

CONTRIBUTIONS FROM THE MUSEUM OF PALEONTOLOGY

THE UNIVERSITY OF MICHIGAN

Vol. XIX, No. 15, pp. 257-263 (2 pls.)

JUNE 11, 1965

PRIMIBRACHIALS AND ARMS OF
ALLOPROSALLOCRINUS CONICUS CASSEDAY
AND LYON, A LOWER MISSISSIPPIAN
CAMERATE CRINOID

BY
ROBERT V. KESLING



MUSEUM OF PALEONTOLOGY
THE UNIVERSITY OF MICHIGAN
ANN ARBOR

CONTRIBUTIONS FROM THE MUSEUM OF PALEONTOLOGY

Director: LEWIS B. KELLUM

The series of contributions from the Museum of Paleontology is a medium for the publication of papers based chiefly upon the collections in the Museum. When the number of pages issued is sufficient to make a volume, a title page and a table of contents will be sent to libraries on the mailing list, and to individuals upon request. A list of the separate papers may also be obtained. Correspondence should be directed to the Museum of Paleontology, The University of Michigan, Ann Arbor, Michigan.

VOLUME XIX

1. Silicified Trilobites from the Devonian Jeffersonville Limestone at the Falls of the Ohio, by Erwin C. Stumm. Pages 1-14, with 3 plates.
2. Two Gastropods from the Lower Cretaceous (Albian) of Coahuila, Mexico, by Lewis B. Kellum and Kenneth E. Appelt. Pages 15-22, with 2 figures.
3. Corals of the Traverse Group of Michigan, Part XII, The Small-celled Species of *Favosites* and *Emmonsia*, by Erwin C. Stumm and John H. Tyler. Pages 23-36, with 7 plates.
4. Redescription of Syntypes of the Bryozoan Species *Rhombotrypa quadrata* (Rominger), by Roger J. Cuffey and T. G. Perry. Pages 37-45, with 2 plates.
5. Rare Crustaceans from the Upper Devonian Chagrin Shale in Northern Ohio, by Myron T. Sturgeon, William J. Hlavin, and Robert V. Kesling. Pages 47-64, with 5 plates.
6. A Fossil Dennstaedtioid Fern from the Eocene Clarno Formation of Oregon, by Chester A. Arnold and Lyman H. Daugherty. Pages 65-88, with 7 plates.
7. A New Species of *Melocrinites* from the Middle Devonian Bell Shale of Michigan, by Robert V. Kesling. Pages 89-103, with 2 plates.
8. A New Spiraculate Blastoid, *Pyramiblastus*, from the Mississippian Hampton Formation of Iowa, by Donald B. Macurda, Jr. Pages 105-114, with 1 plate.
9. A Drastic Reappraisal of "*Lepidasterella babcocki* Schuchert"—as *Helianthaster gyalinus* Clarke, a Streptophiuran Auluroid, by Robert V. Kesling. Pages 115-133, with 4 plates.
10. *Decadocrinus hughwingi*, a New Middle Devonian Crinoid from the Silica Formation in Northwestern Ohio, by Robert V. Kesling. Pages 135-142, with 1 plate.
11. Two New Crinoids of the Family Periechocrinitidae from the Middle Devonian Thunder Bay Limestone of Michigan, by Robert V. Kesling. Pages 143-155, with 2 plates.
12. Two Unusually Well-preserved Simple Rugose Corals from the Jeffersonville Limestone (Devonian) of the Falls of Ohio, by Erwin C. Stumm. Pages 157-161, with 2 plates.
13. Two New Species of Trilobites from the Middle Devonian Silica Shale of Northwestern Ohio, by Erwin C. Stumm. Pages 163-166, with 1 plate.
14. Illinoian and Sangamon Vegetation in Southwestern Kansas and Adjacent Oklahoma, by Ronald O. Kapp. Pages 167-255, with 6 plates.
15. Primibrachials and Arms of *Alloprosallocrinus conicus* Casseday and Lyon, A Lower Mississippian Camerate Crinoid, by Robert V. Kesling. Pages 257-263, with 2 plates.

PRIMIBRACHIALS AND ARMS OF
ALLOPROSALLOCRINUS CONICUS CASSEDAY AND LYON,
 A LOWER MISSISSIPPIAN CAMERATE CRINOID

BY
 ROBERT V. KESLING

ABSTRACT

Many specimens of *Alloprosallocrinus conicus* Casseday and Lyon contain rays with only one, or essentially one, *PBr*, as stressed by the original authors (1862), Wachsmuth and Springer (1897), and others. One specimen reported by Van Sant and Lane (1964) contains rays with two *PBrBr*, said to be abnormal. All four specimens of this species in the Museum of Paleontology of The University of Michigan have two *PBrBr* per ray, suggesting that such development is not unusual. Three of the Michigan specimens have 14 arms each, although the greatest number previously reported is 12. Variations in *PBrBr* in *A. conicus* is reminiscent of similar variations recently reported in species of *Dolatocrinus*.

CONTENTS

Introduction	257
Previous work	258
Museum of Paleontology specimens	259
Primibrachials	259
Arms	260
Conclusion	260
Literature cited	261
Plates	(after) 261

INTRODUCTION

A SURVEY OF PALEONTOLOGICAL LITERATURE indicates that specimens of *Alloprosallocrinus conicus* having more than one primibrachial (*PBr*) per ray or more than ten arms are regarded as sufficiently rare to be called "abnormal." Yet the four specimens deposited in the Museum of Paleontology of The University of Michigan all have rays with *PBrBr*₂ and three of them bear 14 arms each.

The deviation of these specimens from the descriptions was realized several years ago when studying crinoids collected nearly forty years ago in

Kentucky by Professor (now Emeritus) George M. Ehlers. The two specimens of *Alloprosallocrinus conicus* which he discovered near the former University of Michigan Department of Geology Summer Field Course camp at Mill Springs, Kentucky, were put aside for further investigation. Recent remarks on the species by Van Sant and Lane (1964, pp. 110–11) make the observations herein timely and prompt their publication.

I am grateful to Professor Lewis B. Kellum and Professor Chester A. Arnold for reading the manuscript, Mrs. Helen Mysyk for typing the final draft, and Mr. Karoly Kutasi for photography.

PREVIOUS WORK

The classic work on North American camerate crinoids by Wachsmuth and Springer (1897) still provides basic information and standard reference for many crinoids. Describing *Alloprosallocrinus*, Wachsmuth and Springer stated (1897, p. 406), "Costals 2, but generally so closely anchylosed that the line of union is invisible, and there is virtually but one plate." In regard to *A. conicus*, the type species, they said (1897, p. 407), "Costals generally so closely anchylosed that a suture line cannot be traced, both together are pentangular, a little wider than the radials, and wider than long." The "costals" of their terminology are *PBrBr*, the primibrachials, by some called the *IBrr*, the first brachials, or the *IAxx*, if the plates are axillary.

The generic and specific character emphasized by Wachsmuth and Springer is the fusion of the two *PBrBr* in each ray to form essentially one plate, pentagonal and axillary, supporting the two *SBrBr*.

In their excellent study of the crinoids from Crawfordsville, Indiana, Van Sant and Lane (1964) direct attention to the variations of *PBrBr* in *Alloprosallocrinus*. As published, their account contains an instance of indecision as to what is normal for the type species: in the explanation of Figure 37B (p. 110), specimen UCWM 8972 is identified as an "abnormal specimen . . . with two primibrachs in each ray," but in the explanation of Plate 7, Figures 2–4, this same crinoid is called a "typical calyx." As they demonstrate in remarks about the species *A. conicus*, however, Van Sant and Lane recognize that most described specimens have only one *PBr* in each ray (1964, p. 111):

Wachsmuth & Springer, as well as others, have suggested that one feature of particular taxonomic importance is that the *IBrr*₁ [*PBrBr*₁] are fused with the *IAxx* [*PBrBr*₂] so that only a single distinct pentagonal axillary plate is visible. One specimen examined, however, has 2 *IBrr* [*PBrBr*] developed in the A, B, and C rays and in the D and E rays this plate is reduced in size, so as not to extend the entire width of the RR.

Van Sant and Lane (1964, p. 110) place *Alloprosallocrinus gurleyi*

Miller with 11 arms as a junior synonym of *A. conicus* Casseday and Lyon, typically with 10 arms.

MUSEUM OF PALEONTOLOGY SPECIMENS

In the Museum of Paleontology of The University of Michigan are four specimens of *Alloprosallocrinus conicus* Casseday and Lyon. Two were obtained many years ago by exchange with Mr. Frank Springer, and two were collected by Professor George M. Ehlers near Mill Springs, Kentucky. Only the following information is available:

- UMMP 1425, Warsaw Group, Little Barren, Kentucky. Specimen identified by Frank Springer. Calyx silicified, dorsal cup rather well preserved, sutures distinct.
- UMMP S-5529, Keokuk Group, Whites Creek, Tennessee. Specimen identified by Frank Springer. Calyx poorly preserved, dorsal cup cracked and disrupted by siliceous veinlets, sutures fairly distinct except in D ray.
- UMMP 30506, Fort Payne Chert, near Mill Springs, Kentucky. Found and identified by G. M. Ehlers. Specimen picked up on slope, lying on New Providence Shale but probably rolled downhill from the Fort Payne Chert, to judge from the preservation. Calyx smaller than others but excellently preserved, evenly silicified, dorsal cup with sutures well defined.
- UMMP 30507, Fort Payne Chert, near Mill Springs, Kentucky. Found and identified by G. M. Ehlers. Specimen picked up on slope, lying on New Providence Shale but probably rolled downhill from overlying Fort Payne Chert. Calyx large, dorsal cup poorly preserved, secondary siliceous deposits obliterating sutures in many areas.

PRIMIBRACHIALS

Development of $PBrBr$ does not conform to a regular pattern in the four specimens. The arrangement of $PBrBr$ in each ray is reflected in the shape of PBr_1 . Three kinds of $PBrBr_1$ can be distinguished: (1) triangular, with convex sides, present in rays where PBr_1 does not completely separate R from PBr_2 but is inserted wedgelike on one side of the R/PBr_2 suture, (2) subquadrate, varying from nearly rectangular to distinctly trapezoidal, present in rays where PBr_1 completely separates R from PBr_2 , and (3) pentagonal, present in rays where PBr_2 fails to completely separate PBr_1 from SBr_1 but is offset to one side.

In UMMP 1425 (Pl. II, Fig. 5), the $PBrBr_1$ of the A, B, and E rays are quadrate and those of the C and D rays are triangular. In UMMP S-5529 (Pl. I, Fig. 2), the $PBrBr_1$ of the A and B rays are quadrate, that of the E ray is triangular, and the sutures are too indefinite in the C and D rays to distinguish the $PBrBr_1$. In UMMP 30506 (Pl. I, Figs. 5-6), the $PBrBr_1$ of the A, B, D, and E rays are quadrate, whereas that of the C ray is pentagonal. In UMMP 30507 (Pl. II, Fig. 2), the $PBrBr_1$ of the A and B rays are quadrate and the others cannot be distinguished.

The irregularity of arrangement is emphasized in the two posterior (C and D) rays, which include triangular (UMMP 1425), quadrate (UMMP 30506), and pentagonal $PBrBr_1$ (UMMP 30506). Of the quadrate $PBrBr_1$, some are about as large as the adjacent PBr_2 (A ray of UMMP 1425), some are intermediate (B ray of UMMP 30507, D ray of UMMP 30506), and some are very narrow (A ray of UMMP 30506, E ray of UMMP 1425).

ARMS

One of the specimens, UMMP S-5529 (Pl. I, Fig. 2), appears to have 12 arms: two each in the A, B, and E rays and three each in the C and D rays. The other three specimens have 14 arms each: two in the A ray and three in each of the other rays.

An unusual feature for camerate crinoids is the manner in which the three arms originate in a ray in *Alloprosallocrinus conicus*. One arm develops from the series of plates on the outer margin of each SBr and the middle arm develops from a series beginning with a plate in contact with both $SBrBr$ (as shown in the B, C, D, and E rays of UMMP 30506, Pl. I, Fig. 6). In this distribution, it is impossible to determine whether the third arm comes from the left or the right SBr —actually, it comes from both, in what would in other crinoids be an $ISBrBr$ (intersecundibrachial) position. Except in the posterior (CD) interray, the plates of each ray reach contact with those of the adjacent ray, enclosing a large, many-sided (commonly 10-sided) IBr plate.

CONCLUSION

Review of descriptions of *Alloprosallocrinus conicus* shows that many specimens have only one discernible PBr in each ray rather than two, as in the specimens used in this study. Apparently, the number or form of the $PBrBr$ has no value as a generic or specific character. The variations are reminiscent of the occurrence of one or two $PBrBr$ in the rays of certain species of *Dolatocrinus*, and the recent revelation that *Stereocrinus* (originally differentiated for having one PBr) was actually a junior synonym of *Dolatocrinus* (originally described as having two $PBrBr$), the identity being certain when in the same specimen some rays had one and some had two $PBrBr$. In the case of *Dolatocrinus*, the oldest known species had invariably two $PBrBr$ in each ray and the younger species had a mixture of one and two $PBrBr$ in their rays; enough of the history of the genus is known to indicate that evolution involved the elimination of $PBrBr$ in the rays, but the genus became extinct before all specimens were reduced to one PBr per ray.

Little is known of the history of *Alloprosallocrinus*. In the absence of older representatives of the genus, it may be only suggested that the variations in *PBrBr* are evidence of evolutionary reduction.

LITERATURE CITED

- CASSEDAY, S. A., and LYON, S. S. 1862. Description of Two New Genera and Eight New Species of Fossil Crinoidea from the Rocks of Indiana and Kentucky. *Am. Acad. Arts and Sci., Proc.*, Vol. 5, pp. 16-31.
- VAN SANT, JAN F., and LANE, N. G. 1964 (August 14). Crawfordsville (Indiana) Crinoid Studies. *Univ. Kansas Paleontol. Instit., Paleontol. Contrib., Echinodermata*, Art. 7, 136 pp., 8 pls., 41 figs. in text.
- WACHSMUTH, CHARLES, and SPRINGER, FRANK. 1897. The North American Crinoidea Camerata. *Harvard Coll. Mus. Comp. Zool., Mem.*, Vols. 21-22, 897 pp., 83 pls. in atlas, 21 figs. in text.

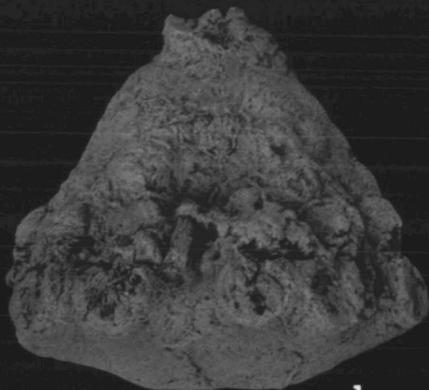
Submitted for publication November 17, 1964

EXPLANATION OF PLATE I

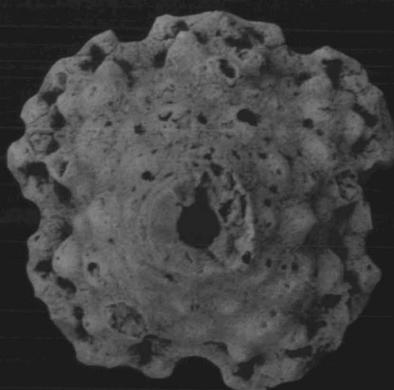
(All figures $\times 2$)

- | | PAGE |
|---|------|
| <i>Alloprosallocrinus conicus</i> Casseday and Lyon | 259 |
| FIGS. 1-2. Lateral and basal views of poorly preserved calyx. UMMP S-5529, Keokuk Group, Whites Creek, Tennessee. Figure 1 centered on BC interray; Figure 2 with A ray uppermost. <i>PBrBr</i> fairly distinct in anterior three rays. | |
| FIGS. 3-6. Tegminal, lateral, and two basal views of silicified calyx. UMMP 30506, Fort Payne Chert, near Mill Springs, Kentucky. CD interray lowermost in Figure 1, forward in Figure 2, and uppermost in Figures 5-6. Figure 6 photographed with specimen immersed in xylol and sutures drawn on print. | |

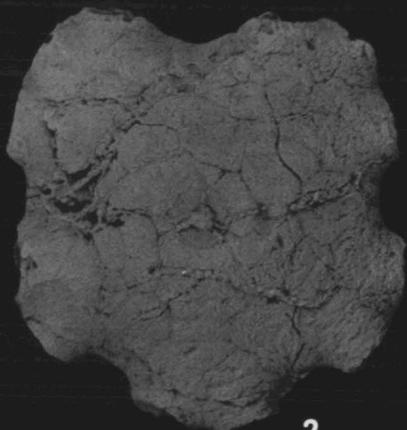
PLATE I



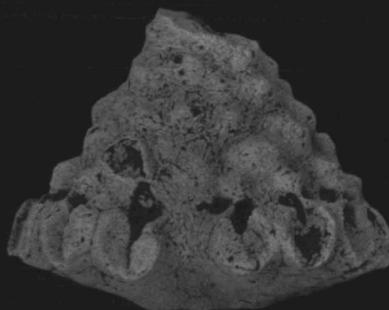
1



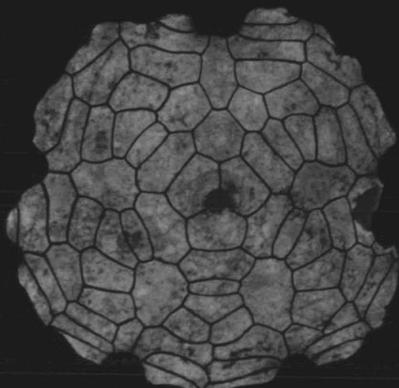
3



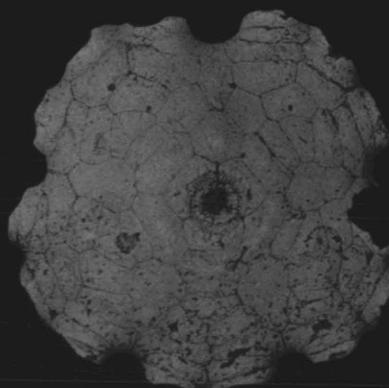
2



4

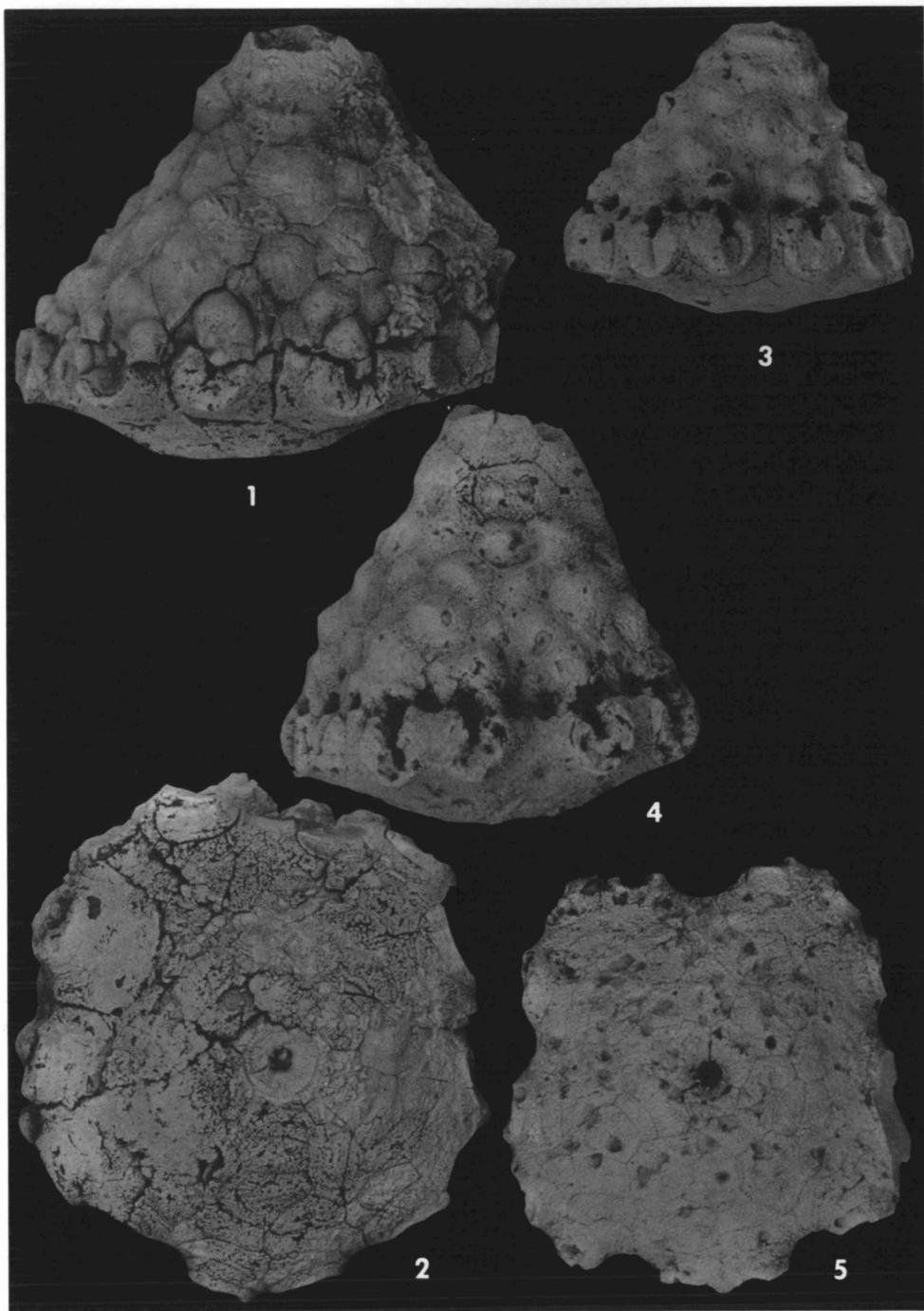


6



5

PLATE II



EXPLANATION OF PLATE II

(All figures $\times 2$)

	PAGE
<i>Alloprosallocrinus conicus</i> Casseday and Lyon	259
FIGS. 1-2. Lateral and basal views of poorly preserved calyx. UMMP 30507, Fort Payne Chert, near Mill Springs, Kentucky. CD interray uppermost in Figure 2.	
FIG. 3. Lateral view of silicified calyx, centered on DE interray. UMMP 30506. Other views on Plate I, Figures 3-6.	
FIGS. 4-5. Lateral and basal views of silicified calyx. UMMP 1425, Warsaw Group, Little Barren, Kentucky. CD interray uppermost in Figure 5.	

