaw formation is limited to a relatively small portion of the North Carolina Coastal Plain and occurs in isolated areas to the south of the Hatteras axis. It overlies the older formations unconformably. Its areal distribution outside of North Carolina is not well known, although it has been found in adjacent parts of South Carolina. The fossils are distinctly later than the Duplin and contain a larger percentage of living species. The fauna and the materials, which are largely sands and shell marls, indicate that the beds were not laid down at a great depth. Similar deposits, if they existed north of the Hatteras axis, have been removed or have been buried by more recent strata. Dr. Gardner, who has been engaged in a study of the fauna, has prepared the following statement. She says:

"The fossil localities of the Waccamaw, as represented on the Cape Fear, though but few in number, are of unusual interest paleontologically. At Walker's Bluff and Neill's Eddy Landing collections have been made which show a fauna rich both in species and individuals. Though the determinative work is still far from complete, it is already evident that after the deposition of the Duplin a new element appeared in the marine life, making it very distinct from that of the Duplin beds. The prominent genera are much the same in both faunas, but the species of the Waccamaw are for the most part those characteristic of the Pliocene. Among the *Pectens*, *eboreus* is predominant, while the Miocene *jeffersonius* and its varieties are rare or altogether absent. The prominent *Arcas* are *limula*, especially the variety *platyura* so common in the Pliocene of the Caloosahatchie, *lienosa* and *adamsi*, all of which have been reported from the Miocene, but have not been known to flourish in that formation. *A. rustica* and *scalarina*, reliable diagnostics of the Pliocene, are present in very limited numbers. Of the *Dosinias*, *elegans* is the common species; of the *Mulinias*, *lateralis*. *Crassatellites undulatus*, hitherto supposed to mark the Miocene, is present, but only rarely, *gibbessii* being the dominant form. *Echinochama arcinella* and *Semele bella*, which make their appearance in the Yorktown, become increasingly numerous. The *Cardiums* present a distinctly Pliocene aspect, the Miocene *C. laquetum* and *C. acutilaqueatum* being absent, while *C. robustum*, *C. sublineatum*, and *C. emmonsi* frequently occur. Among the *Corbulas* the later species, *barratiana*, *cuneata*, and *contracta* are the common ones, while *inaequalis* has become rare. The characteristic Miocene gastropod *Turritella variabilis* has been replaced by the more recent *Turritella subannulata*. One specimen of *Cancellaria carolinensis*, which has been supposed to be confined to the Miocene, was collected at Neill's Eddy