From: Southeastern Geology vol.12 (1970) pages 151-158

THE GOLDSBORO RIDGE, AN ENIGMA [1]

By

R. B. Daniels

E. E. Gamble

Soil Science Department

North Carolina State University

Raleigh, North Carolina

and

W. H. Wheeler

Department of Geology

University of North Carolina

Chapel Hill, North Carolina

ABSTRACT

The Goldsboro ridge is a sand body 25 feet high that rises above the Sunderland surface near Goldsboro, North Carolina. It consists of unfossiliferous sands with a few intercalated clay beds. The ridge is neither an erosional outlier nor an eolian feature. It is a depositional ridge, probably of marine origin. The geography of the relationships among the height and orientation of the ridge, the elevation of the toe of the nearby Kenly scarp, the placement of a distinctive slate knoll immediately northwest of the ridge, and the position and orientation of the Neuse and little Rivers are all compatible with a marine origin. The Goldsboro ridge and the Kenly scarp are the major evidences of a former post-Miocene sea stand above 95 feet (Surry scarp).

INTRODUCTION

The Sunderland surface near Goldsboro, North Carolina, is a flat and uninteresting plain with an altitude of about 110 to 120 feet. East of Goldsboro along U. S. Highway 13, this plain is broken by a sandy ridge rising to an altitude of 140-145 feet for a length of 5 miles.

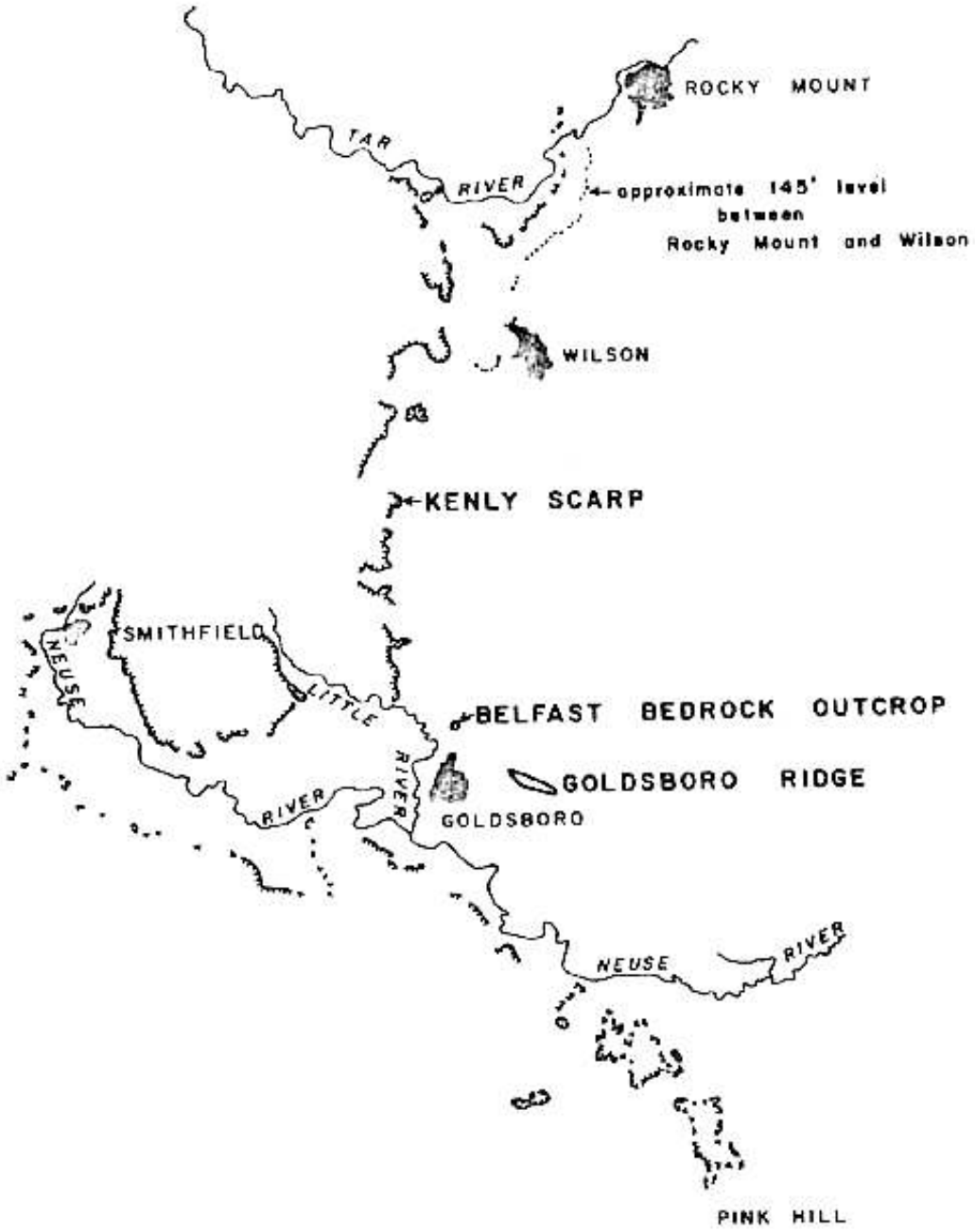

Figure 1. Location of Goldsboro ridge in relation to scarps and the Neuse River valley. The line is at the toe of the scarp and the ticks point to the higher elevations.

This ridge, which we call the Goldsboro ridge, is oriented northwest-southeast and is only 3/4 mile wide. The ridge is between West Bear Creek and Walnut Greek and is completely surrounded by nearly level topography with a relief of about 5 feet. It is slightly asymmetric and is steeper on the southwest side. It has a gently undulating crest and two distinct Carolina bays at the southeast end.

The ridge is five miles east of the Kenly scarp and is oriented perpendicular to it. The ridge lies about 14 miles

southeast of the prominent line of rock Outcrop associated with the Kenly scarp south of Bailey. The long axis of the ridge Points northwest toward the slate knoll at Belfast. This knoll is the easternmost inlier of slate in this portion of the Coastal Plain.

Previous workers did not recognize the Goldsboro ridge, apparently because it did not show on the topographic maps available to them. The ridge probably does not warrant more than casual interest when considered alone. But when the characteristics of the ridge are considered in relation to scarps, terrace surfaces, and the Neuse River valley, many new alternatives for the genesis of this segment of the middle Coastal Plain can be seen.

STRATIGRAPHY

The stratigraphy of the area is shown in Figure 2. The Black Creek -Formation was not reached in most of our bore holes because it is buried by 10 to 20 feet or more of the Yorktown Formation The dark colored laminated sands and clays of the Black Creek Formation are distinctive and easily recognized. The contact between it and the overlying Yorktown is abrupt. We identified the Yorktown. Formation in every bore hole that penetrated the surficial sediments. The upper 5 to 10 feet of the formation was unfossiliferous, and fossils were encountered in only one deep bore hole. The contact between the Yorktown and the surficials is abrupt and easily recognized because the sticky greenish-gray silty Yorktown contrasts with the nonsticky gray coarse sandy surficials. in less than 10 percent of our bore holes the Yorktown at this contact with the surficials had weathered to a brownish yellow smooth clay.

The surficial sediments under the plain near Goldsboro have been called the Sunderland Formation by Stephenson (1912) and Post-Miocene deposits undifferentiated by Pusey (1960). At this time, we are not sure whether the Sunderland Formation of Stephenson is a separate entity, or whether Flusey was more nearly correct. For these reasons we will use the term Sunderland Formation for the sediments underlying the Sunderland geomorphic surface. The informal name Goldsboro sand will be used for the sediments of the Goldsboro ridge and the equally high knoll at Cokers Crossroads.

The Sunderland Formation has an upper fine and lower coarse component. The lower one-half of the formation near Goldsboro is coarse textured and has conspicuous cross-bedding and repeated channeling. Gravel layers and clay-ball conglomerates are common at the bottoms of channels. We interpret these features as evidence for a fluvial origin for the basal part of the Sunderland. These features are well shown in a road cut along Wayne County road 1556 about 0. 4 mile northeast of its junction with Bypass U. S. 70. The base of the forma- tion is gently undulating and slopes to the southeast. The contact with the Yorktown is best seen on Wayne County road 1565 about 200 feet north of its junction with 1588.

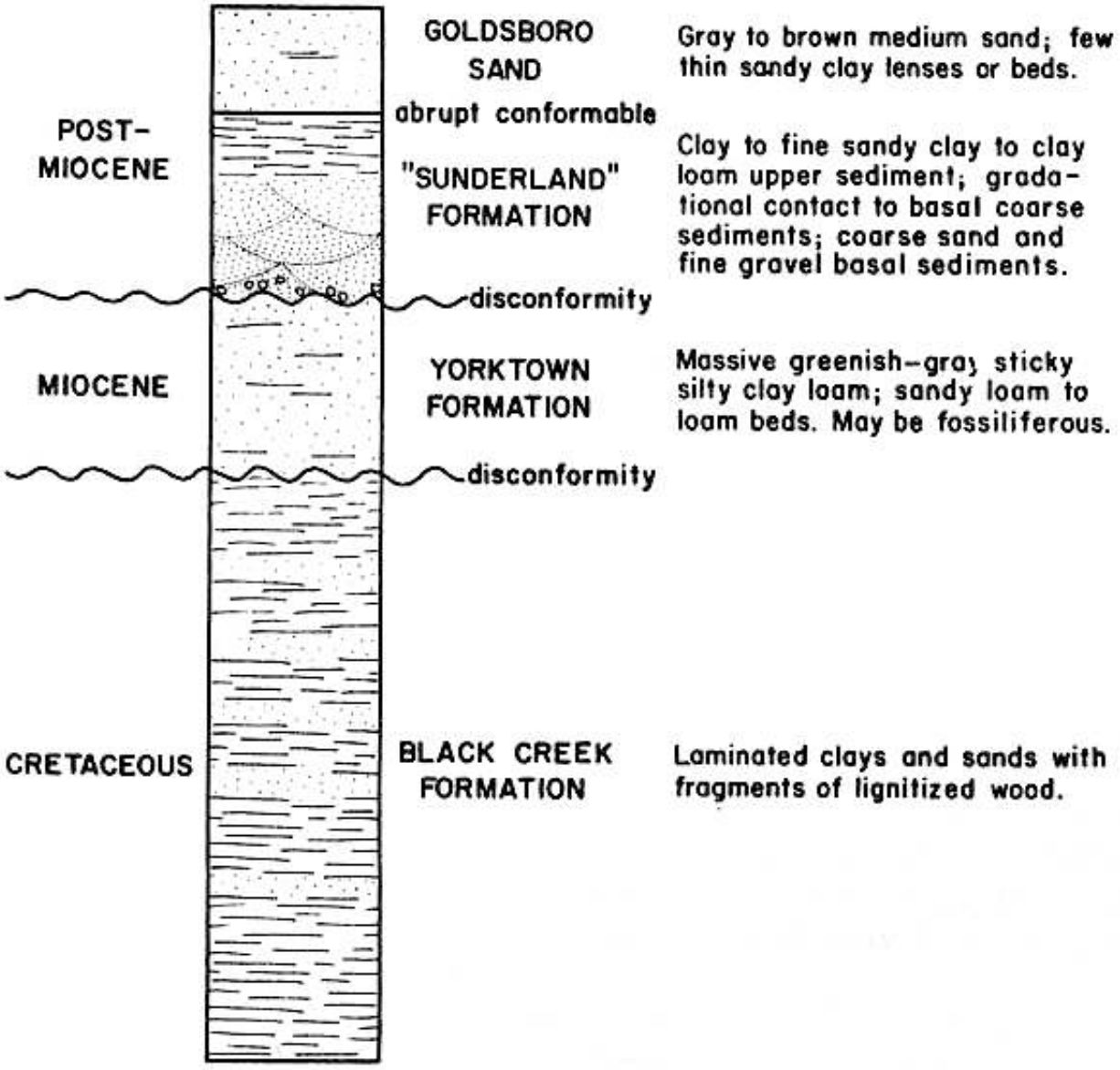

Figure 2. Stratigraphy in the vicinity of the Goldsboro ridge.

The lower half of the Sunderland Formation is dominantly a coarse to medium sand to sandy loam. A basal coarse gravelly sand has pebbles up to 2 cm. in diameter. The coarse lower half grades upward into a finer grained sandy clay loam to clay that is massive with little indication of bedding. The sands become finer as the silt content increases.

Localized clay beds occur in the upper 10 feet of the formation. One 11-foot thick bed of nearly pure clay was found under the northwest edge of the ridge. This bed grades laterally to the west, east and north for several miles with an increase in silt. These clay or clayey beds are found at or near the top of the formation and no fossils have been found in them or anywhere else in the Sunderland.

The Goldsboro sand is present in the Goldsboro ridge and in a low subcircular knoll about 2 1/2 miles in diameter lying about 4 miles northeast of the Goldsboro ridge around the hamlet of Cokers Crossroads. It is

dominantly a loamy sand to sandy loarn composed of medium sands and a few intercalated clay layers (Figure 3). The sand diameters in the Goldsboro sand are about the same as those in the upper half of the Sunderland but they have less clay. The clay content of the Goldsboro sand is about the same as the basal coarse Sunderland. The Goldsboro sand overlies the Sunderland Formation conformably. The contact is always abrupt but there is no evidence of deep channeling, basal coarse material, and evidence of weathering at the contact. Even the Carolina Bays do not disturb the underlying Sunderland materials (Figure 3). The sand in the bay rim is not different from the Goldsboro sand. Therefore, these Carolina Bays are merely surface features associated with the formation of the ridge. The contact between the Goldsboro sand and the Sunderland is easily recognized by the abrupt decrease in clay content and the large increase in silt. No fossils were found in the Goldsboro sand, but this does not preclude a marine origin as the unfossiliferous nature of a large portion of the marine Yorktown Formation shows.

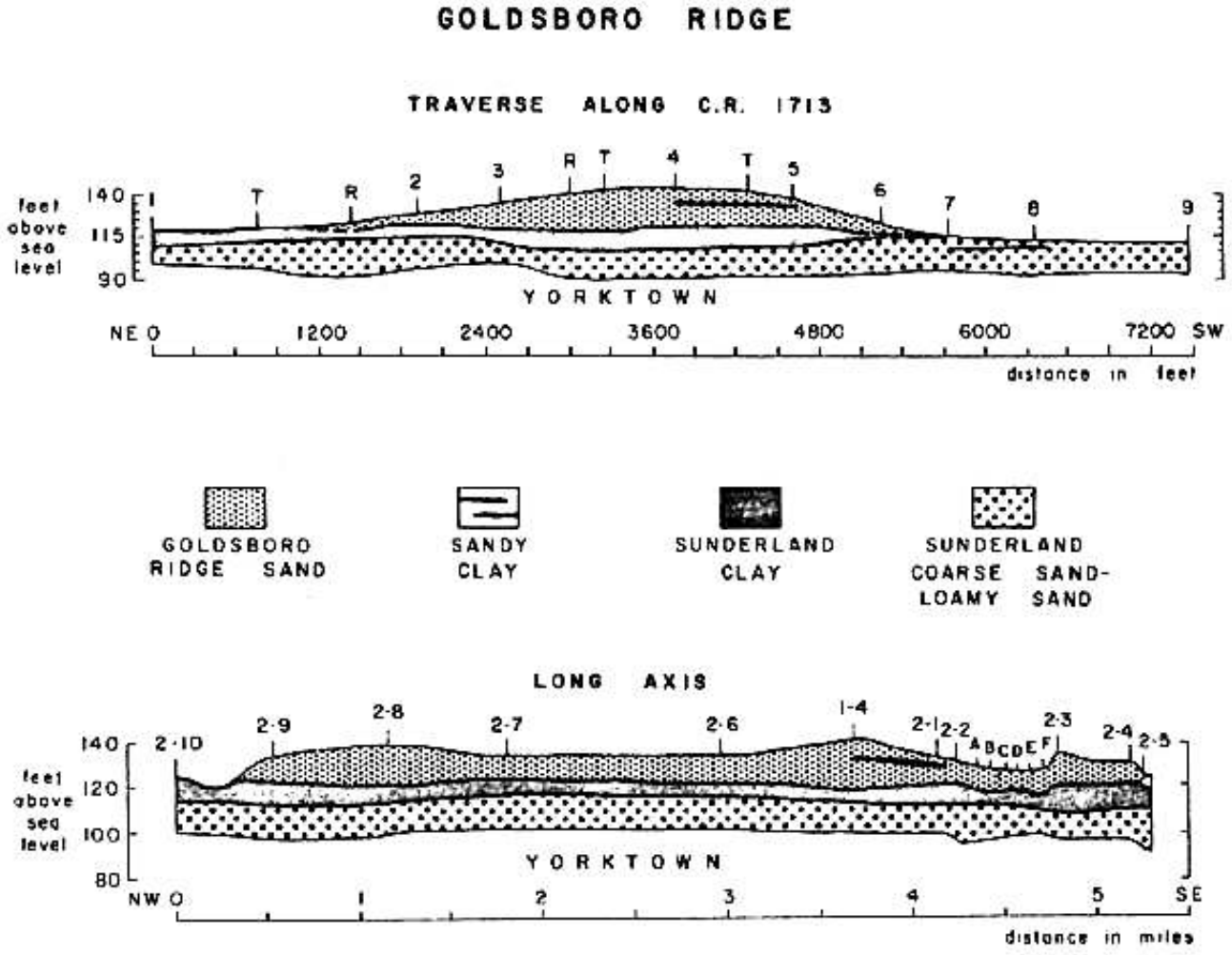

Figure 3. Cross sections of the Goldsboro ridge. Numerals 1 to 9 and 2-1 to 2-10 are bore hole locations along traverse 1, county road 1713, and traverse 2, the long axis. Letters A to F locate closely spaced bore holes in the Carolina Bay. Letters R and T along road 1713 are resistivity and topographic points used in constructing the cross section

GENETIC INTERPRETATION

The Goldsboro ridge is a unique feature on the Sunderland surface and requires special explanation whatever its origin. It must be either an erosional remnant of a once more extensive sediment or a depositional feature.

The Goldsboro sand is present in the ridge and in the smaller patch around Cokers Crossroads. Sediments at similar altitudes to the north and west always have the upper fine and lower coarse sequence typical of the Sunderland Formation overlying the Yorktown Formation or saprolite. Medium sands similar to the Goldsboro sand are found about 30 miles to the southeast near Pink Hill. But those sands are 20 to 40 feet thick and overlie the Yorktown or other Tertiary materials, not the Sunderland Formation.

If the Goldsboro ridge were an erosional remnant of a once more extensive sediment, there should be at least a few other remnants in the area. There is only one other patch. This leaves us with the alternative that the ridge is a depositional feature that may be of eolian, fluvial, or marine origin.

An eolian origin for the ridge is attractive because the sediments to the south and southwest are sandy and could be a source area. But the sediments to the west and north are silty and could not provide sufficient sand. The lack of outcrops prevented us from examining the sedimentary structures of the Goldsboro sand, so this clue to its depositional history is not available. One six foot section near the base was sampled by driving a plastic tube into the sand. The bedding was all horizontal. The intercalated clay beds and the absence of dune topography argue against an eolian origin for the ridge.

If the ridge was deposited by water, we have two alternatives, fluvial or marine. There is little in the Goldsboro sand that argues against a fluvial origin except its very uniform grains size. There is no coarse basal sediment, and except for the clay lenses the sand is monotonously similar from top to bottom. This, however, is not enough to reject a fluvial origin. The limited distribution of the Goldsboro sand indicates that if it is fluvial it must be similar to a natural levee. But there is no companion levee, and no paralleling river channel. Possibly trtces of these features have been destroyed, but by what mechanism? The Goldsboro sand is post-Sunderland surface. How could a post-Sunderland surface river channel and matching levee be destroyed so the Sunderland surface is reconstructed without a trace of its being disturbed? Thus, we must consider an alternative to the fluvial origin for the ridge.

A marine origin is our only. remaining alternative but even this is difficult to justify. Several questions come to mind immediately such as: what would be the minimum altitude of the ocean, are there any nearby features that can be interpreted as old shore lines, and assuming an ocean or sound at Goldsboro, what condition or condition, would result in deposition of the Goldsboro sand? A minimum altitude for the ocean or sound is about 145 feet because the top of the ridge would just be awash at this altitude. This does not preclude a higher sea level. About the only other evidence that can be used to indicate an ocean level in the Goldsboro area is the Kenly scarp (Figure 1). The scarp from near Pink Hill (south of the Neuse River) north to Wilson has a toe altitude of 145 feet. West of Wilson the toe altitude rises to a maximum of 175 feet on the Neuse-Tar divide as the scarp swings up into the Tar valley. This altitude then decreases toward Rocky Mount until due west of the city the toe is again at 145 feet. The dashed or dotted line between Wilson and Rocky Mount in Figure 1 is the approximate location of the 145 foot contour line. In this area the Kenly scarp is farther west and at a higher elevation, and the 145 foot contour is located within a smooth unbroken surface.

The uniformity of the toe altitude of the Kenly scarp between Pink Hill and Wilson is good evidence that the scarp was controlled by an ocean or sound level. Sand dunes are not associated with the scarp through this area

and this can be used as evidence against an open ocean. If one is willing to consider the possibility of a sound existing in the area during deposition of the Goldsboro sand, there is still the question of what conditions existed at this site. The ridge is roughly aligned with the flow direction of the, Neuse, and is southeast of and aligned with a slate knoll near Belfast [2], and is aligned with the south-east trending segment of Little River (Figure 1). The Goldsboro ridge is near the junction of possible north-south longshore currents gene rated by the Neuse and Little Rivers in an estuary. With sea level at 145 feet the water depths between the slate knoll and the Kenly scarp would be 10 feet or less, but they would be 25 to 30 feet at the base of the Goldsboro ridge. The shallow depths, the slate knoll, and currents from the Neuse and Little Rivers could deflect long shore currents, turning them perpendicular to the shore. The sand could be supplied by the longshore currents of the Neuse and Little Rivers, or both. The result was a shoal area built by the interaction of southerly drift along the coast and the eastward flowing current generated by the Neuse and Little Rivers. The largest feature by far of this shoaling and sedimentation is the elongate Goldsboro ridge. An argument supporting this mode of deposition is the asymmetry of the ridge. It is steeper on the south side than the north. This suggests that currents on the river side may have been strong enough to erode the ridge after the main period of deposition. The uniform grain size of the "Goldsboro sand" also is not contrary to deposition in a sound.

A marine origin for the Goldsboro ridge can be opposed on several grounds. The absence of marine fossils is the most valid objection. The uniqueness of the ridge maybe said to make it difficult to prove a marine origin, but this quality would oppose any origin with equal weight. The reasons for choosing marine conditions over others as the probable origin lie in the geography of the relations among the height and orientation of the ridge, the elevation of the toe of the nearby Kenly scarp, the location of the Belfast slate knoll, and the positions and orientation of the ridge, the elevation of the toe of the nearby Kenly scarp, and the positions and orientation of the Neuse and Little Rivers. All these suggest a marine origin.

But, until much more is known about all the middle Coastal Plain, the Goldsboro ridge will remain, in the last analysis, an enigma.

REFERENCES

Pusey, R. D. , 1960, Geology and ground water in the Goldsboro area, North Carolina: N. C. Dept. of Water Resources, Ground-water Bull. 2, 77 p.

Stephenson, L. W., 1912, The Quaternary formations, in Clark, W. B., Miller, B. L., and Parker, H. N., The coastal plain of North Carolina: N. C. Geol. and Economic Survey, v. 3, 372 p.

1/ Paper number 3146 of the Journal Series. Joint contribution from the Soil Conservation Service, U. S. D. A. , and the Department of Soil Science, North Carolina Agricultural Experiment Station, Raleigh, North Carolina.

2/ The slate knoll is a sharp conical hill of Carolina Slate rising to 150 feet. It is about 3 miles north of the junction of U. S. 70 and U. S. 117 in Goldsboro. The slates are well exposed in a cut of the Seaboard Coast Line Railroad.

Home C-bay menu

Georgia.