DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
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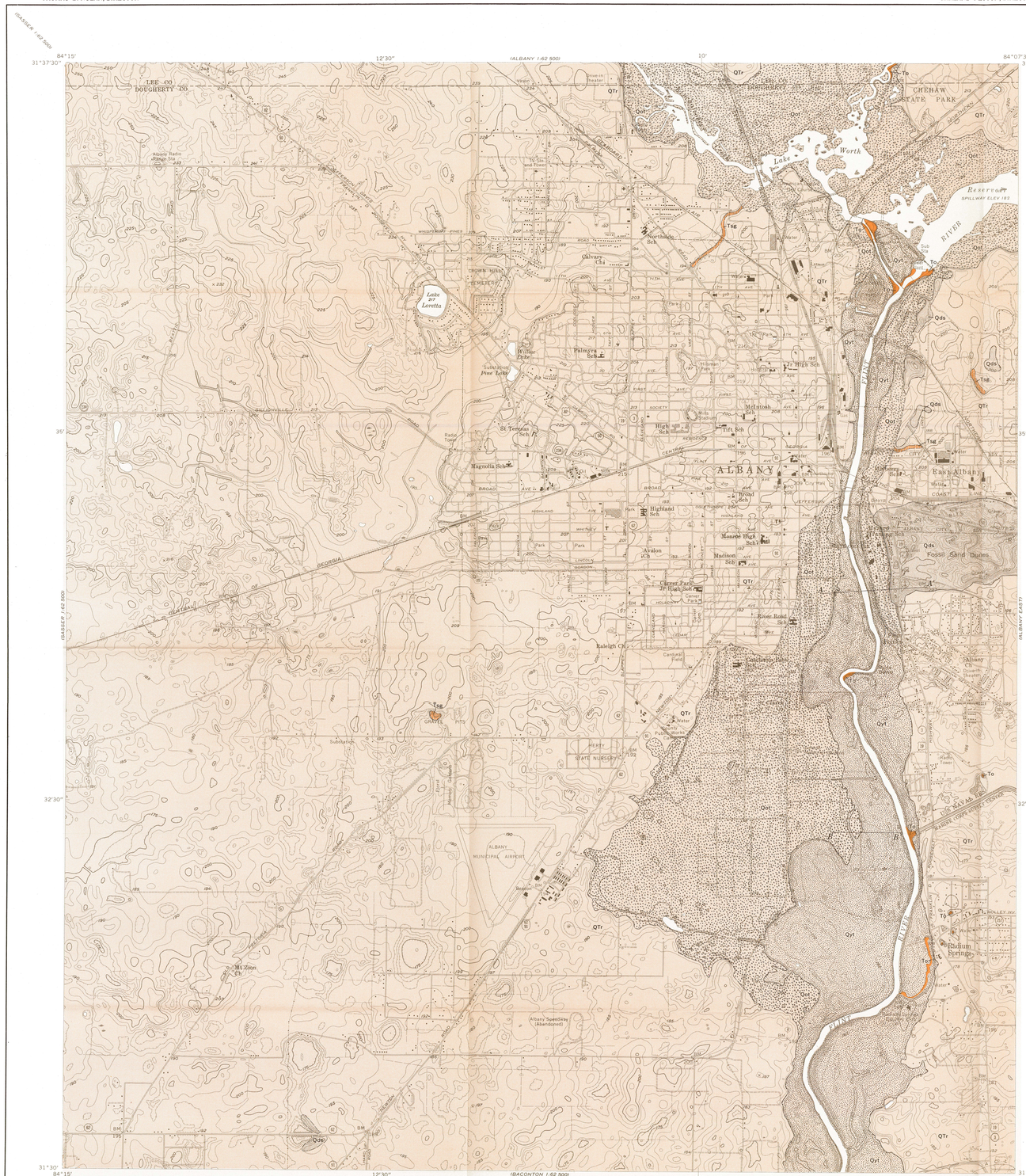
PREPARED IN COOPERATION WITH THE
GEORGIA DEPARTMENT OF MINES, MINING AND GEOLOGY
GARLAND PEYTON, DIRECTOR

MISCELLANEOUS GEOLOGIC INVESTIGATIONS
MAP I-348

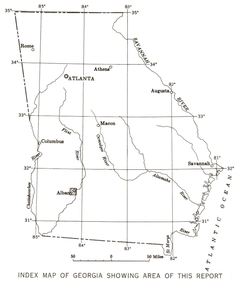


EXPLANATION

- Qds — Dune sand
- Qyt — Younger river-terrace deposits: *Crossbedded sand and gravel below 175 feet*
- Qot — Older river-terrace deposits: *Crossbedded sand and gravel above 175 feet*
- QTr — Residuum, limestone and chert boulders of Eocene and Oligocene ages, Pleistocene sand, and Recent sediments
- Tsg — Massive argillaceous sand and gravel
- To — Ocala limestone: *White to cream, fossiliferous, recrystallized limestone*

Pleistocene and Recent — QUATERNARY
Pliocene(?) — TERTIARY
Eocene — TERTIARY

Contact — *Dashed where approximately located*



INDEX MAP OF GEORGIA SHOWING AREA OF THIS REPORT

ABSTRACT

The Albany West Quadrangle is near the east edge of the Dougherty Plain of southwestern Georgia, an area of karst topography. Limestone (upper Eocene) underlies the quadrangle and crops out along the Flint River and its tributaries and in sinkholes. Sinkholes of two ages are developed in the limestone. A gravelly argillaceous sand of Pliocene(?) age is exposed in ditches near the Flint River and in a sinkhole in the western part of the quadrangle. Reddish brown, argillaceous, older Pleistocene sand, believed to be part of a marine terrace deposit above altitude 160 feet, overlies the Pliocene(?) and is exposed in a sinkhole. River terraces are present along the Flint River at altitudes of 175 and 200 feet. Accumulations of dune sand east of the Flint River are believed to have been derived from the earliest river-terrace deposit. The quadrangle is covered by a mixture of reddish-brown, argillaceous, older Pleistocene sand, and residuum containing siliceous boulders from the Ocala limestone, which has been mapped as residuum.

INTRODUCTION

The Albany West quadrangle is in southwestern Georgia, between lats. 31°30'00" and 31° 37.30" and longs. 84°07'30" and 84°14'00". It includes parts of northeastern Dougherty County and southern Lee County and most of the city of Albany, the county seat of Dougherty County. The rocks exposed within the quadrangle range in age from late Eocene (Jackson) to Recent. Pleistocene sand mantles much of the area and conceals the bedrock. River-terrace deposits of two ages are present on both side of the Flint River, the main stream in the quadrangle. Dune sand is present east of the river. Previous geologic mapping in the area includes that of Spencer (1891), Veatch and Stephenson (1911), Cooke (1943), and MacNeil (1947).

Albany has a mild climate, with an average annual precipitation of 49.92 inches and a mean annual temperature of 67.4° F (U.S. Weather Bureau, 1953). Dougherty County is primarily an agricultural area; peanuts, pecans, cotton, livestock, lumber, and pulpwood are the main products. Mineral industries are represented by several sand companies that mine dune sand and river-terrace deposits.

Albany had a population of 31,155 in 1950, according to the U.S. Bureau of the Census. It has been listed as one of the fastest growing cities in the United States.

This investigation was made by the U.S. Geological Survey in cooperation with the Georgia Department of Mines, Mining and Geology, Garland Peyton, Director. The work was done under the direct supervision of J. T. Callahan, district geologist of the Ground Water Branch, Atlanta, Ga.

GENERAL FEATURES

The Albany West quadrangle is near the eastern edge of the Dougherty Plain, an area of flat to slightly rolling topography, and is characterized by sinkholes. The Flint River enters the quadrangle near the northeast corner and flows nearly due south along a line about a mile west of the east edge of the quadrangle. Kinchafoonee and Muckalee Creeks flow southward from Lee County and join near the north boundary of the quadrangle to form Muckafoonee Creek, which flows into the Flint River about 1½ miles south of that boundary.

The quadrangle has little relief. The highest part of the area is in the northwest corner, where most altitudes are between 200 and 225 feet and several knolls are as high as 250 feet. The land surface slopes gently southward and southeastward toward the Flint River, where the altitude of the younger river terraces is about 175 feet. The river is entrenched to an altitude of 145 feet or slightly less throughout the quadrangle.

Karst topography is present throughout the quadrangle but is best developed on the west side of the river. Sinkholes are present throughout the area.

Dune sand is present east of the Flint River. River-terrace deposits are present along the Flint River and Kinchafoonee Creek. Those deposits along the Flint River and also the dune sand are important locally as sources of sand. The terrace deposits along Kinchafoonee Creek have not been mined.

GEOLOGY

EOCENE SERIES

Ocala limestone (Jackson group)

The Ocala limestone was named by Dall (1892) from exposures at Ocala, Fla. He assigned it to the "Eocene or Oligocene." Cooke (1915) established the Jackson age of the Ocala and applied the name in Georgia to rocks exposed along the Flint River near Bainbridge, Decatur County. Cooke and Shearer (1918) described the Ocala in Georgia.

The Ocala is present throughout about three-fourths of the Coastal Plain of Georgia. It is near the surface throughout the Dougherty Plain area of southwestern Georgia but is best exposed in the valley of the Flint River and along most of its tributary streams. East of the Dougherty Plain the Ocala is covered by Oligocene and Miocene sedimentary rocks.

In the Albany West quadrangle, exposures of the Ocala limestone are limited to the valley of the Flint River, the banks of Kinchafoonee and Muckalee Creeks, and several sinkholes east of the river in the vicinity of Radium Springs. The outcrops along the river are much weathered and pitted by solution action of water and abrasion by streamborne debris. Throughout the quadrangle, limestone exposed in the river banks is undercut, leaving a ledge which, at low stages of flow, protrudes in places as much as 5 feet over the river. The maximum thickness of the Ocala exposed in the quadrangle, about 13 feet, is just below the Georgia Power Co. dam. The following section was measured along the east bank of the river at that locality.

Pleistocene series	Thickness (feet)
5. Sand, light-gray, argillaceous, medium- to very coarse-grained; poorly sorted; boulders of chert and jasper as much as 2 feet in diameter; silt common; may include some artificial fill	10
Eocene series	
Jackson group	
Ocala limestone	
4. Limestone, gray if fresh, dark-gray to black, where stained by water; contains silicified nodules as in bed 2; forms pitted ledge and is caprock of exposure	2
3. Limestone, light-gray to light-yellow if fresh, weathers gray; very fossiliferous, containing pelecypods and echinoids	3
2. Limestone, light-yellow if fresh, weathers gray; fine-grained, fossiliferous; weathered surfaces pitted; contains chert nodules up to 3 feet long and 6 inches thick; basal contact irregular	2
1. Limestone, white if fresh, weathers gray; massive; forms ledge at edge of river; pocketed by solution and erosion of river; very fossiliferous, containing Bryozoa and casts of pelecypods; from water level upward to top of bed	6
Total Ocala exposed	13
Total thickness	23

On a fresh surface the Ocala limestone is commonly light gray to pale orange (10YR 8/2). It varies little in color. At outcrops along the Flint River, the Ocala is very porous and ranges from a soft, friable to a hard, cherty limestone. Calcite replacement is common, and crystals of calcite are abundant in cavities from which fossils have been dissolved. Casts and molds of pelecypods are abundant; Bryozoa also are common to abundant in outcrops along the river. Foraminifera are rare to abundant. Echinoids are present in unit 3 of the section measured below the dam, as are pelecypods, echinoid spines, and Bryozoa. Nummulites are common in the Ocala at places; however, none were found along the Flint River.

In the vicinity of Viola Bend on the east side of the Flint River, the limestone where exposed is covered with a thin coat of limonite.

About 3 to 4 feet of much-weathered limestone is exposed in a sinkhole about 0.4 mile southeast of the Georgia State Patrol radio tower, which is about 1 mile south of Four Points. The limestone is overlain by about 25 feet of gravelly sand and clay. Limestone is exposed near the bottom of several sinkholes in the vicinity of Radium Springs and east of U.S. Highway 19 and also in the bottom of a sinkhole at the corner of 11th Avenue and Harding Street in the northern part of Albany. The limestone in each of these sinkholes is much weathered, soft, and almost claylike when wet.

Weathered silicified limestone is exposed at the entrance of the driveway to the quadrangle. It is used also for agricultural lime in other areas, but none is mined in the quadrangle.

Structure.—The Ocala limestone has no recognizable structural features in the area. A jointing system probably is developed in the limestone, although exposures are too scarce and small to detect it. Aerial photographs were taken in the spring of 1948, when nearly all sinkholes were filled with water and were plainly visible. The photographs show the sinkholes to be aligned in two directions, one about N. 60° W. and the other about N. 10°–30° E. There is an especially noticeable sinkhole, round on the northeast side and straight on the southwest side, 0.3 mile southwest of the gravel pits west of the Herty Nursery. The straight side of the sinkhole trends about N. 60° W. Other, smaller sinkholes are alined in this same direction, and similarly shaped sinkholes are present elsewhere in Dougherty County. Some of the smaller sinkholes are alined N. 10°–30° E. Several of the sinkholes south of the gravel pits west of the Herty Nursery are elongated northeastward. Those 1.3 miles east of Newton Road and south of the abandoned Albany Speedway road are alined about N. 30° E. and are elongated in that direction from 1.2 to 1.8 times their width.

The sinkholes in the Albany West quadrangle are thought to be of two ages. Three sinkholes southwest of the city airport and between Newton Road and Old Pretoria Road are thought to represent the older ones. They are nearly circular in outline and have gently sloping sides and flat bottoms. They are 20 to 25 feet deep and 0.1 to 0.2 mile in diameter. A similar sinkhole is bisected by State Highway 62, 0.4 mile west of its intersection with State Highway 91. About 14 feet of red argillaceous sand is exposed in the road cut. The sand, blown from this sinkhole by the prevailing westerly winds, forms a low dune that rises about 5 feet above the general level of the land along the east side of the sinkhole. Similar accumulations of sand probably are present east of the three large sinkholes to the north, but they are not exposed. The surface soil is very sandy throughout much of this area, and because of lack of exposure it is not possible to determine if several of the gently rounded ridges east of the sinkholes are composed of windblown sand.

The older, larger sinkholes fill with water during wet seasons and drain at a very slow rate, but the smaller sinkholes lose water rapidly. The large sinkhole bisected by State Highway 62 was filled with water during the first 8 or 9 months of 1958; other, smaller sinkholes were dry in a much shorter period, however.

The older sinkholes probably resulted from the solvent action of ground water. Caverns formed along a joint plane and enlarged by solution until the roofs of limestone no longer could support their own weight; then they collapsed and sinkholes were formed. Subsequently the sinkholes were filled with sand, gravel, silt, and clay. The bottoms of the older sinkholes and the younger river terrace are at an altitude of about 175 feet.

The younger, smaller sinkholes may result from the solution of limestone pinnacles that were left protruding up into or above residual clay and from solution along joints. As a pinnacle dissolved, the overlying sediments slumped, resulting in a depression in the land surface. Some of the smaller areas of interior drainage as well as sinkholes that are actively forming may be formed in this manner.

PLIOCENE(?) SERIES

Gravelly, argillaceous sand of probable Pliocene age is exposed east of the Flint River in a drainage ditch that trends east-west along the city boundary line in East Albany. The following description was made of the material exposed in the ditch about half a mile east of the Flint River.

	Thickness (feet)
1. Pleistocene series Sandy clay, yellowish-gray (5Y 8/1), mottled; contains abundant medium- to coarse-grained quartz sand	1
2. Pliocene(?) series Sand, moderate-reddish brown (10 YR 6/4), to light-brown (5YR 5/6), medium- to very coarse-grained, subangular to subrounded, quartz; argillaceous; contains cobbles of quartz as much as 3 inches in diameter; sand consists mostly of clear and milky quartz; mottled red, yellow, and brown on surface	8.5

This material is exposed also along the west bank of a sinkhole about half a mile northeast of the drainage ditch.

West of the Flint River, Pliocene(?) sand is exposed in a drainage ditch that trends northeastward from the intersection of 11th Avenue and Palmyra Road to the mouth of Kinchafoonee Creek. About 4 to 6 feet of Pliocene(?) sediments are exposed below an altitude of 200 feet and are overlain by a veneer of Pleistocene terrace material.

A sand and gravel bed of Pliocene(?) age is exposed in the gravel pits west of the Herty Nursery. This gravel pit is owned by the Musgrove Sand Co. The following section was measured along the north face of the pit.

Pleistocene series	Thickness (feet)
2. Sand and gravel, argillaceous, dark-yellowish-orange (10YR 6/6) to pale-yellowish-orange (10YR 8/6), becoming darker toward top of exposure, where color is pale reddish brown (10YR 5/4); sand is very fine to coarse grained poorly sorted subangular to subrounded clear and milky quartz; increasing amounts of silt toward the top of the exposure; gravel present; stands as vertical bank and is weathered only slightly; basal contact sharp, even	14
Pliocene(?) series	
1. Sand and gravel, dark-yellowish orange (10YR 6/6), with irregular patches of very pale orange (10YR 8/2); very fine- to coarse-grained sand and cobble to boulder gravel; sand clear and milky quartz, subrounded to subangular, well-sorted; about 10 percent of sample is silt; phosphate and muscovite (rare) in fine fraction	11
Total thickness exposed	25

Numbers refer to Rock Color Chart, Natl. Research Council, 1948.

Along the Flint River, the contact of the Pliocene(?) with the Ocala limestone is concealed by river-terrace deposits, and beyond the terrace deposits a reddish argillaceous sand overlies the Pliocene(?) sediments. The Pliocene(?) sediments are exposed only in the above-mentioned places.

The Pliocene(?) deposits probably unconformably overlie the Ocala limestone throughout the quadrangle and are in turn unconformably overlain by the reddish argillaceous sand of Pleistocene age. Pliocene(?) deposits are shown in section *A–A'*. These deposits are tentatively assigned to the Pliocene because of their position and relation to older rocks in the area, as discussed in the following paragraphs.

The Duplin marl (uppermost Miocene) is not known in southwestern Georgia. According to Cooke (1943, p. 98), the westernmost exposure of the Duplin is at Doctortown, Wayne County, which is more than 100 miles east of Albany. The Tampa limestone and Hawthorne formation (lower Miocene) are present along the scarp of the Tifton Upland, just east of the map area, but have not been identified in the Dougherty Plain. The Miocene formations are at altitudes generally above 250 feet, or 50 to 105 feet higher than the Dougherty Plain. The absence of Miocene rocks in the Dougherty Plain area is singularly puzzling, in view of the much lower altitude of the area. Their absence is indicative either of nondeposition or, more probably, deposition and subsequent removal by erosion.

The Flint River formation, of Oligocene age, is present at places in the Dougherty Plain, but seems to be absent from the Albany West quadrangle. It also was probably deposited and then eroded away.

The presence of the older argillaceous sand and gravel in the map area at low altitudes along the river and occurring as filling material in sinkholes indicates that it must be post-Miocene, for the writer believes that Miocene rocks were probably present and were eroded away before the sinkholes were formed. Thus a Pliocene age is tentatively assigned to this sand. Until detailed studies of the upper Eocene and post-Eocene geology have been made in the entire Dougherty Plain area of Georgia, Alabama, and Florida, the exact relation and age of these deposits must remain largely conjectural.

PLEISTOCENE SERIES

The Pleistocene in the Albany West quadrangle is represented by distinct lithologies. The oldest Pleistocene deposit in the quadrangle consists of a generally reddish-brown argillaceous gravelly sand. The younger Pleistocene deposits consist of river-terrace deposits and dune sand.

OLDER PLEISTOCENE SAND

The older Pleistocene sand is reddish brown (10R 4/6). It is poorly sorted, ranges from fine to very coarse grained, is subangular to subrounded, and is composed of grains of clear and milky quartz and cobble gravel. Silt is abundant. Accessory constituents include black polished phosphate and zircon, both of which are rare and are usually very fine to fine grained. Granule and pebble gravel constitutes as much as 20 percent of the material at some outcrops. A mile east of the abandoned Albany Speedway at the junction of River Road and an unnamed east-west road, a slight knoll rises to an altitude of nearly 200 feet, about 25 feet above the level of the surrounding surface. A section measured at the road cut at that locality is described as follows:

	Thickness (feet)
Argillaceous sand, moderate-reddish brown (10R 4/6), subrounded to rounded, well-sorted, fine- to medium-grained, quartz; silty matrix; weathers to firm surface, with prominent shrinkage cracks	4
Total exposed	

Pellets consisting of sand grains cemented by iron oxide are abundant in the older Pleistocene sand. These pellets usually weather out of the sandy matrix and cover the graded slopes of road cuts and excavations. They are found in abundance commonly at an altitude of about 200 feet and higher on both sides of the unnamed stream in the western part of Albany. According to V. J. Hurst of the Georgia Dept. of Mines, Mining and Geology, the iron pellets are the result of extreme lateritization (personal communication, 1959).

About a mile east of the Flint River, in the area of the Fossil Sand Dunes, the older Pleistocene sand is exposed in the bottom of a gravel pit. The sand is chiefly quartz, subrounded to angular, poorly sorted, and fine to coarse grained and contains minor amounts of pebble gravel. Polished phosphate pebbles and zircon are rare accessory constituents and are mostly in the finer fraction. About 50 percent of the grains are elongate and angular. The sand is exposed also in a road cut south of the entrance to the municipal airport on State Highway 62.

In the map area the only exposure of the basal contact of this unit with the Pliocene(?) is in the gravel pit of the Musgrove Sand Co. 1½ miles west of the Herty Nursery and north of the airport.

The existence of marine terraces in the Southeastern States has been recognized for many years, but geologists are not in agreement as to the number of terraces and their altitudes above sea level. Cooke (1943, p. 104) recognized 7 Pleistocene marine terraces in Georgia, ranging from 25 to 270 feet above sea level. They are:

Terrace	Altitude (feet)
Brandywine	270
Cobarts	215
Sunderland	170
Wicomico	100
Penholoway	70
Talbot	42
Pamlico	25

MacNeil (1950, p. 99), however, recognized only 5 marine shorelines, which he regarded as "... peaks of marine transgression," and which can be compared to Cooke's terraces. These are:

Shoreline	Altitude (feet)
Okefenokee	150
Wicomico	100
Pamlico	25–35
Silver Bluff	8–10

He regarded the Penholoway and Talbot shorelines as "late stages, " " " formed during pauses in the following regression " " ". He revived the name "Okefenokee" for the 150-foot terrace, stating, "Inasmuch as there is some doubt that the highest shore line in Georgia here recognized is equivalent to the Sunderland shore line of Maryland, the name 'Okefenokee' is revived for the terrace." He stated further (p. 98), "Many remnants of a terrace surface, believed to have been continuous at one time, are found in Georgia, western Florida, Alabama, and Mississippi. The surface rises to an altitude of about 250 feet in Georgia, to about 280 feet in western Florida, and to over 340 feet at Citronelle, Alabama." " ". Parts of this terrace, therefore, are higher than the highest shore line at an elevation of 270 feet, recognized by Cooke." Cooke, (1925) recognized deposits of the "Okefenokee" [now Sunderland] terrace in the valley of the Flint River, and stated (p. 27), " " "a much larger embayment entering at the southeastern corner of the state passes between Donaldsonville and the foot of the Tifton Upland east of Bainbridge and extends up the valley of the Flint almost to Baconton." He stated further, "It is altogether likely that detailed maps will show fringes of 'Claxton' [now Coharie] and 'Hazlehurst' [now Brandywine] terraces bordering the Okefenokee embayment and extending inland almost to Blakely and Leesburg." Cooke stated later (1943, p. 69), " " " the broad undulating plain between the Flint and the Chattahoochee contains some outcrops of silicified limestone, but in most of it the limestone is concealed by a thin cover of Pleistocene sand." McGee (1891) and Spencer (1891) note the presence of a "red loam" in the Dougherty Plain area. This red loam is probably the same as the sand here referred to as older Pleistocene.

The previous discussion has shown that, although geologists are not in agreement as to the number and altitude of the terraces in the Southeast, the existence of the terraces is recognized; and further, that the 150-foot terrace (Okefenokee of former usage) was mapped by Cooke in the valley of the Flint River, and that the existence of the higher terraces in that area has been suspected, but as yet these have not been mapped. It is believed that the older Pleistocene sand described here is a part of the deposits of a marine terrace higher than 150 feet, as yet unrecognized.

The older Pleistocene and the residuum of the Ocala limestone have been mapped as a unit, as the two generally are indistinguishable; however, the older Pleistocene sand overlies the Pliocene(?) in the gravel pit west of the Herty Nursery and underlies the Fossil Sand Dunes. Also, both the older and the younger river-terrace deposits appear to overlie the older Pleistocene sand.

RIVER-TERRACE DEPOSITS

River-terrace deposits of two ages are present in the quadrangle. The older river-terrace deposits are present at places along both sides of the river, generally above an altitude of 175 feet. The younger river-terrace deposits are present along both sides of the river and are below an altitude of 175 feet. The river terraces range in width from 0.1 mile near the Oglethorpe Avenue bridge to about 2½ miles on the west side of the river in the vicinity of Radium Springs, where large abandoned meanders are cut into the older terrace.

Older river-terrace deposits.—The older river-terrace deposits (section *B–B'*) consist of crossbedded sand and gravel, usually capped by silty sand or silt. The older river terrace is best developed in the area west of the Flint River, from the Oglethorpe Street bridge southward to the vicinity of Radium Springs. It extends westward to the vicinity of the municipal airport. The western boundary of the older river terrace is indistinct but appears to be about the position of the 180-foot topographic contour in the vicinity of the municipal airport. The older river terrace rises above 190 feet in this area. East of the river, the older terrace appears to extend to an altitude of nearly 200 feet.

The materials composing river-terrace deposits of the two ages are indistinguishable, but the younger river terrace is cut into the older one, as shown by the abandoned meanders in the vicinity of Radium Springs. The following section was measured in a pit at the sewage-disposal plant, which was constructed in 1959–60.

Pleistocene series	Thickness (feet)
Older river-terrace deposits	
5. Sand, silty, moderate-reddish-brown (10R 4/6), medium- to coarse-grained, massive, subangular to subrounded, quartz; slightly darker near top; quartz grains stained with iron oxide; contact poorly exposed; 1 to 2 feet of soil developed at surface	9
4. Same as bed 2	13
3. Clay, yellowish-gray (5Y 8/1) to light-greenish-gray (5GY 8/1); plastic when wet; lower part of bed composed of fine-grained sand, weakly cemented with limonite, grading upward to silty clay; contact sharp, uneven	2
2. Sand and gravel, dark-yellowish-orange (10YR 6/6) to bluish-white (5B 9/1), thinly crossbedded; some parts consist only of foreset beds dipping about 30°; upper beds bluish-white (5B 9/1) and thinly laminated; contact sharp, uneven; beds tabular to lenticular; sand and gravel of clear and yellow-stained angular to subrounded quartz, poorly sorted, micaceous; boulders of limestone common; upper part of bed composed of clear quartz, fine- to medium-grained, micaceous; limestone fragments common	5
1. Sand, clay, and silt, homogeneous mixture of quartz sand, clay, and silt, dark-yellowish-orange (10YR 6/6) to dusky-yellowish-brown (10YR 2/2); contains cobbles as long as 1 inch; contains limonite geodes; sand is fine to medium grained, subangular to subrounded, poorly sorted, micaceous	5
Total thickness	34

An exposure 0.4 mile west of River Road and 1 mile north of the intersection with an east-west road and on a line between the airport beacon and Radium Springs contains crossbedded sand at the base. This is the farthest west that older river-terrace material is exposed. The crossbedding and grain size indicate the rapidity with which the material was deposited. The following section was measured at that locality.

Pleistocene series	Thickness (feet)
Older river-terrace deposits	
Soil, gray, silty, sandy	1
Silt, moderate-brown (5YR 4/4) to 5YR 5/4); contact indistinct, gradational; contains quartz cobbles as much as 3 inches long and 1 inch thick	2
Sand, dark-yellowish orange (10YR 6/6) to light-brown (5YR 5/6), coarse- to very coarse-grained, poorly sorted, ferruginous, crossbedded, clear and milky, quartz	4
Total thickness	7

The older river terrace, as seen on U.S. Department of Agriculture aerial photographs AKW -2E-67 and 68 (1948), has dark and light strips that are at the positions of contour lines on the topographic map. The light strips correspond to ridges and the dark strips to slight depressions. The soil developed on the older river-terrace deposits consists mostly of Cahaba fine sandy loam and Grady clay (Carr and others, 1935, p. 62).

Younger river-terrace deposits.—The younger river-terrace deposits are present along both sides of the Flint River below an altitude of 175 feet and consist of sand, silty sand, and gravel, all of which are cross laminated. Construction of a sewer ditch along this terrace exposed as much as 20 feet of yellowish-orange (10YR 6/6) to yellowish-gray (5Y 8/1) cross-laminated very fine- to coarse-grained poorly sorted subangular to subrounded clear and milky quartz sand. Where this ditch is near the edge of the river, blocks of cherty limestone were formed in a gray, to greenish-clay which immediately overlies the Ocala limestone. Sand from the younger river-terrace deposits is mined by the Dawes Silica Co. The pits are on the west side of the Flint River below the Georgia Power Co. dam.

Natural levees parallel the river on the younger river terrace. They consist of a series of disconnected bars. The altitude of the top of the levees is about 175 feet but at places is less. The position of the levees in relation to the river is shown in cross section *A–A'*. Two miles near the river below the younger river terrace is covered with a dense growth of oak, cypress, and brush. The trees on the levee continue to grow when the area is flooded and mark the limits of the river channel.

DUNE SAND

Dune sand is present along the east side of the Flint River from the vicinity of the Georgia Power Co. dam as far south as Four Points. It is usually at altitudes above 200 feet and extends to about 250 feet at the highest point. The most conspicuous deposit of dune sand is about a quarter of a mile east of the Flint River and south of Jefferson Davis Highway (U.S. Highway 82), where an area about a mile long and half a mile wide is covered by sand. This area is called the Fossil Sand Dunes. The dunes are above the older river terrace and rest unconformably upon the reddish argillaceous older Pleistocene deposits. The dunes have no characteristic shape but are a series of mounds. The Fossil Sand Dunes are highest along the south edge. Other dunes begin about half a mile north of the west end of the Fossil Sand Dunes and extend northward as far as the dam; all are mined for sand.

Wind-ripple marks are preserved as internal structure within the dunes. The old dune surfaces are marked by much very fine grained sand and silt which has been cemented by iron oxide and forms zones of hard rock in the dunes. These cemented zones are slightly darker than the intervening, uncemented sand, and on a freshly exposed face they present a striped appearance. After an exposure has been subjected to wind erosion, the cemented zones stand out as ledges, some of which project as much as 4 inches.

The ripple marks have been found to depths of about 5 feet. They are usually less than half an inch high at the crest, and the distance from crest to crest is usually about 4 inches. Ripple marks of similar dimensions were measured on an advancing portion of a dune near the southeast corner of the Fossil Sand Dunes. The ripple marks there had granule gravel in the troughs and fine- to coarse-grained sand on the crests.

The sand composing the dunes is mostly clear and milky quartz, very fine to coarse grained, subangular to subrounded, and poorly sorted. Mica flakes are rare, as are ferromagnesian minerals. The following section was measured along the east face of the northernmost dune in December 1958. The sand from this dune is being used in asphalt by the Albany Asphalt Co.

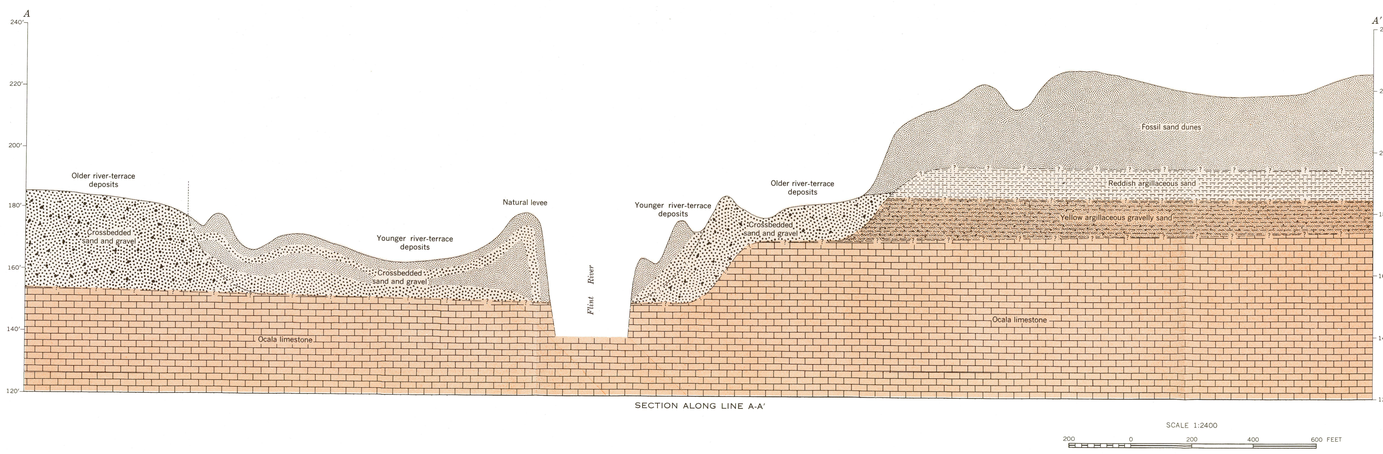
Pleistocene series	Thickness (feet)
3. Soil zone, sand, gray to black, fine- to coarse-grained, subrounded to subangular, well-sorted, quartz; stratification and ripple marks poorly preserved; black layers contain organic matter; chert flakes (rare) as much as 2 inches long and ½ inch thick	2
2. Sand, light- to medium-yellow, subangular to subrounded, well-sorted, fine- to medium-grained, quartz; massive and structureless	4
1. Sand, medium- to light-brown, fine- to coarse-grained, well-sorted, subangular to subrounded, quartz; zones cemented by iron oxide darker than intervening zones, represent wind ripple marks	10
Total thickness	16

All the dune sand is unconformable upon the reddish argillaceous older Pleistocene sand and gravel and occurs above an altitude of 200 feet.

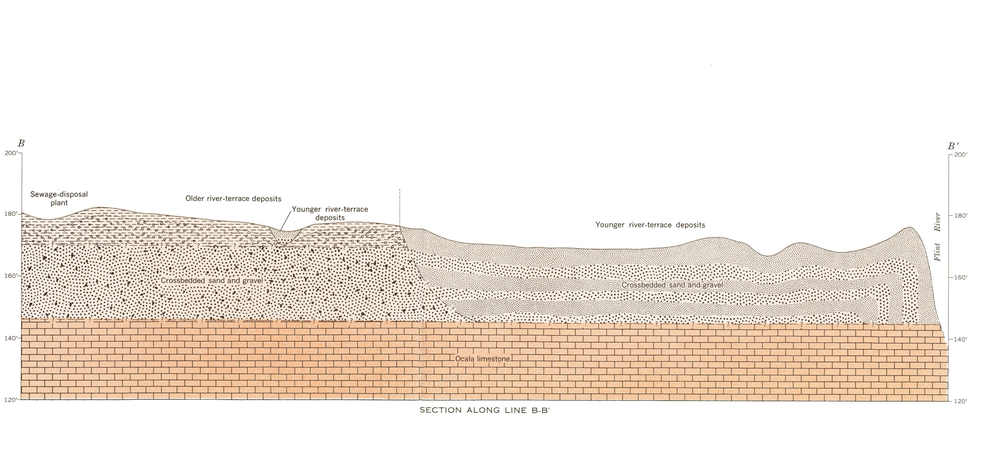
A theory of origin.—The dune sand lies on the east side of the Flint River beyond the east edge of the older river-terrace deposits, which are undoubtedly the major source of the sand constituting the dunes. The volume of dune accumulation depends upon the amount of material available at the source. The dune accumulation is greatest in the area northeast of the largest exposure of the older river terrace. Deposition of the dune sand probably was caused by passage of southwest winds upward over a rather sharp scarp along the east bank of the river. (See cross section *A–A'*.) Turbulent flow of air over the edge of this scarp caused deposition of the sand at this position.

RESIDUUM

The residuum consists of a mixture of reddish argillaceous sand, clay derived from weathering of limestone beds and boulders, siliceous limestone boulders of Eocene and Oligocene ages, and sand of Pliocene(?) age. These materials are so intermixed as to be indistinguishable and are necessarily mapped as a unit, residuum. At some places, iron-oxide pellets are abundant in the residuum; at other places they are absent. Much of the southwestern part of the quadrangle is covered by a thin sheet of sand, as was noted by Spencer (1891, p. 69).



SECTION ALONG LINE A-A'



SECTION ALONG LINE B-B'

SCALE 1:2400
200 0 200 400 600 FEET
DATUM IS MEAN SEA LEVEL

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D. C.—61244

GEOLOGY OF THE ALBANY WEST QUADRANGLE, GEORGIA

By
Robert L. Wait

1962

MISCELLANEOUS GEOLOGIC INVESTIGATIONS
MAP I-348

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