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OKLAHOMA GEOLOGY NOTES

CHARLES DAVID WHITE

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Cover Picture

Charles David White

Charles David White, better known as David White by the scientific world and as "Uncle David" by many of his close associates, has been cited as the most influential geologist of his time in the nation. He was born July 1, 1862, on a farm in Wayne County, New York, and received his formal education at the Collegiate Institute of Marion and at Cornell University. For almost 49 years he was a member of the U. S. Geological Survey, serving as Chief Geologist from 1912 to 1922.

Dr. White's contributions to science were many. He did much for the growth and expansion of the petroleum and coal industries, the development of geology in general, and for his first interest, paleobotany, in particular. Among his many publications, *Fossil plants from the Stanley Shale and Jackfork Sandstone in southeastern Oklahoma and western Arkansas* and *Fossil flora of the Lower Coal Measures of Missouri* should be noted. He is especially known in the petroleum industry for his "carbon-ratio theory," which has particular application in the exploration of hydrocarbons in eastern Oklahoma.

In recognition of services to petroleum geology he was elected an honorary life member of the American Association of Petroleum Geologists, and was awarded the Penrose Medal by the Society of Economic Geologists and the Boverton Redwood Medal by the Institution of Petroleum Technologists of London. For his research in paleobotany he was awarded the Mary Clark Thompson Medal and the Walcott Medal by the National Academy of Sciences. During his professional career he held many important offices in scientific societies and received three honorary degrees.

Dr. White died on February 7, 1935, at the age of 73. Approximately a year after his death, Oklahoma geologists placed a memorial, a giant fossil tree stump, on the campus of East Central State College at Ada. The stump had been seen by David White six years before and identified by him as *Callixylon* and as the largest known of its kind. It is appropriate that on a college campus this monument, now named *Callixylon whiteanum,* be erected to a scientist who was an idealist and who was a believer in the younger generation's ability to resolve the problems of the future.

—L. R. W.

New Species of *Conocardium*

Carl C. Branson

A large species of the bivalve genus *Conocardium* is abundant in Missourian rocks of Oklahoma and Texas. Our collection contains several lots of the species.

Conocardium lanterna, new species

The specific name is a substantive in apposition, derived from Latin lanterna, a lamp, in reference to the shape, which resembles that of illustrators' versions of Aladdin's lamp.

Conch trigonal, oblique, divided into broad anterior wings, carinate body, concave posterior slope. Hinge straight, simple, extended onto the proboscis. Proboscis stout, short, flattened conical. Beaks distinct, curved down to hinge.

Anterior wings triangular, swept back from the hinge, ornament of about 20 round-topped ribs separated by interspaces of about the same width as the ribs. Surface made irregularly cancellate by crossing of growth lamellae concentric about beaks.

Body area broad, extending from beak to ventral margin, ornamented by seven strong ribs separated by wide interspaces and bounded posteriorly by a strong, acute carina. Surface made minutely cancellate by fine lines of growth.

Posterior slope concave, marked by seven or eight narrow ribs which diverge from the beak area to be widely spaced near the venter, and by six or seven closely spaced ribs at and near the posterior margin.

The gape is large, margined by crenulations which give the gape behind the anterior widening the appearance of having teeth.

Conocardium has been recorded in Oklahoma from the Silurian to Pennsylvanian rocks, as follows: from the Chimneyhill Formation and Haragan Marlstone (Branson and Amsden, 1958), from the Pitkin Limestone (Branson, 1958), from the Union Valley Formation (Branson, 1958), and from the Boggy Formation (Morgan, 1924). The genus has been listed from the Wewoka Formation (Weaver, 1955, p. 61) and Holdenville Formation (Weaver, 1955, p. 69; Ries, 1955, p. 44). Specimens in our collection are:

Conocardium sp.

Keel Member, Chimneyhill Formation, Pontotoc County. OU 1234. Branson and Amsden, 1958, p. 148-149, pl. 1, fig. 7.

Conocardium cf. *C. inceptum* Hall

Haragan Formation, Murray County. OU 1278, 1235. Branson and Amsden, 1958, p. 147-148, pl. 1, figs. 8-16.

Conocardium peculiare Girty

Pitkin Limestone, Cherokee County. Chicago University, Walker Museum 7169. Snider, 1915, p. 104-105; Branson, 1958, p. 142.

Conocardium snideri Morgan

Union Valley Formation, Pontotoc County. Columbia University

18501. Morgan, 1924, p. 184-185, pl. 46, figs. 13-13b; Branson, 1956, p. 126-128, figs. 1-7.

Conocardium obliquum Meek and Worthen

Boggy Formation, Pontotoc County (SE¼ SW¼ sec. 3, T. 1 N., R. 7 E.). Columbia University specimen. Morgan, 1924, p. 82, pl. 41, fig. 14.

Boggy Formation, Pontotoc County (sec. 17, T. 2 N., R. 7 E.). OU 799.

Wewoka Formation, Pontotoc County (NW¼ SW¼ sec. 4, T. 3 N., R. 7 E.). OU 4538 (fig. 10).

Boggy Formation, Pontotoc County (sec. 27, T. 3 N., R. 7 E.). OU 4539, 4540.

Conocardium lanterna is represented in our collection by the following:

OU 4541, holotype from S½ sec. 21, T. 29 N., R. 13 E., Washington County, Oklahoma, Wann Shale (figs. 1, 2).

OU 4542, 4 metatypes from the same locality (figs. 5, 6).

OU 4543, 31 metatypes from the same locality.

OU 798, specimen from Palo Pinto Formation, west side Martin's Lake, 2 miles south of Bridgeport, Wise County, Texas (figs. 7-9).

OU 803, 8 specimens from Wayland Shale Member of Graham Formation, Jack County, Texas.

OU 3154, specimen from Wayland Shale at Jacksboro, Jack County, Texas (figs. 3, 4).

Specimens which appear to belong to the species have been collected from the shale below the Wildhorse Dolomite along State Highway 20 in SW¼ sec. 21, T. 22 N., R. 10 E., Osage County, from the Kanwaka Shale in sec. 28, T. 24 N., R. 9 E., Osage County, and from the Chanute Shale in SW¼ SW¼ sec. 10, T. 19 N., R. 10 E., Tulsa County.

Conocardium lanterna is the largest of the known Pennsylvanian species. It differs from *C. obliquum* in being several times larger, in being more oblique and concave posteriorly, and in details of ornamentation. *C. nicholasense* Price, 1921, from the Eagle Shale of Nicholas County, West Virginia, is known from a single specimen with incomplete preservation. *C. turdum* Eichwald, 1860, from the Moscovian, is poorly known. *C. teramellii* Gortani, 1905, is from Carnia, Italy, but

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Figure 1. Right valve of holotype of Conocardium lanterna from the Wann Shale of Washington County, Oklahoma. OU 4541, x2.

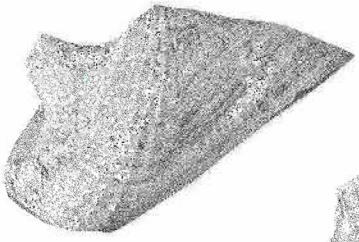
Figure 2. Dorsal view of holotype, x2.

Figure 3. Right valve of specimen from the Wayland Shale of Jack County, Texas. OU 3154, x2.

Figure 4. Dorsal view of same specimen, x2.

Figure 5. Right valve of a metatype from the Wann Shale of Washington County, Oklahoma. OU 4542, x2.

Figure 6. Dorsal view of same metatype, x2.



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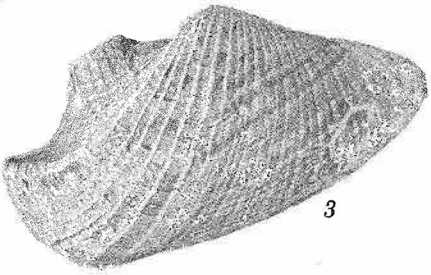

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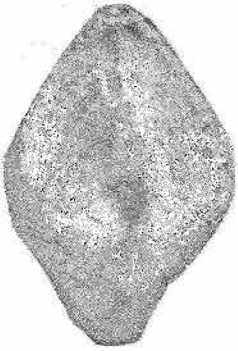

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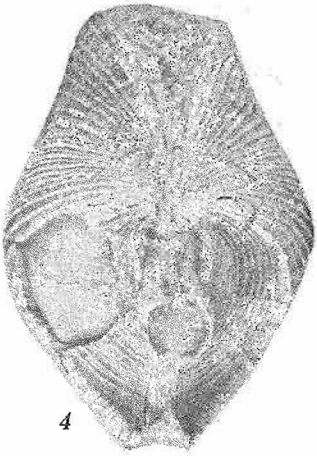

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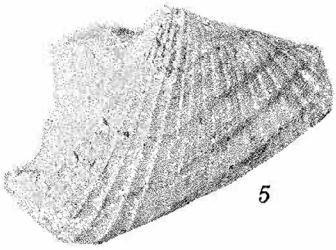

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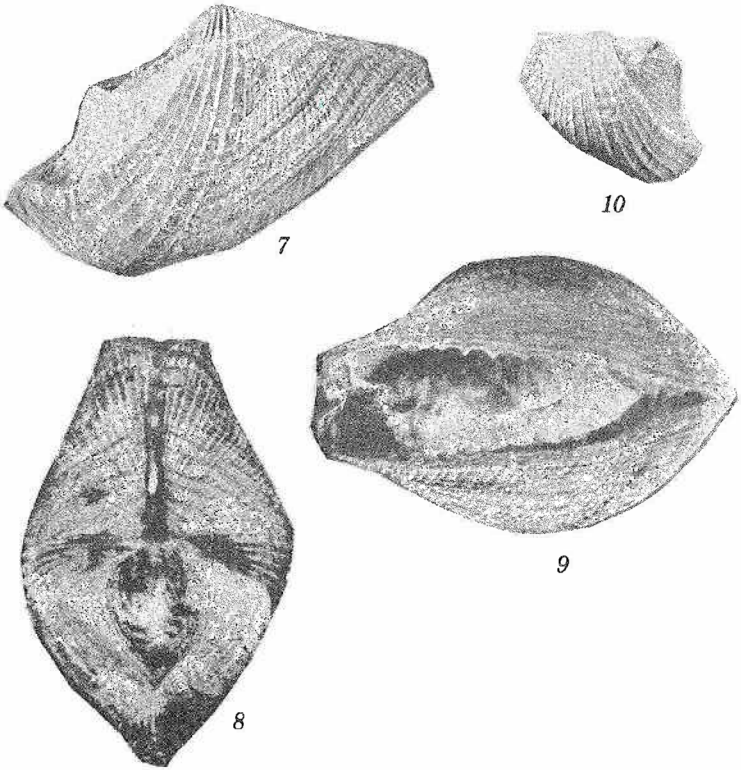

Figure 7. Right valve of a specimen of C. lanterna from the Palo Pinto Formation of Wise County, Texas. OU 798, x2.

Figure 8. Ventral view of same specimen, x2.

Figure 9. Dorsal view of same specimen, x2.

Figure 10. Left valve of a specimen of Conocardium obliquum from the Wewoka Formation of Pontotoc County, Oklahoma. OU 4538, x2.

is not well known and is from rocks of probable Pennsylvanian age. *C. ouralicum* (Verneuil, 1845) is a widespread species in the Pennsylvanian of Russia, but is one of the group of species with long, narrow anterior wing and globular body. A single specimen from St. Joseph, Missouri, in the U. S. National Museum and numerous specimens from the Millsap Lake Formation of Hood County, Texas, are of this group.

Conocardium parrishi Worthen, 1890, from the Winterset Limestone of Kansas City, Missouri, is a small, symmetrical, strongly carinate species unlike *C. lanterna*. *C. missouriense* Roundy (*in* Girty, 1915) is a synonym.

Other specimens of *C. lanterna* that have been examined are:

Lot of 34 specimens from the Copan locality. University of Tulsa.

Lot of 4 specimens from shales and sandstones above Balsora Limestone and below the Bridgeport coal, 2 miles north of Bridgeport, Texas. University of Kansas.

Lot of 5 specimens from the Caddo Creek Formation, Parr Ranch, near Chico, Wise County, Texas. Texas Bureau of Economic Geology 8226.

Lot of 4 specimens from 25 feet above the Avant Limestone, SE¼ sec. 20, T. 29 N., R. 13 E., Washington County, Oklahoma. University of Tulsa.

One specimen from the Wayland Shale, 1 mile south of Gunsight, Texas. Chicago University 48049.

In Oklahoma Late Paleozoic rocks *Conocardium snideri* is known only from the Morrowan Union Valley Formation in one small area; *C. obliquum* is confined to the Boggy and Wewoka Formations of Pontotoc County; *C. lanterna* is characteristic of Missourian rocks in northern Oklahoma. Specimens uncertainly identified as *C. lanterna* occur in Virgilian rocks. A single specimen of a different species of *Conocardium* was found in the silty facies of the Red Eagle Limestone in the south end of the Burbank quarry, Osage County. *Conocardium oklahomense* Beede is of sparse occurrence in the Doe Creek Lentil of the Marlow Formation at Whitehorse Springs, Woods County.

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Holotype of Type Species of *Mortoniceras*

Carl C. Branson

The ammonite genus *Mortoniceras* Meek, 1876, is based upon the species *Ammonites vespertinus* Morton, 1834. The type species was designated in the original paper (Meek, 1876, p. 448). Adkins pointed out in an abstract (1944, p. 102) that the species *M. vespertinum* is valid, is the true type species, and that it came from Choctaw County, Oklahoma.

Morton's original description (1834, p. 40-41, pl. 17, fig. 1) is as follows:

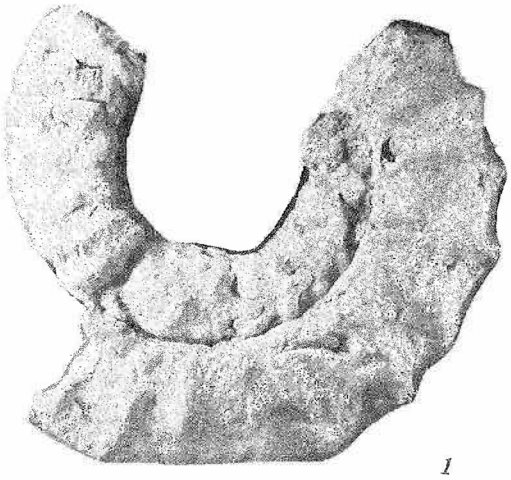
> 7. A. vespertinus. (S. G. M.) Pl. XVII fig. i. Specific character. Volutions uncertain; each furnished with profoundly elevated transverse ridges, with three slight nodes on each; that on the margin most prominent.
>
> Length of the fragment 13½ inches.
>
> My friend Dr. Z. Pitcher, of the United States Army, has presented me with several large fragments of this ammonite, from the plains of Kiamesha, in Arkansaw; where it is accompanied by Gryphaea vomer, G. Pitcheri and Exogyra costata. It is allied to A. delawarensis, but differs in the absence of bifurcations in the costae.

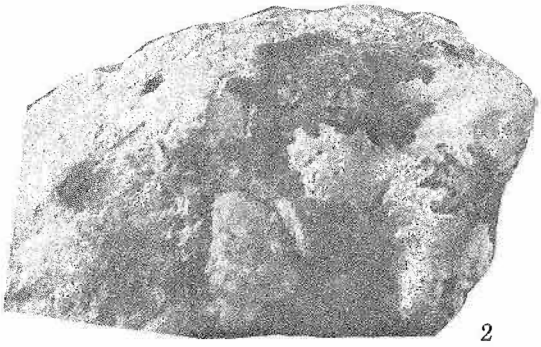
On page 24 Morton stated under the heading "Arkansas," "Mr. Nuttall long ago found fossils of this formation on the calcareous platform of Red river, above and below the junction of the Kiomeska; and Dr. Pitcher, of the United States' army, now at Fort Gibson, has politely obtained specimens for my use, among which I readily identify the Gryphaea vomer, Exogyra costata &c." (this is obviously not *E. costata*).

On page 82 he stated, "It will be observed that I have used the genus Ammonites in its unrestricted acceptation. The A. delawarensis and A. vespertinus are true ammonites, while all the other species of the synopsis might be associated with genus Orbitulites of Lamarck."

The new species *Gryphaea pitcheri* Morton, 1834 (p. 55, pl. 15, fig. 9) was said to be associated with *Ammonites vespertinus*. *G. pitcheri* is based upon a small specimen (1 inch long), but Morton stated that he had larger specimens. The locality was given as "from the plains of the Kiomeska, in Arkansas." He further stated, "I have seen others from the falls of Verdigris river, in the same territory." This latter statement is clearly in error as we understand the Verdigris River, which flows entirely upon Pennsylvanian rocks.

Marcou attempted to establish the locality of *G. pitcheri*. Hill had erroneously assumed that it was on the Llano Estacado (1887, p. 46). Marcou (1889, p. 189-190) printed the text of a letter which Dr. Pitcher had written to A. W. Whipple in 1859. Pitcher said that the *Gryphaea* came from the plains drained by the Kiomechia, "a small stream which empties into the Red River," and that the fossils were collected in 1833. The type specimen of *Mortoniceras vespertinum* has adhering and embedded specimens of *Gryphaea*, a condition which makes it likely that both of the new species came from the same locality.





Holotype of Mortoniceras vespertinum (Morton). Academy of Natural Sciences of Philadelphia 4783. Caddo Limestone, Choctaw County, Oklahoma.

Figure 1. Lateral view, one-fourth natural size.

Figure 2. Lateral view of inner part of second whorl, two-thirds natural size.

The type of *M. vespertinum* is a section, 13 inches across, of the outer whorl of a large specimen with a portion of the next inner whorl, 9 inches across and about 15 inches around the periphery, remaining. The specimen is No. 4783 in the Academy of Natural Sciences of Philadelphia. The original label reads "(Type) Ammonites vespertinus Mort., Cret., Dr. Morton. Arkansas."

A label prepared by W. S. Adkins reads "Genoholotype. Mortoniceras vespertinum (Morton), Prob. Duck Creek, Washita group, Cretaceous. Southern Oklahoma, ? Choctaw County, plains of Kiamichi River." The area was in Arkansas Territory until 1821, on the margin of Arkansas Territory until 1824, in Indian Territory at the time the collection was made.

Dr. Matsumoto studied the specimen in 1957 and left a note with it. He recognized the type nature of the material but thought that there are two specimens. Dr. Matsumoto's article (1961) is in Japanese, and it was kindly translated for me by Dr. Yoshikozu Sasaki of the School of Civil Engineering and Environmental Science, The University of Oklahoma.

(1) Ammonites vespertinus Morton (1834, p. 40, pl. 17, fig. 1) [Mortoniceras (s. s.) vespertinum (Morton)]. This is the original type specimen of **Mortoniceras** Meek and others, and therefore it is important. Two syntypes composed of specimens of relatively outer parts of the whorl have the same number ANSP 4783. The original of the figure by Morton is the larger one. In this paper, I will show the whorl-sections of the two syntypes, including also the smaller one. Both are very similar and could be judged to belong to the same species. It should be however noted that processes, one over the wide rib, are also seen around the umbilicus and at the corners of the ventrolateral area (original two pieces are united in the latter area). Also slight nodes, although insignificant, are seen at the middle of both sides. Furthermore, I had an opportunity at U. S. Geological Survey, Denver, by kind arrangements of Dr. Cobban to see good examples judged to be **M. vespertinum,** which were found at Duck Creek, Texas. Among these specimens are shells of immature specimens on which rib branches are well preserved on the inner whorls.

The definition of **Mortoniceras** given by Young (1957, p. 3) is hardly accepted because he was not concerned with the types.

I agree with the view held by Wright (1957) who argued that **Pervinquieria** Boehm, **Inflaticeras** Stieler, is a synonym of **Mortoniceras (Mortoniceras).** Furthermore Spath (1932) clearly indicated that it is a mistake to call a similar form of Senonian age **Mortoniceras** by confusing it with those of Albian age. Since then, the confusion has been eliminated by calling the former **Texanites** ("false" **Ammonites texanus** Roemer, 1852). There is however still some confusion in this area, and it is worth mentioning.

Dr. H. G. Richards has kindly lent the specimen to me. A small area of suture has been prepared, perhaps by Adkins. It shows the

characteristic club-shaped lobes on the saddles. The shell has strong nodose ribs and a distinct keel. The conch has an almost square outline, as illustrated by Matsumoto (1961, p. 37, figs. A, B).

The genus *Mortoniceras* was named and described by Meek (1876, p. 448-449). He designated the type in a line under the generic heading "Type.—*Ammonites vespertinus*, Morton (= *A. Texanus*, Roemer)." In a footnote he stated that Gabb had compared specimens of *A. texanus* Roemer from Morton's type locality with Morton's figure and found them identical. In fact Gabb's specimens must have been of *M. vespertinum* because *A. texanus* is referred to *Texanites*, which belongs to another ammonite family.

The Duck Creek and Fort Worth Formations cannot be separately mapped in Bryan and Choctaw Counties and are called the Caddo Formation, and it is from this formation that the specimen was collected, probably from the lower part of the Fort Worth equivalent.

Gryphaea corrugata Say, 1823, is the first fossil to be described from the area now included in the State of Oklahoma. The specimens were collected by Nuttall along the Kiamichi River about 14 miles northwest of the mouth. The locality would be at or close to the type locality of *Mortoniceras vespertinum* and *Gryphaea pitcheri*, possibly in the south-central part of T. 6 S., R. 18 E., a few miles southwest of Sawyer and the old Rock Chimney ferry. The statement of Hill and Vaughan (1898, p. 57) that "The present town of Goodland, Choctaw Nation, is as near the locality as can be identified" is clearly in error. Goodland was at that time in sec. 7, T. 7 S., R. 17 E., a site near the base of the Woodbine. The present town of Goodland is in the NE¼ of sec. 8 in the same township. The present town of Good was called Goodland in the early 1900's.

The fossils described from Oklahoma in the early nineteenth century are:

Ammonites vespertinus Morton, 1834 = *Mortoniceras vespertinum* (Morton)

Gryphaea corrugata Say, 1823

Gryphaea pitcheri Morton, 1834 (possibly equal to *G. corrugata*)

It is unfortunate that the genus *Mortoniceras* was founded upon a species with such a poor type specimen, and as yet the only known specimen. Good specimens are being sought in the type area. Until such are found the genus is understood only as a concept.

Several geologists have further confused the nomenclature and the generic concept by their labored interpretation of Meek's selection of type. Meek (in two places) stated "Type.—*Ammonites vespertinus*, Morton = (*A. Texanus* Roemer)." The two species are distinct, but, if they were not, Morton's is the older and the valid name. De Grossouvre (1893, p. 66) apparently was the first to consider *A. texanus* as type species. Pervinquière (1907, p. 227) rejected *A. vespertinus* as type species because it is insufficiently defined, an obviously illegal course. Stanton (1937) also concluded that *A. texanus* is the type species, and it is clear that Meek described the genus in part upon other species than *A. vespertinus*. Spath (1932) was correct in insist-

ing that the Albian form *A. vespertinus* is the type species and that the Senonian forms typified by *A. texanus* are best referred to his genus *Texanites*.

The inadequate preservation of the type specimen of *Mortoniceras vespertinum* leaves the generic concept including only those features which it displays: strong keel, square whorl section, ribs strong and radial (unknown on inner whorls), ribs nodose, three nodes on each rib (observable on but one rib), sutures trilobate on first lateral saddle, whorls slightly compressed.

Until satisfactory topotype material is found, the genus *Mortoniceras* cannot be considered useful.

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Rhizophagites, A Fossil Fungus from the Pleistocene of Oklahoma

L. R. Wilson

Rhizophagites Rosendahl, 1943, is a mycorrhizal type of fungus that is widely distributed through Pleistocene deposits in North America, yet is seldom reported in floral lists, probably because fossil fungi have not received adequate attention. Rosendahl's statement that *Rhizophagites* probably became extinct at the end of the Pleistocene must be questioned because fragments of similar organic structures are found at places in topsoil samples and in Recent Oklahoma stream-terrace deposits being studied by Thomas A. Bond. This fungus was first reported in Oklahoma by Pitt, Madeley, and Robertson (1961) from a stream-bar deposit in Cleveland County, and more recently by Wilson (in press) from the Domebo site, a late Wisconsinan swamp deposit which contained the skeleton of a mammoth and several artifacts considered by archeologists as contemporaneous with the elephant. The oldest wood in the deposit has been dated by the carbon-14 technique as 11,045 B. P.

The third occurrence, reported here, is from a swamp-soil deposit underlying a forest layer near the base of a cliff along Tesesquite Creek in Cimarron County, Oklahoma, sec. 26, T. 5 N., R. 1 ECM. A radiocarbon age of the deposit has not been obtained, but stratigraphic evidence indicates that it is as old as or older than that of the Domebo site.

Rosendahl's (1943) description of the genus *Rhizophagites* is not easily available to palynologists, and, because it is concisely comprehensive, it is given below. Also given is the description of *R. butleri*, with which the Oklahoma species compares exactly. The description of the fossil genus is essentially that of the modern genus *Rhizophagus* described by Butler (1939).

Rhizophagites Rosendahl, 1943

Mycelium consisting of subdichotomously branched, more or less tortuous, nonseptate, thick-walled hyphae, with unilateral projections, pale yellow to light brown in color and varying in thickness from 6.5 to 20.7μ, producing terminally ovate or short pyriform or subspherical, yellowish-brown to dark-brown vesicles, varying in size from 42 x 46μ to 103 x 124μ, with walls considerably thicker than the walls of the mature hyphae, vesicles at first in open communication with the hyphae, later becoming variously occluded by basal plugs or septa at the neck of the stalk or in the stalk or by a second wall forming around the contents, sometimes a second vesicle is formed within by proliferation from the stalk; contents made up of numerous granules, oil globules, and a number of angular crystallike bodies, vacuoles occasionally present.

Rhizophagites butleri Rosendahl, 1943

Hyphae moderately tortuous, with numerous unilateral projections and occasional diverticula, pale yellow in color, 9-11μ in diameter and uniform in thickness except where the branching occurs, stalks of the vesicles about the same diameter as the rest of the hyphae, vesicles chestnut brown in color, oval to subspherical, varying in size from 75 x 79μ to 103 x 124μ, average size 89 x 98μ, walls at the base of mature vesicles and walls of the neck of the stalks much thickened.

The naming of this apparently extant fungus *Rhizophagites* instead of *Rhizophagus*, the living form, would pose a problem if the same procedure were to be applied to all other Pleistocene plant genera or species that are not extinct. The little-known occurrence of the fungus at the time of its description was the motivating reason for the establishment of a fossil generic taxon. When *Rhizophagus* and *Rhizophagites* are better understood, it may be desirable to abandon the latter name.

The abundant occurrence of *Rhizophagites* in the Tesesquite Creek section is generally associated with dark blue-black clays, and the specimens were recovered from the clay by means of agitating in distilled water containing a commercial detergent. A heavy-liquid separation of zinc bromide (1.58 sp. gr.) removed the silt and clay particles, and microscope slides were made from the light-weight fraction. The material was prepared for study by Stephen A. Hall, and specimens illustrated in plate I are in the palynological collection of the Oklahoma Geological Survey with the accession numbers OPC 1125 B-3-1 and OPC 1125 B-4-1.

In the Tesesquite Creek section *Rhizophagites* occurs in association with moss leaves, disassociated moss capsules, many other soil-fungus spores, and pollen of pine, spruce, several species in the families Onagraceae, Malvaceae, Compositae, and Gramineae, and cattail (*Typha*). The paleoecology suggested by this assemblage is a local swamp, with wet to dry prairie around its periphery, and pine forest on the adjacent sandstone bluffs. The relatively small percentage of spruce pollen may indicate that this pollen was transported from the Rocky Mountains several hundred miles to the west.

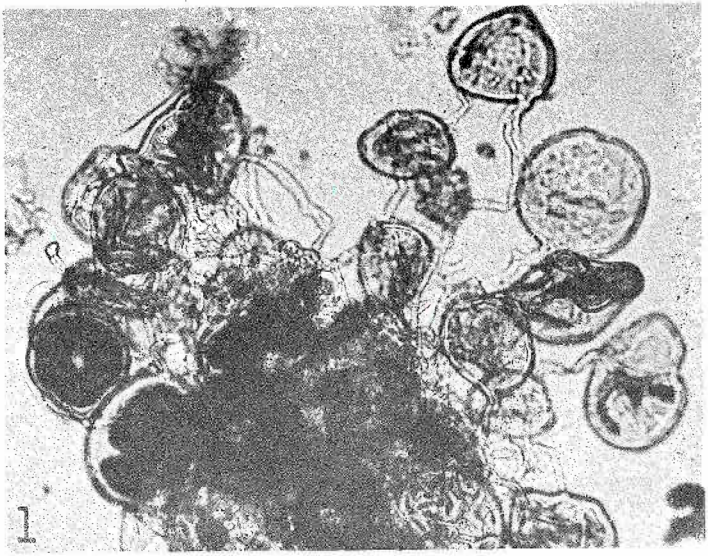
Explanation of Plate I

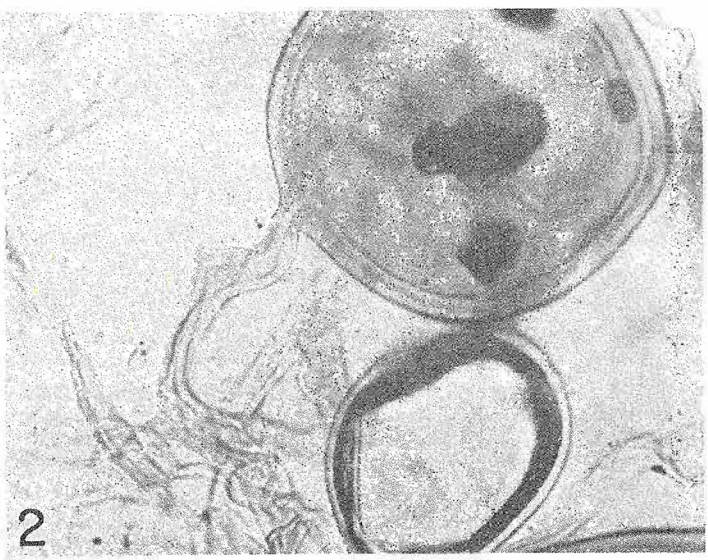
Rhizophagites butleri **Rosendahl, 1943, from Pleistocene forest-soil horizon in Tesesquite Creek, Cimarron County, Oklahoma.**

Figure 1. Cluster of hyphae, and stalks with vesicles. Hyphae diameter 6 to 9.7 microns, vesicle diameter 72 to 104 microns, wall thickness 4.8 to 7.7 microns. Slide OPC 1125 B-3-1.

Figure 2. Two vesicles, upper specimen showing mode of attachment to stalk and nonseptate tortuous hyphae with unilateral projections. Hyphae diameter 6 to 11.6 microns, large vesicle diameter 106 microns, wall thickness 7.7 microns. Slide OPC 1125 B-4-1.

Plate I





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Craig County Report Issued

Oklahoma Geological Survey Bulletin 99, *Geology and oil and gas resources of Craig County, Oklahoma,* was issued July 8, 1965. The report consists of two parts:

Part I. *Geology of Craig County,* by Carl. C. Branson and George G. Huffman

Part II. *Oil and gas in Craig County,* by Daniel M. Strong and George G. Huffman

The book comprises 109 pages, 36 figures, and 2 plates (plate I is a colored geologic map of Craig County). It may be purchased from the Survey for $4.00, cloth bound, or $3.00, paper bound.

ERRATA

Oklahoma Geology Notes, July 1965, Volume 25, Number 7

Page 194, last line: For **x42,00 read x42,000**
Page 198, last line: Add **Direct print: x42,000.**
Page 200, line 20: For **Bicteux-Grégoire** read **Bricteux-Grégoire**

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