MISSISSIPPI
STATE GEOLOGICAL SURVEY

WILLIAM CLIFFORD MORSE, Ph.D.
Director

BULLETIN 71

LAFAYETTE COUNTY GEOLOGY

by

JAMES SAMUEL ATTAYA, M. S.

UNIVERSITY, MISSISSIPPI

1951

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

LAFAYETTE COUNTY GEOLOGY
JAMES SAMUEL ATTAYA

ALLUVIUM
KOSCIUSKO K BASE
TALLAHATTA T • BASE
MERIDIAN M BASE
ACKERMAN A BASE
FEARN SPRINGS FS

MISSISSIPPI
OXFORD QUADRANGLE
15-MINUTE SERIES

HOLLY SPRINGS 21 MI.
MALONE 6 MI.

WATER VALLEY 10 MI.
GRENADA 41 MI.

Topography by Corps of Engineers, U. S. Army, W. C. Thompson, and F. F. Blankenbaker
Surveyed in 1939–1940

APPROXIMATE MEAN DECLINATION, 1940

Scale $\frac{1}{62500}$

Contour interval 20 feet
Datum is mean sea level

Polyconic projection. 1927 North American datum
5000 yard grid based on U. S. zone system, C
10000 foot grids based on Mississippi (East) and Mississippi (West) rectangular coordinate systems

ROUTES USUALLY TRAVELED
HARD IMPERVIOUS SURFACES
OTHER SURFACE IMPROVEMENTS
1943
U. S. ROUTE
STATE ROUTE

MISSISSIPPI STATE GEOLIGICAL SURVEY
WILLIAM CLIFFORD MORSE, DIRECTOR

OXFORD, MISS.
Edition of 1943
N3415—W8930/15

BULLETIN 71
PLATE 1

MISSISSIPPI
STATE GEOLOGICAL SURVEY

WILLIAM CLIFFORD MORSE, Ph.D.
Director

BULLETIN 71

LAFAYETTE COUNTY GEOLOGY

by

JAMES SAMUEL ATTAYA, M. S.

UNIVERSITY, MISSISSIPPI

1951

CONTENTS

ILLUSTRATIONS

FIGURES

PLATES

LETTER OF TRANSMITTAL

Office of the State Geological Survey
University, Mississippi
May 23, 1951

To His Excellency,
Governor Fielding Wright, Chairman, and
Members of the Geological Commission

Gentlemen:

Herewith is Bulletin 71, Lafayette County Geology, by James Samuel Attaya—a report also submitted to the Graduate School of the University of Mississippi as a fulfillment in part of the requirements for the Master of Science degree.

The geology of Lafayette County includes a consideration of the Holly Springs sand problem—a problem faced by every geologist that ever worked in the county, even by the State Geologist himself and his associate, Franklin Earl Vestal, both of whom have spent weeks, even months, in its study. Starting at this stage, Mr. Attaya has pursued the problem to its final solution, it is believed. In the Graduate paper he concludes:

"An exhaustive study has revealed that the 'Holly Springs' formation is the equivalent of three formations—the Meridian, the Tallahatta, and the Kosciusko; that the white clays of the 'Holly Springs' are Tallahatta in age to a large degree and reworked Tallahatta to a lesser degree; that the carbonaceous clay shale once identified as the Grenada formation and assigned to the Wilcox is actually Tallahatta shale and Claiborne in age; that the assigned great thickness of the 'Holly Springs,' based on outcrop-width and estimated dip, is considerably in error due to the practically horizontal attitude of the three component formations; that the Kosciusko was deposited on the peneplaned Tallahatta and Meridian formations following elevation of the north-Mississippi area at some time after the Zilpha was deposited; that this mantle of Kosciusko sand was once referred to as the Lafayette formation, a correlation finally abandoned because of the confusion resulting from the inability of geologists to recognize the existence of three dominantly sand formations and their unconformable relationship."

Very sincerely yours,

William Clifford Morse
Director and State Geologist

LAFAYETTE COUNTY GEOLOGY

JAMES SAMUEL ATTAYA

INTRODUCTION

The subject of this paper was chosen in preference to any other because the problem offered a challenge not exceeded in Mississippi geological problems.

Lafayette County geology has been a controversial issue among students of stratigraphy since about 1860. Each worker on the problem has reached conclusions satisfactory to himself, but offering little to the satisfaction of others interested in it. This paper presents data which it is believed will contribute to the satisfactory solution of the problem, if the conclusion is not wholly satisfactory in itself.

PORTERS CREEK FORMATION

The Porters Creek formation has been identified in Lafayette County in but one locality, a surface exposure near the Pontotoc County line about 6 miles straight southeast of Tula (NW. ¼, NW. ¼, Sec 24, T. 10 S., R. 1 W.).

As is typical of most of the upper Porters Creek formation, this 6-foot exposure is sandy, highly micaceous, possibly marcasitic, slightly carbonaceous, and stratified. It is probably equivalent to the Naheola of Alabama, but for the lack of an exposure showing a zone of differentiation between it and underlying typical Porters Creek clay, the upper sandy phase is herein retained as a part of the Porters Creek formation.

FEARN SPRINGS FORMATION

The Fearn Springs formation had never been identified in Lafayette County previous to this survey. The beds of this formation had long been considered Ackerman in age. Structural movement along the eastern edge of the county has probably contributed to this conception, having eliminated the Fearn Springs in some places, exposing it in others in such a manner that the sequence of strata above the Porters Creek has been hard to determine. Without the use of the helicopter and the shallow exploratory drill, this investigation might not have been able to put the pieces of the puzzle together.

Probably the most nearly complete section of the Fearn springs in Lafayette County is in the northeast corner along Cyprus Creek. Suggestion of a structure at this place brought about the drilling of three shallow exploratory holes. Data from these holes combined with surface exposures revealed a section of Fearn Springs nearly 150 feet in thickness. One of these drill holes showed also the relationship of the Fearn Springs to the Porters Creek.

SECTION OF TEST HOLE Ls 1, IN THE EAST VALLEY WALL OF CYPRUS CREEK AND 0.2 MILE SOUTH OF HIGHWAY 30 (SE. ¼, SEC. 27, T. 7 S., R. 1 W., LAFAYETTE COUNTY)

Elevation: 315 feet approximately	Feet	Feet
Recent		13.0
Sand and clay, alluvial	13.0	
Fearn Springs formation		72.0
Clay, dark-gray to black lignitic	14.0	
Sand, medium buff to gray angular; stringers of clay	13.0	
Silt, blue-gray clayey; grades to fine sand near bottom	25.0	
Sand; fine at top to coarse at bottom	20.0	
Unconformity		
Porters Creek formation		45.0
Clay, very sandy blue-black micaceous plastic glauconitic (?)	45.0	

At the location of this drill hole silty shale and micaceous, lignitic, and sandy clay rest directly on the upper beds encountered therein, without any evidence of a break. Comparatively speaking, a large number of petrified logs are associated with the surface exposures.

Just a short distance north of Highway 30 (NW. ¼, NW. ¼, Sec. 26, T. 7 S., R. 1 W.) and about a mile northeast of this drill hole is a section of gray-white clay and two associated thin beds of black lignitic clay much like those of the Fearn Springs. In addition to the similarity of these clay beds to ones definitely identified as Fearn Springs, a 6-inch bed of hard siliceous claystone having upright impressions of plant stems practically proves the clays to be upper Fearn Springs and stratigraphically the same as a similar claystone bed at the top of that formation at Flat Rock Church, Benton County.

Further evidence of the Fearn Springs in this area is found about 1½ miles southeast of Spring Hill School. Near valley floor level, east of Cyprus Creek (NE. ¼, SW. ¼, Sec. 13, T. 7 S., R. 1

W.) and just south of the Rocky Ford Road, bauxitic silt and reworked pisolites underlie a section of lignitic clay and shale comparable to those previously mentioned, with seemingly no break between them. Combining the thickness measured in the drill hole with that exposed nearby, the total thickness of the Fearn Springs is about 150 to 165 feet.

Through the central part of the eastern edge of the county, no Fearn Springs is exposed unless it be at a place 2½ miles north of Lafayette Springs (NW. ¼, SW. ¼, Sec. 25, T. 8 S., R 1 W.). At this place, a 10-foot to 12-foot section of white silt and sand and a thin bed of lignitic clay resemble Fearn Springs material.

In the southeastern corner of the county, about 6 miles southeast of Tula, several exposures of Fearn Springs have been noted. At first, the identification was not definite as no upper or lower contracts could be found. However, with the discovery of the exposure of Porters Creek in Lafayette County together with other exposures just across the line in Pontotoc County, it soon became clear that a good section of Fearn Springs is present in the southeast corner of Lafayette County.

No consistency of beds could be determined in the Fearn Springs. In places, the Fearn Springs clays rest directly on leached or on unaltered Porters Creek. Above the clays are sands, silts, clay breccia, lignite, silicified logs, and thin claystone, all interworked in such a manner as to suggest a brecciated fault zone. On the other hand, the fine silty sand and badly weathered clay breccia rest on the Porters Creek; and above the sand and silt is a considerable thickness of lignitic clay and shale. Reworked bauxite is not uncommon throughout the Fearn Springs. Two features are fairly consistent in the Fearn Springs: One, the relatively large amount of petrified wood; the other, the presence of a white silty shale zone near the top which has the appearance of wood structure. Neither of the two features is diagnostic, however, because similar features are present throughout the Ackerman. Probably the most revealing feature of the Fearn Springs, learned in this survey, is the large amount of sand in it as well as the surprising thickness of the formation itself.

Since the Fearn Springs would not have been exposed in Lafayette County except in structural uplift, one must readily conclude that the absence of it in undisturbed areas is due to erosional and over-lap unconformity. It would be expected, then, that further down dip, the thickness of the Fearn Springs would, to some extent, be greater.

Where the formation is exposed over a large enough area, an attempt was made at mapping it separately from the Ackerman, but where the exposures are small in areal distribution, only its position on the map is indicated by FS. Similarly, the Porters Creek is indicated by PC in the Ackerman outcrop belt.

ACKERMAN FORMATION

SEDIMENTATION

The Ackerman formation in its outcrop area of Lafayette County is entirely non-marine. The abundance of fossil leaves, petrified wood, lenses, cross-bedding, lateral gradation, and the lack of marine fossils and sediments show the formation to have been deposited under conditions similar to those now existing in the flood plain areas of the Mississippi-Louisiana gulf coast.

Dense vegetation on most of the source area is suggested by the large quantity of fine sediments in the Ackerman—the thick vegetable mantle preventing the rapid run-off of precipitation and consequently allowing only the fine particles to be transported by surface streams.

Many local contemporaneous erosion channels illustrate how the sediments were spilled out on an almost level plain and built the plain up, only to be partly eroded and the material deposited farther seaward. The intensity and extensiveness of this reworking of sediments time and again within the same formation is clearly shown throughout the whole Ackerman outcrop in Mississippi.

Currents of varying strength were active most of the time during the period of deposition—sorting materials in some places, reworking them in others; causing cross-bedding throughout.

The source area for the Ackerman was very near at hand, except for a portion of the basal sand unit. The Porters Creek, Betheden, and Fearn Springs formations probably furnished the bulk of the material, as would be expected because of the rather large erosional unconformity existing between the base of the Ackerman and the three underlying formations. Too, the Ackerman sediments seem to be, for the most part, lithologically the same as the three underlying formations, differing from them only in that their original physical structure was destroyed by transportation and redeposition.

TOPOGRAPHY

Two types of topography are expressed by the Ackerman, namely, that of rugged sand hills and that of gently rolling clay hills. The basal Ackerman sand, where it is well developed, forms a sharp cuesta overlooking the "Flatwoods" topography along the Porters Creek outcrop. Sharp ridges and roundtopped hills having steep slopes form a distinct topographic feature averaging approximately three miles in width in eastern Lafayette County and western Pontotoc County.

The low rolling hills form on the clays and constitute the larger topographic unit of the Ackerman. Weathering is generally very deep in the clay outcrop, and fresh exposures of unaltered material are hard to find except in newly made roadcuts.

Very striking topographic features in the Ackerman outcrop, and in many other areas of north Mississippi, are the broad, level flood plains of relatively small streams. These flood plains generally intersect the valley walls at sharp angles, like a plane intersecting a sphere or a cylinder. The reason for such a condition is that the small streams are unable to transport the great quantity of sediments that is supplied them from the deeply weathered drainage area. Consequently, the streams are depositing vast quantities of sediments on their flood plains and in their channels and are gradually aggrading their courses.

LITHOLOGY AND STRATIGRAPHY

On the basis of data obtained from shallow exploratory holes and surface exposures, the Ackerman is herein divided into four units (numbered 1, 2, 3, 4, in ascending order), the composite of which forms a cyclothem. At least two of these units can be traced almost the entire length of the Ackerman outcrop in Mississippi.

Ackerman formation, unit 1, has been described very well by Mellen in his Winston County report,[1] and a name proposed for it in his Fearn Springs bulletin[2] with the suggestion that it have the rank of member. The following log of exploratory hole P4 shows the complete thickness of the unit.

SECTION OF TEST HOLE P4, SOUTH SIDE OF STATE HIGHWAY 6 NEAR ROAD CULVERT (SW. ¼, SE. ¼, SEC. 17, T. 9 S., R. 1 E., PONTOTOC COUNTY) 16 MILES EA[illegible]

Elevation: 396 feet approximately	Feet	Feet
Recent alluvium and residuum		10.0
Ackerman formation, unit 2		11.0
Clay shale, chocolate-brown	3.0	
Clay and clay shale, blue-black sandy	3.0	
Clay, blue-black, and sand	3.0	
Clay shale, light and dark-laminated stained brown	2.0	
Ackerman formation, unit 1		99.0
Sand, fine argillaceous, micaceous brown; contains white clay	9.0	
Sand and silt, brown fine micaceous, argillaceous; interbedded with strings of white clay	10.0	
Sand, yellowish-brown fine; interbedded with thin strings of white clay	80.0	
Unconformity		
Betheden formation		3.0
Bauxite and Kaolin	3.0	
Porters Creek formation		7.0
Clay, dark steel-blue very plastic	7.0	

Of course, one cannot observe the bedding structure of unconsolidated strata from the cuttings of the bit, but nearby surface exposures show the sand to be highly cross-bedded (Figure 1).

The drilled thickness of Ackerman, unit 1, is considerably greater than its real thickness. Actually, it is about 70 feet thick. The difference is that the drilled thickness is a vertical measurement across the bed and not one at a right angle to its dipping beds. The dip of the unit is about 45 feet a mile at the lower contact and about 40 feet at the upper limit.

In most exposures of the extreme lower part of Ackerman, unit 1, the sand is coarse to very coarse, and contains innumerable clay bowlders ranging in diameter from an inch to over a foot. Many sandstone and quartzite bowlders have been found in Ackerman, unit 1, by various geologists working in Mississippi, but this investigation failed to reveal any in Lafayette County except in one small locality, where they have not been definitely established as being those of the basal Ackerman.

Ackerman, unit 2, is not so easily recognized as Ackerman, unit 1, nor is it so sharply bounded at its upper limit. It seems to grade into Ackerman, unit 3, near the surface but nonetheless has fairly well defined upper and lower limits in the sub surface. Exploratory hole L2 shows Ackerman, unit 2, very well.

Figure 1.—Basal Ackerman sand (NE. ¼, NE. ¼, Sec. 24, T. 9 S., R. 1 E., Pontotoc County), ½ mile east of Toccopola Junction along State Highway 6. April 27, 1951.

SECTION OF TEST HOLE L2, NORTH SIDE OF STATE HIGHWAY 6 ON MCGLAWIN CREEK, 1½ MILES WEST OF LAFAYETTE-PONTOTOC COUNTY LINE (NW. ¼, NW. ¼, SEC. 14, T. 9 S., R. 1 W., LAFAYETTE COUNTY)

Elevation: 384 feet approximately	Feet	Feet
Recent		10.0
Clay and sand	10.0	
Ackerman formation, unit 3		42.5
Sand, coarse quartz	2.5	
Silt and sand, bluish-green clayey	7.5	
Silt, greenish-blue micaceous, sandy; contains ferruginous laminae	7.0	
Silt; slightly less sandy than overlying interval	3.0	
Silt, bluish-green micaceous; slightly consolidated	22.5	
Ackerman formation, unit 2		69.5
Lignite, black	3.0	
Sand, very fine white; contains pepper-like particles	10.0	
Sand and clay, white; contains pisolites	2.0	
Clay, white; abundance of pisolites	1.5	
Clay, dark gray-green micaceous plastic	6.5	
Clay, slightly sandy dark gray-green	8.25	
Sandstone, fine grained	0.25	
Clay, black plastic	15.5	
Silt and very fine sand, dark-gray to brown	6.0	
Clay, black silty very plastic	10.0	

The material of the second unit shows minor fluctuations of deposition during this period of the Ackerman, but on the whole it represents sediments deposited in deeper water as the Gulf slowly encroached on the land elsewhere.

The actual thickness of Ackerman, unit 2, measured by projected dip, is about 60 feet. The lower limit of the unit dips at the rate of 40 feet a mile whereas the upper dips about 32 feet. It is clear that this unit pinches out or becomes thinner toward the surface and thicker down dip. This feature of flattening of the dip toward the top of the formation has particular significance and will be discussed farther along in this report.

The third unit of the Ackerman in Lafayette County has probably been confused with the "Holly Springs" formation in many instances, it being thought that this unit was actually the "Holly Springs" overlapping far to the east. However, the drill shows that the sand and clay unit is actually near the middle of the Ackerman.

Ackerman, unit 3, is easily recognized when encountered by the bit. Drilling speed increases tremendously as the bit passes out of the overlying clays into unit 3. Too, the returning water is milk-white because of the fine white quartz sand and white clay it is carrying. Stratification and interlamination of the sand and clay are a certainty, determined by the striking regularity with which the drilling speed slows down, then increases within just a matter of inches of hole. Ackerman, unit 3, is well represented in hole L6.

SECTION OF TEST HOLE L6, SOUTH SIDE OF STATE HIGHWAY 6, BRIDGE OVER KETTLE CREEK, WEST BANK OF STREAM (NE. ¼, SW. ¼, SEC. 8, T. 9 S., R. 1 W., LAFAYETTE COUNTY) 12 MILES EAST OF OXFORD

Elevation: 372.7 feet approximately

	Feet	Feet
Recent		8.0
Surface clay and alluvium	8.0	
Meridian formation		30.5
Sand, coarse quartz; contains ferruginous laminae	5.0	
Sand and green-blue clay	4.0	
Sand, medium clayey	3.0	
Sand, medium; interbedded with green clay	18.5	
Unconformity		
Ackerman formation, unit 4		21.0
Lignite, black	0.5	
Sand and green clay	1.0	

Sand, clay, and ferruginous sandstone	3.0	
Lignite, black	1.0	
Clay lignitic, sandy	7.0	
Lignite, black	0.75	
Clay, gray-white sandy	4.0	
Lignite	0.25	
Clay, dark-gray lignitic; some white clay	0.5	
Lignite and lignitic clay	0.5	
Clay, lignitic, sandy	1.5	
Lignite and lignitic clay	1.0	
Ackerman formation, unit 3		73.5
Sand and clay, white	0.5	
Clay, milk-white silty, sandy	10.0	
Sand, very fine, very silty and clayey; white	10.0	
Sand, very fine, very silty; contains ferruginous laminae	10.0	
Sand, very fine white to brown	10.0	
Sand, medium white; some lignitic clay	33.0	
Ackerman formation, unit 2		17.0
Clay, light-green sandy	17.0	

In actual thickness, Ackerman, unit 3, is about 65 feet. Its lower contact dips at the rate of 32 feet a mile, whereas the upper dips about 29 feet a mile.

The fourth unit of the Ackerman is composed chiefly of clays, silts, and lignite. It has varying thicknesses due to the unconformity at its upper limit. Exploratory holes L7 and L12 are representative of the unit.

Section of test hole L7, western fork of Little Kettle Creek on south side of Highway 6 (N. ½ Sec. 12, T. 9 S., R. 2 W., Lafayette County) 10 miles east of Oxford

Elevation: 395.2 feet approximately

	Feet	Feet
Recent		3.5
Clay	3.5	
Meridian formation		28.5
Sand, very coarse, pebble-bearing	24.5	
Clay, dark colored; reworked into overlying sand	4.0	
Ackerman formation, unit 4		87.5
Clay, lignitic	4.0	
Clay, blue very plastic	7.0	
Clay, dark-gray; grades downward into black lignitic clay	12.0	
Lignite, black	4.0	
Clay, dark gray; grades downward into light-gray clay	6.0	

Clay, light-gray	1.0	
Lignite, black hard	1.0	
Clay, brown lignitic	0.5	
Clay, light-gray	4.0	
Clay, silty light-gray; becomes less silty near bottom	8.5	
Clay, light-gray	6.0	
Lignite and white clay	0.5	
Clay, light-gray; thin stringers of lignite	11.5	
Lignite and lignitic clay, black	8.5	
Lignite and lignitic clay; silt stringers	13.0	
Ackerman formation, unit 3		30.5
Sand and silt, cream colored; the sand is coarse	3.5	
Silt and fine sand	6.8	
Silt and coarse sand	2.7	
Clay, dark-gray lignitic	5.0	
Sand, medium	12.5	

SECTION OF TEST HOLE L 12, 100 YARDS WEST OF CYPRUS CREEK ON SOUTH SIDE OF ROAD (SE. ¼, SEC. 18, T. 8 S., R. 1 W., LAFAYETTE COUNTY) 10 MILES EAST OF OXFORD

Elevation: 390 feet approximately

	Feet	Feet
Recent		9.0
Sand and clay	9.0	
Ackerman formation, unit 4		111.00
Clay, dark-gray carbonaceous	11.0	
Clay, dark-gray to black lignitic; becomes silty at bottom	10.0	
Clay, blue-white to blue-green	8.0	
Clay, lignitic, silty	7.5	
Clay, green silty and sandy	4.5	
Sand, silt, and clay; greenish-brown; salt and pepper texture	18.25	
Lignite, black	3.25	
Clay, lignitic dark-brown to dark-gray silty plastic	18.5	
Clay, dark-gray	2.0	
Clay, dark-brown to black plastic	5.5	
Clay, dark to light-gray	2.5	
Clay, cream colored; streaks of dark clay	10.0	
Clay, light-gray sandy	10.0	
Ackerman formation, unit 3		30.0
Sand, very fine silty; some green clay	30.0	

Ackerman, unit 4, ranges in thickness from approximately 80 to 170 feet computed by projected dip in drill holes and surface outcrops. The lower contact dips at the rate of 20 feet a mile; the upper, at approximately 22 feet. The maximum thickness is in the locality of L 12.

In surface exposures, the contact of the Ackerman clay and the overlying Meridian sand is sharp and undulating without any interbedding or gradation between the two. Clay balls of various shapes and sizes are commonly found in the sand near the contact. Quartz grains ranging from coarse to very coarse, and even small gravel more or less massively bedded, characterize the sand. The most instructive surface exposure of the contact is about one-third mile southeast of Denmark.

Figure 2.—Ackerman-Meridian contact (SW. ¼, SE. ¼, Sec. 7, T. 9 S., R. 1 W., Lafayette County), 1/3 mile southeast of Denmark. April 27, 1951.

SECTION OF ROADCUT ON SOUTHEAST SLOPE OF HILL (SW. ¼, SE. ¼, SEC. 7, T. 9 S., R. 1 W.) ONE-THIRD MILE FROM DENMARK

	Feet	Feet
Meridian formation		16.5
Sand, very coarse to medium crossbedded; contains small pebbles; stained red	16.5	
Unconformity		
Ackerman formation, unit 4		26.0
Clay shale; stained yellow; sandy and badly weathered near top	3.0	
Clay, jointed and blocky green to dark; well preserved leaf imprints along bedding planes	23.0	

The Ackerman-Meridian contact is the most easily recognized contact in Lafayette County, because of the sharp lithologic difference of the two formations and the undulating erosional relationship (Figure 2).

ECONOMIC PRODUCTS

At the present time, none of the Ackerman materials is being exploited on a commercial scale in Lafayette County. However, at least three of them have considerable potential economic value.

The clays constitute the most voluminous economic product. Beds of clay, probably excellently suited to the manufacture of brick, various tile products, and pottery, exist throughout the formation. Some of these clays, especially the underclay associated with the lignite, would undoubtedly made good fire brick.

Second only to the clays are the lignite deposits, some of which are fairly well developed in thickness and areal distribution.[3] As fuel material, the lignite in itself is not especially good, but with the recent development of a process of converting lignite to combustible gas by treatment with steam, it has much potential for future development as fuel. Too, the manufacture of phonograph records requires some lignite or lignitic material, so there is a possibility for its use in that field.

The sporadic iron ores in the Ackerman clays have been given some attention for many years.[4] Although Lafayette County has not received a great amount of attention concerning these ores, several other regions have, Marshall County[5] in particular. At the present time, Webster County is being surveyed by the Mississippi Geological Survey to ascertain the extent of iron ore deposits there. Small scale strip mining is in progress in northeast of Kilmichael, where the ore is at or near the surface. Whether or not the venture will prove successful is yet to be seen. Should the operations be successful a considerable area in Mississippi will be affected inasmuch as these ores are present from the Tennessee line to Alabama in the Ackerman outcrop. The ore in its unaltered state is generally iron carbonate, $FeCO_3$, but most of it has gone through a process of weathering resulting in the formation of hematite, Fe_2O_3, and limonite, $Fe_2O_3nH_2O$.

In Lafayette County, the ore is concentrated near the top of the Ackerman formation where the clays underlie the Meridian sand. At least two separate beds from 6 inches to 1 foot in thickness can be seen in the east valley wall of West Cyprus Creek in the road cut (SE. ¼, Sec. 18, T. 8 S., R. 1 W.). Large masses of the sub-spherical bodies lie on the slopes of hills bordering the

Tallahatchie flood plain about 5 miles east of Abbeville (extreme eastern edge R. 2 W). Roughly, a north-south line 11 miles east of Oxford (line between R. 1 W. and R. 2 W.) approximates the location of the greatest development of the ore in the county. Probably as much ore is present in this locality as in any other place yet discovered in the state, with the exception of the Flat Rock Church area of Benton County.

Of some importance are the sands of the Ackerman as masonry sand. They are suitable as fine aggregate in the making of mortar and concrete for local building purposes. They are also an important source of ground water for domestic consumption.[6]

MERIDIAN FORMATION

DISCUSSION

As an introduction to the discussion of the geology of the Meridian, as the name is herein applied, a brief history concerning its past and present status is necessary in order to clarify, as far as possible, its treatment in this paper.

In the year 1860, Eugene W. Hilgard, State Geologist of Mississippi, reported on the Orange Sand formation of the state.[7] In the paper, all the sands mantling Lafayette County were included in the Orange Sand formation. Of course, Dr. Hilgard did not have the aid of oil well logs, water well logs, and the accumulated geological research that is now available to geologists working in Mississippi, so it would be improper and highly unethical to make an issue of discrediting the work of one of the greatest state geologists of Mississippi and one of the greatest geologists produced in the United States. With all due respect to his work, however, it must be said here that the work of geologists following Hilgard has proved his Orange Sand to be not a formation in itself, but rather a surface residue of a number of formations, ranging from the Upper Cretaceous Tuscaloosa gravel to the Pliocene Citronelle sands and gravels—all of the intermediate sands being included in the Orange Sand also.

In 1907, Logan applied the name Lafayette to the "sands gravels, conglomerates, ironstone, loams, and plastic clays" that covered great areas of the state, including Lafayette County.[8] The name, of course, was used to replace Hilgard's Orange Sand. He, as did Hilgard, considered the Sand to be Quaternary in age.

He, as did Hilgard, included too much, for it is only those sands and gravels underlying the loess bordering the Mississippi flood plain and mantling the surface in the southern one-third of the state that are correctly Quaternary in age. In his report, he places the thickness of the formation at about 50 feet.

Dr. E. N. Lowe described the sand around Oxford and Holly Springs in 1913, and at that time suggested the name Holly Springs sands for it. He estimated its thickness as being 350 feet, stating also that the sand contained lenses of pink and white clays with leaf impressions.[9] In a later publication, Lowe described a 100-foot clay bed which more or less completely divided the "Holly Springs" into two equal parts. Dr. Lowe goes on to say that in the vicinity of Grenada, the "Holly Springs" is not so prominently exposed. Neither it nor the "Grenada" beds is very well exposed south of Grenada, which led him to suggest an overlap of the Claiborne onto them.[10]

Bulletin 25 of the Mississippi Geological Survey supplies more interesting information concerning the "Holly Springs" sand. In this bulletin, Dr. Lowe fixes the rate of dip at about 24 feet a mile slightly south of west. Based on this dip and an outcrop belt in excess of 20 miles, he computes the thickness of the "Holly Springs" to be 576 feet in the latitude of Oxford.[11]

In an unpublished manuscript Dr. Lowe named the thick sand stratum below the Tallahatta siltstone and above the lignitic sands and clays the Meridian formation and assigned it to the Claiborne.

All the works which have just been cited brings the history of the sands that crop out in Lafayette County up to date, more or less. It might be appropriate to mention here Thomas's conclusion on the meridian.[12] He places the Meridian in the Wilcox because:

"It is lithologically much more similar to the underlying non-marine Wilcox than to the overlying marine Tallahatta.

"The marine Tallahatta section overlies the Meridian sand with distinct disconformity throughout eastern Mississippi and western Alabama.

"The lower Meridian contact changes over short distances along the strike from conformable to disconformable (local erosional channels)."

As can be seen from the references just mentioned, the sand formations above the Ackerman and below the Basic City member of the Tallahatta have been so confused with one another that their relative stratigraphic positions are still in question to practically all the geologists interested in the Mississippi area. The condition is very acute in the north-central part of the state where erosional unconformity and overlap have obscured beds that might be used as key horizons.

The present investigation, supplemented by a study of numerous publications has led to the following conclusions:

1. A distinct erosional and somewhat angular unconformity exists at the top of the Ackerman.
2. The Ackerman is the only exposed formation of the Wilcox in Lafayette County, although there is definite indication that there are younger Wilcox beds mantled by the Claiborne sands.
3. The "Holly Springs" sand in its lower half is identical with the Meridian sand.
4. The white bond clays resting unconformably beneath the red sands in the vicinity of Oxford and Holly Springs are erosional remnants of the Tallahatta or reworked material derived from it.
5. The erosional break at the top of the white clay is of considerable magnitude.
6. The sand lying above the white clay zone and below the red sand is Tallahatta in age, as is conclusively shown by the typical Tallhatta paper shale that lies within the sand.
7. The uppermost portion of the "Holly Springs" is much younger than the Tallahatta, being Kosciusko in age.
8. The name "Holly Springs" should be dropped from the literature inasmuch as the sands included in the formation are actually equivalents of three formations rather than one.

SEDIMENTATION

The Meridian in Lafayette County was laid down under conditions somewhat similar to the conditions prevailing during the sedimentation of the Ackerman, except that the currents were considerably more active in Meridian time. That the Ackerman outcrop area was elevated before the deposition of the Meridian or contemporaneous with it is without question. The lower Meridian contact is very irregular showing as much as 30 to 40 feet difference in elevation within a distance of 50 or more yards (NW. ¼, SE. ¼, Sec. 18, T. 8 S., R. 1 W.). If the contact were conformable, there would be no such irregularity at the top of a dominantly clay and lignite formation. Also, the sharp change in the type of sediments being deposited is a criterion that cannot be dismissed in determining the unconformity. There is no exposure in Lafayette or adjoining counties where there is even the slightest gradation of the one into the other.

During Meridian time, streams were very active as attested by the beautiful fluvial cross-bedding throughout the formation, and by the coarseness of the sand at the base. Also, the sand is fairly well sorted.

Toward the close of the Meridian, current action became less, as shown by the increased amount of white clay at the top of the formation. It is logical to conclude that most of this clay was derived from the Ackerman. Numerous exposures are found where the uppermost lignitic beds of the Ackerman have been leached white to a considerable depth. Two of the most instructive locations are just beyond the city limits of Tula (SE. ¼, SW. ¼, Sec. 1, T. 16 S., R. 2 W.) and slightly more than a mile southeast of Paris (SE. ¼, NE. ¼, Sec. 31, T. 10 S., R. 2 W.).

The climate of Meridian time was very much like that of Ackerman time, namely mild.

Leaves and other vegetation are the only fossil remains in the formation. From that fact, and from the complete absence of marine sediments, together with the deltaic or fluvial type cross-bedding, the Meridian of Lafayette County is considered to be non-marine throughout.

TOPOGRAPHY

The Meridian develops a more or less strong cuesta on the low, rolling Ackerman outcrop area. Some of the greatest relief in the county is where the streams cut their courses on the resistant Ackerman beds and have the Meridian sand for valley walls.

As on the Ackerman, the streams develop broad, flat flood plains which intersect the hills at sharp angles. In places, the alluvial sand, deposited in the present erosion period, reaches a thickness in excess of 25 feet, as measured in drill holes located on the flood plains.

Gullies and ravines are practically numberless, having been multiplied when the slopes were denuded by white men to cultivate cotton. The unconsolidated sand was easy prey for wind and rain, and they have left their mark with individual gullies that literally cover acres. This rapid rate of erosion is taking place at the present time, and unless the Lafayette County land owner gets busy to check it, even the scanty remains will soon be gone. In areas such as Mississippi where there are no vast mineral resources save oil, the productivity of the soil in raising crops is the mainstay, and the state is fast losing this most vital resource.

LITHOLOGY AND STRATIGRAPHY

The Meridian of Lafayette County is identical with the formation of the type locality. It is predominantly white sand in the upper portion and grades downward into a rusty brown or red sand, which is cross-bedded to evenly stratified with light- colored sand. With the exception of the basal unit which varies in thickness from 1 foot to about 6 or 7 feet, the Meridian is an extremely well-sorted, medium sand throughout its entire thickness. Minor stringers and "pockets" of coarse and fine sand can be detected on close examination, but, as a whole, the formation is the most uniform in structure and texture of any in the county.

The basal interval is coarse and pebble-bearing, having the appearance of being a transgressive deposit. The grains show a range of transportation wear from subangular to well-rounded.

Mica is the most abundant accessory mineral in the quartz sands although small specks of black material resembling grains of black pepper are abundant. It might be this oxidized mineral and compounds of iron that give the Meridian its beautiful coloration.

The Meridian is so nearly uniform from bottom to top that no interval in it can be used as a key for correlating surface sections of the formation, but the following generalized section has been attempted.

GENERALIZED SECTION OF MERIDIAN FORMATION, LAFAYETTE COUNTY

	Feet	Feet
Meridian formation 100 to		125
Sand and white clay, irregularly laminated to stratified micaceous; sand dominant locally highly cross-bedded and variegated absent in places	25	
Sand, highly micaceous cross-bedded to evenly stratified; light colored in fresh exposures, red, yellow, pink, brown, purple, and violet when weathered; thin partings of white clay	100	

ECONOMIC PRODUCTS

The Meridian formation, having its upper and lower limits thus respectively fixed at the base of the white clay zone (Tallahatta) and the top of the Ackerman, does not offer very much in the way of economic products. Masonry sand of high quality can be obtained from the Meridian in many places. Where there is good protection from surface water carrying dissolved iron compounds, the sand is almost perfectly white. This condition is especially true near the top of the formation where the overlying impermeable Tallahatta clay shale gives much protection. For small domestic uses, white plaster or mortar can be made from carefully selected Meridian sand.

An abundance of mica and the presence of a light film of iron oxide on the grains practically eliminate any chance that the sand might be used in the manufacture of glass.

The Meridian is a prolific aquifer near the surface and deep down-dip. It is claimed that the water obtained from it is so nearly chemically pure in the vicinity of Oxford that it has been used for years as battery water without any harmful effects.

TALLAHATTA FORMATION

SEDIMENTATION

The Tallahatta formation of Lafayette County was deposited in part under marine conditions and in part under non-marine conditions. The formation as a whole was laid down under relatively quiet conditions as attested by the vast quantity of fine material and the abundance of mica.

In the lower part of the formation a considerable thickness of non-marine carbonaceous clay shale, clay, and sand, containing fossil leaf impressions, clearly shows that at the beginning of Tallahatta time the climate was sufficiently warm for the growth of trees. There has been much controversy among past and even present students of Mississippi geology concerning the age of these beds. Lowe considered them to be equivalent to the Grenada beds, which he named, and later correlated with the Hatchetigbee of western Alabama and Lauderdale County, Mississippi. The authors of the Claiborne and Wilcox Field Trip Guidebook of the Mississippi Geological Society (March 1940) considered the Grenada beds to be Tallahatta in age. In Lafayette County these lignitic beds are sandwiched between typical Tallahatta clay shales (NE. ¼, SW. ¼, Sec. 16, T. 8 S., R. 4 W.).

Marine conditions existed during part of Tallahatta time as definitely indicated by the presence of a large marine pelecypod, *Venericardia* sp. in the typical Tallahatta siltstone quarried northwest of Taylor by the Monolithic Paving Company. Although the writer has not actually found a fossil at this locality, he identified this fossil impression that reportedly had come from the pit. Also it was reported by workmen that many "sea shells" were found during the time the pit was in operation.

TOPOGRAPHY

The Tallahatta crops out in the western half of Lafayette County. On the eastern extremity of the outcrop area, the lower sands of the formation combine with the thick Meridian sand to give rise to the high sand hills typical of the North-Central Hills region. Gullies, much the same as those in the Meridian sand, are present throughout the outcrop.

No sharp cuesta has developed on the lower Tallahatta sands because they are in contact with the Meridian sand and thus blend into the same topographic features. Moreover, the erosional unconformity at the base of the Kosciusko is of such magnitude that the whole Tallahatta formation is almost entirely absent up-dip, causing the overlying Kosciusko sand to rest on the Meridian. In the extreme northern and southern parts of western Lafayette County, very rugged ridges and individual hills develop from the typical Basic City shale and siltstone. These hills form a broken chain that trends roughly north and south about 8 miles west of Oxford (along the range line of 4 W. and 5 W.). Although much of the hill slopes is covered with vegetation and mantled by sand, it is soon recognized that these sharp topographic features are typical of the Tallahatta indurated material. Starting about 2½ miles northwest of Taylor (Sec. 15, T. 9 S., R. 4 W.) and extending due west on the Tallahatchie and Yocona water-shed divide, isolated outcrops of clay shale and siltstone are present in the deeply dissected ridge. Even though the ridge is capped with sand, some of which has washed down the slopes, it is almost certainly the siltstone that is holding the ridge high. The same condition is apparent in the Clear Creek-Toby Tubby divide.

Woodson Ridge, the most striking topographic feature in the county, because of its anomalous slope, has long been an interesting problem. Carbonaceous, silty, clay shale and its white leached portion underlie the surface sands. The presence of this high plateau in the midst of rolling hills is attributed to two factors: (1) Resistant clay shale of the Tallahatta lying almost horizontally under the sand; (2) A thin terrace or loess deposit capping a large portion of the ridge.

In Woodson Ridge is the eastern-most outcrop of Tallahatta clay shale in the county, the shale being considerably farther east than any other recognizable shale bed. Three reasons for this condition are: (1) The ridge reaches a maximum elevation slightly in excess of 600 feet, thereby exposing younger beds than the lower surrounding topography; (2) The Tallahatta probably overlapped the Meridian to some extent, indicated by the greater thickness of the Meridian sand farther down dip, as compared with the thickness computed from surface outcrop width; (3) Erosion which developed the basal Kosciusko unconformity cut away the surrounding clay shale, leaving Woodson Ridge as an outlier.

On the west side of the gravel road about 1 mile southwest of Splinter (Sec. 24 and Sec. 25, T. 9 S., R. 5 W.) a high ridge showing Tallahatta siltstone from top to bottom is a striking topographic feature. The ridge is completely gray-white despite the cover of trees and fallen leaves. Similar isolated hills and ridges are scattered about the county west of a north-south line through the University. This feature of isolated hills and ridges of considerable thicknesses of Tallahatta siltstone, contributed to the conclusion that the Tallahatta has suffered erosion prior to the present cycle.

Four relatively large creeks and two rivers, not to mention the smaller streams, drain the Tallahatta outcrop area in Lafayette

County. In the northern two-thirds of the area, the Tallahatchie River is fed by Hurricane, Toby Tubby and Clear Creeks. In the southern one-third, the Yocona River is supplied by Splinter Creek. All these streams are carrying vast quantities of sand and silt from the uplands right into the reservoirs of Sardis and Enid Dams. Unless erosion is greatly arrested by reforestation and resodding of the slopes, the years of useful life of these reservoirs are going to be too few to compensate the cost of building the dams, and for the cost to Lafayette County imposed

Figure 3.—Flood plain sand deposition and channel filling on West Goose Creek (SE. ¼, NE. ¼, Sec. 27, T. 8 S., R. 4 W., Lafayette County) along State Highway 6, 3½ miles west of University. April 28, 1951.

by taking most of the best farm land out of production. One needs only a quick glance at the channels of East and West Goose Creeks and of Clear Creek along Mississippi Highway 6 to observe the detrimental effect that erosion is having and will continue to have on the reservoirs (Figure 3).

LITHOLOGY AND STRATIGRAPHY

The Tallahatta formation of Lafayette County is a maze of sands, clays, clay shale, and siltstone. Any satisfactory subdividing of the formation is practically impossible, although there are certain zones within the formation where clay, clay shale, and siltstone seem to have definite positions with respect to each other. Sand composes the greater part of the formation, and the clays, shales, and siltstones are local developments in it.

The lower beds of the Tallahatta are mostly fine sands, white, yellow, brown, red, pink, purple, and buff in color, highly micaceous, silty, cross-bedded to evenly stratified, with local development of alternately laminated white and pink clays and yellow and white sand. Considerable thicknesses of typical Tallahatta carbonaceous, silty, micaceous lightweight clay shale are present in the sand. These shale beds are the old Grenada beds. The following sections probably lie not more than 50-75 feet above the Meridian sand.

Figure 4.—Gully exposure of carbonaceous, silty, clay shale of the Tallahatta, overlain by Kosciusko sand, ½ mile north of Spring Hill Church (NE. ¼, SW. ¼, Sec. 16, T. 8 S., R. 4 W., Lafayette County). April 28, 1951.

SECTION OF GULLY IN SOUTH VALLEY WALL OF HEADWARD PRONG OF LEAF CREEK ON WOODSON RIDGE (ABOUT THE CENTER OF N. ½, SEC. 7, T. 8 S., R. 2 W.)

	Feet	Feet
Kosciusko formation		34.0
Sand, partly covered red and yellow	34.0	
Tallahatta formation		13.0
Clay shale, cream to white (leached)	3.0	
Clay shale, black carbonaceous, micaceous silty; very fine white sand along lamination planes	5.5	
Clay, cream to white, micaceous stratified plastic	4.5	
Meridian formation		1.0
Sand, brown micaceous; interlaminated with white clay	1.0	
Covered interval		2.0
Stream level: Elevation 490 feet approximately		

On discovery of the clay and shale in this section, some doubt arose as to their stratigraphic position, because of their striking lithologic similarity to beds of the Hatchetigbee in Lauderdale County. Also, the beds extend far to the east of any definitely recognizable Claiborne beds. A diligent search for a known bed that could help fix the position of these carbonaceous beds in Woodson Ridge revealed strata, some 10 miles west, which are believed to be the same as the Woodson Ridge beds (Figure 4).

SECTION OF GULLY ON NORTH SIDE OF RIDGE ROAD (NE. ¼, SW. ¼, SEC. 16, T. 8 S., R. 4 W.)

Elevation: 420 feet approximately at top of exposure

	Feet	Feet
Kosciusko formation		17.0
Sand, yellow medium well-sorted, loose to slightly indurated micaceous, massive to bedded; weathers deep-red; much platy ferruginous colluvium	17.0	
Unconformity		
Tallahatta formation		30.8
Clay or shale, gray-white micaceous stratified; alternately bedded with yellow sand in upper 3 feet	9.0	
Clay shale, black to dark-gray carbonaceous, micaceous fissile silty; light grayish brown on drying; fine white sand along bedding planes; typical Tallahatta material	9.0	
Clay, cream to pink plastic micaceous; very fine white sand along bedding planes; grades into lower interval	5.5	
Sand, light yellow, buff, white, brown highly micaceous; interlaminated with white clay	7.0	
Sandstone, soft hematitic	0.3	
Unconformity		
Meridian formation		4.5
Sand, variegated, cross-bedded to evenly stratified, micaceous; slightly indurated near the top	4.5	
Gully floor		

A number of quartzite blocks similar to those of the Kosciusko, lie on the gully floor along with a few well rounded sandstone bowlders.

Almost due north and about 4 miles air-line from the University, the following sections of unquestionable Tallahatta shale, were measured.

SECTION OF GULLY ON INSIDE OF SHARP CURVE OF RIDGE ROAD, (NW. ¼, NE. ¼, SEC. 5, T. 8 S., R. 3 W.)

Elevation: 485 feet approximately at top of section

	Feet	Feet
Kosciusko formation		40.0
Sand, pink to yellow micaceous; weathers red; partly covered	40.0	
Unconformity		
Tallahatta formation		23.0
Clay shale, dark-brown to light-gray platy and fissile micaceous; dipping strongly to the southeast; seemingly light colored sand beneath	23.0	
Bottom of exposure		

About one-half mile to the northwest, the Tallahatta shale is exposed very well in a number of gullies and washes.

SECTION OF GULLY BESIDE COLORED FARMER'S HOUSE (NE. ¼, SW. ¼, SEC. 32, T. 7 S., R. 3 W.)

Elevation: 460 feet, approximately, at top of section

	Feet	Feet
Kosciusko formation		40.0
Sand, pinkish-red and white, stratified micaceous; sharp contact with underlying interval; well-rounded quartz bowlders probably coming from above the contact	40.0	
Unconformity		
Tallahatta formation		23.0
Clay shale, light and dark-brown to gray, fissile to silty paper micaceous; lower 3 feet rather plastic cream to pink clay; contact sharp and cuts diagonally across the underlying sand; shales dip steeply northwest	23.0	
Unconformity		
Meridian formation		19.0
Sand, medium well-sorted light-colored micaceous stratified variegated; thin partings of white clay	19.0	
Bottom of exposure		

In comparing the last two sections, one immediately notices the uniform thickness of the Tallahatta and the overlying Kosciusko sand, the steep angle of dip of the shale, and the difference in elevation of the top of the shale in the two sections.

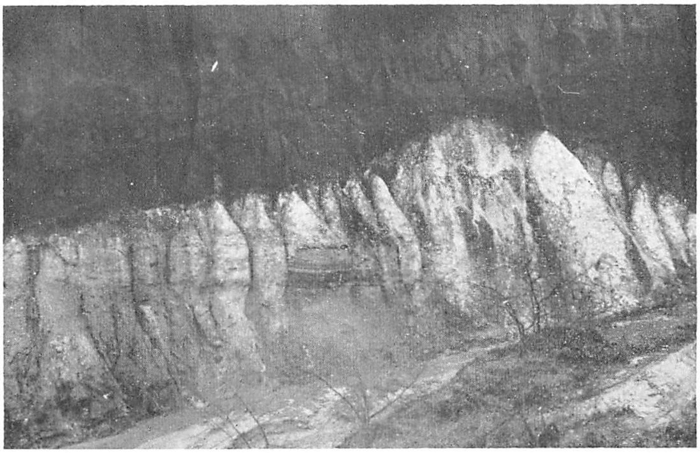

Figure 5.—Kosciusko sand unconformable on Tallahatta and Meridian in Sadler Hill (SW. ¼, Sec. 32, T. 7 S., R. 3 W., Lafayette County) one mile northwest of College Hill Station. March 30, 1951.

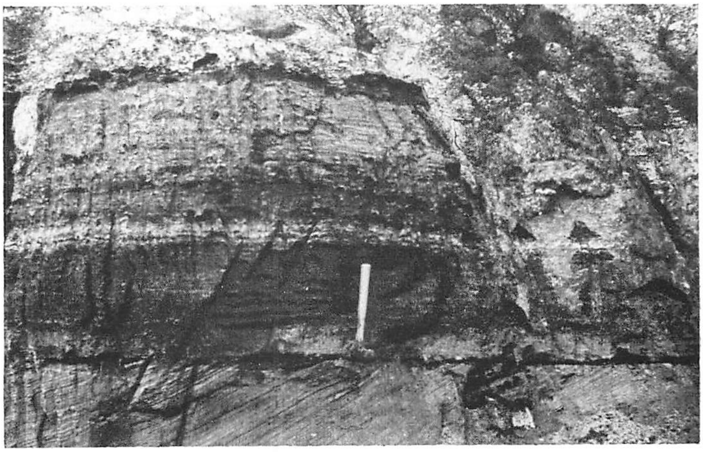

Figure 6.—Sharp unconformable Meridian-Tallahatta contact one mile northwest of College Hill Station (SW. ¼, SW. ¼, Sec. 32, T. 7 S., R. 3 W., Lafayette County). Close-up view of Figure 5. March 30, 1951.

There is a difference in elevation of approximately 25 feet in this contact, the one to the northwest being lower, which conforms nicely with the northwest dip of the beds. The possible structural significance of these two exposures will be treated under the heading 'Possibilities for Oil."

A third exposure in the immediate area of the two sections just described holds a definite key position with respect to the age of the "Holly Springs" white clay and clayball breccia. The gully exposure is in the west side of Sadlers Hill (NW. ¼, SE. ¼, Sec. 32, T. 7 S., R. 3 W.) about ½ mile from each of the preceding exposures, the three outcrops forming an equilateral triangle with Sadlers Hill on the northeast angle. In the gully is a section of roughly 60 feet of highly cross-bedded and evenly stratified sands that are brilliantly colored deep-red, purple, brown, white, yellow, and buff. A body of dominantly white silty sand and clay, interbedded with bright-yellow and red sand, occupies a position that on first glance appears to be that of a lens in a thick sand. However, such is not true. Close examination of a good clean face showed a sharp contact between the overlying bright-yellow, white, and red, horizontally-stratified sand and clay and the underlying variegated and evenly stratified sand, the bedding planes of which are truncated at an angle of about 30 degrees (Figure 6).

Lying with distinct erosional unconformity above the horizontally stratified light-colored sand and clay is a beautifully cross-bedded variegated well-sorted micaceous sand. Where the overlying sand extends completely across the horizontal sand and clay, and rests on the lower sand, it looks as though the whole were all one sand with only a lens in it (Figure 5). However, on making a fresh surface a sharp contact is noted. This contact is clearly visible due to the pronounced cross-bedding in the upper sand in contrast to the even stratification of the lower. In addition, a ledge of ferruginous sandstone and, most interesting of all, a water-worn milky quartz bowlder are in place at the contact (Figure 7). Bowlders similar to this one are almost everywhere, slope material near the base of the Kosciusko sand in Lafayette County, but the bowlder just mentioned was the only one observed in place.

In strong support of the conclusion that practically all of the white clay breccia in the lower part of the red sand in Lafayette and adjoining counties is post-Tallahatta in age, and was probably derived from the Tallahatta and Zilpha formations, is the following section.

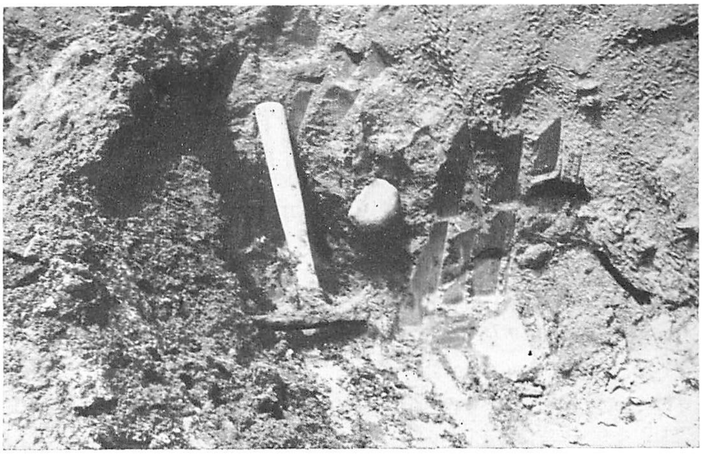

Figure 7.—Water-worn quartz bowlder at base of Kosciusko in Sadlers Hill exposure. Hammer head at the contact of Tallahatta-Kosciusko. March 30, 1951.

SECTION OF ROADSIDE GULLY AND ROADCUT (SW. ¼, NE. ¼, SEC. 30, T. 8 S., R. 4 W.) ABOUT ONE-HALF MILE EAST OF CLEAR CREEK

Elevation: 341 feet approximately

	Feet	Feet
Kosciusko formation 11.0 to		18.0
Sand, red and yellow silty massive partially consolidated	4.0	
Sand, red to pink; contains many white clay balls; cuts across underlying interval sharply and contains reworked shale pellets near the contact 7.0 to	14.0	
Unconformity		
Tallahatta formation		23.1
Sand and clay, interbedded; clay white, sand yellow; micaceous	7.0	
Shale, grayish-brown blocky, jointed silty; fucoidal masses	9.5	
Sand and clay, yellow micaceous; alternately bedded	2.1	
Sand, yellow and red cross-bedded; partings of gray silty clay	4.5	

ECONOMIC PRODUCTS

The Tallahatta formation offers little in the way of economic products at the present time. However, tests by the Mississippi Geological Survey have shown encouraging possibilities for the siltstone as a light-weight aggregate.[13] The siltstone is burned in a process similar to burning brick, screened to desired sizes, and used as an aggregate the same way as gravel and sand. A block of this light-weight material is about half as heavy as a sand-gravel concrete block of the same dimensions. Also the block has good insulating properties and is more water resistant than regular concrete block.

A less important use for the crushed siltstone is that of road metal. Several large pits were opened northwest of Taylor by the Monolithic Paving Company, but operations ceased about 1944. County roads around Taylor have had this material applied to them, but, for lack of a bitumen surface, weathering soon disintegrates the raw siltstone to nothing more than fine particles.

KOSCIUSKO FORMATION

SEDIMENTATION

The Kosciusko formation in Lafayette County is nonmarine as it is throughout the state. Following the deposition of the Zilpha, the coast line was elevated, the movement starting somewhere about the middle of the coast line in the state, increasing rapidly in southern Yalobusha County and farther north. After a period of erosion that completely removed the Zilpha, Winona, and in places all of the Tallahatta in Lafayette County, great quantities of quartz sand were poured out upon a dissected peneplane. Deposition was carried on by many small streams and by at least one large one in the Lafayette County area, as indicated by the small erosional channels in the tops of the formations on which the Kosciusko lies unconformably, and by the many waterworn quartz and sandstone cobbles and bowlders on the slopes where the formation is present.

No fossils, marine or non-marine, have been observed by the writer in Lafayette County. In Grenada County, however, petrified logs are lying near the lower contact.[14]

TOPOGRAPHY

The Kosciusko does not develop a major topographic feature in Lafayette County, although it does form two outstanding minor features: Thacker Mountain (on section line of Secs. 1 and 2, T. 9 S., R. 4 W.) and Carter Mountain (SW. 1/4, Sec. 32, T. 7 S., R. 4 W.) where large blocks of stratified to massive ferruginous sandstone hold the slopes high.

Figure 8.—Tallahatta sandy clay overlain by pink Kosciusko sand in a gully on east side of State Highway 7 (NW. 1/4, NW. 1/4, Sec. 15, T. 8 S., R. 3 W.). 1 1/2 miles north of Oxford. March 30, 1951.

The Kosciusko is superimposed on the Tallahatta and the Meridian, both of which are dominantly sand; consequently, it blends into their respective topographic expressions (Figure 8). It is practically horizontal over large areas of Lafayette County, having just a slight westward dip.

LITHOLOGY AND STRATIGRAPHY

The Kosciusko sand of Lafayette County is similar in almost every respect to the sand at the type locality. It is practically always light-colored in fresh exposures but weathers to many beautiful colors and tints—red, yellow, purple, violet, and brown. Mica is abundant in the sand in Lafayette County—a constrast to the sparingly to non-micaceous sand farther south. Cross-bedding characterizes the sedimentary structure, but massive sand is not uncommon.

So far as the writer knows no report has mentioned the Kosciusko sand in Lafayette County. However, the following sections and line of reasoning have led him to the conclusion that the Kosciusko is represented in Lafayette County.

1. A definite erosional unconformity exists between the lower contact of the sand herein identified as the Kosciusko and the underlying formation. This condition is clearly shown by erosional channels in the tops of the older formations, the sharpness of the contact, the difference in the sedimentary structure, the erosional remnant of the Tallahatta between the Kosciusko and the Meridian, and the reworked white clay breccia in the base of the sand.

Figure 9.—Kosciusko sand channel through Zilpha and into Winona (outlined by white paper sheets), State Highway 7 cut in east valley wall of Howard Creek, midway between Grenada and Dubard.

2. The Winona and Zilpha formations are not recognizable on the surface at any place in the county.

3. The sand herein identified as the Kosciusko is, of all the post-Tallahatta Claiborne which might possibly be present in Lafayette County, most nearly like its formation type.

4. Quartzite, typical of the Kosciusko, is found on many slopes in the county, being concentrated around exposures of the lower contact.

5. The white clay breccia in the base of the sand is genetically the same as that in it in southwestern Yalobusha County.

6. A large exposure in the east valley-wall of Howard Creek, Grenada County, shows the Kosciusko to have been deposited upon the eroded surfaces of the Zilpha and Winona, filling channels cut entirely through the Zilpha and deeply into the Winona (Figure 9).

7. A reconnaissance survey through southwestern Yalobusha County revealed the Kosciusko encroaching onto the Tallahatta, with only slight evidence of the presence of the Winona or the Zilpha intervening.

8. Brown recognizes the Kosciusko resting on the Tallahatta in excavations at Sardis Dam.[15]

The following sections and illustrations are offered as evidence of the unconformity at the base of the Kosciusko.

SECTION OF NEW CUT, STATE HIGHWAY 7, 3 MILES WEST OF GRENADA IN THE EAST VALLEY WALL OF HOWARD CREEK (SW. 1/4, NE. 1/4, SEC. 10, T. 22 N., R. 4 E., GRENADA COUNTY)

	Feet	Feet
Recent		7.0
Kosciusko formation		56.0
Sand, medium well sorted stratified sparingly micaceous, white to buff and brown; reworked white to pink Zilpha clay at lower contact	56.0	
Weathered zone		10.3
Sand, brown to buff argillaceous; partly consolidated due to weathering. This interval is exposed on the south side of the road where the Zilpha has been completely removed and the Winona is in contact with the Kosciusko	10.0	
Limonitic siltstone, brown hard platy		0.3
Unconformity		
Zilpha formation		4.0
Clay and clay shale, green to gray glauconitic in lower 3 feet; hard brown platy limonitic siltstone laterally; completely channeled through in two places on north side of road and completely lacking on opposite side	4.0	
Winona formation		44.5
Sand, deep-red argillaceous highly glauconitic mica ceous; weak concretionary ferruginous sandstone here and there	13.0	

Sandstone, ferruginous, limonitic cavernous	1.0	
Sand, dominantly dark reddish-brown, stratified to massive, micaceous, highly glauconitic; clay inclusions as small tubular masses filled with glauconitic sand; grades downward into sand interbedded with thin clay partings	27.5	
Sand, red, sparingly to non-glauconitic, micaceous; partings of clay shale; (transition zone)	3.0	
Tallahatta formation		45.0
Sand and shale, micaceous interbedded; sand red, yellow, white and brown; clay green to gray; seemingly non-glauconitic	11.0	
Sand, coarse to medium, argillaceous, highly glauconitic; mottled yellowish-brown by limonite; many fucoidal masses; forms a protruding ledge	3.0	
Covered interval	11.0	
Clay, green plastic black silty, micaceous	4.0	
Sand and clay, plastic black silty, micaceous	2.5	
Covered interval	13.5	
Highway level across flood plain of Howard Creek		

The writer discovered the preceding exposure after he had convinced himself that the Kosciusko is present and lies unconformably on older beds in Lafayette County. This exposure alone is sufficient evidence that, following deposition of the Zilpha, the shore-line was elevated and erosion took place prior to or contemporaneous with the deposition of the Kosciusko. The Kosciusko occupies a channel almost twenty feet in the Winona in the road cut—the contact plunging sharply beneath road level (Figure 10). It is very possible that the unconformity extends completely through the Winona, and that the Kosciusko is resting on the Tallahatta even this far south.

It is not the intention of this paper to detract, unnecessarily, from the work of others. However, it is essential that the reader be referred to the Mississippi State Geological Survey Bulletin 48 in which Thomas states, "The Kosciusko-Zilpha contact is conformably and gradational." It is unfortunate that Thomas did not recognize the unconformity at the base of the Kosciusko, especially in view of the fact that the preceding section, although not exposed at the time of his survey, is only a half-mile east of one of his sections.[16]

A reconnaissance north of Grenada along U. S. Highway 51 revealed that the northernmost exposures of Winona sand is on the east side of the highway on the south side of South Fork Creek (NE. ¼, NW. ¼, Sec. 8, T. 24 N., R. 4 E., Yalobusha County). At this place, about 4 feet of deep reddish-brown, glauconitic, micaceous, argillaceous sand is overlain unconformably by a red sand which contains about 3 feet of massive ferruginous sandstone in the upper part and chert gravel and bowlders at the lower contact. The upper sand is identified as Citronelle.

Figure 10.—Another view of the Kosciusko unconformable on Winona at same locality as above figure.

Along the secondary roads east of Tillatoba and Scobey in Yalobusha County, much material was found that definitely belongs to the Zilpha, or the reworked Zilpha, overlain sharply and unevenly by the Kosciusko. About 5 miles east of Tillatoba on the west side of the road a huge gully (SW. ¼, Sec. 30, T. 25 N., R. 5 E.) shows 20 to 25 feet of light-colored sand and white clay breccia. This exposure is identified as Kosciusko sand, containing reworked Zilpha clay.

Northwest along the gravel highway from Coffeeville to Oakland, Tallahatta shale is exposed in the road cuts for 4 or 5 miles, and there extends under a thick, stratified dominantly light-colored, medium, well-sorted sand, which has none of the features generally associated with the typical Winona sand, but has practically all of those associated with the typical Kosciusko.

Closer to Lafayette County, the following section was measured September 21, 1950 in the excavation for the blow-hole of Enid Dam.

SECTION OF EXCAVATION F.R BLOW-HOLE, ENID DAM

	Feet	Feet
Citronelle formation		40.0
Sand and gravel	40.0	
Unconformity		
Kosciusko formation		22.0
Sand, yellow, brown, white, stratified to massive; medium, well-sorted; reworked clay in lower half; completely white in upper half	22.0	
Unconformity		
Zilpha formation		5.5
Sand, coarse, and gray clay mottled red and yellow	5.5	
Winona formation?		4.0
Sand, glauconitic green coarse	4.0	
Tallahatta formation		41.5
Sand, micaceous very fine bright-yellow	3.0	
Sand and clay shale irregularly interbedded carbonaceous, micaceous, marcasitic, glauconitic	16.5	
Clay shale, black carbonaceous, marcasitic, glauconitic, micaceous, sandy	22.0	

Exposed at the emergency spillway of Sardis Dam is one of the most instructive sections of the Kosciusko north of Grenada.

SECTION OF EMERGENCY SPILLWAY, SARDIS DAM, PANOLA COUNTY

	Feet	Feet
Kosciusko formation		35.0
Sand, highly cross-bedded, medium grained, well-sorted, micaceous, white to yellow; weathers pinkish-red; contains well-rounded pebbles up to 2 inches in diameter and a piece of well-preserved, unpetrified driftwood near the contact	35.0	
Tallahatta formation		19.0
Claystone, yellow to brown, platy, shaly, very hard	5.5	
Sand, dark gray-black, lignitic, marcasitic, micaceous, argillaceous	3.0	
Shale, black lignitic bedded hard to soft sandy, micaceous	8.0	
Sand, black liginitic, marcasitic, argillaceous, micaceous	2.5	
Water level		

At the southeast end of the dam-site the same beds are exposed, but a bed of white clay balls and light-colored sand 25 feet in thickness truncates and overlies the lignitic Tallahatta beds. This clay breccia is in the basal Kosciusko and represents material eroded prior to and contemporaneous with the deposition of the main body of the sand. It is this same clay breccia that is found throughout Lafayette, Panola, and Yalobusha Counties.

It is not considered necessary to present additional sections of the Kosciusko in adjacent counties or to add to the ones in Lafayette County, for the reason that the Kosciusko was described in the sections dealing with the Tallahatta.

ECONOMIC PRODUCTS

The Kosciusko offers no economic products except masonry sand.

POSSIBILITIES FOR OIL

Despite the difficulty of detecting surface structure in this dominantly sand area, several localities in Lafayette County suggestive of structural disturbances have been noted.

The whole of Lafayette County subsurface is without question affected by a regional structure that has caused a flattening of the normal regional dip which farther south is roughly 30 feet a mile to the west. Tallahatta white and black clay shale exposed in Woodson Ridge at an elevation of approximately 506 feet crop out 10½ miles to the west at an elevation of approximately 390 feet, a difference of elevation representing roughly a dip of only 11 feet a mile. Beds of the Tallahatta are exposed as far west as Sardis Dam, making an abnormally wide outcrop belt. Not only is this general flattening of dip suggestive of regional disturbance, but local reversal of dip and accelerated west dip are found in every quarter of the county.

As a local indication of structure, Woodson Ridge is the most outstanding surface feature. The Ridge is, in reality, a high plateau in the midst of rugged sand hills. It covers about 20 square miles northeast of Oxford, and the whole topographic feature shows a decidedly east slope.

On the western flank of Woodson Ridge, 3½ miles northeast of Oxford (NW. ¼, SW. ¼, Sec. 11, T. 8 S., R. 3 W.) is a fault, which is clearly seen in a large gully beside a farm house. This fault has a two-fold significance in that it is on the flank of the large surface-slope anomaly of Woodson Ridge, and in that the faulting took place contemporaneous with the deposition of the Tallahatta clay. That the faulting preceded the last stages of Tallahatta deposition is certain because the fault did not affect the upper 1½ feet of the clay; neither did it displace the overlying Kosciusko sand. In the light of this information, one might con-

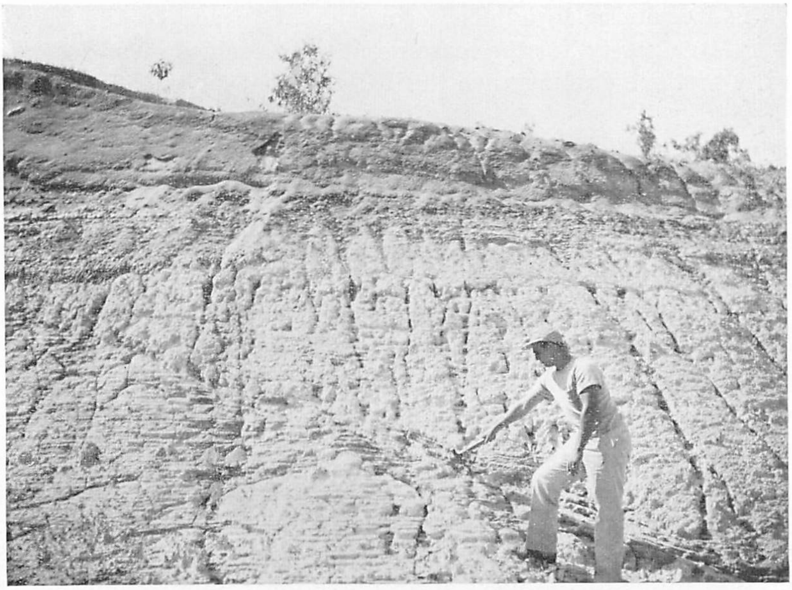

Figure 11.—Fault in the Upper Meridian—Lower Tallahatta transition zone, about 3 miles northeast of Oxford (NW. ¼, SW.¼, Sec. 11, T. 8 S., R. 3 W.).

clude that a great percentage of the white clay breccia in the vicinity of Oxford is due to re-deposition of clay from fault zones near drainage level.

The upthrown side of the fault is on the east, and the beds of that block slope eastward. The beds of the downthrown western block slope westward. The vertical displacement of this fault cannot be determined readily from the surface although it probably does not exceed 20 feet, if that much. Horizontal displacement will be about the same as the vertical, because the fault plane is roughly 45 degrees from vertical (Figure 11). Although the displacement does not seem to be large at the surface, it might increase with depth, as do many oil producing structures in southwestern Mississippi.

Probably connected with the fault northeast of Oxford are several natural depressions along Old Highway 6 about 1½ mile from its juncture with New Highway 6 just east of Oxford. These depressions are 4 miles slightly west of south from the gully exposure in Section 11. They were discovered by James Turner in the course of field study in the Department of Geology at the University of Mississippi.

In the northeastern part of the county, evidence of structure is prominent north and south of Mississippi Highway 30 where it passes over Cyprus Creek. The north-south, asymmetrical valley of the creek with the gently-sloping west wall was the first suggestion of structure at this place. Study of outcrops by use of the helicopter, supplemented with data obtained from a few shallow exploratory holes, has revealed evidence of a structure of magnitude worthy of further consideration.

Near Spring Hill School (Secs. 11, 14, T. 7 S., R. 1 W.), sand of the Meridian formation overlies the Ackerman clays at an elevation of 370 feet in the west wall of Cyprus Creek valley. Slightly more than a mile southeast along the Rocky Ford road, lignitic clays and bauxitic silt of the Fearn Springs formation are exposed at an elevation of 320 to 340 feet. Bearing in mind that the sand overlying the Ackerman is unconformable thereon and "overlaps" to the east considerably, it is still strikingly obvious that a section of approximately 100 feet of basal Ackerman sand and probably as much as 50 feet of overlying clay could not extend below drainage in approximately one mile by normal regional dip.

A drill hole on the bank of Puskus Creek three-fourths mile south of Rock Hill School (Sec. 28 T. 7 S., R. 1 W.) and approximately 3 miles southwest of Spring Hill School encountered sands identified as Ackerman, Unit I or basal Ackerman, at an elevation of 270 feet. If this identification be correct the position of the Fearn Springs would be at an elevation of 170 to 200 feet. Yet about 1½ miles due east across the valley, white silt and clay, containing two thin beds of black lignitic clay and a 6-inch bed of hard siliceous claystone, having upright impressions of plant stems, are identical with beds of the Fearn Springs at Flat Rock Church, Benton County. These beds in Lafayette County are exposed at an elevation of 320 to 340 feet. Just south of Highway 30 and about three-fourths mile south of the exposure just mentioned (SW. ¼, SE. ¼, Sec. 27, T. 7 S. R. 1 W.) a drill hole encountered Porters Creek clay at an elevation of roughly 225 feet. This position of the Porters Creek clay seems to be higher than would be expected when compared with the position of Ackerman clays on the west side of the valley.

Still farther south of this locality (SW. ¼, Sec. 3, T. 3 S., R. 1 W.) a drill hole penetrated 77 feet of sand, identified as basal Ackerman, below 23 feet of Alluvium; yet the total thickness of the sand and was not penetrated at this depth, or at an elevation of about 238 feet. In contrast, the east valley wall opposite this drill hole seemingly shows the same sand at an elevation of 400 feet and higher.

In general then, it might be said that the east valley wall of Cyprus Creek is composed of Fearn Springs clays, silts, and sand, capped by Ackerman sand. whereas the west valley wall is composed of Ackerman clays capped by Meridian sand. It must be concluded, therefore, that a fault or a faulted anticline is present, trending north-south along Cyprus Creek. Further prospecting is recommended along both sides of Cypress Creek (T. 7, 8 S., R 1 W.).

Northeast of Abbeville (about the common corner of Secs. 34 and 35, T. 6 S., R. 3 W., and Secs. 2 and 3 T. 7 S., R. 3 W.), interbedded white clay and red sand have pronounced northeast dip.

About 4 miles north of the University (SW. ¼, Sec. 32, T. 7 S., R. 3 W.) an erosional remnant of the Tallahatta has a slight eastward dip. In contrast, an exposure of Tallahatta clay shale, half a mile to the west, has a northwest dip of 19 feet in the short distance of 60 feet (Figure 12). Only half a mile distant (NW.¼, NE. ¼, Sec. 5, T. 8 S., R. 3 W.) from these two exposures, in turn, Tallahatta clay shales have pronounced southeast dip and are lying about 25 feet higher than the steeply dipping beds just mentioned. All these abnormalities seem to indicate a fault, tending northeast-southwest, having the upthrow on the eastern side. The writer had arrived at this conclusion and discussed it with members of the Mississippi Geological Survey staff before the regional structure map in Mississippi Geological Survey Bulletin 50, Tallahatchie County Mineral Resources, came to his attention. In the bulletin is described a major fault trending northeast-southwest through Effie and just west of Charleston in Tallahatchie County, across the northwestern edge of Yalobusha County, through the center of the southeastern quarter of Panola County. If this fault line were projected into Lafayette County, it would pass about midway between Harmontown and Abbeville, or almost directly through the area having the pronounced northwest-dipping Tallahatta shale. Also the upthrow side would coincide with that suggested in this paper.

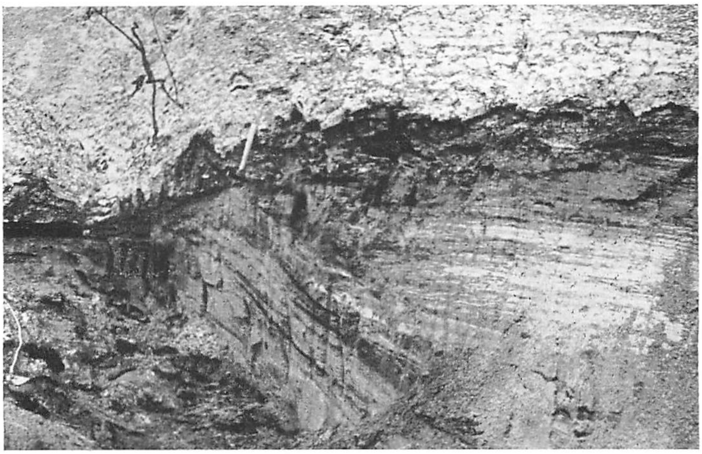

Figure 12.—Meridian-Tallahatta contact 1½ miles northwest of College Hill Station (center of SW. ¼, Sec. 32, T. 7 S., R. 3 W.). The Tallahatta shale has 15-20 degree dip northwest. March 30, 1951.

Another area of structural disturbance in Lafayette County which is seemingly separate from the one just mentioned is in the vicinity of Tula. On Sandy Creek (NW ¼, Sec. 6, T. 10 S., R. 1 W.) beds of Ackerman, units 3 and 4, are dipping at an angle of 20 to 30 degrees slightly south of west. This accelerated dip is not caused by surface sliding as is common in the clayey Ackerman beds, because the dip is clearly continuous from the east valley wall to the west valley wall of the creek over a horizontal distance of about one-quarter mile. In Pontotoc County southeast of Toccopola, Priddy describes the faulted Porters Creek and Fearn Springs formation.[17] Another place of disturbance, probably connected with the Tula indications of structure, is just beyond the city limit of Water Valley (NW. ¼, Sec. 10, T 11 S., R. 4 W.) where Tallahatta clay shale dips steeply east.

Referring to the regional structure map of Tallahatchie County Mineral Resources, one notes that an extension of the fault line that trends a few miles south of Scobey and Gatewood in Yalobusha County would extend precisely through the Water Valley disturbance and on into southeastern Lafayette and southwestern Pontotoc Counties.

It is more than coincidental that these projected fault lines should fall nicely into the disturbed areas of Lafayette County. Therefore, it becomes increasingly evident that all of the northwest Mississippi area is affected by a series of structures that has a common origin. It is also striking that the individual faults described by Priddy should combine to give a "winding stair" effect. The north Mississippi area should receive more attention in the future than it has in the past. It has been avoided by the oil prospectors largely for the reasons:

(1) The belief that no reservoir beds of high permeability are present.

(2) The extreme hardness of the Paleozoic rock from which the oil or gas must come.

It is the opinion of William Clifford Morse, as well as of the writer, that somewhere in north Mississippi will be found a permeable reservoir bed, and that cable tools should be used in drilling because of the possibility of chert in some of the beds.

CONCLUSIONS

From the study of the geology of Lafayette County, the following conclusions are drawn:

1. The Ackerman is the youngest Wilcox bed exposed on the surface.
2. The "Holly Springs" formation is non-existent.
3. The Meridian sand overlies the Ackerman.
4. The Tallahatta overlies the Meridian.
5. The Winona and Zilpha are not present.
6. The Kosciusko is unconformable on the Tallahatta, Meridian, and possibly the Ackerman.
7. The white clay breccia formerly identified as the "Holly Springs" is basal Kosciusko.
8. The white bond clays also formerly identified as "Holly Springs" are Tallahatta in age, or a reworked portion thereof.

ACKNOWLEDGEMENTS

The writer wishes to acknowledge with sincere appreciation the helpful suggestions and aid given him by Tracy W. Lusk, James Turner, and Mrs. Mary N. DeShazo, of the Mississippi Geological Survey, and by Mrs. James S. Attaya. He wishes especially to thank William Clifford Morse, Director, and Franklin E. Vestal, Geologist, for their help in mapping the county. Although they had done considerable work on the county previous to this survey, they allowed the author to approach the problem without the aid of their maps and notes, so that his conclusions would not be biased by their work. When the writer reached his conclusions, Morse and Vestal's work was made available which largely confirmed his findings and greatly speeded the mapping of the county.

REFERENCES

1. Mellen, Frederic Francis, Winston County mineral resources: Miss. Geol. Survey Bull. 38, pp. 37-43, 1938.

2. Mellen, Frederic Francis, Status of Fearn Springs formation: Miss. Geol. Survey Bull. 69, p. 10, 1950.

3. Brown, Calvin S., Lignite of Mississippi: Miss. State Geol. Survey Bull. 3, pp. 31-34, 1907.

4. Lowe, E. N., Preliminary report on iron ores of Mississippi: Miss. Geol. Survey Bull. 10, p. 24, 1913.

5. Lowe, E. N., Iron ores of Marshall and Benton Counties: Miss. State Geol. Survey Report, 1912.

6. Stephenson, Logan, Waring, The ground-water resources of Mississippi: U. S. Geol. Survey Water-Supply Paper 576, pp. 259-266, 1928.

7. Hilgard, Eugene W., Report on the geology and agriculture of the State of Mississippi: Miss. State Geol. Survey report, pp. 5-46, 1860.

8. Logan, William N., Clays of Mississippi: Miss. State Geol. Survey Bull. 2, pp. 165-166, 1907.

9. Lowe, E. N., Preliminary report on the iron ores of Mississippi: Miss. State Geol. Survey Bull. 10, pp. 50-62, 1913.

10. Lowe, E. N., Mississippi its geology, geography, soil and mineral resources: Miss. Geol. Survey Bull. 14, pp. 68-70, 1919.

11. Stephenson, Cook, Lowe, Costal plain stratigraphy of Mississippi: Miss. Geol. Survey Bull. 25, p. 73, 1933.

12. Thomas, Emil Paul, The Claiborne: Miss. Geol. Survey Bull. 48, p. 21, 1942.

13. Morse, W. C., Light-weight aggregate, (geology): Miss. Geol. Survey Bull. 61, pp. 15-17. McCutcheon, Thomas Edwin, Mandlebaum, Bernard Frank (tests) pp. 19-20, 1945.

14. Thomas, Emil Paul, The Claiborne: Miss. Geol. Survey Bull. 48, p. 86, 1942.

15. Brown, Glen Francis, Geology and Artesian water of the alluvial plain in northwestern Mississippi: Miss. Geol. Survey Bull. 65, p. 46, 1947.

16. Thomas, Emil Paul, The Claiborne: Miss. Geol. Survey Bull. 48, pp. 86-87, 1942.

17. Priddy, Richard Randall, Pontotoc County mineral resources: Miss Geol. Survey Bull. 54, 1943.

MISSISSIPPI STATE GEOLOGICAL SURVEY

William Clifford Morse, Director

University, Mississippi

Memorandum for the Press

For Release on
September 24, 1951

Lafayette County Potential Oil Structures

Potential oil and gas structures, described in forthcoming Bulletin 71, Lafayette County Geology, by James Samuel Attaya, Geologist of the Mississippi State Geological Survey, indicate that Lafayette County should receive further investigation by oil and gas prospectors. Attaya's recommendations bear out the early opinion of State Geologist, William Clifford Morse, that if a structure be present in any one of the five Chester sands toward the west or southwest down dip from their outcrops in northeastern Mississippi and northwestern Alabama, it may have trapped some of the oil before all of it reached the surface and escaped. (Miss. State Geol. Survey Bulletin 23, p. 203).

The reconnaissance survey in Lafayette County has revealed five structures:

1) Along Cypress Creek (T. 7, 8 S., R. 1 W.) in northeastern Lafayette County;
2) Along western edge of Woodson Ridge (NW. ¼, SW. ¼, Sec. 11, T. 8 S., R. 3 W.) 3½ miles northeast of Oxford;
3) On Sandy Creek (NW. ¼, Sec. 6, T. 10 S., R. 1 W.) east of Tula;
4) Near College Hill Station (SW. ¼, Sec. 32, T. 7 S., R. 3 W.) 4 miles north of University; and
5) Near Abbeville (Secs. 34, 35, T. 6 S., R. 3 W. and Secs. 2, 3, T. 7 S., R. 3 W.) one-half mile northeast of the village.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

LAFAYETTE COUNTY GEOLOGY
JAMES SAMUEL ATTAYA

ALLUVIUM
KOSCIUSKO K BASE
TALLAHATTA T BASE
MERIDIAN M BASE
ACKERMAN A BASE
FEARN SPRINGS FS

MISSISSIPPI
DENMARK QUADRANGLE
15-MINUTE SERIES

Topography by W. C. Thompson, T. D. Anderson, F. F. Blankenbaker, G. H. Briggs, Jr., B. O. Fridge, W. D. Ingersoll, G. C. McKinnon, Le Grand Smith, J. J. Consoll, W. A. Fisher, R. R. Embrey, Jr., and Corps of Engineers, U. S. Army
Surveyed in 1940–1942

APPROXIMATE MEAN DECLINATION, 1942

Scale 1:62500

Contour interval 20 feet
Datum is mean sea level

ROUTES USUALLY TRAVELED
HARD IMPERVIOUS SURFACES
OTHER SURFACE IMPROVEMENTS
1943
U. S. ROUTE
STATE ROUTE

Polyconic projection. 1927 North American datum
5000 yard grid based on U. S. zone system, C
10000 foot grid based on Mississippi (East) rectangular coordinate system

DENMARK, MISS.
Edition of 1943
N3415—W8915/15

MISSISSIPPI STATE GEOLIGICAL SURVEY
WILLIAM CLIFFORD MORSE, DIRECTOR

BULLETIN 71
PLATE 2