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MISSISSIPPI
State Geological Survey

E. N. LOWE, Director

BULLETIN No. 22

Ralph E. Grim

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Preliminary Report on
BENTONITE IN MISSISSIPPI

By Ralph E. Grim
1928

MISSISSIPPI GEOLOGICAL SURVEY

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Preliminary Report on

BENTONITE IN MISSISSIPPI

By Ralph E. Grim.*

January, 1928.

Introduction.

For several years bentonite has been known to occur in the Upper Cretaceous of the Coastal Plain west of the Mississippi River as well as in Wyoming and adjacent states. Its occurrence in Louisiana was first noted by Easton [1] and later described by Bramlette[2]. Since that time more or less of a search has been carried on in Mississippi to see whether corresponding material could be found east of the Mississippi River.

Last Spring Mr. N. W. Dahlem sent the Mississippi Geological Survey a sample of clay found on his land south of Aberdeen that was recognized as bentonite. A portion of the material was sent to Dr. Clarence Ross, of the United States Geological Survey, who confirmed the determination and pronounced the sample to be bentonite of excellent quality. Dr. E. N. Lowe, Director of the Mississippi Geological Survey, then made a preliminary examination of the deposit and pronounced it of sufficient importance to warrant a more detailed study with a view toward future development, and accordingly the writer was asked to make this more detailed examination of the deposits.

Since this examination was made, Mr. W. A. Williams, of Booneville, has located beds of bentonite in Prentiss County. It is the belief and hope of the Survey that additional deposits will be found in the Eutaw formation of East Mississippi.

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1 Easton, H.D.: Oil Weekly, Feb.16,1924, p.53.

2 Bramlette, M.N.: Bentonite in the Upper Cretaceous of Louisiana, A.A.P.G., Vol.8, No.3 (1924).

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* Assistant Geologist, Miss.Geological Survey.

BENTONITE IN MONROE COUNTY

Location:

The location of the bentonite in Monroe County is shown in Fig.I, and the location of this area in Monroe County and in the state as a whole, is shown in Fig.II. Outcroppings of the material can be found in the beds of Panther and Little Panther creeks and their numerous tributaries about a mile west of the Tombigbee River, in parts of Sections 14, 23, 26, Twp.15S.,R.7E. This area, from four to six miles south of the town of Aberdeen, can be reached by a good country road that has been gravelled, and which may be travelled throughout the year.

Topography and Geography:

The region in which the bentonite is located is very uneven and hilly. The small tributary streams of the Tombigbee River have cut down into the upland, producing this irregularity. The creek beds are from 75 to 100 feet below the upland surface, forming many irregular valleys and sloughs with rather steep walls. Along the west side of the Tombigbee River there is no flood plain, and consequently the uneven surface extends to the river itself. The small tributary streams are without large enough flood plains to reduce the unevenness of the region.

All of the streams on the west side of the river in this vicinity are small, and their heads are fairly close to the river. As a result, the uneven country is limited and does not extend far to the west. Usually in less than two or three miles the upland flattens and the country generally is more even. The surface of the country is covered with much undergrowth and a moderate amount of timber. No part of the area in the immediate vicinity of the bentonite is under cultivation, as the topography would make this very difficult, or even impossible. The timber, consisting of both hard and soft woods, is mainly second growth. Occasionally a large first growth tree can be seen that was saved from being cut down by its inaccessibility,

GEOLOGY

Stratigraphy:

The bentonite occurs in layers interstratified with the Eutaw sands of Upper Cretaceous age. In the area under consideration, two distinct beds can be seen, each having a thickness of from four to seven feet. Possibly there are other beds of bentonite above these two, as in this area the material above the higher bed is covered by slump, making it impossible to work out a higher detailed section.

In Fig.II a detailed section is presented to show the relationship between the two layers of bentonite. Because

Fig.1

Location of Bentonite in Monroe County, Miss.

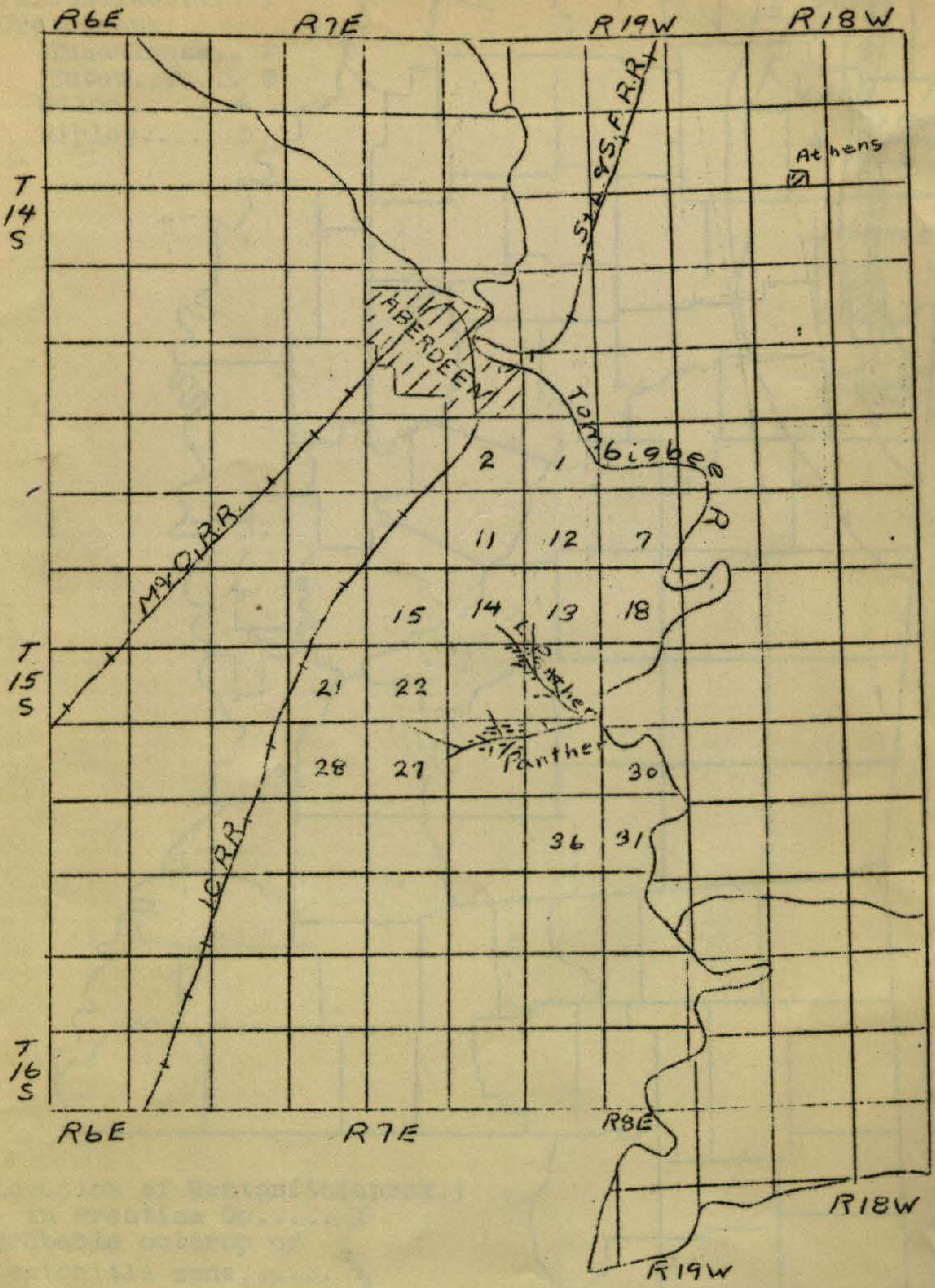


Fig. II.

Sketch Map of Cretaceous Area in Mississippi

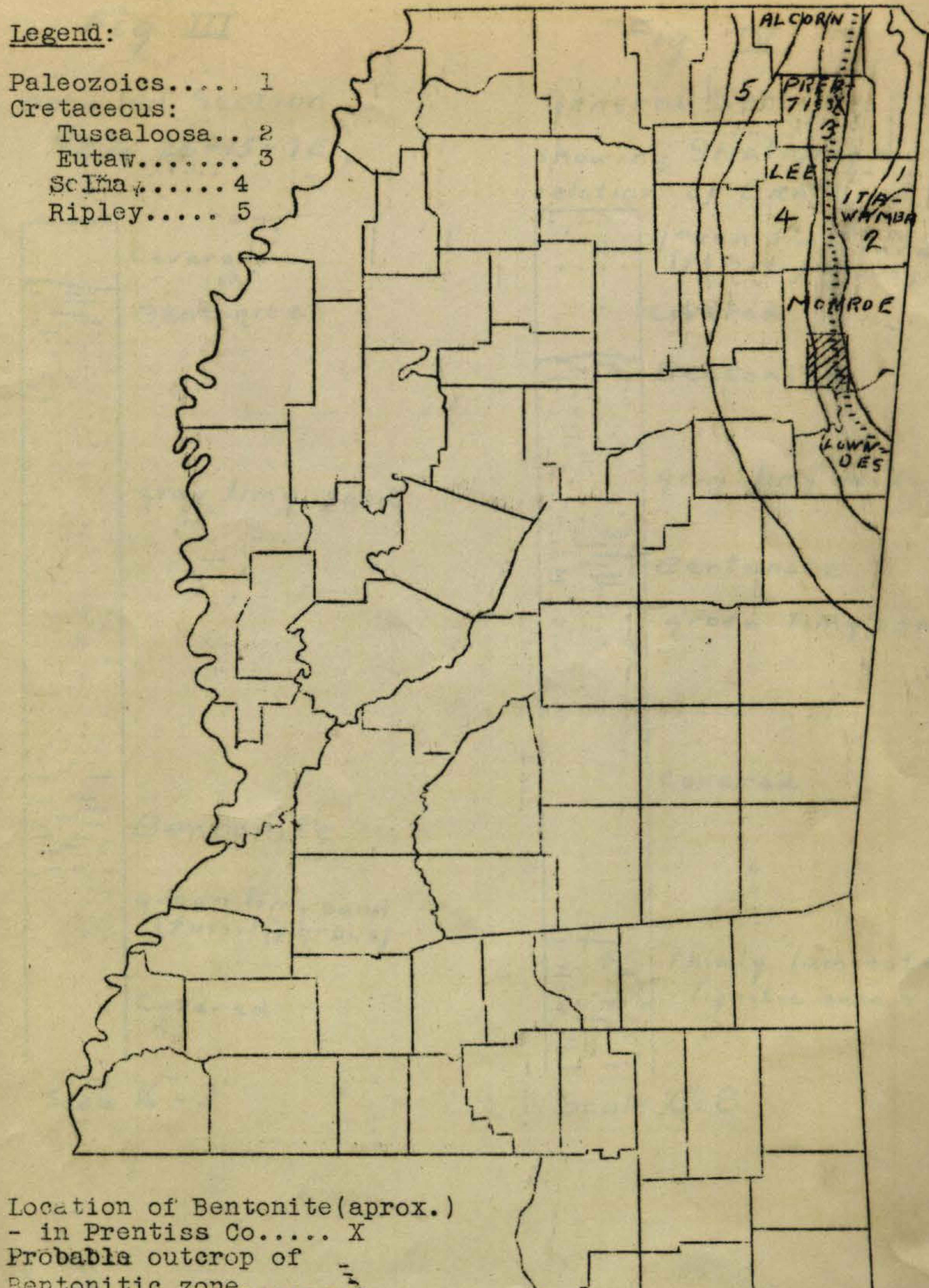
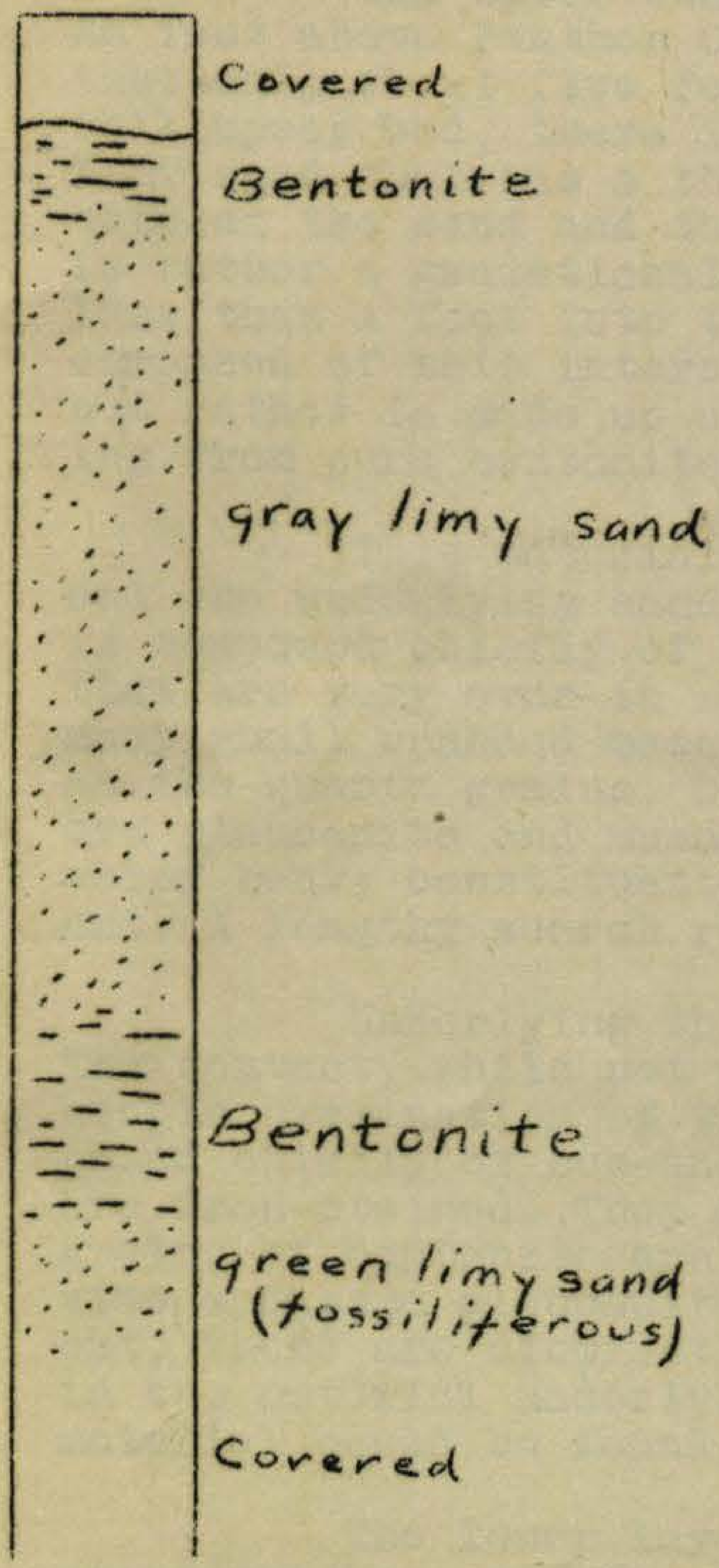


Fig. III

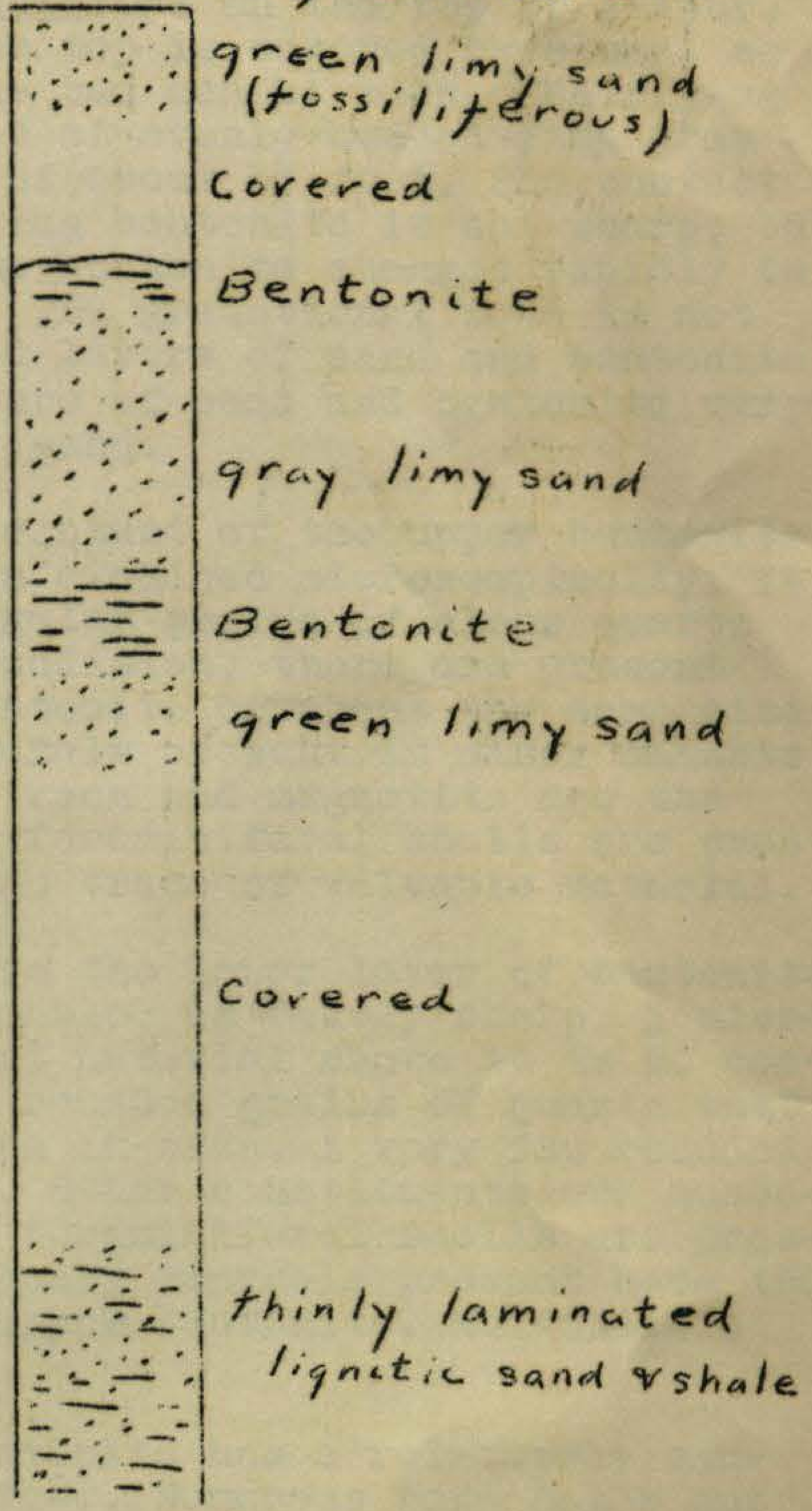
Detailed Section
NE¼ 26-15-7E



Scale ¼" = 3'

Fig. IV

General Section
showing Stratigraphic
relation of Bentonite



Scale ¼" = 8'

of the unusual amount of slump present, no positive section can be worked out immediately above the higher bentonite. The slump material is a red to gray sand on a weathered surface, suggesting that the covered material is probably a sandy shale. The outcrops in the road-cuts on the upland, perhaps 50 feet stratigraphically higher than the bentonite, shows a green limy, shaly sand. Concerning the intervening material, information is lacking.

The upper bentonite outcrops on the top of a spur, 25 feet above Panther Creek. The top is covered by slump, so that only about five feet of the bed can be seen. Underlying this upper bed, there is a layer of evenly-bedded fine gray limy sand that has a thickness of about 35 feet. The contact between the sand and the overlying bentonite is not sharp, but is rather a gradational one. The bentonite changes rapidly in less than a foot into the sand. The gradational zone is not composed of thin interstratified layers of sand and bentonite, but rather is made up of a mixture of sand and bentonite varying from pure bentonite to pure sand.

This material at the contact of the upper bentonite and the underlying sand has been examined microscopically. It is composed chiefly of fine, angular grains of clear quartz that are very even in size. In addition, there are present many small rounded masses of bentonite of about the same size as the quartz grains. Other minerals present in minor amounts are glauconite and muscovite. Zircon and magnetite are the chief heavy constituents. A few foraminiferal shells are present. A lengthy search revealed no trace of volvanic material.

Underlying this sand is the lower layer of bentonite. The contact, while not unconformable, is fairly sharp. A microscopic examination of the contact material shows it to be composed chiefly of sub-angular to rounded grains of quartz that are iron-stained. They are uneven in size. A very few rounded grains of bentonite are present. Other constituents are muscovite and some glauconite. A few foraminiferal shells are present. There are distinctly more heavy minerals present here than in the material underlying the upper bentonite. No volcanic material could be found.

The lower layer of bentonite has a relatively constant thickness of from 7 to 9 feet. Numerous bore holes put down through it have determined this thickness. Its outcrops can be seen along the beds of Panther and Little Panther Creeks and their various branches (see Fig.1). In appearance and in its characteristics, it is similar to the upper bentonite.

Underlying the lower bed of bentonite there is a very fossiliferous green limy sand. Only about 15 feet of this material can be seen, as the section lower down is covered by recent alluvium and slump. The contact between this sand and the bentonite is a gradational one, similar in every respect to that found under the upper bentonite. The gradation takes place in about six inches. Material from this contact under the microscope is shown to consist of rounded to sub-angular grains of fine quartz. The grains are variable in size. A few rounded grains of bentonite are also present. Muscovite and glauconite are abundant. Heavy minerals are scant. No volcanic material could be found.

It is important to accurately locate this zone of bentonite in the Eutaw, if it is to be correlated with Cretaceous bentonite elsewhere. Future prospecting for the material will be aided also by a definite determination of its stratigraphic location. Fig.IV shows in a general way the relation of the detailed section to the Eutaw. The material shown at the bottom of Fig.IV outcrops along the bluffs of the Tombigbee about one miles east of the bentonite. The intervening material cannot be seen as it is mostly covered by alluvial material and slump. On the basis of the general regional dip, and assuming that no structural variation occurs, this section must be approximately 60 feet below the bentonite. The thinly bedded lignitic sand and shale is more characteristic of the Tuscaloosa than the Eutaw. The material is not limy, again suggesting the Tuscaloosa. Directly across the Tombigbee River to the east the bottom lands extend for a distance of six miles, and consequently the underlying material can not be seen. It appears probable, however, that the zone of bentonite is low down in the Eutaw, not more than 50 or 100 feet from the top of the Tuscaloosa.

Overlying the bentonite zone there is a covered section of about 20 feet. Above this the material is a limy green fossiliferous shaly sand that weathers to a deep red. Material of this general character, which is characteristic of the Eutaw, can be seen to the west until the prairie country is reached, which is underlain by the Selma Chalk. The beginning of the prairie country in East Mississippi is also the approximate Selma-Eutaw contact. This is approximately six miles west of the bentonite. On the assumption that there is no intervening structural irregularity, and assuming the general dip to be 30 feet per mile, the bentonitic zone would be several hundred feet below the top of the Eutaw. In a general way this places the zone in the Eutaw section.

STRUCTURE.

The strike of the bentonite beds is approximately north and south coinciding with the general regional strike of the Coastal Plain formations in this region. In the limited area studied where the exposures were poor and scant, it has been impossible to obtain the strike more accurately. The beds dip to the west about 60 feet per mile. Levels were run on the top of the bed, and this figure, while slightly higher that the previously accepted one for the Coastal Plains, is believed to be essentially accurate.

No indication at the surface was noted of any variation in the structure of the bentonite beds. Their dip and strike appear to be relatively constant. One of the greatest difficulties in working out the structure of the formations in the state has been the lack of key beds. Because of its recognizable character and its probable areal extent, the bentonite beds may aid in solving this problem in this area. The fact that there are two, and perhaps more, distinct beds must be recognized and caution used accordingly.

CHARACTER OF THE BENTONITE.

The bentonite occurs in massive beds and is devoid of stratification. On a fresh surface it is cream-colored and possesses a conchoidal fracture. The material is hard and tough, so that a dry piece can hardly be broken between the fingers. It is more resistant to weathering than the surrounding sand, and consequently the outcrop in the creeks causes small waterfalls to be formed. There is a total absence of grit, and the material is so fine-grained that with a lens no individuals can be differentiated. It has a distinct soapy feel.

As the material is located in the creek bottoms, and has not been dug into, it is very hard to get unweathered material for testing. The weathered material is greenish-gray in color, and considerably iron-stained along the cracks and crevices. The conchoidal character is better shown by the weathered material than by the unweathered. Many large rounded masses can be seen that are built up of concentric layers from a fourth to one inch in thickness. If such a mass is broken, it appears similar to a very large onion that has been cut in two. This is a very pronounced character of the material. Prolonged weathering has also served to form many irregular cracks which checker the material. The surface does not appear to have the crinkled appearance which, according to Spence [1] is so characteristic of other bentonite deposits. This feature is believed to be due to the alternate wetting and drying of the material. In the area under consideration in Mississippi, the material is almost constantly water soaked, and this feature would probably not result. The weathered material is a soft soapy substance that can be ground between the fingers without any suggestion of grit. A careful search of the area revealed no evidence of any salines. In several other bentonite deposits salines are commonly associated with the beds. But here they seem to be absent. Material that has been air dried will absorb from two to four times its volume of water and increase correspondingly in size. In general the shape of the specimen is poorly preserved,

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[1] Spence, H.S., "Bentonite", Bull.62, Canada Dept.of Mines, Mines Branch. #626

and it begins to crumble when the maximum amount of water is approached.

The material is very fine-grained and has no grit so that it can be crushed into a powder, practically all of which will pass through a 200-mesh sieve. Material of this fineness will form a suspension in water that will stand for a long time (several days) without settling out. Blocks of the material when soaked in water will form a jelly-like mass about the consistency of a thick paste, that appears to stay almost permanently in this condition.

Some of the material was air dried and crushed so that it would pass through a 60-mesh sieve and then crude cotton seed oil was passed through it. A large part of the color of the oil was removed. Very probably bentonite at a greater distance from the outcrop where it would be unweathered would produce a complete discoloration. Undoubtedly tests of the unaltered material will materially change the above determinations.

The United States Geological Survey very kindly made a thin section of the material which was examined microscopically. Under a single nicol the material is ultra-microscopic. No individual grains can be seen, and practically the whole section appears as a uniform light orange-colored mass. The only exceptions are very small inclusions, which are chiefly quartz, magnetite, apatite, and zircon. These minerals are probably foreign to the bentonite, having become trapped in the bentonite when it was deposited. The color of the material becomes lighter away from the many cracks that cut the section. as the color is controlled by these cracks, it is probably secondary.

The surface of the section has the appearance of fine-grained leather. Whether this is the same thing as the vermicular, or worm-like structure mentioned by other investigators, the writer is unable to say, as no section showing that structure is available for comparison. From the published descriptions they would not appear to be the same. The index of refraction is slightly below 1.541.

Under crossed nicols the material is isotropic with the exception of the very few inclusions, and also a small amount of secondary calcite appearing along the cracks cutting the section. The main isotropic mass shows no hint of structure. According to the investigations of Ross and others, the chief mineral constituent of bentonite is Leverrierite. Because of the ultra-microscopic and non-crystalline character of the material, the presence of this mineral or any other can not be proven in this section. The character just noted are characteristic of volcanic glass, which suggests that the material may be a volcanic glass, perhaps slightly devitrified.

Chemical Composition:

The following chemical analysis of the bentonite from Monroe County was made by W. F. Hand, State Chemist of Mississippi. The material analyzed was a sample of the crude material that had been air dried at room temperature for several weeks before the analysis was made. The sample was obtained in the field by digging as far back from the out-crop as possible in order to obtain material uncontaminated from slump and surface waters. The material, therefore, is as free from such alteration as is possible to obtain until the deposit is opened; but it cannot be considered to be wholly uncontaminated.

Analysis of Crude Bentonite

SiO_2	60.51
Al_2O_3	16.56
Fe_2O_3	7.74
Volatile matter...	14.34
	99.15

Probably almost the whole amount of the volatile matter is water, because, as stated above, the specimen was collected fairly close to the outcrop. It is possible that the amount of volatile matter shown is greater than would be the case from a perfectly fresh sample farther from the surface. It is also believed that the iron oxide content as shown is higher than would be the case in absolutely fresh material. The overlying formation contains much iron, some of which is carried downward by seeping waters and deposited in the cracks and fissures of the bentonite. The thin section, as already mentioned, brings out this fact. Material as free as possible from iron stains was analyzed, but very probably there was present a sufficient amount of iron of this character to appreciably show in the analysis.

For the purpose of comparison the following table is presented which shows further analysis of bentonite. An analysis of Porters Creek clay of Midway age, which, according to Burchard[1] contains bentonitic material is also presented.

[1] Burchard, E. F., Bauxite in Northeastern Mississippi. U.S.G.S. Bull.750-G, page 109. 1925.

Analyses of Bentonite

	1	2	3	4	5	6	7	8
SiO_2	60.51	60.68	67.04	59.80	60.18	66.90	59.84	54.00
Al_2O_3	16.56	15.66	13.46	16.36	26.58	15.26	11.84	24.48
Fe_2O_3	7.74	6.40	2.79	2.23		2.80	3.26	3.00
FeO		none	.23	3.52		.12		
CaO		.29	1.78	1.82	.23	.46	2.90	2.08
MgO		1.79	1.93	2.67	1.01	2.26	2.32	2.75
Na_2O			.53	2.00		2.12	2.13	1.74
K_2O			.22	.27	1.23	.42	2.34	
TiO_2		1.00	.25	.05		.11		
P_2O_5			.09	trace		.04		.71
S			.01	nil		.01		
SO_3			nil	nil		.08	Loss	
C			.10	.09		.03	on ignition	
CO_2			.02	.72		.05	10.50	
H_2O-	14.34	5.56	6.64	5.18	10.26	5.80		9.12
H_2O		6.18	4.92	4.91		3.67		
	99.15	97.52	100.01	99.62	99.49	100.13	95.13	97.88

1. Bentonite from Monroe County, Mississippi.
2. Porters Creek Clay, Tippah County, Miss. (U.S.G.S. Bull. 750-G).
3. Quilchena, near Merritt, British Columbia.
4. Rosedale, Alberta; Rosedale Coal Company.
5. Type material from Rock Creek, Wyoming.
6. Wyoming, probably from the Newcastle District.
7. Otay, San Diego County, California.
8. So-called Bentonite, from Shelbyville, Tennessee.

From the foregoing table it is evident that the chemical analysis of the material from Monroe County is almost identical with that from other localities. There would probably be more agreement if the analysis could have been made from a perfectly fresh sample.

There has been much discussion as to the way in which the main constituents, silica, alumina, and water are combined in the bentonite. Until a relative recent date bentonite has been thought of as composed of colloidal material. It was believed that it was the colloidal character of the material that gave it its unusual properties. Recent investigations carried on chiefly by various members of the United States Geological Survey, the Geophysical Laboratory, and the United States National Museum, have tended to disprove this and to show that the material is crystalline, composed of a definite mineral known as Leverrierite.

BENTONITE IN PRENTISS COUNTY:

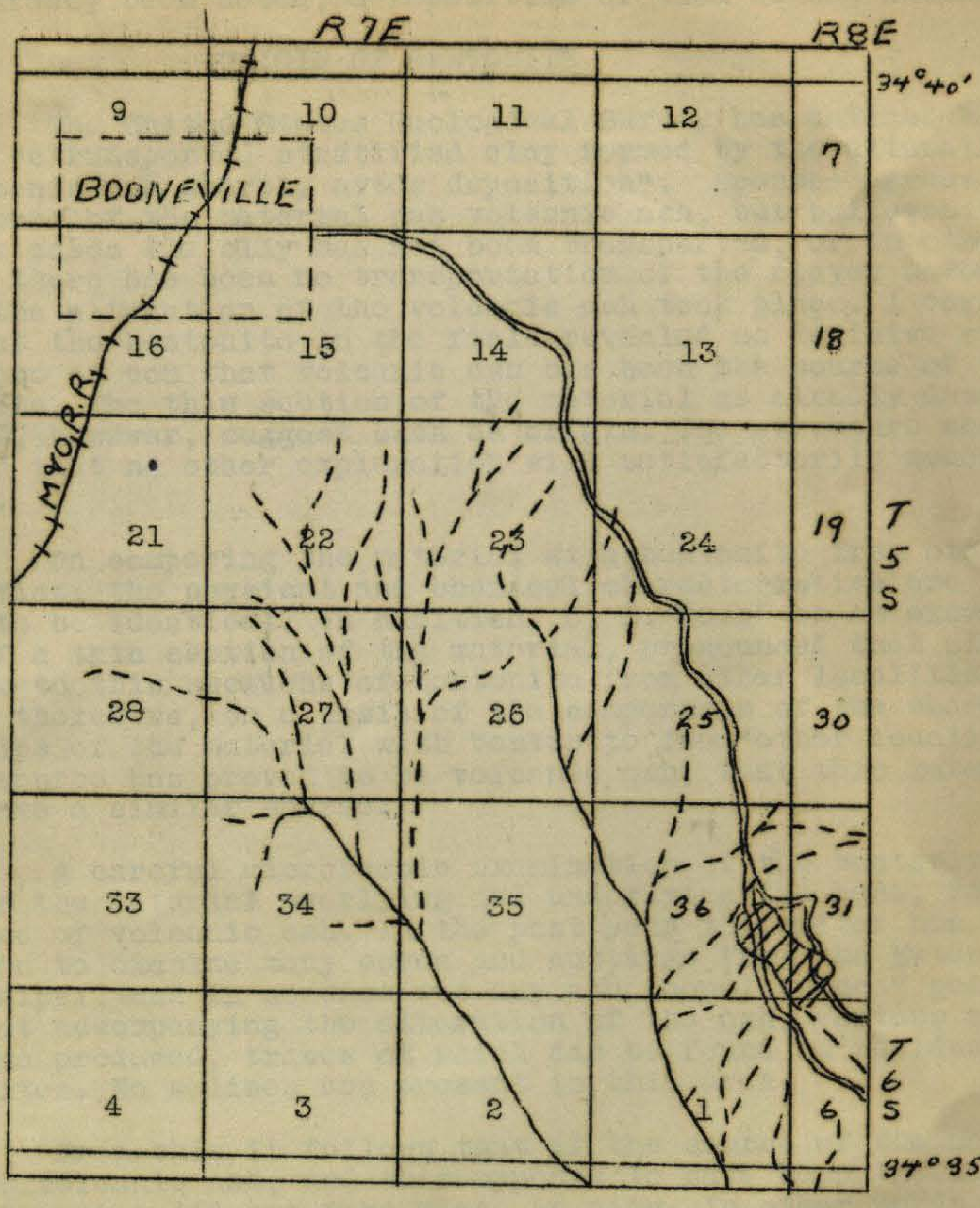
Mr. W. A. Williams, of Booneville, Prentiss County, has kindly supplied the following information concerning the deposit found by him in Prentiss County. The writer has made no field examination of the material, as the Director of the Mississippi Geological Survey has planned to make a detailed study of all the bentonite in Mississippi during the summer of 1928.

The deposit is found chiefly on the land of Mr.S.M. Wroten, and is located about five miles southeast of Booneville on the state road to Belmont. A sketch map of the area, showing the general location of the deposit is presented on Fig.V. This area is approximately five miles from the Mobile and Ohio Railroad, and the good roads make it readily accessible. The overburden, according to Mr.Williams, has an average thickness of 12 feet, with a maximum of about 25 feet. This small amount of overburden should increase the opportunity for developing the deposit.

The bentonite occurs as a bed which at the outcrop has a thickness of from 18 to 26 inches. Probably slumping of the surface material has obscured a portion of the bed, and hence the normal thickness may be somewhat larger. As the bed has not been test-pitted or bored through, the true thickness cannot be given. The layer of bentonite is overlain by a limy gray glauconitic sandy shale that contains many fossils. The underlying material is of the same character. The general character of the material with which the bentonite is interstratified, and its general location, serve to place it in the Eutaw formation. Very probably a more detailed study will show it to be approximately equivalent with the Monroe County material.

Because of the presence of more than one layer of bentonite elsewhere in the Eutaw, it is possible that other

Fig.V



Sketch Map, showing the approximate location of the
Bentonite near Booneville, Prentiss Co., Miss.
Constructed chiefly from data furnished the Survey by
Mr. W. A. Williams, of Booneville.

Approximate location of Bentonite..

beds may be found in this area. So far none have been found. Bentonite from this locality has exactly the same physical properties as the material from Monroe County. As these properties have already been noted, a repetition of them is not necessary.

ORIGIN OF BENTONITE.

The United States Geological Survey has defined bentonite as "atransported stratified clay formed by the alteration of volcanic ash shortly after deposition". Spence[1] agrees that the source of the material was volcanic ash, but believes that in some cases the clay has not been transported, or in other words, there has been no transportation of the clayey material after the alteration of the volcanic ash took place. A careful study of the bentonite in the field revealed no decisive evidence pro or con that volcanic ash has been the source of the bentonite. The thin section of the material as already described does, however, suggest such an origin. The structure shown is such that no other explanation will satisfactorily account for it.

On comparing the material with bentonite from other localities, the physical and chemical characteristics are found to be identical. In addition, C. S. Ross[2] on an examination of a thin section of the material, pronounced that also similar to thin sections of bentonite from other localities. It seems, therefore, on a basis of the comparison of the characteristics of the material with bentonite from other localities whose source has proved to be volcanic ash, that this material must have a similar source.

A careful microscopic examination of the bentonite as well as the material overlying and underlying the beds, revealed no trace of volcanic ash. In the past year the writer has had occasion to examine many cores and cuttings from the Eutaw of Mississippi, and in no case was any ash found. Spence[3] points out that accompanying the alteration of the ash, various salines are produced, traces of which can be found in residual bentonites. No salines are present in this area.

From this it follows that if the source of the material was volcanic ash, and this appears to have been the case, the alteration did not take place in situ. In other words, the bentonite is no doubt a transported clay, the alteration of the ash taking place elsewhere than the present situation of the deposit. If the alteration took place where the material is now located there should be some trace of it. None

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1 Spence, H.S."Bentonite"; Bull.No.628,Canada Dept.of Mines, Mines Branch.

2 Ross, C. S. Personal Communication.

3 Spence, H.S. Op.Cit.

whatsoever appears.

No indication as to the exact source of the ash can be found. As the general source of all the Eutaw material was from the land mass to the northeast, it is possible that the ash may also have come from this area. On the other hand bentonite deposits of about the same age are known in Louisiana and Texas, and consequently as the material is so widespread, the source may have been farther away and to the west to permit it to spread over this large area. One other possibility presents itself, and that is, that several small local sources may have supplied the material found widespread in the Cretaceous.

As the material is interstratified with the Eutaw and not separated by any break, it follows that the material was deposited under the same conditions as the Eutaw. As the Eutaw is a marine sand deposited fairly close to the shore line and in not very deep water, similar conditions no doubt prevailed when the bentonite was deposited.

Possibility of other Deposits in the State.

From a consideration of the origin and some characteristics of the bentonite, it is to be expected that the beds of bentonite would be rather continuous in areal extent. This seems much more likely than that they would occur in local isolated lenses.

The fact that bentonite of about this age is known west of the Mississippi River shows that conditions must have been favorable, and that bentonite was deposited over a wide area in a portion of Upper Cretaceous time. The deposit of bentonite which has been noted in Prentiss County (noted by x in Figure II), appears from its location to be in about the same stratigraphic horizon as those south of Aberdeen. This seems to bear out the conjecture, arrived at from a consideration of the origin, that the beds are widespread throughout a particular zone in the Eutaw. Very likely, therefore, a detailed search along the outcrop of this zone (See Figure II), would reveal additional deposits.

The probability that the beds are widespread and continuous in areal extent has another value. That is in the exploration of the material. This idea, together with the lack of unconformities at the top and bottom of the bentonite would make it very unlikely that the beds would lens out in a horizontal direction.

USES OF BENTONITE.*

The established uses for bentonite at the present time are somewhat limited. On the other hand, because of its

*Information chiefly from Canada Mines Branch Bull.No.626. By Hugh S. Spence.

unusual properties, it appears to have a great potential importance in a wide variety of industries.

This situation has arisen for several different reasons; in the first place, because of the character of the material it has been found difficult to remove the impurities naturally found associated with it. This difficulty is aggravated by the fact that washing, which seems to be the only satisfactory method of cleansing, requires later drying to prepare the material for the commercial market. Further research is necessary to solve this problem of cleaning. In addition, up until recently, the known commercial deposits of the material were found at a great distance from any possible demand, and as a result, the freight charges were high. This served as a deterrent to possible users who might have otherwise tested the material.

Chiefly for these reasons no exhaustive or satisfactory tests have been made on the material by prospective users with a view toward its development. It appears unquestionable that with a source nearer the demand, experiments on the material will be made, and a manifold use of the material will be proven.

Some of the uses which suggest themselves because of the properties of the material, are as follows. In most cases further experimentation will be needed before the actual processes by which the bentonite can be used in the following ways are known.

<u>Cements and Plasters:</u>

A small amount of bentonite will hasten the setting and increase the strength of Portland Cement. It also acts as a retarder in gypsum plasters.

<u>Ceramics:</u>

It may be used as a suspending agent in pottery glazes, and the enamel mixtures of the metal-enamelling industry. Bentonite also acts as a more efficient binder in the manufacturing of graphite crucibles, electric and chemical porcelain ware, etc.

<u>Dye Industry:</u>

The absorptive power of bentonite for chemical salts and compounds, particualarly dyes, suggest a possible use in this industry.

<u>Emulsions:</u>

It is stated that a small amount of bentonite acts both as a stabilizer and accelerator in emulsions made of water and various oils, fats, resins, etc. Experiments made on emulsifying asphalts, etc., for roofing purposes have been extremely satisfactory.

Explosives:

Bentonite has been proposed as an absorbent for nitro-glycerine in the manufacture of dynamite. It has twice the absorbent power of diatomaceous earth.

As a Filler, or Loader:

A filler is a more or less inert substance introduced in manufactured products to give weight or body to the goods. The paint, paper, and rubber industries present perhaps the most favorable fields of use in this way. Also a suggestion has been made that bentonite can be used as a filler in fertilizers. It has also been satisfactorily used as a sizing agent in the textile industry.

Foundry Work:

Bentonite can be used as an ingredient in core washes functioning to keep the carbonaceous material in suspension. Bentonite also can be used as a binder in moulding sands.

Horticultural Sprays and Animal Dips:

Its ability to form a permanent suspension, and its inert character suggest a use as a sticking or spreading agent. It probably could be used in the place of soap in dipping fluids.

Lubricants:

The inert character of bentonite, its excessive smoothness, and its property of remaining in indefinite suspension, suggest a possible use in this field.

Pencils, Crayons, Inks:

Bentonite because of its fineness and lack of grit could be substituted to advantage for the clay now in use. In this way the usual prolonged grinding process would be omitted.

Pharmaceuticals and Cosmetics:

Various curative and antiseptic properties have been claimed for bentonite that are probably based on more than imagination. It is the original base for Antiphlogistine, and is the present base for many Beauty Muds. Many other cosmetics and special soaps contain this material.

Refining Oils and Fats:

Bentonite, treated with sulphuric acid has proven extremely efficient in clarying oils. Its absorptive powers also make it available as a de-watering agent in oil refining.

Putty:

Bentonite may prove an efficient substitute for whiting.

Soaps and Detergents:

Research has shown that bentonite possesses valuable detergent properties, and may be used to good advantage in soaps, scouring compounds, cleansers, etc. It is claimed that bentonite can replace from 25% to 50% of the soap substance, and the product will be equal or superior to straight soap. In the scouring of textiles it has been found to be especially efficient.

Stove Polish:

Bentonite can be used as a substitute for clay as a binding agent.

Water Softening:

The property of absorbing ions from salt solutions has been utilized in the manufacturing of commercial water softeners.