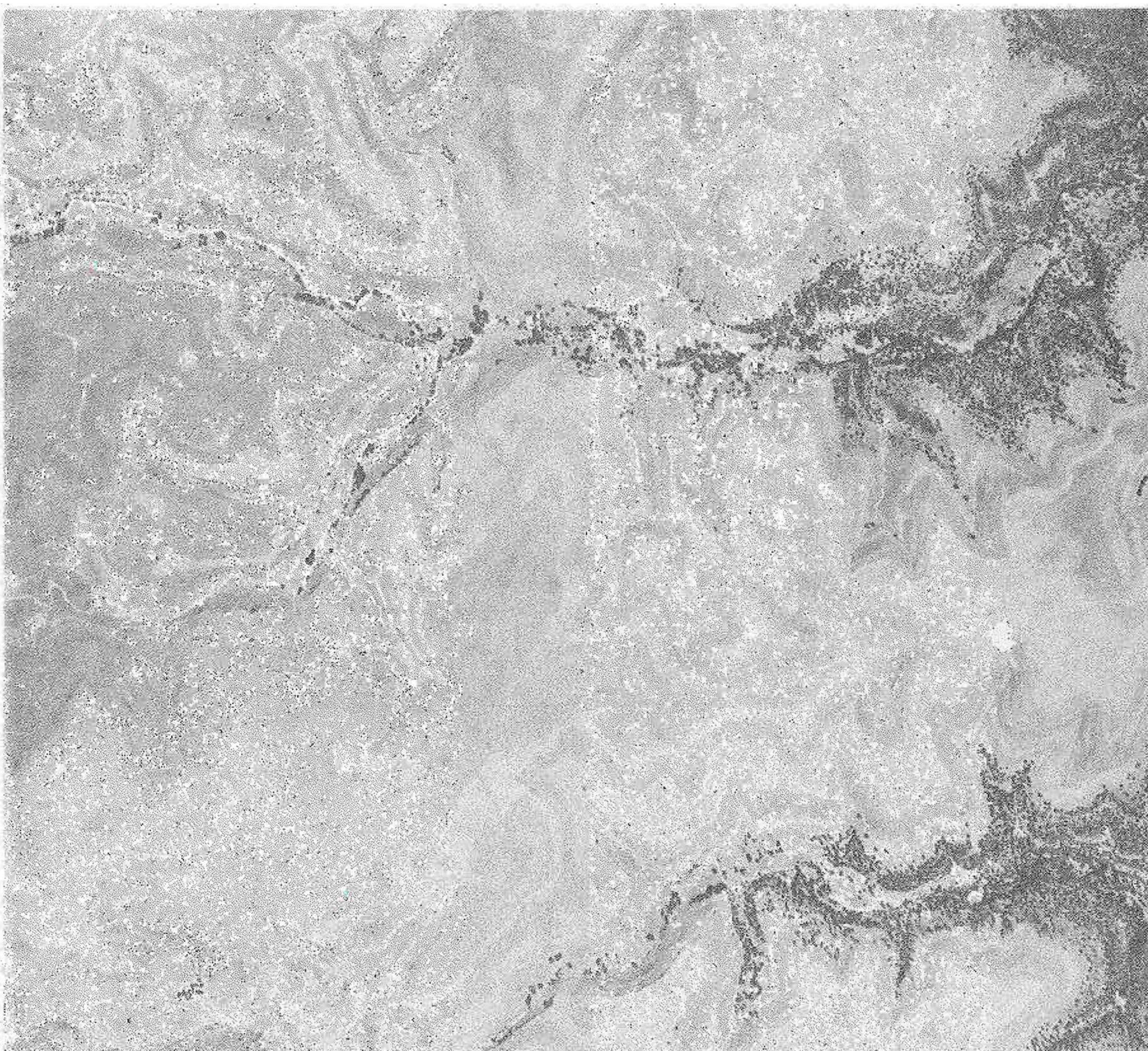
OKLAHOMA GEOLOGY NOTES



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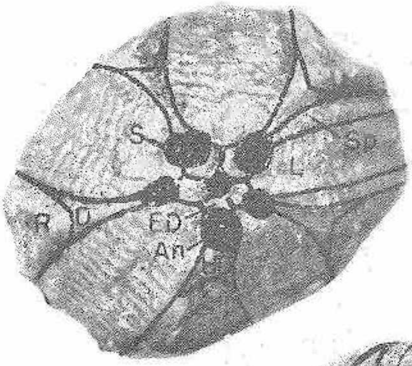
(two specimens), E,37 (one specimen); unfigured types (six specimens, one of which is shown here in text-figure 1); Geologisch-Paläontologisches Institut und Museum der Humboldt-Universität, Berlin, Germany. From upper part of Korallenkalkes, Etroeungtian (Lower Mississippian), Bahnhof Isenbügel, Wunstorf (shown on Kettwig sheet), Germany.



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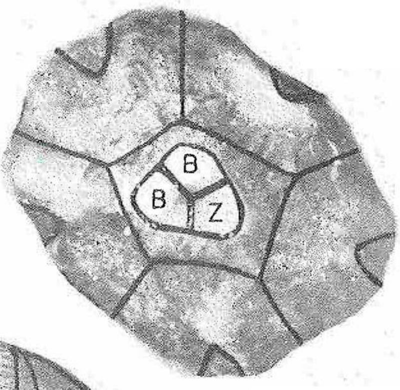

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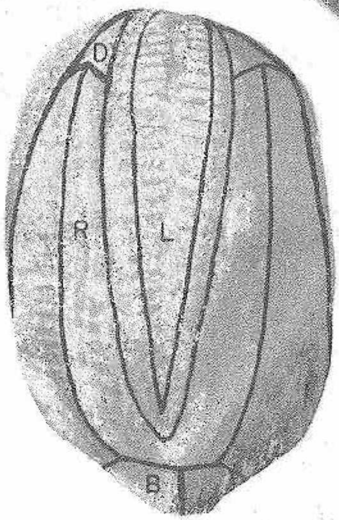

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Plate II

Petaloblastus ovalis (Goldfuss), 1829. Uebergangskalk, Lower Mississippian (Etroeungtian), Ratingen, Germany. Lectotype, Geologisch-Palaontologisches Institut und Museum der Rhein, Bonn.

Figures 1-3. Oral, aboral, and (D) ambulacral views, x6.7.

An—anal opening (anispiracle)	**L—lancet plate**
B—basal plate	**R—radial plate**
D—deltoid plate	**S—spiracle**
ED—epideltoid plate	**Sp—side plate**
HD—hypodeltoid plate	**Z—azygous basal plate**

Cover Picture

LIMESTONE OUTCROPS IN THE LONG-GRASS PRAIRIE

The cover photograph is a vertical view taken for the U. S. Department of Agriculture by Aero Exploration Company of Tulsa on August 26, 1954. The area includes sections 19 to 21, 28 to 30, and 31 to 33 in Township 28 North, Range 9 East, Osage County. The region was mapped geologically in 1954 by James Carter as part of his work for the Master of Science degree.

The area of the picture is the grassland on the limestone cuesta of the Pawhuska Formation (Virgilian Series) and the bands of difference in shading are the traces of the members of the formation. The lowest member (Lecompton Limestone) is exposed along the valley just above the tree-covered area, which is on sandy soil derived from the Elgin Sandstone. The member which supports the escarpment which extends onto the prominent points of land between streams is the Deer Creek Limestone. The thin limestone on the divides is the Little Hominy Limestone Member, seen as a narrow white band. Between the limestone layers are shales, thin (less than one foot thick) limestone beds and two thin coal seams.

On the airplane photograph the outcrop pattern is clearly seen as color bands. These bands are belts of differing type and concentration of vegetation and contrasting shades of soil color. The minor units cannot be differentiated by a geologist on the ground except in the few cliff exposures.

—C.C.B.

PLATYCRINITID COLUMNALS FROM THE PUMPKIN CREEK LIMESTONE

HARRELL L. STRIMPLE

The existence of platycrinitid-type columnals of Pennsylvanian and Lower Permian ages has been reported by Moore (1939a, 1939b), Weller (1930), and Tien (1926). Most of the columnals involved in those studies have elliptical articular facets. Tien reported three different types of such columnals from the Houkou Limestone, Upper Carboniferous (Pennsylvanian) of China, and assigned them to the genus *Platycrinus*. The generic name *Platycrinites* is the proper designation. Wanner has reported specimens of platycrinitids from the Permian formations of the Island of Timor, as *Eucladocrinus, Neoplatycrinus,* etc. The Chinese specimens could just as well belong to one of these genera. Unfortunately we are not informed as to the type of columnals that are applicable to the Timorian genera. Weller also used the generic designation of *Platycrinus* for his specimens. Moore (1939a) described a specimen as *Ellipsellipsopa spicata*. Here the "form" genus or group was termed *Ellipsellipsopae* Moore and was followed by Moore (1939b) for *E. latissima* Moore of Lower Permian age.

In *Index Fossils of North America* (1944), the "form" genus or group recommended by Moore and Laudon for use with isolated columnals was *Columnals*. This designation will be used herein in the descriptions of two new forms from the Pumpkin Creek Limestone, Desmoinesian, of southern Oklahoma.

Group COLUMNALS Moore and Laudon, 1944
Columnal quadrangulatus Strimple, new section
Figures 4-7

The holotype of *Columnal quadrangulatus* is a large, more or less quadrangular columnal. The articular facets are narrow, elongate, and elliptical. The intersection angle between the two facets is about 84 degrees. Rather large surfaces are exposed beyond the articular facets and there is a keel-like ridge at the middle of the sides. A small section of cirri is attached between the angles formed at the points of the divergent articular facets. Articular surfaces are not preserved well enough to determine the presence or absence of denticles. The fulcral ridges are prominent, rising sharply out of mid-portion of the facet to a height equal to the raised edges of the facets at about mid-distance between the lumen and the outer extremities of the facets. The lateral extremities of the facets are raised above the normal, outer, nonarticular surfaces.

The smaller paratype has a greater thickness and the long axis is proportionately shorter than that of the holotype. The intersecting angle is about 76 degrees. Two large scars, one of which is well preserved, are present for cirral attachment. The diameter of the better preserved scar is four times larger than that of the cirral found on the holotype. Numerous long crenulations radiate from a small round lumen at the center of the scar. The contour is circular and there is no fulcral ridge on the cirri.

Specimens figured by Tien (1926, pl. 3, figs. 5d-f, 6c-d) have more or less quadrangular outlines and elliptical articular facets. The first specimen is very thin and has much sharper corners than those found in *Columnal quadrangulatus*. The specimen represented by plate 3, figures 6c-d is rather poorly preserved and has an altogether different outline from those of other forms.

Weller's specimens 4 and 5 have external outlines somewhat comparable to the present form. The transverse ridges of the Illinois specimens intersect at an angle of 68 degrees, which is rather close to the 76 degrees found in the figured paratype of *Columnal quadrangulatus*.

Measurements of holotype in millimeters:

	OU 3969
Width of articular facets (long axis)	14.7
Width of articular facets (short axis)	6.7
Maximum width of columnal	15.7
Greatest length of segment	3.7
Diameter of lumen (long)	1.1
Diameter of lumen (short)	0.6
Width of cirri	1.5

Types.—Holotype, OU 3969; paratype, OU 3980; deposited in the paleontological collections, The University of Oklahoma.

Occurrence.—Pumpkin Creek Limestone Member, Big Branch Formation, Dornick Hills Group, Desmoinesian, Pennsylvanian; abandoned quarry southwest of Tucker Tower Museum, Lake Murray State Park, Love County, Oklahoma.

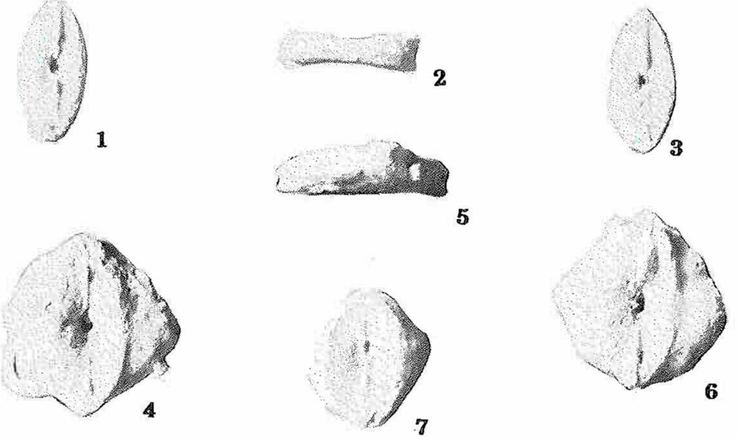
Columnal ellipticus Strimple, new section
Figures 1-3

Columnal ellipticus has a mildly swollen mid-section which is not pronounced enough to be termed a keel. The extremities are sharply produced as short spines, with the intervening nonarticular surface appearing to be slightly depressed. One specimen that has been observed is a nodal. The cirri attachment truncates one of the normally sharp-pointed extremities. The fulcral ridge occupies the medial portion of the articular surface, parallel to the long axis, and is strongly elevated at a short distance from the centrally located lumen. There is no noticeable widening of the fulcral ridge as the lateral extremities are approached. No denticles have been noted; however, the preservation is not favorable for such delicate structures. If there is any divergence of angle between the articular facets, it is too slight to be a serious factor and certainly could not produce the twisted stem associated with the platycrinids.

Measurements in millimeters:

	OU 3979
Width of articular facet (long axis)	11.8
Width of articular facet (short axis)	5.0
Maximum width of segment	12.3
Maximum width of segment (short axis)	5.0
Diameter of lumen (long)	1.3
Diameter of lumen (short)	0.7

Several described forms are comparable to *C. ellipticus*. *Platycrinus* sp., Tien (1926, pl. 3, figs. 6a-b), is proportionately shorter and the lateral extremities are more rounded than those of *Columnal ellipti-*



Columnal ellipticus, **new section.**

Figures 1-3. Isolated ossicle (holotype) from one articular side, from lateral side, and from opposite articular side. OU 3979.

Columnal quadrangulatus, **new section.**

Figures 4-6. Isolated ossicle (holotype) from one articular side, from lateral side, and from opposite articular side. OU 3969.

Figure 7. Isolated ossicle (paratype) from upper? articular surface. OU 3980.

cus. Platycrinus sp., Tien (pl. 3, figs. 5b-c), appears to be proportionately longer, but is a compressed specimen. It does not have pointed lateral extremities.

Weller's specimen, *Platycrinus* sp. (1930, fig. 1) is somewhat comparable but is much closer to the specimen in Tien's plate 3, figures 6a-b than to the present form. *Ellipsellipsopa latissima* is proportionately longer and is keeled entirely around the columnal.

Holotype.—Paleontological collections, The University of Oklahoma, OU 3979.

Occurrence.—Pumpkin Creek Limestone Member, Big Branch Formation, Dornick Hills Group, Desmoinesian, Pennsylvanian; abandoned quarry southwest of Tucker Tower Museum, Lake Murray State Park, Love County, Oklahoma.

References Cited

Moore, R. C., 1939a, The use of fragmentary crinoidal remains in stratigraphic paleontology: Denison Univ., Bull., Jour. Sci. Lab., vol. 33, p. 165-250, pls. 1-4.

———— 1939b, Platycrinid columnals in Lower Permian limestone of western Texas: Jour. Paleontology, vol. 13, p. 228-229, 1 text-fig.

Moore, R. C., and **Laudon, L. R.,** 1944, Class Crinoidea, **in** Index Fossils of North America: New York, John Wiley & Sons, Inc., p. 137-209.

Tien, C. C., 1926, Crinoids from the Taiyuan series of North China: Palaeontologia Sinica, ser. B, vol. 5, p. 5-51, pl. 3.

Wanner, J., 1916, Die permischen Echinodermen von Timor, Teil I: Paläontologie von Timor, Lieferung 6, Teil 11, p. 1-329, pls. 96-114, Stuttgart.

Weller, J. M., 1930, On the occurrence of **Platycrinus** in Pennsylvanian strata of western Indiana: Ill. State Acad. Science, Trans., vol. 22, p. 478-484, text-figs. 1-7.

Report of *Syringopora multattenuata* in Oklahoma

E. A. Frederickson

A recent article in the September 1961 issue of the Journal of Paleontology (McCutcheon, 1961) designated and described a neotype specimen for the species *Syringopora multattenuata* McChesney.

The article listed the Upper Pennsylvanian rocks in the various states of North America from which the species had been reported. Oklahoma was not one of the states mentioned.

However, specimens of this species have been found in abundance in the Confederate Limestone, south of Ardmore, Oklahoma, in Lake Murray State Park.

According to McCutcheon, "the characters of *S. multattenuata* that distinguish it from all other species of *Syringopora* are the thick wall, lack of septa, and the hollow axial tube bordered by dissepiments."

Thin sections of a portion of a large corallum from the Confederate Limestone, illustrated here, show these characters well. However, the axial tube is obvious only in a portion of the longitudinal section. The flexuous character of the corallite tube made a continuous axial section exceedingly difficult to obtain. Weathered specimens of corallites, not illustrated, also showed the axial tube.

The neotype specimen is from a locality on Crow's Creek, approximately 8 miles south of Springfield, Illinois. The limestone in which it occurs is considered equivalent to the Macoupin Limestone which is lower Missourian.

The Confederate Limestone in the Ardmore basin area of Oklahoma is also lower Missourian and is considered the basal member of the Hoxbar Group (Upper Pennsylvanian).

McCutcheon reported that the maximum size of the corallum in the specimens available was greater than 8 cm high, 12 cm long, and 9 cm wide. The large corallum from which the thin sections illustrated here were made is nearly 3 times as large, measuring 15 cm high, 32 cm long, and 27 cm wide.

Reference Cited

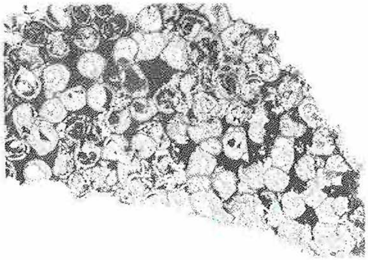
McCutcheon, V. A., 1961, Redescription of **Syringopora multattenuata** McChesney: Jour. Paleontology, vol. 35, p. 1014-1016.

Explanation of Plate I

Syringopora multattenuata McChesney, 1860

Figure 1. Transverse section of portion of corallum showing pattern of dissepiments, x2.
Figure 2. Longitudinal section of two corallites showing axial column in left corallite, x5.
Figure 3. Longitudinal section of corallite showing flexuous nature and dissepiment pattern, x5.
Figure 4. Enlarged lower right-hand portion of specimen shown in figure 1, showing thick walls of corallites, x5.
Figure 5. Longitudinal view of part of corallum showing numerous corallites and pattern of dissepiments, x5.

Plate I



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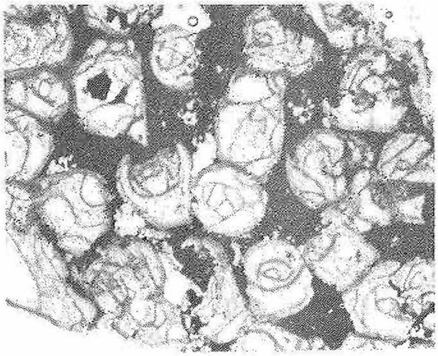

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Résumé of New Nomenclature Published in Oklahoma Geology Notes

September 1960 through January 1962

Beginning with the September 1960 issue (vol. 20, no. 9) the policy of the *Oklahoma Geology Notes* was modified to allow the publication of new taxa. Since that date seven new genera and fifteen new species have been named by authors of the *Notes*. Because of the recentness of this policy change, the following tabulation of new taxa introduced is presented for the convenience of those interested in Oklahoma paleontology.

NAME	AUTHOR	VOLUME	PAGES
Ostracoda			
Ceratoleperditia n. gen.	Harris	20	211-216
C. arbucklensis n. sp.			
Blastoidea			
Ellipticoblastus n. gen.*	Fay	20	315-317
E. orbicularis (Sowerby) n. comb.*			
Deltoblastus n. gen.*	Fay	21	36-40
D. elongatus (Wanner) n. comb.*			
Polydeltoideus n. gen.	Reimann & Fay	21	86-89
P. enodatus n. sp.			
Doryblastus n. gen.*	Fay	21	194-196
D. melonianus (Schmidt) n. comb.*			
Agmoblastus n. gen.	Fay	21	278-280
A. dotti (Moore & Strimple) n. comb.			
Scyphozoa			
Conostichus stouti n. sp.*	Branson	21	130-138
C. hoodi n. sp.			
C. pulcher n. sp.			
C. arkansanus n. sp.*			
C. quinni n. sp.*			
Crinoidea			
Bronaughocrinus cherokeensis n. sp.	Strimple	21	186-189
Stuartwellercrinus praedecta n. sp.			
Paradelocrinus wapanucka n. sp.	Strimple	21	225-229
P. johnstonensis n. sp.			
P. atoka n. sp.			
Paragassizocrinus bulbosus n. sp.	Strimple	21	294-298
P. elevatus n. sp.			
P. ellipticus n. sp.			
Cephalopoda			
Wewokites n. gen.	Furnish &		
W. venatus (Girty) n. comb.	Beghtel	21	289-293

*Not an Oklahoma form.

In addition to the above, two new crinoid-columnal form taxa were introduced by H. L. Strimple (pages 3-5, this issue).

Only one new stratigraphic term was introduced during this time, that of the Lyon (Lyonian) Series (Lower Permian?), by C. C. Branson, volume 20, pages 229-235.

A Taxonomic and Grammatical Dilemma

Carl C. Branson

In 1911 (p. 149) G. H. Girty described a new species of cephalopod from the Wewoka and named it *Gastrioceras venatum*. He further described the species and illustrated it in 1915 (p. 254, pl. 32, figs. 1-3b). In 1961 Furnish and Beghtel established the new genus *Wewokites* with *Gastrioceras venatum* as type species. The name *Gastrioceras* is neuter; *Wewokites* is masculine. Should the specific name have been changed to *venatus*, the masculine form? Girty did not give the derivation of the name. With the help of Miss Romona Howell of the Classics Department of The University of Oklahoma it was determined that there is no Latin adjective *venatus, a, um*. There is a Latin noun *venatus*, meaning hunting, or the chase. If Girty derived the name from the noun, he changed the ending to the neuter form and set it up as a substantive in apposition to the generic name. In this case the spelling cannot be changed and the gender does not matter. Girty was a classical scholar of considerable attainments and it seems as unlikely that he would change the ending of a noun as that he would use a meaningless specific name.

It is here suspected that he coined an adjective, venatus, from Latin *vena*, a vein. The Latin adjective for "full of veins" is *venosus, a, um*. The species is clearly ornamented by vein-like lirae and the intent to coin a word seems clear. A note by me (1952, p. 999-1000) strongly urged authors to give derivation of new names of fossils. The present example is a clear case of the doubt introduced by failure to do so. Either Girty changed the ending of the Latin noun to give the form *venatum*, in which case it is fixed and unchangeable or he coined an adjective, *venatus, a, um*, from the noun *vena*, not recognizing that the classical form is *venosus, a, um*. In the latter case, the specific name is an adjective and its gender must agree with that of the name of the genus. Furnish and Beghtel adopt this view and render the specific name as *venatus*.

References Cited

Girty, G. H., 1911, On some new genera and species of Pennsylvanian fossils from the Wewoka Formation of Oklahoma: New York Acad. Sciences, Annals, vol. 21, p. 119-156.

Girty, G. H., 1915, Fauna of the Wewoka Formation of Oklahoma: U. S. Geol. Survey, Bull. 544, p. 271.

Branson, C. C., 1952, Taxonomy in the Journal of Paleontology: Jour. Paleontology, vol. 26, p. 999-1000.

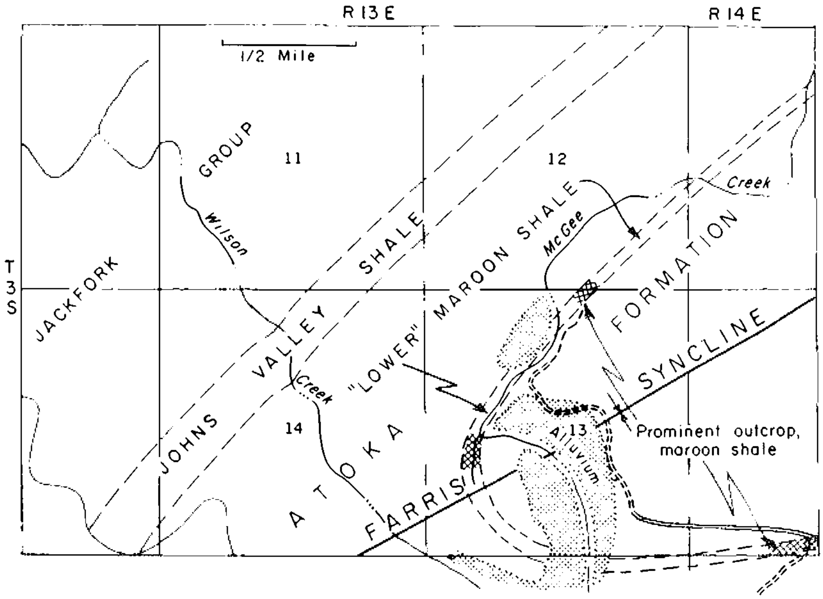
Furnish, W. M., and **Beghtel, F. M.,** 1961, New genus of cephalopods from the Wewoka Formation of Oklahoma: Okla. Geol. Survey, Okla. Geology Notes, vol. 21, p. 289-293.

Maroon Shale in Lower Part of Atoka Formation

William D. Pitt and Richard L. Boone

A distinctive maroon-colored shale was recognized by Richard L. Boone during his recent mapping of Bruno and Lane quadrangles of south-central Atoka County (Boone, 1961, p. 75). The shale is about 1,500 feet above the base of the Atoka Formation and lies directly upon thick beds of tan and green sandstone. The stratigraphic position of this lower Atoka shale resembles that of the Prairie Hollow Maroon Shale Member of the Wildhorse Mountain Formation with respect to the base of the Jackfork Group, for the Prairie Hollow Member is about 1,700 feet above the base of the Jackfork Group (Cline and Moretti, 1956, p. 12; Shelburne, 1960, p. 27). The maroon-colored shale of the lower Atoka is only 50 to 75 feet thick, but Boone reported that it is persistent in the western part of the Farris syncline in secs. 7 and 18, T. 3 S., R. 14 E., and secs. 12, 13, 24, T. 3 S., R. 13 E. (fig. 1). The maroon shale is especially well exposed at a road-cut in SE¼ sec. 18, T. 3 S., R. 14 E., as well as along a north-draining gully in NW¼ SW¼ sec .13, T. 3 S., R. 13 E. Maroon probably is the original color; the shale probably is another result of the existence of widespread oxidizing conditions in the Ouachita depositional trough (Cline, 1960).

A two-foot-thick bed of dark siliceous shale rests upon the maroon shale. The siliceous shale also could have stratigraphic significance as it is traceable eastward from the Northwest Lane quadrangle into the Farris quadrangle. The siliceous shale is well exposed in a southwest-draining gully about 2,000 feet west of SW cor. sec. 12, T. 3 S., R. 13 E.;



typically it forms thin plates of siliceous shale that are easily recognized on slopes.

The mapped maroon shale outcrop is only about 12 miles east-southeast of the type area of the Atoka Formation, which is directly southwest of Atoka. The nearness of these two areas suggests that the maroon shale might also be present in the type area, together with other units within the Ouachita Mountains, such as the siliceous shale bed 200 feet above the base of the Atoka Formation described by Hendricks et al. (1947, sheet 1). A type section could be measured in the type area.

References Cited

Boone, R. L., 1961, Areal geology of Bruno and Lane quadrangles, Atoka County, Oklahoma: Okla., Univ., unpublished MS thesis.

Cline, L. M., and **Moretti, Frank**, 1956, Two measured sections of Jackfork Group in southeastern Oklahoma: Okla. Geol. Survey, Circ. 41, 20 p.

Cline, L. M., 1960, Late Paleozoic rocks of the Ouachita Mountains: Okla. Geol. Survey, Bull. 85, 113 p.

Hendricks, T. A., Gardner, L. S., Knechtel, M. M., and **Averitt, P.**, 1947, Geology of the western part of the Ouachita Mountains in Oklahoma: U. S. Geol. Survey, Oil and Gas Inv. Prelim. Map 66, 3 sheets.

Shelburne, O. B., Jr., 1960, Geology of the Boktukola syncline, southeastern Oklahoma: Okla. Geol. Survey, Bull. 88, 84 p.

Honess Mountain

In the fall of 1961, the United States Board on Geographic Names in *Decisions on Names in the United States, Decision List No. 6102,* announced the approval of the name Honess Mountain for an east-west trending mountain in the Ouachita Mountains in eastern Oklahoma. Situated in Ouachita National Forest, just east of Coon Mountain and north of Rich Mountain, and two miles west-southwest of the town of Page, Honess Mountain is about two miles long, 0.4 mile wide, and has an elevation of 1,845 feet.

The mountain was named for Dr. Charles William Honess, a geologist who did pioneer work in the area. The name was granted at the request of Dr. Donald Seely, then a graduate student at The University of Oklahoma. Seely then gave the name Honess fault to a major Ouachita fault that follows Big Creek down the valley between Rich and Blackfork Mountains. In his research for his doctoral dissertation, Dr. Seely found that the fault had been discovered by Honess, who showed it in one of his cross sections, but that it had not been named.

Dr. Honess was associated with the Oklahoma Geological Survey from 1916 to 1923. After spending three field seasons (1917-1919) in the Ouachita Mountains, he prepared Bulletin 32, entitled *Geology of the Southern Ouachita Mountains of Oklahoma,* which was published in 1923. Of this profusely illustrated bulletin, Dr. C. N. Gould, in his autobiography, *Covered Wagon Geologist,* said, "Many geologists consider this report one of the finest pieces of scientific writing ever published in Oklahoma."

From 1923 to 1927, Dr. Honess was a petroleum geologist for the Empire Gas and Fuel Company (now Cities Service). From 1927 until his death in 1949 at the age of 64, he was with the geology department of the Gulf Oil Corporation, serving first in Oklahoma and Kansas and later as district geologist in Kentucky and Indiana.

—E.F.

Maynard Pressley White (1896-1961)

Maynard White, who worked for many years on the fusulinids of the Ardmore basin, passed away on October 12 at his home in Sedgewick, Queenstown, Maryland.

Maynard was born in Newark, Ohio, on August 19, 1896. He received his bachelor's degree from Brown University in 1920, his master's degree from Columbia University in 1923 and his doctorate there in 1929. He served in the U. S. Army from 1917 to 1919. He had worked at various times for the Pennsylvania Railroad as assistant in the maintenance of ways and valuation departments (1916, 1921, 1922), as assistant geologist for Compania Mexicana de Petroleo (1920-21), as paleontologist for International Petroleum Company, in Mexico (1923-1926), and as inspector for the New York Water Supply System (1926-1928). In 1928 he joined Gulf Oil Company, for whom he worked in Ardmore until his retirement in 1952.

Dr. White was expert in the use of fusulinids for correlation and determination of age of rock strata. He wrote a long illustrated book on more than 100 species of fusulinids of the Ardmore basin, a book which unfortunately was not published. His doctoral dissertation, *Some index Foraminifera of the Tampico embayment area of Mexico,* was published in the Journal of Paleontology (vol. 2, p. 177-215, 1928, and vol. 3, p. 30-58, 1929). Some of his fusulinid work was published as *Some Texas Fusulinidae* (Texas University, Bull. 3211, 105 pages, 1932), *Some fusulinid problems* (Journal of Paleontology, vol. 10, p. 123-133, 1936), and *A fusulinid slide rule* (Journal of Paleontology, vol. 24, p. 123-129, 1950).

White suffered a stroke not long after his retirement and had been largely incapacitated for some years.

Dr. White was a fellow of the Geological Society of America, and of the American Association for the Advancement of Science, a member of the American Association of Petroleum Geologists, the Paleontological Research Institution, and the Society of Economic Paleontologists and Mineralogists, and research associate of the American Museum of Natural History.

Maynard and Ruth were married in 1923, and she and a son, Pressley, survive him.

—C.C.B.

A Fossil Sinkhole

Arthur J. Myers

Because of the presence of large amounts of soluble rock (salt and gypsum) in the Permian formations of western Oklahoma, sinkholes are common throughout much of that area. In many instances the walls of these sinkholes are nearly vertical. Sinkholes in western Oklahoma have been described by Myers (1959, 1960), Stephens (1960), and Meinert (1961), and the recent development of new sinks during 1958 was reported by Fay (1958) and Copley (1961).

Ground water, percolating through the Permian rocks, dissolves the salt and gypsum to form caverns. Once a cavern is formed, subsidence can take place either slowly or rapidly. In the former case the result may be only a distortion of the overlying beds. In the case of rapid or sudden subsidence, a sinkhole will form at the surface. Fay (1958, p. 59) described a recent sink 45 feet in diameter and 17 feet deep. Copley (1961, p. 45) described one 19 feet across and 35 feet deep. In each case the wall of the sink was nearly vertical. Once developed, a sinkhole will be filled partly or completely by sediments carried into it by rainfall runoff or by streams.

Porter E. Ward of the U. S. Geological Survey Ground Water Branch called the writer's attention to circular landforms in Roger Mills County, Oklahoma, which have the appearance of silos. The largest and best preserved of these is in SW¼ NE¼ sec. 11, T. 12 N., R. 23 W., but others are present in nearby sections (figs. 1, 2).

The silo-like structure encloses an area of approximately 50 feet in diameter. The wall ranges in thickness from 1 to 2 feet and has a max-

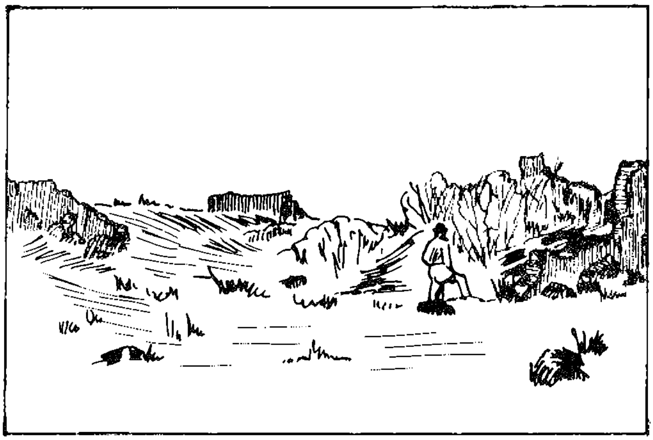


Figure 1. Sketch of close-up view of fossil sinkhole with lithified peripheral wall exposed above ground level. Central area is depressed due to removal of sand for the making of cement.
(Sketch by Porter E. Ward)

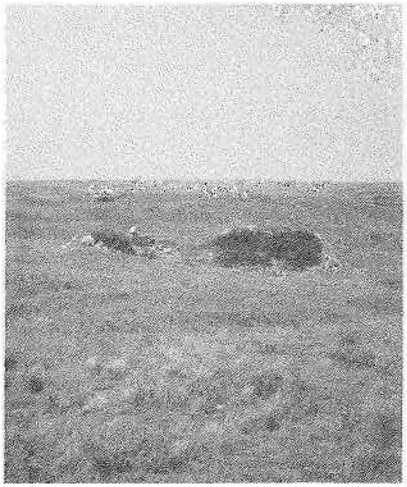


Figure 2. Fossil sinkhole viewed from same direction as in figure 1. Details shown in figure 1 are obscured by vegetation.

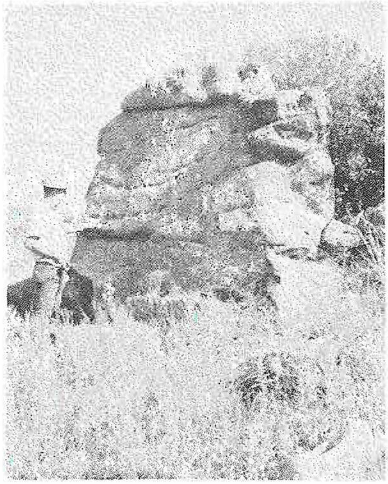


Figure 3. Part of wall of fossil sinkhole formed by lithification of peripheral portion of sinkhole fill.

imum height of 8 feet above land surface (fig. 3). The material within the enclosed area is grayish orange-pink, medium-grained, subangular sand containing some coarse grains and a few well-rounded to spherical grains. Colorless quartz is the most abundant mineral; rose quartz is second in abundance; and there are minor amounts of round magnetite grains, soft highly weathered orthoclase, and biotite. Also present are pebbles of red Permian mudstone up to 4 inches in diameter. The wall is composed of the same materials cemented by calcium carbonate. Loose sand from the central portions of this and other similar structures has been used by local residents in making concrete.

These silo-like forms are probably "fossil sinks." The materials of which the walls and central parts are composed are unlike the materials of the Doxey Formation in which they are found. The Doxey in this area is composed of flat-lying brownish-maroon siltstones and mudstones, some of which form prominent ridges. At the beginning of Pleistocene time there was at least a thin veneer of the Ogallala Formation above the Doxey Formation, as the Ogallala is in place three miles to the west and Ogallala debris caps nearby hills. In western Roger Mills County the Ogallala has a maximum thickness of 300 feet (Kitts, 1959, p. 5). The original sink in sec. 11, T. 12 N., R. 23 E., formed during early Pleistocene time by collapse of the rocks above a cave which had formed in one of the underlying Permian formations. The soluble material could be gypsum (or salt) in the underlying Cloud Chief Formation, or in a deeper formation. Lovett (1960) estimated that the total thickness of the Cloud Chief Formation is about 160 feet in Roger Mills County. The Cloud Chief consists of shales with interbedded gypsum lenses and stringers and veins of selenite and satin spar, and J. R. Bowers (oral communication) believes that the gypsum and selenite make up about one-third of the bulk. If a major part were removed, the subsidence could have been as much as 50 feet. How much subsidence has taken place is not known, but in the collapse zone there must be a jumbled mass of Cloud Chief, Doxey, and Ogallala boulders.

The early Pleistocene streams eroded channels and then filled them to the High Plains level, as is evidenced by the alluvial deposits in Harper and Woodward Counties. In northwestern Oklahoma the melt-water streams from the Rocky Mountains flowed on the Ogallala and formed channels which cut into Permian beds. Some of the water flowed into the sink and deposited its load, which consisted of Permian pebbles, Ogallala sand, and sand derived from the Rocky Mountains. Once the sink was filled, the outer wall was lithified by precipitation of calcium carbonate from percolating ground water. Since middle Pleistocene time, the streams have been downcutting and have formed their present valleys. Tributaries from the Washita River have eroded headwardly and removed the Ogallala and part of the Doxey, with consequent exhumation of the sink. The Doxey has a maximum thickness of 60 feet, but in the area of the sink about 30 feet is present. Because the lithified outer portion of the sink fill is more resistant than the Doxey, it rises above the surrounding topography like a silo.

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Late Desmoinesian Crinoids

Bulletin 93, *Late Desmoinesian crinoid faunule from Oklahoma,* by Harrell L. Strimple, was released by the Survey on December 12, 1961. The book is a description of crinoid specimens nearly all of which have been collected from one locality in the Holdenville Formation near Beggs, Okmulgee County. The Holdenville locality has yielded 436 cataloged specimens of crinoids, representing 21 genera, 25 species, and 1 subspecies. Eleven of the genera, 21 of the species, and the subspecies are new. The Holdenville collection is remarkable because the excellent preservation of the specimens has yielded new information on anal sacs, umbrella structures, regeneration of damaged parts, and parasites.

The book consists of 189 pages, 19 plates, and 23 text-figures. It may be purchased from the Survey for $2.50 cloth, $1.50 paper bound.

Types of *Petaloblastus*, a Mississippian Blastoid from Germany

Robert O. Fay

The genus *Petaloblastus* Fay, 1961, may be characterized as a spiraculate blastoid, with 5 spiracles, anispiracle between an epideltoid and a hypodeltoid plate, short deltoids with apex of radiodeltoid suture pointing adorally, lancet plate exposed almost its entire width, radials overlapping deltoids, 4-6 hydrospire folds on each side of an ambulacrum, and pyriform shape. There are two known species, *P. ovalis* (Goldfuss), 1829, (type species, small, medium width, 4 hydrospire folds) and *P. boletus* (Schmidt), 1930, (large, wide, 5-6 hydrospire folds), both from the Etroeungtian marls (Lower Mississippian) of Germany. The type specimens of Goldfuss are on deposit in the Bonn Geologisch-palaeontologisches Institut und Museum der Rhein. Friedrich Wilhelms-Universität, and those of Schmidt are on deposit in the Geologisch-Paläontologisches Institut und Museum der Humboldt-Universität zu Berlin. The specimens are labeled *Pentremites ovalis* and *Pentremites boletus* respectively.

I wish to thank Professor Doctor H. K. Erben of Bonn and Professor Doctor W. Gross of Berlin for loan of the types, and Dr. A. J. Boucot, Massachusetts Institute of Technology, for delivery of the specimens from Bonn. There are 5 specimens of *P. ovalis,* one of which has been selected as lectotype, and 9 specimens of *P. boletus,* one of which is the holotype.

Petaloblastus boletus (Schmidt), 1930

Plate I, figures 1a-c, 2a-c; text-figure 1

Pentremites boletus Schmidt, 1930, p. 68-69, fig. 13a-d.

The description is that of the holotype, supplemented by that of the other specimens where needed. Theca calcitic, 14.5 mm long by 10.5 mm wide, obpyriform, with vault 8.5 mm long and pelvis 6 mm long, pelvic angle on radial bodies 105 degrees, and on aboral end of basals 10 degrees. Basalia pentagonal, 6 mm in diameter, with 3 normally disposed basals forming a broad cone in side view. Stem round, 0.75 mm in diameter with small round lumen. Radials 5, each broadly pentagonal, 8.5 mm long by 5 mm wide, with a wide, broad, shallow sinus 5 mm long by 5 mm wide (at top). The radiodeltoid suture forms an

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Explanation of Plate I

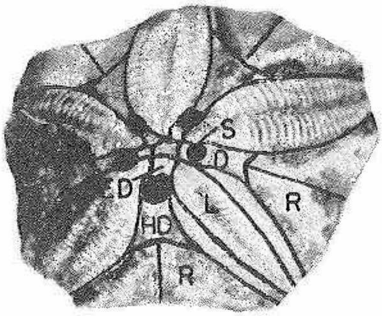
Petaloblastus boletus **(Schmidt), 1930. Upper Korallenkalkes, Lower Mississippian (Etroeungtian), Bahnhof Isenbügel, Wunstorf, Germany.**

Figures 1a-c. Oral, (C) ambulacral, and aboral views of holotype, $E_4$21, x4.3.

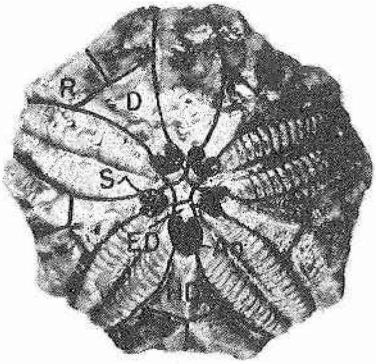
Figures 2a-c. Oral, (D) ambulacral, and aboral views of paratype, $E_4$23, x4.3.

An—anal opening (anispiracle)	**L—lancet plate**
B—basal plate	**R—radial plate**
D—deltoid plate	**S—spiracle**
ED—epideltoid plate	**Sp—side plate**
HD—hypodeltoid plate	**Z—azygous basal plate**

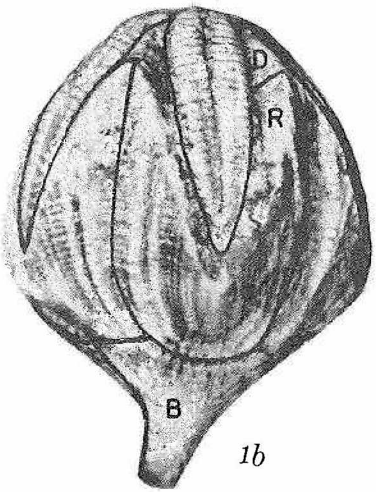
Plate I



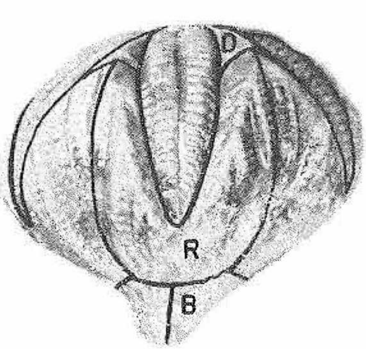
1a



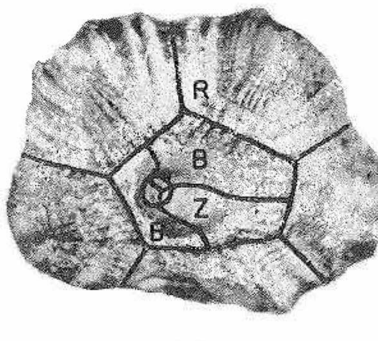
2a



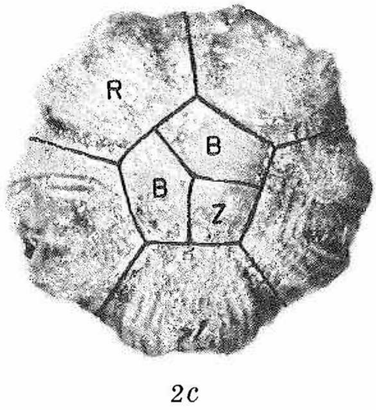
1b



2b



1c



2c

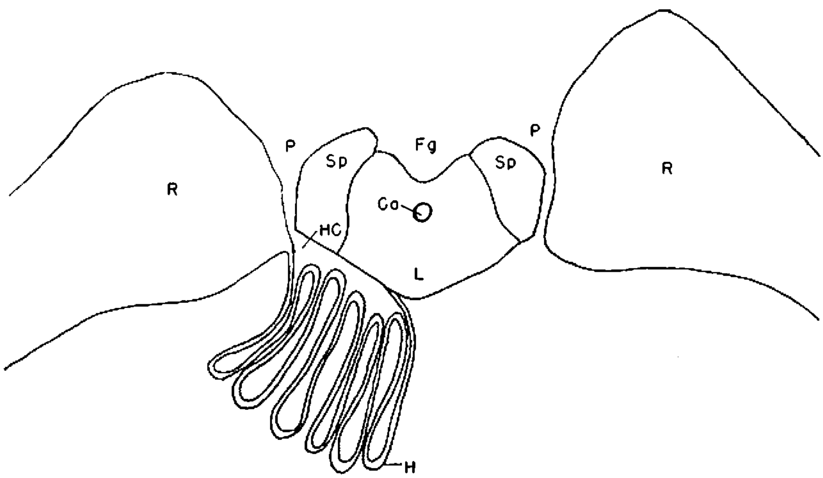
inverted V, with apex adoral, forming an angle of approximately 140 degrees, with center at intersection with interradial suture. Radials overlap deltoids.

Deltoids 4, arrow-shaped, short, each 3.5 mm long by 2 mm wide, with one large spiracle notched in the adoral tip. On the anal side the anispiracle is between a small adorally disposed pentagonal epideltoid and a large subquadrangular aborally disposed hypodeltoid. Thus there are 5 spiracles surrounding the oral opening, comprising 4 spiracles plus the anispiracle. The oral opening is surrounded by the 5 deltoid lips.

Ambulacra 5, petaloid, with lancet exposed its entire width, supporting the main food groove. There are approximately 32 side plates in 10 mm length of an ambulacrum, one large pore between side plates, and a large hemielliptical outer side plate on the bevelled adoral-abmedial corner of each primary side plate. The pores are between the outer side plates along the radial and deltoid margins. In one polished section there appear to be 6 hydrospire folds on one side of an ambulacrum, but the crushed condition of the specimen and poor preservation internally have partly obscured these structures.

The surfaces of the thecal plates are ornamented with large pustules, arranged in a regular manner along growth lines. Those along the basiradial suture are laterally confluent, giving the appearance of deep grooves at right angles to the suture.

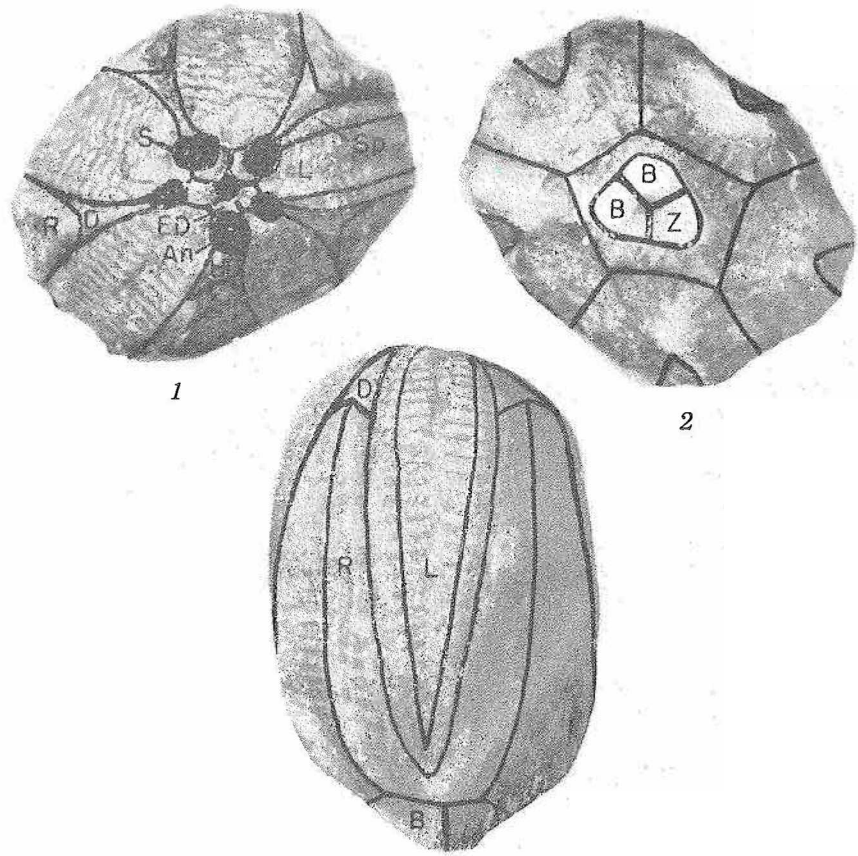
Occurrence and types.—Holotype, $E_4$21; paratypes, $E_4$22, $E_4$23



Text-figure 1. Petaloblastus boletus (Schmidt), 1930. **Cross section of an ambulacrum, x21.0**

Ca—radial canal	**L—lancet plate**
Fg—main food groove	**P—pore**
H—hydrospire fold	**R—radial plate**
HC—hydrospire canal	**Sp—side plate**

(two specimens), E,37 (one specimen); unfigured types (six specimens, one of which is shown here in text-figure 1); Geologisch-Paläontologisches Institut und Museum der Humboldt-Universität, Berlin, Germany. From upper part of Korallenkalkes, Etroeungtian (Lower Mississippian), Bahnhof Isenbügel, Wunstorf (shown on Kettwig sheet), Germany.



1 *2* *3*

Plate II

Petaloblastus ovalis (Goldfuss), 1829. **Uebergangskalk, Lower Mississippian (Etroeungtian), Ratingen, Germany. Lectotype, Geologisch-Palaontologisches Institut und Museum der Rhein, Bonn.**

Figures 1-3. Oral, aboral, and (D) ambulacral views, x6.7.

An—anal opening (anispiracle)	**L—lancet plate**
B—basal plate	**R—radial plate**
D—deltoid plate	**S—spiracle**
ED—epideltoid plate	**Sp—side plate**
HD—hypodeltoid plate	**Z—azygous basal plate**

Petaloblastus ovalis (Goldfuss), 1829
Plate II, figures 1-3

Pentremites ovalis Goldfuss, 1829, p. 161, pl. L, figs. 1a-c.

The description is that of the lectotype, selected by Schmidt (1930). Theca calcitic, 10 mm long by 7 mm wide, with vault 8.5 mm long, pelvis 1.5 mm long, pelvic angle on radial bodies 160 degrees, and on aboral part of basals 85 degrees. Ambulacra slightly recurved below, giving an oval outline to the specimen in side view. The periphery is about at midheight, well above the radial lips. The ornamentation, disposition, and general shape of the spiracles and thecal plates are similar to those of *P. boletus*, differing only in proportions. Presumably there are 4 hydrospire folds on each side of an ambulacrum.

Occurrence and types.—Lectotype, one of five specimens selected by Schmidt (1930) from the original collection of Goldfuss (1829), figured herein. Geologisch-palaeontologisches Institut und Museum der Rhein. Friedrich Wilhelms-Universität, Bonn, Germany. From Uebergangkalk, Etroeungtian (Lower Mississippian), Ratingen, Germany.

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