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NEW EDRIOASTEROID FROM
THE MIDDLE CAMBRIAN OF WESTERN UTAH¹

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Abstract—A new edrioasteroid species, *Totiglobus? lloydi*, is described from the Marjum Formation (Middle Cambrian, *Ptychagnostus punctuosus* Zone) of western Utah based on a single specimen. This is the second species representing the order Edrioasterida described from the Cambrian.

A SINGLE SPECIMEN of a new Middle Cambrian edrioasteroid has been collected from the Marjum Formation in the House Range of western Utah. This specimen is associated with numerous homoiosteles and a few eocrinoids that are described by Georges Ubaghs and R. A. Robison in an accompanying paper. Edrioasteroids are rare in the Cambrian of the Rocky Mountains (Sprinkle, 1976), with only three other described or possible occurrences. Durham (1964:25) reported the discovery of a single edrioasteroid resembling *Stromatocystites* from the Lower Cambrian of western Nevada; Sprinkle (1973:107-109) described and figured several types of "eocrinoid(?) plates" from the Lower Cambrian Poleta Formation of eastern California, some of which may represent fragments of an undescribed edrioasteroid; and Bell and Sprinkle (1978) described the edrioasteroid

Totiglobus nimius from the Middle Cambrian Chisholm Shale of eastern Nevada.

The new edrioasteroid was collected by Lloyd and Metta Gunther from the middle Marjum Formation of the House Range, western Utah. The specimen is preserved as a flattened and somewhat weathered calcite theca exposed in side view on a slab of silty limestone (Fig. 1,1). Parts of the exposed side have been weathered away, but the lower theca, portions of two interambulacra, and segments of three apparently straight ambulacra are preserved. The best preserved ambulacrum, which lacks attached cover plates, has large pores between adjacent floor plates, implying that this specimen is a member of the order Edrioasterida (Bell, 1976) and probably the family Totiglobidae (Bell and Sprinkle, 1978). The aboral or lower theca is made up of many small plates and tapers to a slightly concave surface, possibly used for attachment. Neither a basal disk

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(as in *Totiglobus nimius*) nor a small peripheral rim (as in such later genera as *Cystaster*) is evident, but the basal surface in this new specimen is nearly the same size as these other structures. One ambulacrum appears to have the cover plates still attached, whereas cover plates from the other two ambulacra are missing or scattered over the adjacent interambulacra. This new specimen most closely resembles *Totiglobus nimius*, also of Middle Cambrian age, and is questionably assigned to the genus as a new species. If this new species does lack the basal

disk, then it would be intermediate in thecal morphology between *T. nimius* and such Ordovician edrioasteroids as *Edrioaster* and *Edriophus*, which have a nonplated aboral surface.

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SYSTEMATIC PALEONTOLOGY

Subphylum ECHINOZOA Zittel, 1895

Class EDRIOASTEROIDEA Billings, 1858

Order EDRIOASTERIDA Bell, 1976

Family TOTIGLOBIDAE Bell and Sprinkle, 1978

Genus TOTIGLOBUS Bell and Sprinkle, 1978

Type species.—*Totiglobus nimius* Bell and Sprinkle, 1978.

Diagnosis (emended herein).—Totiglobid with subglobose theca, center of aboral theca occupied by basal plated disk or tiny-plated attachment surface; ambulacra medium to fairly long, nearly straight, large passageways between ambulacral floor plates, two or more sets of cover plates; interambulacral plates large and slightly imbricate or fairly small and adjacent, periproct aboral between tips of ambulacra.

Occurrence.—Middle Cambrian (*Peronopsis bonnerensis* to *Ptychagnostus punctuosus* zones), eastern Nevada and western Utah.

Discussion.—This new species is provisionally assigned to *Totiglobus*, which it most closely resembles, until more and better preserved specimens become available. The diagnosis of *Totiglobus* has been slightly modified to accommodate this form.

TOTIGLOBUS? LLOYDI, new species

Figure 1

Holotype.—USNM 172047.

Diagnosis.—Theca subglobose, longer than wide, ambulacra extending slightly more than

halfway down theca, ambulacral floor plates barely exposed on thecal surface, perhaps three types of cover plates present, oral frame plates inconspicuous, interambulacral plates fairly small, aboral theca conical, plates decreasing in size aborally to tiny-plated aboral surface about half of thecal width.

Description.—Only one partial theca known (Fig. 1). Theca preserved in side view with parts of three ambulacra visible; theca crushed nearly flat, plates somewhat disrupted along left side, and several holes weathered through exposed side. Theca 14.8 mm long, 12.5 mm wide (crushed), maximum width just below midheight; adoral theca hemispherical with ambulacra at least 9.0 mm long, aboral theca conical, about 5.6 mm long, tapering down to slightly concave basal surface (disk?) about 5.3 mm wide (crushed).

No oral frame plates observed, and no large plates visible near junction of best preserved ambulacra (Fig. 1, *I*, right). Ambulacra of medium length, extending short distance past ambitus, apparently straight. Ambulacra moderately wide, about 2.1 mm wide adorally, floor plates slightly raised above interambulacral surface, ambulacral groove slightly concave (Fig. 1, *I*, center), cover plates moderately domed (Fig. 1, *I*, right). Floor plates in alternating biseries, ambulacral portions well developed with large sutural pores for tube feet on each side, external portion apparently small and nearly vertical. Nineteen to 20 floor plates visible in best ambulacrum (incomplete aborally). Ambulacral part of floor plate 0.5 to 0.6 mm long, 0.8 to 0.9 mm wide; pores between

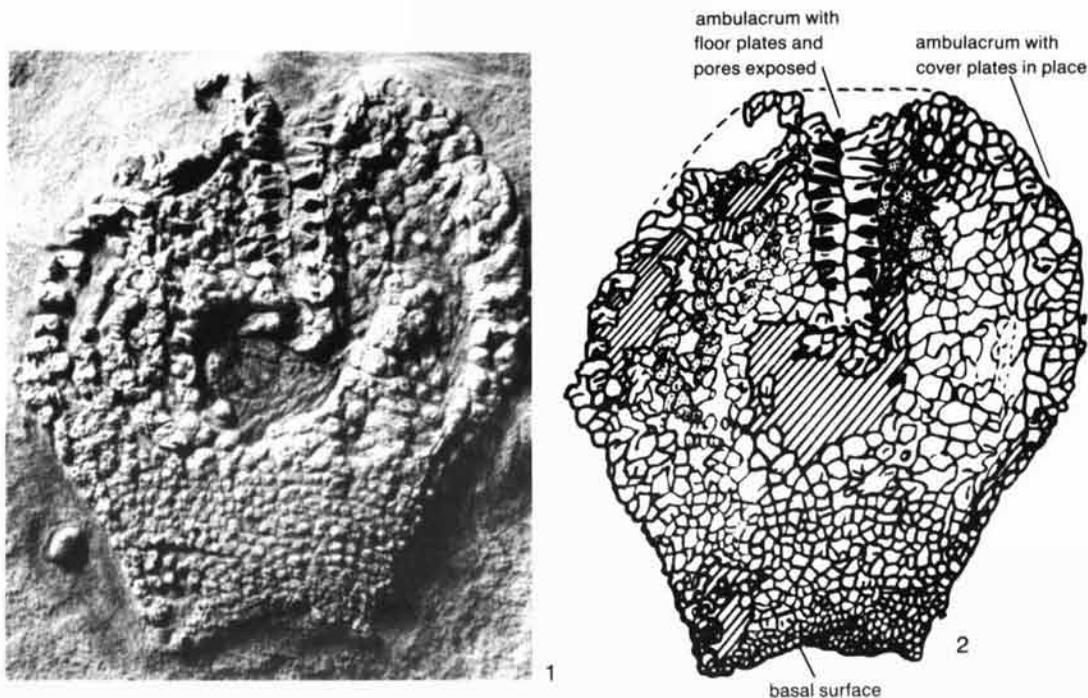


Fig. 1. *Totiglobus? lloydi* Sprinkle, n. sp.; holotype, USNM 172047; $\times 5$.—1. Side view of theca.—2. Explanatory drawing of holotype; weathered-through areas in the exposed thecal side are lined, apparently disarticulated cover plates lying alongside ambulacra are finely stippled.

floor plates abmedial, elliptical along floor plate suture, about 0.5 mm long by 0.3 mm wide; short groove on abmedial part of each floor plate between pores (Fig. 1,2), about 0.1 to 0.3 mm long.

Ambulacral cover plates poorly preserved, articulated only on one ambulacrum (Fig. 1,1, right), disarticulated cover plates apparently scattered alongside other ambulacra (Fig. 1,2,). Apparently two or three types of cover plates on each side, alternating with ones below, and decreasing in size upward, forming curved "columns" bending adorally (Fig. 1). Largest cover plates rounded triangular, about 0.6 mm long and wide, not obvious whether directly above or alternating with exposed part of ambulacral floor plates below although size appears similar. Higher accessory cover plates about 0.2 mm in size.

Interambulacra relatively wide, apparently flat to slightly concave originally, plated with numerous, small, adjacent plates lacking pores. About 60 to 65 plates present in best exposed

interambulacrum, which is 3.5 mm and about 8 plates wide; most plates polygonal, 0.5 to 0.6 mm in size, slightly convex. Aboral theca continuous with interambulacra, conical with slightly concave edges, plated with numerous, small to very small, adjacent plates decreasing in size aborally. About 250 plates present on exposed part of aboral theca, plates grading from 0.6 mm in size adorally to 0.1 to 0.2 mm aborally, plates slightly to moderately convex, no pores present. Aboral edge poorly exposed, slightly concave, about 5.3 mm wide (crushed), plated with numerous tiny plates about 0.1 mm in size, possibly surrounding basal disk or unplated aboral surface used for attachment.

Many thecal plates having slightly pustular or rugose ornament, especially in aboral theca where one raised pustule per small plate.

Mouth, anal pyramid, and hydropore not observed in only known specimen.

Occurrence.—The holotype is from about 190 m above the base of the Marjum Formation in the central House Range of western Utah.

Descriptions of the locality, number 811 of R. A. Robison, are recorded in files of the U. S. National Museum of Natural History and the University of Kansas Museum of Invertebrate Paleontology. Associated fossils are representative of the *Ptychagnostus punctuosus* Zone of Middle Cambrian age.

Etymology.—Named for Lloyd Gunther of Brigham City, Utah, who, together with his late wife Metta, collected the only known specimen.

Discussion.—*Totiglobus? lloydi*, n. sp., most closely resembles *T. nimius* from the Chisholm Shale of Nevada. It differs from *T. nimius* by being more elongate with a longer aboral theca

and shorter ambulacra, by having smaller and nonimbricate interambulacral and lower thecal plates, by apparently lacking the complex basal disk, by having smaller oral frame plates, and by having smaller but more numerous ambulacral cover plates. Other features of *T.? lloydi* such as location of the anal pyramid, structure of the oral area with its cover plates and hydropore, and morphology of the basal structure are still unknown and may also be different. A new genus may be necessary for this species when additional, better preserved specimens are collected.

REFERENCES

- Bell, B. M. 1976. A study of North American Edrioasteroidea. New York State Museum, Memoir 21, 447 p.
- , and James Sprinkle. 1978. *Totiglobus*, an unusual new edrioasteroid from the Middle Cambrian of Nevada. *Journal of Paleontology* 52:242-266.
- Billings, Elkanah. 1858. On the Asteriadae of the Lower Silurian rocks of Canada. Geological Survey of Canada, Canadian Organic Remains, decade 3:75-85.
- Durham, J. W. 1964. The Helicoplacoidea and some possible implications. *Yale Science Magazine* 39(2): 24-26.
- Sprinkle, James. 1973. Morphology and evolution of blastozoan echinoderms. Harvard University Museum of Comparative Zoology, Special Publication, 283 p.
- . 1976. Biostratigraphy and paleoecology of Cambrian echinoderms from the Rocky Mountains. Brigham Young University Geology Studies 23(2):61-73.
- Zittel, K. A. von. 1895. *Grundzüge der Palaeontologie (Palaeozoologie)*. R. Oldenbourg (München), 8 v., 971 p.