DOLATOCRINUS AND STEREOCRINUS,
ITS JUNIOR SYNONYM

BY

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INTRODUCTION

BECAUSE the genus Stereocrinus Barris, 1878, cannot be clearly separated from Dolatocrinus Lyon, 1857, it must be relegated to synonymy. The distinguishing characters attributed to both genera occur within the same specimen.

Just after completing our work on species of Dolatocrinus from the Middle Devonian Dock Street Clay exposed in the abandoned Thunder Bay quarry in Alpena, Michigan (Kesling and Mintz, 1963), we turned our attention to specimens of Dolatocrinus and Stereocrinus from the Thunder Bay Limestone exposed at Partridge Point, only a few miles south of Alpena. Our first interest was comparison of Dock Street and Thunder Bay crinoids. Later, it occurred to us to examine critically the generic distinction between Dolatocrinus and Stereocrinus.

Stereocrinus was defined as having only one primibrachial (PBr) in each ray instead of two, as in Dolatocrinus. Thus, the axillary primibrachial in Stereocrinus was said to be the first (PBr₁), whereas the axillary in Dolatocrinus was the second (PBr₂).

With the great variability of Dolatocrinus species fresh in mind, we were not greatly surprised to discover specimens in which one or more rays branched from PBr₁ and the other rays from PBr₂. The combination of Stereocrinus and Dolatocrinus diagnostic characters in the same crinoid is fatal to the junior genus. Taxonomy does not allow a specimen to be classified as two-fifths Stereocrinus and three-fifths Dolatocrinus. Dolatocrinus has priority by 21 years.

Alerted by this state of development in the specimens from the Thunder Bay Limestone, we restudied older crinoids assigned to Dolatocrinus. To
our embarrassment, we found that we had overlooked the occurrence of Stereocrinus-type rays in some of the Dock Street Clay specimens. Insofar as indicated by the crinoids in the Museum of Paleontology at The University of Michigan, examples of axillary $PBrBr_1$ are rare in specimens from the Dock Street Clay and fairly common in those from the Thunder Bay Limestone. Accordingly, “Stereocrinus” is nothing more than an increasing trend in Dolatocrinus toward elimination of the non-axillary $PBr$ in one or more rays.

The Systematic Descriptions which follow are devoted to abbreviated descriptions of selected specimens and to taxonomic revisions made necessary by suppression of Stereocrinus. All specimens used in this study are catalogued and deposited in the Museum of Paleontology of The University of Michigan.

**SYSTEMATIC DESCRIPTIONS**

*Subclass CAMERATA* Wachsmuth and Springer  
*Order MONOBATHRA* Moore and Laudon  
*Family Dolatocrinidae* Bather  
*Genus Dolatocrinus* Lyon


*Dolatocrinus* Lyon, 1857, p. 482 (type species: *D. lacus* Lyon, 1857, p. 482, Pl. 4, Figs. 2a-c; Jeffersonville Limestone, Jefferson Co., Ky., and Columbus Limestone, Columbus, Ohio).

*Cacabocrinus* Hall, 1862, p. 137 (type species: *C. speciosus* Hall, 1862, p. 137; Onondaga Limestone, Schoharie Co., N. Y.).

*Stereocrinus* Barris, 1878, p. 282 (type species: *S. triangulatus* Barris, 1878, p. 283, Pl. 11, Figs. 1-2; *Strobilocystites* zone of “Upper Davenport beds,” now called Cedar Valley Limestone, Iowa, and Thunder Bay Limestone, Alpena Co., Mich.).

Our discovery of specimens in which some rays have $PBr_1$ axillary and some have $PBr_2$ axillary is ample justification for combining *Dolatocrinus* and *Stereocrinus* under the former name. The strong similarity of the two genera has already been noted by several authors.

Nevertheless, it is difficult to describe the specimens which show the combination of two kinds of rays, primarily because the posterior interray of *Dolatocrinus* is like any other interray. Without positional reference, any discussion of the rays must be predicated on an arbitrary system. We elect to designate the rays with axillary $PBr_2$ as “D” and those with axillary $PBr_1$ as “S.” In listing the rays for a particular specimen, we give the “D” rays first and progress clockwise in dorsal view; thus, a specimen with two adjacent rays with axillary $PBr_1$ and the other three with axillary
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$PBr_2$ would be classed as D-D-D-S-S. From this formulation, individual rays can be indicated as first, second, and so on.

*Dolatocrinus triangulatus* (Barris)
(Pl. I, Figs. 1–9; Pl. II, Figs. 1–6, 9–10)

*Stereocrinus triangulatus* Barris, 1878, p. 283, Pl. 11, Figs. 1–2.
*Stereocrinus triangulatus liratus* Barris, 1878, p. 284, Pl. 11, Fig. 3.
*Dolatocrinus triadactylus* Barris, 1885 (*in* Wachsmuth and Barris), p. 25, Pl. 2, Figs. 5–7; 1886, p. 100, Pl. 2, Figs. 5–7.

Wachsmuth and Springer (1897, p. 325) favorably compared *Stereocrinus triangulatus* with *Dolatocrinus triadactylus* in many respects, but thought one $PBr$ was invariably present in each ray in the first and two $PBrBr$ were invariably present in each ray in the second species. In comparing specimens with all S-rays against those with all D-rays, we can discern no consistent differences in shape of dorsal cup, ornamentation, or structure of tegmen.

*UMMP 45093* (Pl. II, Fig. 6).—Rays D-D-D-D-D. The median ridge of each ray from $R$ to $PBr_2$ is crossed near the middle by a ridge or ridges from $PBr_1$ to adjacent $IBr_1$; around this cross, wider than high, is a rhomb made of ridges from each adjacent $IBr_1$ to $R$ and to $PBr_2$. In this pattern, the ridge or pair of ridges extending laterally from each side of $PBr_1$ are aligned so that they appear to be a continuous ridge or set of ridges leading from one $IBr_1$ to the next, narrowing or combining at midpoint where crossing the median ray ridge. Even if plate boundaries are somewhat obscure, the cross-within-a-rhomb pattern identifies a D-ray.

*UMMP 6005A* (Pl. II, Figs. 1–5).—Rays D-D-D-D-?S. The questioned S-ray (Pl. II, Fig. 4) has a very narrow gap between the sets of ridges leading from the median ray ridge to the adjacent $IBrBr_1$. It appears too narrow to allow room for another $PBr$ to be inserted between $R$ and the axillary $PBr$. Instead of a rhomb, the ridges more nearly outline a triangle. We can see no suture between the first lateral ridges and the nearby center of the axillary $PBr$, which we suppose is $PBr_1$.

This specimen shows another feature present in several of the crinoids from the Thunder Bay Limestone. The $PBrBr_1$ are high on one side of the dorsal cup and progressively decrease in height toward the opposite side, in some specimens not discernible or absent opposite the high $PBrBr_1$. In *UMMP 6005A*, the third ray (Pl. II, Fig. 2) has a higher $PBr_1$ than that of either the fourth ray (Pl. II, Fig. 5) or the first ray (Pl. II, Fig. 3), the two rays next to the ?S-ray.

*UMMP 45092* (Pl. II, Figs. 9–10).—Rays D-D-D-D-S. In this specimen four of the rays are distinctly D-rays (Pl. II, Fig. 9), having ridge
patterns of crosses-within-rhombs. The fifth ray (Pl. II, Fig. 10), however, has the ridges forming a wide triangle with a bisector; the axillary primibrachial is \(PBr_1\).

_UMMP 45096_ (Pl. I, Figs. 1–5).—Rays D-D-D-S-S. No trace of another \(PBr\) can be found between \(R\) and the axillary \(PBr\) in the fourth (Pl. I, Fig. 3) or fifth (Pl. I, Fig. 4) rays. Yet adjacent to this pair of S-rays, the first (Pl. I, Fig. 5) and the third (Pl. I, Fig. 2) rays are definite D-rays, each having a well-developed \(PBr_1\) between \(R\) and the axillary \(PBr_2\). That the difference in kinds of rays does not greatly affect the symmetry of the dorsal cup is well shown in the basal view of the cup (Pl. I, Fig. 1), in which the pentagram of ridges connecting \(RR\) and \(IBrBr\) has equal sides.

_UMMP 45094_ (Pl. I, Figs. 6–9).—Rays D-D-S-D-S. This is exceptional for the alternation of D-rays and S-rays; in most crinoids having the two types, the D-rays are together. In the third (Pl. I, Fig. 7) and fifth (Pl. I, Fig. 9) rays, the \(R\) is succeeded by a large pentagonal \(PBr_1\); but in the fourth ray (Pl. I, Fig. 8), the \(R\) is separated from the pentagonal \(PBr_2\) by a rectangular \(PBr_1\), just as in the first and second rays.


*Dolatocrinus barrisi* (Wachsmuth and Springer)

(Pl. II, Figs. 7–8, 11–15)

*Stereocrinus barrisi* Wachsmuth and Springer, 1897, p. 326, Pl. 26, Figs. 9a, b.

We have some doubts about this species. Of the characteristics ascribed to it by Wachsmuth and Springer and used by them to differentiate it from *D. triangulatus*, the only one which does not fall within the realm of individual variation is the circular rim around the basal pit. From sectioning some specimens having such a circular rim, we find that it is really part of the plates, despite the suggestion in some specimens that it is either part of the column or a fused structure of cup and columnals. Yet young specimens with a circular rim have the centers of their \(RR\) spaced about the same as those specimens without such a rim. The column fits tightly against the sides of the rim; we have not investigated enough specimens to determine to our satisfaction whether or not such close contact may have induced secretion of the rim. For the present, we accept *D. barrisi* as a species distinct from *D. triangulatus*.

All but one of the 15 specimens we examined have all S-rays. The exception, however, has all D-rays. It also has the ornamentation somewhat simpler in pattern and more accentuated than the typical specimens.
Nevertheless, such variations have been noted in other *Dolatocrinus* species, and we believe the exception should be included in *D. barrisi*.

**UMMP 6005B** (Pl. II, Figs. 7-8).—Rays D-D-D-D-D. The PBrBr$_1$ are all large, so that the ridges connecting R and PBr$_2$ with adjacent IBrBr$_1$ outline a large rhomb in each ray. These elements of ornamentation are especially conspicuous, and coupled with the high sides of the cup, accentuate the difference created by D-rays as compared with S-rays.

**UMMP 45097** (Pl. II, Figs. 11-12).—Rays S-S-S-S-S. This is typical of medium-size specimens. In larger specimens, the ornamentation is not as clearly defined and additional concentric triangles are added to make a more complex pattern. The specimen is slightly compressed, so that the rays appear more nearly in plan view as seen dorsally (Pl. II, Fig. 11).

**UMMP 6018A** (Pl. II, Figs. 13-15).—Rays S-S-S-S-S. The dorsal cup is not compressed or distorted. The median ray ridges are higher than other ornamentation. The circular rim has a sharp fissure around its periphery.

**Occurrence.**—Thunder Bay Limestone, Partridge Point, Alpena County, Michigan.

*Dolatocrinus stelliger* Miller and Gurley

(Pl. I, Figs. 10-12)

The long synonymy is given by Kesling and Mintz, 1963.

Of over fifty specimens studied, only one contained an S-ray. It is from the Dock Street Clay member of the Four Mile Dam Formation.

**UMMP 44995** (Pl. I, Figs. 10-12).—Rays D-D-D-D-S. The axillary nature of PBr$_1$ in the fifth ray (Pl. I, Fig. 12) is indicated by the bisected-triangle form of associated ridges. In contrast, the non-axillary nature of PBr$_1$ in the fourth ray (Pl. I, Fig. 11) is indicated by the cross-within-a-rhomb form of the associated ridges. When submersed in xylol, the sutures of this specimen are distinct; they confirm the presence of two PBrBr$_1$ in each of the D-rays and only one PBr in the S-ray.

**Occurrence.**—Dock Street Clay member of Four Mile Dam Formation, Thunder Bay Quarry, Alpena, Michigan.

*Dolatocrinus liratus* (Hall)

(Pl. I, Figs. 13-15; Pl. II, Fig. 16-17)

The very lengthy synonymy is given by Kesling and Mintz, 1963.

Of about fifty specimens we have examined, only two have any S-rays. Both are from the Dock Street Clay member of the Four Mile Dam Formation.
UMMP 44978 (Pl. I, Figs. 13–15).—Rays D-D-D-D-S. In this adult, the axillary \( PB_r \) in the S-ray (Pl. I, Fig. 15) is much larger than that in the adjacent fourth D-ray (Pl. I, Fig. 14), and the \( SBrBr \) are also larger. However, the combined height of the two \( PB_rBr \) in the D-ray greatly exceeds that of the single \( PB_r \) in the S-ray.

UMMP 44980 (Pl. II, Figs. 16–17).—Rays D-D-D-D-S. The contrast between the two kinds of rays in this young specimen is the same as in the adult described above. The second (Pl. II, Fig. 16) and fifth (Pl. II, Fig. 17) rays are illustrated.

Occurrence.—Dock Street Clay member of Four Mile Dam Formation, Thunder Bay Quarry, Alpena, Michigan.

**Dolatocrinus sp.**

(Pl. II, Figs. 18–19)

A specimen in the Museum of Paleontology was labeled “Sink hole about 20 miles W. of Alpena. A. W. Grabau.” This locality cannot be correct. No Middle Devonian strata crop out 20 miles west of Alpena. Sink holes occur in the Alpena Limestone a few miles west of Alpena; possibly, the crinoid is from the Alpena Limestone, although it does not bear close resemblance to specimens known to be from that formation. If it does come from the Alpena Limestone, it is the oldest specimen with an S-ray that we have studied.

UMMP 45095 (Pl. II, Figs. 18–19).—Rays D-D-D-D-S. Although the fourth ray (Pl. II, Fig. 18) is an excellent example of a D-ray, the fifth ray (Pl. II, Fig. 19) is definitely an S-ray. The \( PB_r \) of the S-ray is only slightly larger than the \( PB_r \) of the fourth ray.


**LITERATURE CITED**


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