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A NEW SPECIES OF *MELOCRINITES* FROM THE MIDDLE DEVONIAN BELL SHALE OF MICHIGAN

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VOLUME XIX

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ABSTRACT

Melocrinites michiganensis, sp. nov., from the Middle Devonian Bell Shale of Michigan, has trunks and arms like those in *M. powelli* (Goldring), from the Middle Devonian Moscow Shale of New York. It can be distinguished by its smaller and proportionally narrower *PBrBr* and by the stronger ornamentation of plates in its dorsal cup. The species is known from a nearly complete specimen, lacking only the ends of the trunks, distal arms, and column.

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INTRODUCTION

A SPECIMEN of *Melocrinites* was discovered several years ago in an exposure of the upper strata of the Bell Shale in the abandoned quarry of the Kelley's Island Lime and Transport Company by Mr. Irving G. Reimann and deposited in the museum of the Buffalo Society of Natural Sciences. Recently, I studied it in detail. It proves to be a new species, in some respects strongly similar to *Melocrinites powelli,* described by Winifred Goldring from the Moscow Shale of New York, but readily distinguished by other features. Inasmuch as it is the first crinoid of the genus to be found in our state, I name it *Melocrinites michiganensis.*

Although many species of *Melocrinites* have been described, the genus continues to interest paleontologists, particularly because of the diversity of development in the peculiar ray system. As I accept the genus, it includes crinoids with arms biserial or uniserial, with *ISBrBr* present or absent, and with plates highly ornamented or nearly smooth. With all the

various combinations of these characteristics that have been reported, however, the species have in common that the innermost row of *TBrBr* in each half-ray are fused to those in the paired half-ray to form a long trunk, a structure serving as a shared ambulacral conduit from the numerous arms attached along each of its sides.

Other authors interpret the genus differently. As discussed below, some paleontologists use *Melocrinites* in a much narrower sense.

The specimen is catalogued and deposited in the Buffalo Society of Natural Sciences as BSNS E 16578. A plaster replica is catalogued and deposited in the University of Michigan Museum of Paleontology as UMMP 48206.

LOCALITY

Upper ten feet of Bell Shale below contact with Rockport Quarry Limestone, in the abandoned quarry of the Kelley's Island Lime and Transport Company near Rockport, Alpena County, Michigan, exposed in drainage ditch, west of quarry buildings, NW ¼ sec. 6, T. 32 N., R. 9 E. Sales from the exposure are found in dump piles along the sides of the ditch. Specimen found by Irving G. Reimann in the 1940's.

SYSTEMATIC DESCRIPTION

Subclass CAMERATA Wachsmuth and Springer
Order Monobathra Moore and Laudon
Family Melocrinitidae Bassler, 1938

Bassler (1938) was the first to use the correct spelling of the family name and is credited with authorship, but others had used the family Melocrinidae many years before with approximately the same content.

Suprageneric placement of the crinoids here regarded as *Melocrinites* has varied in major classification systems according to the relative importance accorded rigidity and plate composition of calyx, presence or absence of *IBB*, and number of *BB*.

Bather (1900, p. 161) gave the following taxa, here briefly characterized:

Subclass Monocyclica. Monocyclic crinoids.

Order Monocyclica Camerata. *PBrBr* and *IBrBr* fixed in cup; calyx rigid, all its plates with sutures; *AmbAmb* in tegmen or below it; arms pinnulate.

Suborder Melocrinoidea. *RR* forming uninterrupted circlet.

Family Melocrinidae. 4 *BB*; 2 to 5 *SBrBr* in each half-ray, supporting 2 or 4 main rami giving off pinnules or pinnulate ramuli (arms); *IBrBr* numerous but definite in number, *ISBrBr* numerous, less definite; ridge of anals in posterior interray; tegmen with numerous small, irregular plates; stem round.

It will be noted that the family diagnosis is faulty. Some species of *Melocrinites* lack *ISBrBr* and none have a well-developed ridge of anals in the posterior (CD) interray.

Jaekel (1918, p. 32) offered the following system:

Subclass Cladocrinoidea. Calyx distinctly divided into dorsal cup and tegmen; tegmen covering and enclosing mouth and ambulacral grooves; circlets of *IBB* may be present; circlet of *BB*; *RR* and *PBrBr* in rows leading to arms by branching; *IBrBr* grading into tegmen without sharp boundary; posterior *IBrBr* normally more numerous and symmetrical; arms bearing unbranched pinnules.

Order Monocyclica. No *IBB* circlet.

Suborder Tetramera. 4 *BB*.

Family Melocrinidae. Both innermost branches (TBrBr) of each ray enlarged and lying close together; outermost branches directed laterally and unbranched.

Moore and Laudon (1943) in their revision of the crinoids employed the following classification:

Subclass Camerata. All calyx plates united by rigid sutures; mouth and food grooves covered over by rigid tegmen; arms pinnulate, uniserial or biserial.

Order Monobathra. Monocyclic.

Family Melocrinitidae. 4 or 5 *BB*; *RR* in contact all around; *IBrBr* not depressed; anal area having few extra plates or not differentiated.

The family description is here taken from page 96. On page 97, in Figure 17, however, their description says "BB 3 or 4, commonly 4 .... Extra plates on anal side."

The classification adopted in this paper rather closely follows that of Moore and Laudon (1943), which is the latest comprehensive study of crinoids.

Genus *Melocrinites* Goldfuss

Melocrinites Goldfuss, 1826, p. 197. Type species: *M. hieroglyphicus* Goldfuss, 1826, p. 197, Pl. 60, Figs. 1A-C*a*.

Melocrinus Agassiz, 1836, p. 197. *Nomen vanum pro Melocrinites.*

Ctenocrinus Bronn, 1840, pp. 542, 547. Type species: *C. typus* Bronn, 1840, p. 547, Pl. 8, Fig. B.

Astrocrinites Conrad, 1841, p. 34, *non* Cumberland, 1839 (*nec* Austin, 1843). Type species: *A pachydactylus* Conrad, 1841, p. 34 (senior synonym of *Mariacrinus plumosus* Hall, 1858).

Ctenocrinites Steininger, 1849, p. 22. *Nomen vanum pro Ctenocrinus.*

Castanocrinus Roemer, 1855, pp. 228, 252. Type species: *Melocrinites gibbosus* Goldfuss, 1826, p. 211, Pl. 64, Figs. 2*a–d*.

Mariacrinus Hall, 1858, p. 278. Type species: *M. nobilissimus* Hall, 1858, p. 278.

Cytocrinus Roemer, 1860, p. 46. Type species: *C. laevis* Roemer, 1860, p. 46, Pl. 4, Figs. 2*a–c*.

Clonocrinus Oehlert, 1879, p. 3. Type species: *C. bigsbyi* Oehlert, 1879, p. 4, Pl. 2, Figs. 2–4.

Turbinocrinus Wachsmuth and Springer, 1881, p. 237. *Nomen vanum pro Turbinicrinites* Troost MS. (*nomen nudum*).

Xenocrinus Jahn, 1892, p. 416, *non* S. A. Miller, 1881.

Zenkericrinus Waagen and Jahn, 1899, p. 102. Type species: *Z. melocrinoides* Waagen and Jahn, 1899, p. 106, Pl. 62.

Astrocrinus Bather, 1900, p. 161. *Nomen vanum pro Astrocrinites.*

Turbinicrinites Troost *in* Wood, 1909, p. 44. Type species: *Actinocrinites verneuili* Troost, 1850, p. 60, *nomen nudum* (= *Cytocrinus laevis* Roemer, 1860).

Trichotocrinus Olsson, 1912, p. 27. Type species: *Melocrinus* (*Trichotocrinus*) *harrisi* Olsson, 1912, p. 29, Pl. 6, Figs. 1–2.

Remarks.—Until the nature of the rays, trunks, arms, and ornamentation is made known in each of the type species, I prefer to place all the above genera in synonymy. As published, several of the genera were erected on incorrect grounds, and others do not show the diagnostic features.

Table I summarizes the disposition of critical species in some important crinoid studies.

The content of the genus *Melocrinites* was reviewed by Wachsmuth and Springer, who proposed the following key for three closely related genera (1897, p. 264):

Arms uniserial, arranged in groups; simple or bifurcating, distichals (*SBrBr*) two to four, calyx of moderate size ..... *Mariacrinus*

Arms long, branching often; palmars (*TBrBr*) and arm joints very short, deeply interlocking. Distichals (*SBrBr*) five and upwards. Calyx very large; lower palmars partly included in dorsal cup, interbrachials very numerous ..... *Scyphocrinus*

The rays extended into five tubular trunks, from which biserial arms are given off from its outer sides all the way to their tips ..... *Melocrinus*

They further remarked on *Melocrinites* (1897, p. 294): "Neither can the presence or absence of interdistichals (*ISBrBr*), unless accompanied by other positive characters, be considered sufficient for generic separation, as proposed in the case of *Ctenocrinus* Bronn. These plates are mere auxiliary pieces, which may be present or absent in the same species."

Convinced that the crinoids exemplified by *Mariacrinus plumosus* Hall were generically distinct from those exemplified by *M. nobilissimus* Hall, Wachsmuth and Springer (1881, p. 288) proposed to place *M. nobilissimus,* the type species of *Mariacrinus,* in *Melocrinites* and to select a new type species, *M. plumosus,* for *Mariacrinus.* Not only was this illegal by the Rules of the International Commission on Zoological Nomenclature, but it failed to make any decision on the status and definition of the previously proposed *Ctenocrinus* Bronn (1840). Bassler and Moodey (1943, p. 381) believed that *Mariacrinus plumosus* Hall was a junior synonym of *Astrocrinites pachydactylus* Conrad, 1841, which they placed in the genus

TABLE I

GENERIC PLACEMENT OF CERTAIN RELATED CRINOIDS

Species	Original genus, Author, Year	Wachsmuth & Springer, 1881	Jaekel, 1918	Goldring, 1923	Bassler, 1938	Bassler and Moodey, 1943	Moore and Laudon, 1943
hieroglyphicus	**Melocrinites* Goldfuss, 1826	*Melocrinus*	*Melocrinus*	*Melocrinus*	*Melocrinites*	*Melocrinites*	*Melocrinites*
typus	**Ctenocrinus* Bronn, 1840	*Melocrinus*	*Ctenocrinus*	*Melocrinus* (Ctenocrinus)	*Ctenocrinus*	*Ctenocrinus*	*Ctenocrinus*
pachydactylus	**Astrocrinites* Conrad, 1841	*Melocrinus*		*Melocrinus*	*Melocrinites*	*Ctenocrinus*	*Melocrinites*
gibbosus	*Melocrinites* Goldfuss, 1826; **Castanocrinus* Roemer, 1855	*Melocrinus*			*Melocrinites*	*Melocrinites*	*Melocrinites*
nobilissimus	**Mariacrinus* Hall, 1858	*Melocrinus*	*Mariacrinus*	*Melocrinus*	*Ctenocrinus*	*Ctenocrinus*	*Ctenocrinus*
laevis‡	**Cytocrinus* Roemer, 1860	*Melocrinus*			*Cytocrinus*	*Cytocrinus*	*Cytocrinus*
bigsbyi	**Clonocrinus* Oehlert, 1879	*Melocrinus*	*Clonocrinus*		*Melocrinites*	*Melocrinites*	*Melocrinites*
melocrinoides	**Zenkericrinus* Waagen and Jahn, 1899				*Ctenocrinus*	*Ctenocrinus*	*Ctenocrinus*
verneuili	*Actinocrinites* Troost, 1850 **Turbinicrinites* Troost *in* Wood, 1909	*Melocrinus*			*Melocrinites*	= *Cytocrinus laevis* Roemer	
harrisi	*Melocrinus* (**Trichotocrinus*) Olsson, 1912			*Melocrinus* (*Trichotocrinus*)		*Trichotocrinus*	
plumosus	*Mariacrinus* Hall, 1858	*Mariacrinus*†		*Mariacrinus*		= *Ctenocrinus pachydactylus* (Conrad)	

* Type of the genus; † Incorrectly designated type species; ‡ Not *Melocrinites laevis* Goldfuss, 1826.

Ctenocrinus Bronn, 1840. This is an example of the confusion that exists in the taxonomy of these crinoids.

Another example is the type species of *Cytocrinus, C. laevis* Roemer (1860, p. 46, Pl. 4, Figs. 2*a–c*). Wachsmuth and Springer (1897, p. 301) placed this crinoid in *Melocrinus,* a genus in which the species *Melocrinites laevis* had already been described by Goldfuss (1826, p. 197, Pl. 60, Figs. 2*a–b*); therefore, having disposed of *C. laevis* as a junior homonym, they erected *Melocrinus roemeri* as a substitute name for *Cytocrinus laevis* Roemer *non Melocrinites laevis* Goldfuss. If *Cytocrinus* is distinct from *Melocrinites,* as interpreted by Bassler (1938, p. 82) and by Bassler and Moodey (1943, p. 402), then its type species is valid in all respects and *M. roemeri* has no basis.

Kirk (1929, pp. 337–38) analysed the Melocrinitidae as an evolutionary series in which certain rami (arm branches) became progressively atrophied: (1) *Alisocrinus* Kirk, with four equal rami in each ray; (2) *Promelocrinus* Jaekel, with outer rami reduced and the inner enlarged but not apposed; (3) *Ctenocrinus* Bronn, with outer rami still present and the inner in lateral apposition; and (4) *Melocrinites* Goldfuss, "in which the outer pair of rami typically has disappeared" (p. 338). He made *Mariacrinus* Hall a junior synonym of *Ctenocrinus* Bronn.

The critical question in the classification of these crinoids is whether the type species listed above belong to one genus or to two or more genera. Present knowledge of these species is insufficient, in my opinion, to warrant recognition of more than one genus. By seniority, this genus must be *Melocrinites* Goldfuss.

Melocrinites michiganensis, sp. nov.

(Figs. 1–2; Pl. I, Figs. 1–2; Pl. II, Figs. 1–2)

Calyx.—Four unequal *BB,* as in other species of the genus, together forming a pentagon as viewed dorsally (Figs. 1–2). Anterior *B* the largest, pentagonal, its wide distal side abutting against the *R* of the A ray, its short ventrolateral sides in contact with *RR* of the B and E rays, and its proximal sides against adjacent *BB;* in lateral view appearing broad and hexagonal, the dorsal surface being hidden (Pl. I, Fig. 1). Lateral *BB* each of medium size, subquadrate, the one in contact with *RR* of the B and C rays, the other in contact with *RR* of the D and E rays; in lateral view appearing to be broad and pentagonal (Pl. I, Fig. 1). Posterior *B* slightly smaller than either of the lateral *BB,* kite-shaped, in contact with *RR* of the C and D rays. As viewed laterally, *BB* about one-fourth the height of *RR* measured along midline of the ray.

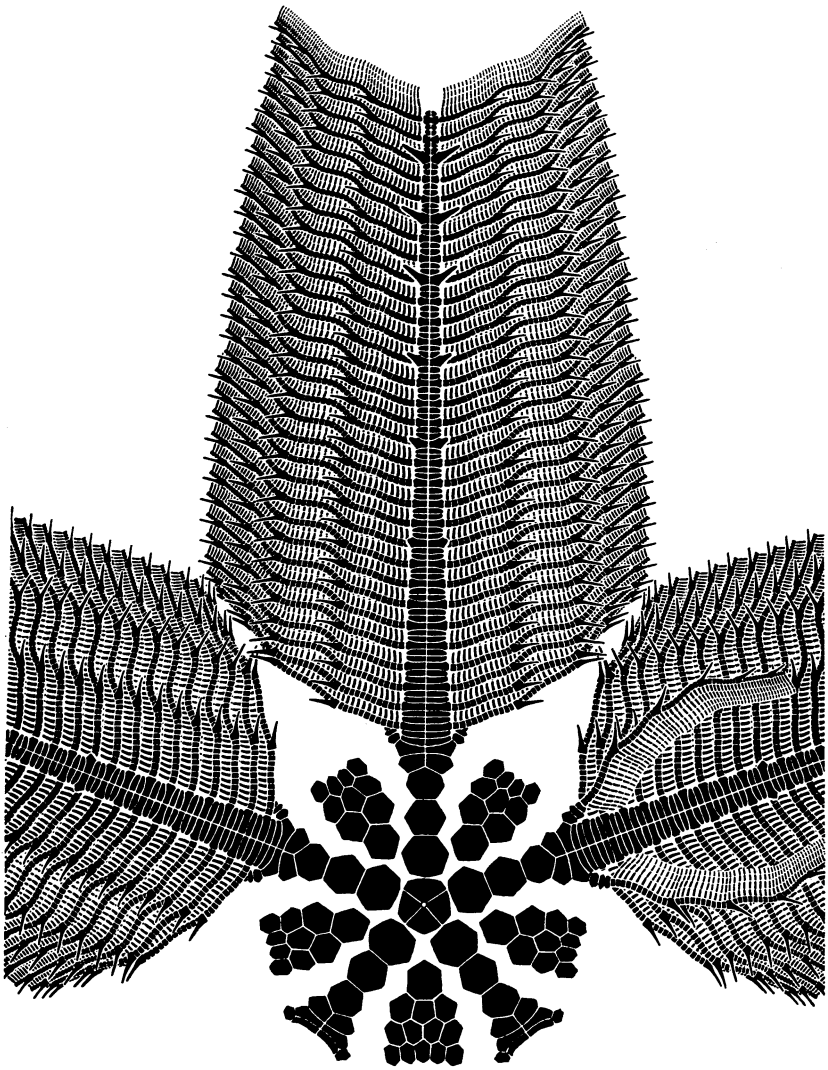

FIG. 1. *Melocrinites michiganensis,* sp. nov. Diagram of plate arrangement, showing the extent of arms (which may be incomplete) in the A ray. Although distal parts of auxiliary arms are not preserved, it is assumed that they are similar to other arms, just as in other species of *Melocrinites*. Pinnules shown on only one side of arms. In B ray, parts of arms deleted to show the two auxiliary arms.

RR subequal, forming a complete circlet. *R* of the A ray hexagonal, in contact with only one *B*; other *RR* septagonal, in contact with two *BB*; *R* of B ray a mirror image of that of E ray, *R* of C ray a mirror image of that of D ray. Ventrolateral sides of each *R* fitting against $IBrBr_1$, ventral side fitting against PBr_1. Sides of each *R* nearly equal except for those in contact with *B* or *BB*.

$PBrBr_1$ equal, nearly the same height as *RR* but narrower. Each only slightly modified from a regular hexagon, the sides in contact with PBr_2 and $IBrBr_2$ a trifle shorter than those in contact with *R* and $IBrBr_1$. $PBrBr_2$ equal, smaller than $PBrBr_1$. Each septagonal, its height and width equal; bordered by PBr_1, two $SBrBr_1$, two $IBrBr_2$, and two $IBrBr_3$ (Fig. 2).

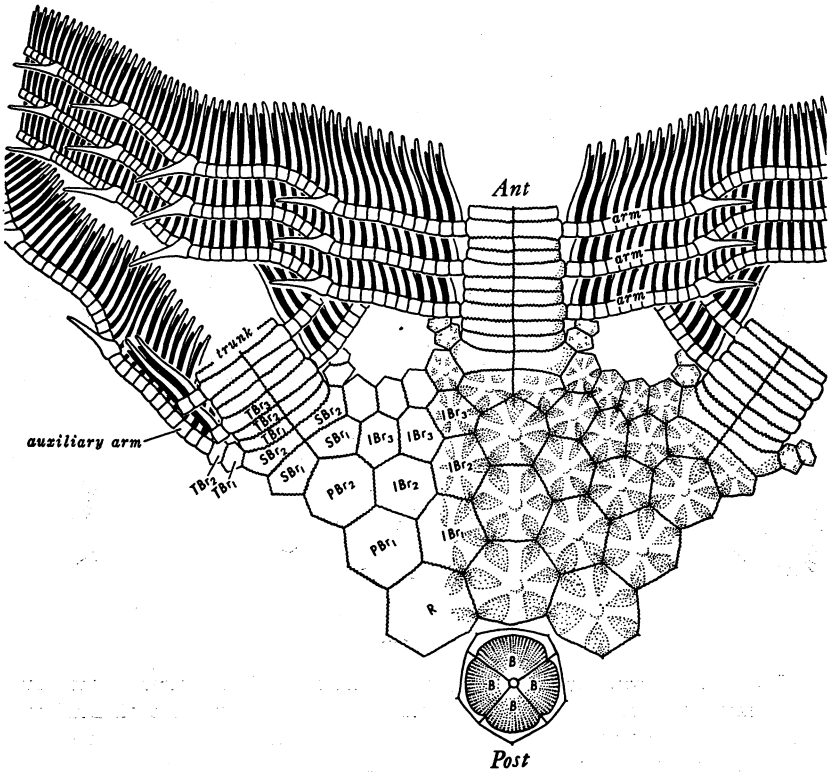

FIG. 2. *Melocrinites michiganensis*, sp. nov. Diagram of part of dorsal cup and proximal arms in B, A, and E rays. Arms in A ray extended to show length. Pinnules shown in outline, not divided into pinnulars.

SBrBr$_1$ wider than high, pentagonal, the sides adjacent to *PBr*$_2$ and *SBr*$_2$ longer than those adjacent to *IBr*$_3$, *IBr*$_4$, and *SBr*$_1$. *SBrBr*$_2$ smaller than *SBrBr*$_1$, each concave ventrally, the sides adjacent to *TBr*$_1$ of the trunk and *SBr*$_1$ much longer than those adjacent to *TBr*$_1$ of the auxiliary arm, *IBr*$_4$, and the paired *SBr*$_2$.

TBrBr of the trunks free at about *TBrBr*$_2$; those of the auxiliary arms free at *TBrBr*$_3$.

All sutures of the dorsal cup crenulate, the crenulations weakly developed in the dorsal part, strongly developed in ventral part and in the trunks (Fig. 2).

Surface of *BB* in contact with proximal columnal radially striate or grooved, causing exposed junction to be crenulate. *RR*, *PBrBr*, *SBrBr*$_1$, and *IBrBr* ornamented with ridges radiating from the centers of the plates to each of the sides; near the border of the plate, each ridge flared out, causing edges of the plate to be scalloped (Pl. I, Fig. 1). Vertical ridges of the rays stronger than the others; ridges of interrays producing a stellate pattern (Pl. II, Fig. 2). Each plate bearing a central protuberance at the junction of the radial ridges, a small node or tubercle (Pl. I, Fig. 1).

In the posterior (CD) interray, *IBrBr* consisting of one *IBr*$_1$, three *IBrBr*$_2$, four *IBrBr*$_3$, and (apparently) five *IBrBr*$_4$; *IBr*$_1$ septagonal, bordered by two *RR*, two *PBrBr*$_1$, and three *IBrBr*$_2$, slightly smaller than *PBrBr*$_1$ at either side; *IBrBr*$_2$ nearly equal, about three-fourths the dimensions of *IBr*$_1$, the middle one pentagonal, the outer two hexagonal; *IBrBr*$_3$ nearly equal, all hexagonal, smaller than *IBrBr*$_2$; *IBrBr*$_4$ equal, hexagonal, each less than half the dimensions of *IBr*$_1$. In the other four interrays, *IBrBr* with the same arrangement, all hexagonal; one *IBr*$_1$, two *IBrBr*$_2$, three *IBrBr*$_3$, and four *IBrBr*$_4$ in each interray; *IBr*$_1$ nearly the same size as that in the posterior interray; each *IBr*$_2$ slightly larger than an *IBr*$_2$ of the posterior interray; each *IBr*$_3$ two-thirds the dimensions of an *IBr*$_2$, and each *IBr*$_4$ about half the dimensions of an *IBr*$_2$. All *IBrBr* ornamented with ridges radiating from the centers of the plates to the sides, together producing a pattern of shared triangles (Pl. II, Fig. 2).

No *ISBrBr*, the *SBr*$_1$ and *SBr*$_2$ of each half ray separated from those of the opposite half ray only by crenulate sutures.

Trunks.—Each trunk long and tapering, its length at least 5¾ times the combined height of *R* and *PBrBr* in the ray, probably much longer, consisting of a series of *TBrBr*. At least *TBr*$_1$ and perhaps *TBr*$_2$ incorporated in dorsal cup, the remainder of the *TBrBr* free. Proximal *TBrBr* short and wide, their width nearly 4 times their length; distal *TBrBr* subquadrate, their length only slightly less than that of the proximal

TBrBr. All *TBrBr* joined to succeeding and to opposing *TBrBr* by strongly crenulate sutures (Fig. 2). Only a shallow median groove along the dorsal side of each trunk (Pl. I, Fig. 2).

Every third *TBrBr* longer at the outer border of the trunk than the two intervening *TBrBr*, attached to an arm. Certain arm-bearing *TBrBr* ornamented; in the proximal part of the trunk, every fifth to eighth arm-bearing *TBr* ornamented with a node near its outer margin; in the central part of the trunk, every fourth or fifth one ornamented with a short, blunt spine; and in the distal part of the trunk, every third one bearing a progressively longer and sharper spine (Pl. II, Fig. 2). In some trunks, the ornamented *TBrBr* of each half-ray directly opposite those of the other half-ray; in other trunks, the ornamented *TBrBr* in one half-ray offset by the interval of one arm (rarely two arms) from those of the other half-ray.

Arms of the trunk.—Arms long and tapering, proximal arms with length more than twice the combined height of *R* and *PBrBr* of one ray, distal arms only slightly shorter (Figs. 1–2). Each arm consisting of a series of *QBrBr*. Certain *QBrBr* bearing long stout spines; in the proximal part of the arm, about every twelfth to fifteenth, in the distal part about every tenth to twelfth (Pl. II, Fig. 1).

Arms bearing long, thin, tapering pinnules, one on each side of every *QBr*. Pinnulars narrow, each with length about 4 times its diameter. Four or five pinnulars in each pinnule.

Auxiliary arms.—Only exposed in holotype as far as TBr_3, but apparently resembling arms of the trunk, as in other species of *Melocrinites*.

Tegmen.—Not well exposed, its dorsal series of plates small and polygonal, grading into *IBrBr*.

Remarks.—This species most closely resembles the younger *Melocrinites powelli* (Goldring) from the Moscow Shale of western New York. It is compared with that species in Table II. The most readily apparent difference is in the ornamentation of the plates in the dorsal cup: *M. michiganensis* is more highly ornamented than *M. powelli*.

Some doubt persists about the content of *Melocrinites powelli*. The species was first described simply as "*Melocrinus* sp. nov." (Goldring, 1923, pp. 142–44). At that time Miss Goldring had available (1923, p. 143) "a very beautifully preserved tubular appendage or arm trunk and several pieces of column which apparently belong to this species and are provisionally placed here." She referred to these specimens as "cotypes," although no species was named. Twelve years later (1935, pp. 355–58), Miss Goldring named the crinoid *Melocrinus powelli* and redescribed it. At that time the material consisted of the following, as listed by Goldring (1935, pp. 355–56):

A column of this species was described and figured by the writer as *Melocrinus* sp. nov. It was found occurring on the same slab with a tubular appendage ... the same type of column was found on two other slabs from the same locality associated with small arm fragments of the same type ... In a collection of Devonian crinoids loaned by Percy R. Powell of Niagara Falls, N. Y., is a column of this species attached to a poorly preserved dorsal cup and a fairly complete tegmen from the same locality, believed to belong to the same species.

Goldring did not name a holotype. On page 358 she stated, "The original types are from the Hamilton (Moscow shale) beds, Cashong Creek, Bellona, N. Y. The two specimens in the Powell collection are also from the Moscow shale, Bowen Creek, Genesee County, N. Y."

The only specimens which Goldring considered as types are the columnals and dissociated trunk bearing arms. The specimens in the Powell collection, however, were described at the same time and qualify as syntypes. In the whole of the material on which *M. powelli* is based

TABLE II

COMPARISON OF *Melocrinites michiganensis*, SP. NOV., AND *M. powelli* (GOLDRING)
(All measurements in millimeters)

	M. michiganensis, sp. nov.	*M. powelli* (Goldring, 1935)
Height × width		
R	4.3 × 5.1	4.3 × 6.2 (p. 356)
PBr_1	4.3 × 4.0	4.4 × 5.4 (p. 356)
PBr_2	3.7 × 3.7	4.2 × 5.4 (p. 356)
SBr_2	1.7 × 3.5	2.2 × 4.2 (p. 356)
Height proximal 11 *TBrBr* of trunk	9.0	10.3 (p. 357)
Ratio height/width		
R	.84	.69
PBr_1	1.08	.81
PBr_2	1.00	.78
Radial ridges of *RR, PBrBr, IBrBr*	Each plate with radiating ridges to sides, furrows at corners, so that border is scalloped; more prominent than in *M. gracilis*.	"...most of them appear quite smooth ... less prominent radial ridges (than in *M. gracilis*)" (p. 358).
Central nodes of *RR, PBrBr, IBrBr*	Each plate with small central node or tubercle	"Plates ... showing no tubercles" (p. 358).
Trunks	Shallow dorsal groove	"... deeply grooved on dorsal side ..." (p. 357).

there is neither a dorsal cup attached to a tegmen nor any arms attached to a calyx. The description is compiled from dissociated fragments. Whether these are from the same species is at least open to question.

Later (1945, p. 62; Pl. 1, Fig. 5), Goldring described and illustrated a small specimen which she assigned to *M. powelli*. As she admitted, the specimen is immature. It does, however, demonstrate the association of stem, calyx, and arms. Because it is immature, the ornamentation and certain other features are not precisely like those in the type material.

Melocrinites michiganensis is definitely distinct from *M. powelli*, differing in both the calyx and the trunks.

Occurrence.—Middle Devonian Traverse Group, upper part of the Bell Shale, not more than ten feet below the base of the overlying Rockport Quarry Limestone.

Type.—Holotype, Buffalo Society of Natural Science Museum, E 16578. Plastoholotype, cast as obverse and reverse of the slab, Museum of Paleontology of The University of Michigan, 48206.

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PLATES

EXPLANATION OF PLATE I

(Both figures × 1¾)

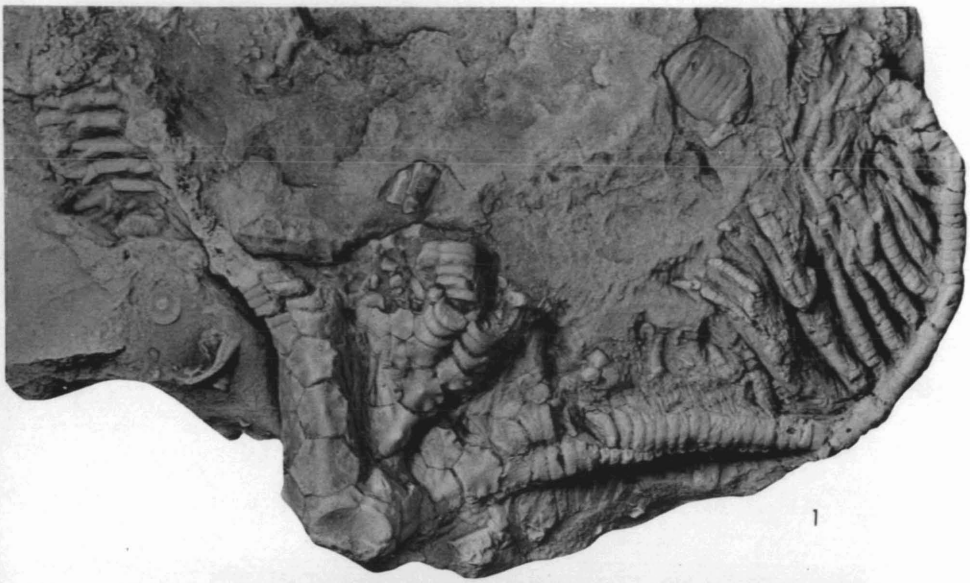
PAGE

Melocrinites michiganensis, sp. nov.
Specimen lightly coated with sublimated ammonium chloride. 94

FIG. 1. View showing A (anterior) ray at the left, E ray in center, and D ray at right. Part of crushed CD interray at extreme right in the dorsal cup. Edges of *RR, PBrBr, SBrBr,* and *IBrBr* scalloped or crenulate, and centers bearing small nodes or tubercles. Compare with Plate II, Figure 1. Holotype and only specimen, BSNS S16578.

FIG. 2. View showing edge of D ray at left, C ray in center, and B ray at right. Junction of *TBrBr* rows in each trunk not much depressed. Compare with Plate II, Figure 2. Holotype.

PLATE I



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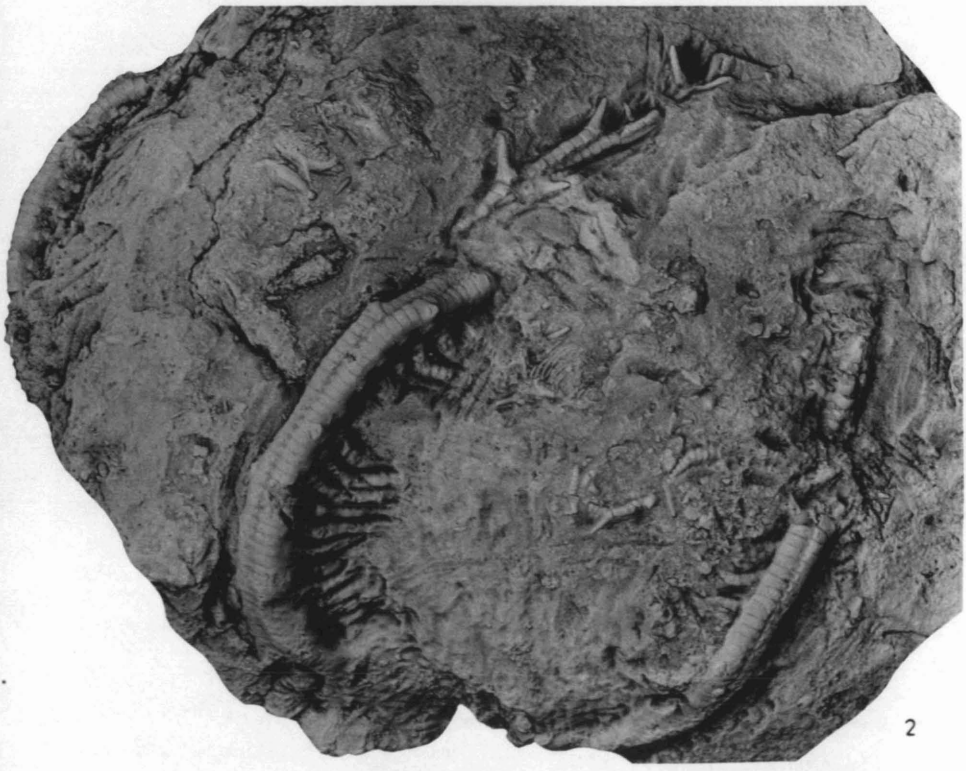

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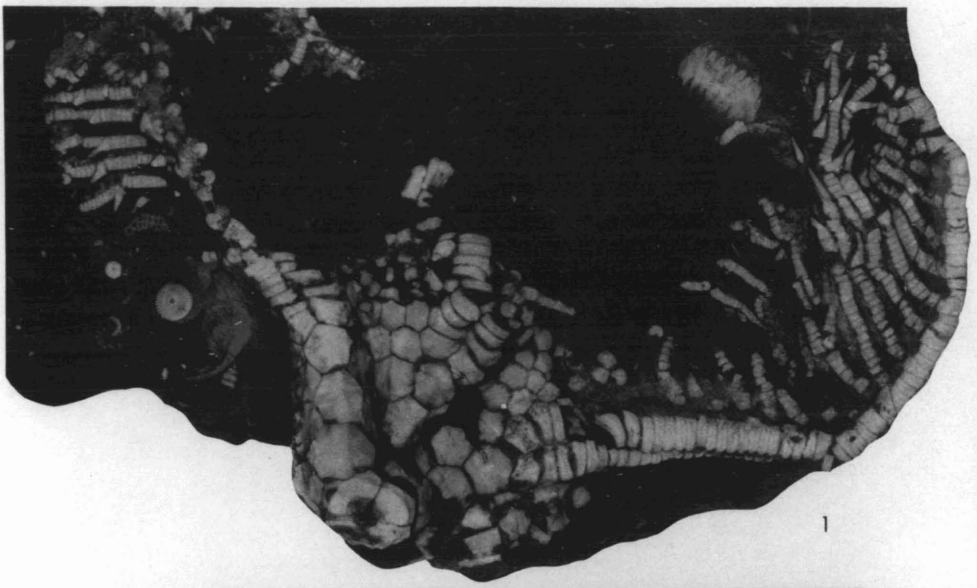
PLATE II



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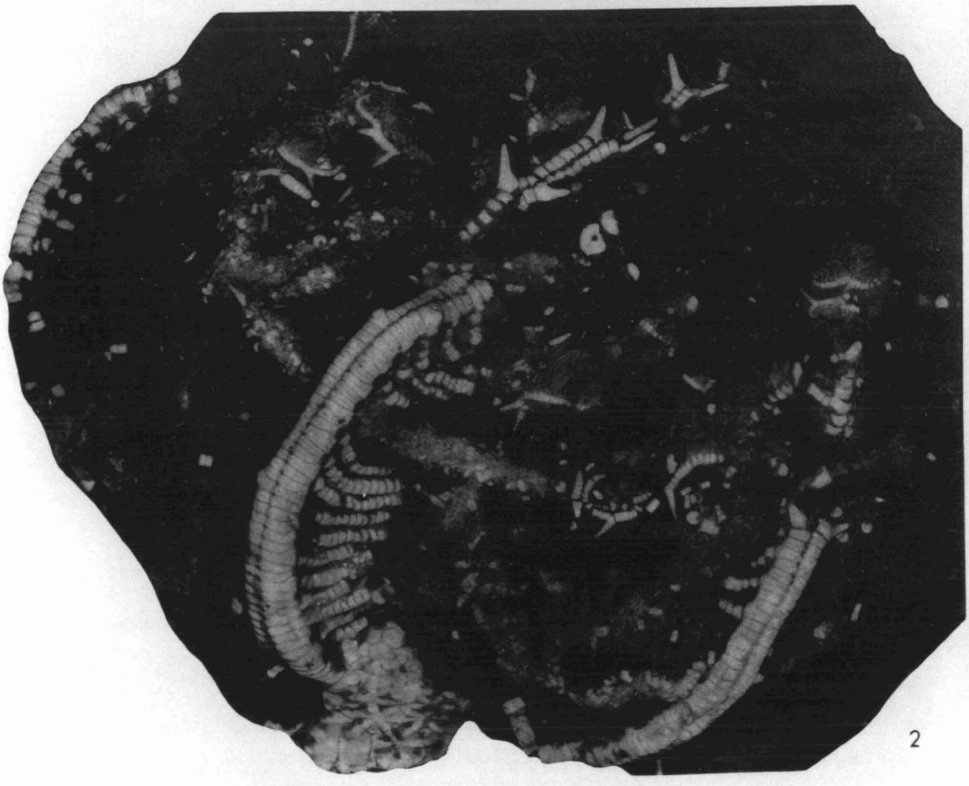

2

EXPLANATION OF PLATE II

(Both figures × 1¾)

PAGE

Melocrinites michiganensis, sp. nov. 94

Specimen stained with mythelene blue and submersed in xylol to emphasize plate boundaries.

FIG. 1. View showing rays A, E, and D. Ray D shows arms particularly well. Compare with Plate I, Figure 1. Holotype and only specimen, BSNS E 16578.

FIG. 2. View showing rays D, C, and B. Disjoined section of trunk in upper part of figure probably belongs to ray C. Numerous disjoined pieces of arms and pinnules scattered on surface of slab. Compare with Plate I, Figure 2. Holotype.