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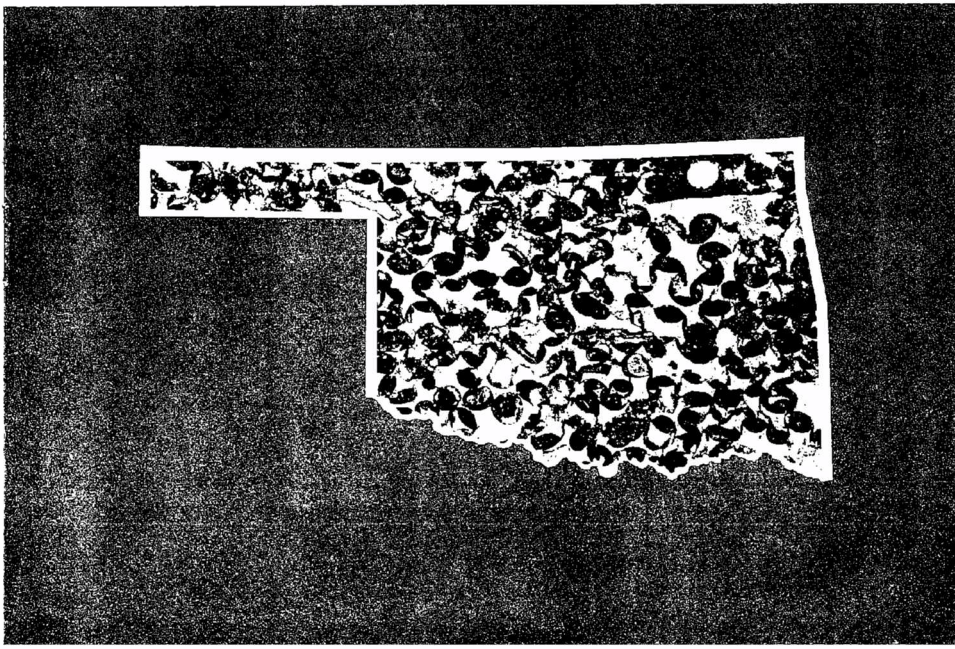
OKLAHOMA GEOLOGY NOTES



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Cover Picture

PETTIT OÖLITE

The cover picture is a photomicrograph (x8) of a thin section from the Pettit Oölite Member of the Blackgum Formation, near Qualls, Cherokee County, northeastern Oklahoma. The Pettit is a thin (generally less than 2 feet thick), discontinuous oölite which forms the basal member of the Blackgum Formation (Early Silurian) in northeastern Oklahoma. In most places the oölites exhibit a normal texture, but in this particular outcrop they appear to have been deformed or squashed, some being hooked into chains by elongate tails. These appear identical in structure to oölites described and illustrated by A. V. Carozzi from the Triassic of Europe. Carozzi interpreted this structure as due to distortion of the oölites shortly after formation and before cementation, and concluded that this must have taken place in a subaqueous environment, as the result of the oölites' being knocked against one another by strong wave or current action. The Pettit Oölite Member is described and discussed in Oklahoma Geological Survey Bulletin 105, from which this picture is reproduced (pl. 6, fig. 2).

— *Thomas W. Amsden*

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Prepared by Jane Howe

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Report on the Geology of Northern Adair County

Oklahoma Geological Survey Circular 68, *Geology of Northern Adair County, Oklahoma,* was issued in February 1966. The report is authored by George G. Huffman, Jackson M. Langton, and James M. Hancock, Jr.

The report area comprises 260 square miles in Tps. 17-19 N., Rs. 24-26 E., and is underlain by rocks ranging in age from Early Ordovician (Cotter Dolomite) to Early Pennsylvanian (Hale Formation). Of particular interest are the limestone reefs of the St. Joe Group.

Structurally, the area is in the southern part of the Ozark Plateau and the rocks dip gently southward. The regional dip is interrupted by northeastward-trending faults and folds. The structural pattern conforms to that of the Ozark uplift.

The report consists of 50 pages, 21 figures, and 1 plate. The plate is a colored geologic map at a scale of 1½ inches equal 1 mile. The book may be purchased from the Survey: $3.70 cloth bound, $2.80 paper bound.

New Genus of Spiriferid Brachiopod from Oklahoma and Texas

Carl C. Branson

The species *Neospirifer texanus* was described by Meek in 1871 (p. 179) as *Spirifer (Trigonotreta?) Texanus,* and figured by him in 1876 (in Newberry, p. 139-140, pl. 3, fig. 5). Hall and Clarke (1894a, p. 26, 38, pl. 37, figs. 16, 17) described and figured the species as *Spirifer Texanus.* Schuchert (1897, p. 407) unaccountably listed it as *S. texasanus* and just as unaccountably referred *Spirifera multigranosa* Worthen, 1890, to synonymy. That species does not belong to the same genus. Weller (1898, p. 592) listed the species as *Spirifer texanus.* Hall and Clarke (1894b, expl. pl. 26, fig. 9) mistakenly gave the occurrence as "Coal Measures, Missouri." The figure is the same as Hall and Clarke's (1894a) plate 37, figure 17, from "Carboniferous limestone, Graham County, Texas." There is no Graham County in Texas and probably the town of Graham, in Young County, was meant.

The type horizon and locality have been determined as lower Cisco, probably Graham Formation, Young County, Texas. Meek (in Newberry, 1876, p. 139, pl. 3, figs. 5-5b) also stated that Newberry had specimens from the northwest corner of Jack County, Texas. Plummer and Moore (1921) listed the species from the Brownwood Shale Member of the Graford Formation at two localities in Palo Pinto County, Texas; from the Jacksboro Member of the Graham Formation in Jack County, Texas; and from 11 localities in the Wayland Shale of Texas, and figured one of these specimens (pl. 21, fig. 1). Drake (1892) had earlier reported the species from the Brad, Graham, and Thrifty.

Dunbar and Condra (1932, p. 338-341) noted the presence of *Neospirifer texanus* in the Lenapah Limestone at Nowata in Nowata County, Oklahoma, and figured two specimens (pl. 38, figs. 9, 10a-b). They also reported specimens from the Graham Formation in Brown County, Texas (pl. 38, figs. 6-8).

The genus *Neospirifer* is based upon the type species (by original designation) *Spirifer fasciger* Keyserling, 1846, from the Lower Permian of the Ural region, Russia, and widely identified in Russia, Asia, and Australia. Thirty-two species and 15 subspecies of Permian brachiopods have been referred to *Neospirifer.* In Pennsylvanian rocks of the United States species referred to *Neospirifer* are *N. cameratus* (Morton, 1836), *N. dunbari* King, 1933, *N. dunbari alatus* Dunbar and Condra, 1932, *N. dunbari gibbosus* Dunbar and Condra, 1932 (Deer Creek Limestone, Osage County, Oklahoma), *N. latus* Dunbar and Condra, 1932 (homonym of *N. mexicanus latus* King, 1931), and *N. kansasensis* (Swallow, 1867). *N. goreii* (Mather, 1915) is here considered to belong to some other lineage.

N. texanus (Meek) appears to be sufficiently distinct from the Permian type species of the genus to deserve separate generic status.

Eridmatus, new genus

Type species: *Spirifer texanus* Meek, 1871.

Conch of moderate size for a Pennsylvanian spiriferid; length, width, and height approximately equal; hinge straight, extended onto alar projections; interarea high, extending across alar projections; delthyrium open; beaks strongly curved over delthyrium and hinge; pedicle valve with deep V-shaped sinus; brachial valve with well-developed fold. Surface of valves strongly plicate, plications fasciculate at places. The generic name is from Greek eridmatos, strongly built, referring to the equidimensional character of the conch.

Eridmatus texanus (Meek, 1871), new combination

Plate I, figures 1-3

1871. **Spirifer (Trigonotreta?) Texanus** Meek, Philadelphia, Acad. Nat. Sciences, Proc., p. viii, 179.

1876. **Spirifer (Trigonotreta?) Texanus** Meek, in Newberry (the initials F. B. M. follow the description), Macomb's Report of the Exploring Expedition from Santa Fé, etc., p. 139-140, pl. 3, figs. 5-5b.

1893. **Spirifer Texanus** Meek, Hall and Clarke, Geol. Survey N. Y., Palaeontology, vol. 8, pt. 2, p. 26, 38, pl. 37, figs. 16, 17.

1894. **Spirifer Texanus** Meek, Hall and Clarke, State Geologist [N. Y.], 13th Ann. Report, vol. 2, pl. 26, fig. 9.

1921. **Spirifer texanus** Meek, Plummer and Moore, Tex., Univ., Bull. 2132, p. 106, 116, 121, 139, 144, 216; pl. 21, fig. 1; pl. 27.

1932. **Neospirifer texanus** (Meek), Dunbar and Condra, Nebr. Geol. Survey, Bull. 5, 2nd ser., p. 338-341, pl. 38, figs. 6-10.

1944. **Neospirifer? texanus** (Meek), Cooper, Index fossils of North America, p. 325, pl. 125, figs. 3, 4 (may be Meek's holotype).

The specimen figured here (OU 161) is 29 mm long, 25 mm wide along the hinge, and 21 mm high. In the species the beak of the pedicle valve is curved far over the delthyrium. The valve bears a deep, wide, V-shaped sinus which extends from the beak to the anterior margin. It bears a narrow median plication. Each slope of the sinus carries one plication at the beak, increasing to eight at the anterior margin by bifurcation.

Each side of the sinus is bounded by a prominent, round-topped plication which is trifurcated toward the front margin.

The brachial valve bears a prominent fold which bears two equal elevated plications on its summit, one plication on each slope increasing by bifurcation to six at the front margin. A pair of deep furrows lies at the sides of the fold. Lateral to each furrow is a prominent plication which bifurcates anteriorly. The next lateral plication is less prominent and is trifurcated anteriorly. The lateral plications are successively less prominent, are vaguely fasciculate, and total seven. The surface of the alar areas is cancellated by fine lirae and growth lines.

The entire shell surface bears minute "spines," four or five to a square millimeter. At most places on the shell these are in random arrangement, but at places are parallel to the growth lines. The

"spines" are short and resemble pinched-up shell material more than they do true spines. The minute "spines" are here considered as but of specific value, although these have not been noted on other spiriferids.

The interior of the ventral valve bears elongate muscle scars extending more than half the length of the shell and tapering out at that point. Dunbar and Condra (1932, p. 340) observed the short, thick conical spiralia, and accurately described the callus, the dental lamellae, and the hinge line.

The genus has certain similarities, in shape, possession of well-developed sinus and fold, and minute ornamentation, to the group of genera called *Spiriferella* and *Blasispirifer*, and is assigned as they are to the family Brachythyrididae.

Our shells bear specimens of the adherent foraminifer *Minammodytes*.

The peculiarly limited distribution of the genus is here considered to arise in part from the massive nature of the beak area which results in many specimens of the posterior (few complete specimens). When the fragmentary shells of fasciculate spiriferids are searched for the minute spines, it is probable that specimens will be recognized in Kansas, New Mexico, Nebraska, Iowa, and Illinois in Late Desmoinesian and Missourian rocks.

In Oklahoma the species ranges from Late Desmoinesian (Lenapah) to Middle Missourian (Nellie Bly). In Texas it is reported to range from Early Missourian (Graford) to Early Virgilian (Graham).

Our specimens are:

OU 161. Seminole Formation, S1/4 cor. sec. 33, T. 13 N., R. 10 E., Okfuskee County, Oklahoma. Collected by E. Ries.

OU 4987. Wewoka Formation, 10 miles northwest of Ada, Pontotoc County, Oklahoma. Collected by Culbertson.

OU 4989. Shale in the upper part of the Coffeyville Formation, NE1/4 NE1/4 NE1/4 sec. 33, T. 6 N., R. 7 E., Seminole County, Oklahoma. Three specimens collected by W. F. Tanner.

OU 4988. Shale in Coffeyville Formation below a limestone conglomerate, NE1/4 sec. 33, T. 6 N., R. 7 E., Seminole County, Oklahoma. Six specimens collected by W. F. Tanner.

Explanation of Plate I

Eridmatus texanus **(Meek, 1871)**

Figures 1a-c. Specimen OU 161, Seminole Formation, Okfuskee County.
a. Dorsal view, x2.
b. Ventral view, x2.
c. View of shell surface, approximately x10.

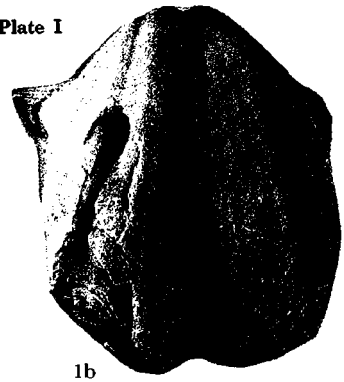
Figure 2. Specimen OU 4989, Coffeyville Formation, Seminole County. Interior of beak area of a pedicle valve, x2.

Figure 3. Specimen OU 4987, Wewoka Formation, Pontotoc County. Interior of beak area of a pedicle valve, x2.

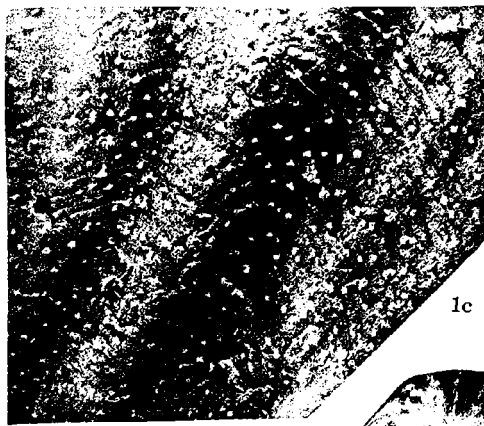
(Photographs by Phillip Blackwell)

Plate I

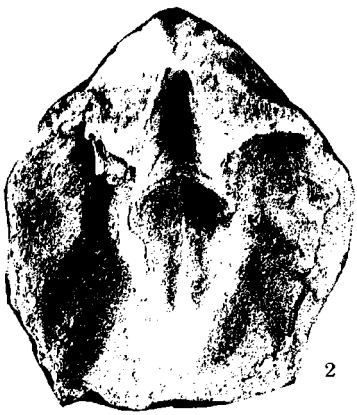
1a



1b



1c



2

3

Tanner (1956, p. 77) reported the species from the green shale in the lower part of the Nellie Bly Shale in NW¼ NW¼ sec. 9, T. 5 N., R. 7 E., Seminole County. Faucette (1955, p. 246) reported the species from the Lenapah Limestone (Perry Farm Shale Member) in the Peerless Rock Co. quarry in sec. 30, T. 28 N., R. 16 E., Nowata County.

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Conocardium IN THE BROMIDE FORMATION (ORDOVICIAN) OF OKLAHOMA

CARL C. BRANSON

The bivalve genus *Conocardium* is represented by about 160 named species ranging in age from Chazyan (Ordovician) to Guadalupean (Permian). Ordovician species are:

Conocardium beecheri Raymond, 1906, Chazyan of New York.
Conocardium richmondense Foerste, 1910, Elkhorn Formation, Indiana.

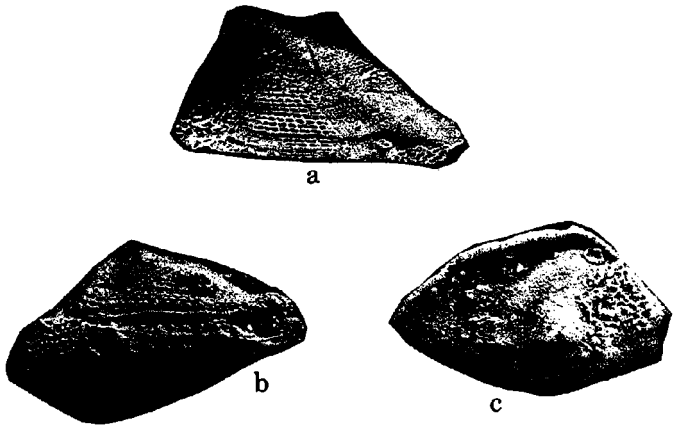

Figure 1. Conocardium **sp. All figures x8.**
a. Lateral view of left valve.
b. Ventral view.
c. Posterior view.
(Photographs by Phillip Blackwell)

Conocardium limatulum Bradley, 1930, Kimmswick Formation, Missouri.
Conocardium isbergi Branson, 1942, Leptaena limestone, Sweden.
Conocardium antiquatum Branson, 1942, Middle or Upper Ordovician, Manitoba.
Conocardium dipterum (Salter, 1876). Caradocian, Scotland.
Conocardium immaturum Billings, 1863, Leray Limestone, Quebec.
Conocardium lindstroemi Isberg, 1834, upper Leptaena limestone, Dalarna, Sweden.

Several other species are imperfectly known. The present specimen is minute, 4.5 mm long, 5.3 mm high, 4.0 mm wide. The shell is strongly oblique, a prominent carina bordering the anterior wing from the beak to the posteroventral margin. The posterior edge of the carina is platelike and appears to represent the hood. It overhangs the posterior slope, which is deeply concave below the carina, is smooth, and extends onto the short conical proboscis.

The anterior wing is triangular, broadly curved, with long straight ventral margin. The surface is ornamented by about 16 narrow ribs crossed by nearly equal concentric ridges to make a cancellate pattern.

The gape is narrow, lined by 12 small irregular "teeth." The anterior end of the gape opens into a small circular anteroventral opening.

The specimen was collected by Allen Graffham from the Pooleville Member of the Bromide Formation 2 feet below the base of the Viola Group at Rock Crossing, NW¼ SE¼ sec. 35, T. 5 S., R. 1 E., Carter County, Oklahoma. The specimen, OU 4975, is in the paleontology collection, The University of Oklahoma.

A Unique Crinoid from the Upper Permian

Harrell L. Strimple*

In the spring of 1965, a field party from the State University of Iowa, consisting of W. M. Furnish, B. F. Glenister, W. W. Nassichuk, Claude Spinosa, and the author, spent several days in the Glass Mountains in West Texas with G. A. Cooper and R. E. Grant from the U. S. National Museum. G. L. Wilde from the Humble Oil & Refining Company, Midland, Texas, was also with the party for part of the time. A limestone block was obtained from the upper part of the Word Formation (between limestone No. 3 and limestone No. 4) about 2 miles northeast of the junction of Hess Canyon with the south branch of Hess Canyon, Hess Canyon quadrangle, Texas, and was dissolved during the summer of 1965 in a 10-percent solution of hydrochloric acid. A unique crinoid cup was recovered and was found to be related to forms from the Ural Mountains, Russia, and from the Island of Timor, Indonesia. The group of crinoids is unusual in that the development of arms is suppressed, the number of infrabasals has been reduced to three, and pore slits are on the angles of the cup plates. A new family, Indocrinidae, is proposed for their reception.

ACKNOWLEDGMENTS

The author is especially grateful to G. A. Cooper, U. S. National Museum, for directions to rocks most likely to contain silicified crinoid cups. B. F. Glenister used a sledge hammer to reduce the rock to a reasonable size after it was pried out by other members of the field party. Assistance in several respects was provided by W. M. Furnish.

SYSTEMATIC DESCRIPTIONS

Suborder POTERIOCRINITINA Jaekel, 1918

Family INDOCRINIDAE Strimple, new family

Genera.—*Indocrinus* Wanner, 1916; *Proindocrinus* Yakovlev, 1939; *Metaindocrinus* Strimple, new genus.

Occurrence.—Permian: Krasnooufimsk, Ural Mountains, SSSR; Island of Timor, Indonesia; Glass Mountains, West Texas, North America.

Diagnosis.—Dorsal cup with three infrabasals visible in side view, five basals, five radials with one (right anterior) or two (+ left anterior) nonarm bearing, 3 to 0 anal plates within the cup, stem round, pore slits at angles of cup plates.

Discussion.—*Proindocrinus* was reported by Yakovlev (1939, p. 832) to have three anal plates and two nonarm-bearing radial plates. The drawings of *Proindocrinus* (*Indocrinus*) *piszowi* Yakovlev by Yakovlev (1951, figs. 1-3) and by Yakovlev and Ivanov (1956, fig. 17) show one large anal plate followed evenly above by two short anal plates. The entire posterior side of the cup is extended upward. Yakov-

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lev (1939) restricted *Indocrinus* to those forms having a single or no anal plate within the dorsal cup, which factor he correctly interpreted as being more advanced. Both *Indocrinus* and *Proindocrinus* have two nonarm-bearing radials, the right and left anterior, and have pore slits on the angles of the cup plates.

It is somewhat difficult to follow the intent of Yakovlev and Ivanov (1956, p. 61) because, after they discussed the necessity for retention of the genus *Proindocrinus*, they assigned the species *piszowi* to *Indocrinus* with question, that is, as *Indocrinus*? *piszowi*. Without examination of the Russian specimens it is impossible to resolve questions which have arisen, but with the new information afforded by the American form it is possible to support a concept leading to *Proindocrinus*, and it seems reasonable to assume that the genus is valid.

The American form, *Metaindocrinus*, new genus, is in some respects more primitive than either *Proindocrinus* or *Indocrinus*. The latter genera have two nonarm-bearing radials, whereas *Metaindocrinus* has only one nonarm-bearing radial. Asymmetry is produced so that the posterior basal is to the left of the posterior position. The main portion of the right posterior basal is directly under the right posterior radial. One anal plate is in radial position and is followed evenly above by two small anal plates which project above the summit of the cup. The anterior radial is not directly opposite the anal plates but is to the left. Pore slits are present on the plate angles.

Some Ordovician genera among the Palaeocrinidae are marked by pore slits at the plate angles but are not likely to be related to the Indocrinidae from the Permian. Yakovlev (1939) directed attention to the apparent close relationship between *Hemiindocrinus* Yakovlev, which does not have pore slits on the plate angles, and *Proindocrinus* and *Indocrinus*. In 1949, Yakovlev added *Ulocrinus globosus* de Koninck (now *Ureocrinus*) as the probable oldest member of the lineage. The relationship may be more apparent than real.

It was the opinion of Yakovlev (1939, p. 832, and elsewhere) that the fauna of the Krasnoufimsk was older than that of the Island of Timor, and he often demonstrated the more primitive nature of the Russian forms. The Permian of the Ural Mountains is currently considered to be older than the Guadalupean of West Texas or the Basleo of the Island of Timor.

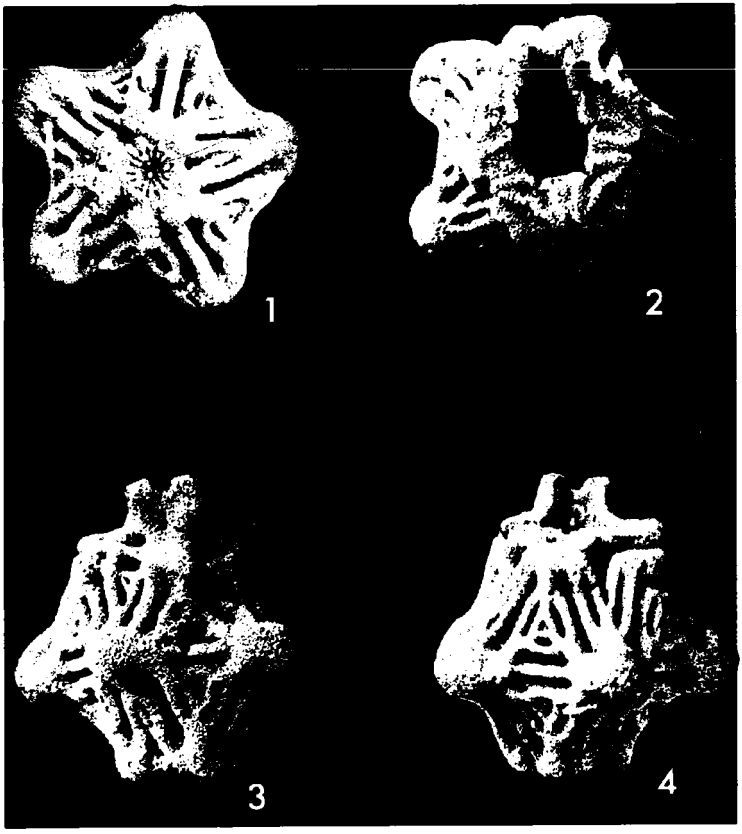
Genus *Metaindocrinus* Strimple, new genus

Type species.—*Metaindocrinus cooperi* Strimple, new species.

Occurrence.—Permian; Glass Mountains, West Texas, North America.

Diagnosis.—Three infrabasals, low but readily visible in side view of dorsal cup; five basals, long, marked by node in midportion; five radials, short, that of right anterior slender and nonarm bearing, articular facets wide, filling most but not all of distal face of radial; three anals, one large, resting between posterior and right posterior basal and supporting evenly above two smaller plates; columnar cicatrix round, heavily crenulated and pierced by a minute, star-shaped lumen.

Remarks.—Metaindocrinus is readily separable from *Indocrinus* and *Proindocrinus* in having only one nonarm-bearing radial. It differs from *Proindocrinus,* which has the large anal plate directly over the posterior basal, in having the posterior basal to the left flank of the large anal plate. The entire posterior side of *Proindocrinus* is elevated and forms a scooplike structure which Yakovlev considered to be related to current direction. The large anal plate of *Metaindocrinus* is much smaller than that of *Proindocrinus* and the posterior side of the cup is only slightly extended. The small anal plates of the former genus extend well above the summit of the cup.



Metaindocrinus cooperi, new species, holotype SUI 12346, x7

Figure 1. Basal view.
Figure 2. Summit view.
Figure 3. Posterior view.
Figure 4. Anterior view.

Indocrinus has a single anal plate, which may be pushed entirely out of the cup, resting evenly on the posterior basal. It likely evolved directly from a form like *Metaindocrinus* through migration of the anal plates upward and reduction of the number of arm-bearing radials to three.

Metaindocrinus cooperi Strimple, new species

Figures 1-4

The dorsal cup rises and widens evenly to about midheight where the width is accentuated by knoblike protrusions on the midportion of each basal, and then tapers slowly to its summit. Long, well-defined pore slits mark the corners of the cup plates. The three infrabasals form a scalloped outline as viewed from below.

Asymmetry of the cup is explained in the familial discussion. The posterior basal is to the left flank of the large anal and the right posterior basal is to the right, directly below the right posterior radial. The right anterior radial is nonarm bearing and somewhat atrophied.

The large anal plate is followed evenly by two smaller, elongate plates which are separated a short distance above the summit of the cup.

Articular facets of the radials are wide but do not fill the entire width of the plates, are subhorizontal, have well-developed outer ligament furrows, a stout transverse ridge, two long oblique furrows, and a well-defined intermuscular notch. The areas normally occupied by muscle scars are small and more or less confluent with the large oblique furrows.

The dorsal cup of the holotype has a maximum width of 6.5 mm and a height of 5.8 mm (anterior side).

The species is named after G. Arthur Cooper, who has worked extensively in the Glass Mountains.

Remarks.—The long, well-defined pore slits of *Metaindocrinus cooperi* are more like those of *Indocrinus rimosus* Wanner (1916), from Basleo, Island of Timor, than of other described species, and the general outline of the cup is somewhat similar. In the latter species the infrabasals are elongate, but in the former species they are laterally projected. Of course there are generic differences, for example, *I. rimosus* has a single anal plate and three arm-bearing radials, whereas *Metaindocrinus cooperi* has three anal plates and four arm-bearing radials.

Occurrence.—Upper part of Word Formation (between limestone No. 3 and limestone No. 4) Upper Permian; about 2 miles northeast of the junction of Hess Canyon with the south branch of Hess Canyon, Hess Canyon quadrangle, Glass Mountains, Texas.

Holotype.—SUI 12346, paleontological collections, State University of Iowa, Iowa City.

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