AMELIACRINUS BENDERI, A NEW DICYCLIC CAMERATE CRINOID FROM THE MIDDLE DEVONIAN SILICA FORMATION IN NORTHWESTERN OHIO

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ABSTRACT—Ameliacrinus benderi is a new genus and species of the family Archaeocrinidae. Although it occurs in Middle Devonian strata, this crinoid retains several very primitive characters, including a median anal series of plates, rays composed of numerous plates and elevated on the cup, depressed interbrachial areas, acuminate base, and separated radials. It is progressive in having many of its IBrBr plates polygonal and regularly arranged and most of its arm BrBr biserial. IBB of the new crinoid lie in a basal pit, concealed by articulation of the column.

INTRODUCTION

Even though numerous Middle Devonian camerate crinoids are known, from time to time a new kind is discovered. Outcrops and dump piles of the Middle Devonian Silica Formation in the South and North Quarries of the Medusa Portland Cement Company, just west of Centennial Road and southwest of Sylvania, Ohio, are scoured daily by fossil collectors, both professionals and amateurs. The South Quarry has been opened for over forty years. The faunal list for the formation compiled by Stumm & Chillman (1967) is long. Even relatively rare fossils have been found and presented to scientific institutions.

It is a fortunate circumstance, therefore, when a specimen of a new species is offered for study and a very special occasion when the species proves to belong to a new genus. The crinoid described in this paper is a new genus and species. In addition, it shows an unexpected retention of primitive dicyclic camerate features.

I take exceptional pride in naming the new genus for my wife, Amelia Bradham Kesling, whose patience and understanding have enabled me to maintain enthusiasm for paleontology through many years, whose unselfish sacrifices have contributed to my research, and whose constancy has made life a wonderful experience. I am also proud to name the species in honor of Mr. Jack Bender of Toledo, Ohio, for his great generosity in donating this prized specimen to our Museum of Paleontology.

For their assistance in improving the quality of this paper, I appreciate the efforts of Professor C. A. Arnold and Professor E. C. Stumm in critical review, Mrs. Gladys Newton in typing, and Mr. Karoly Kutasi in photography.

AGE AND LOCALITY

The crinoid described here came from the Middle Devonian Silica Formation, possibly from unit 9 of Ehlers, Stumm, & Kesling (1951). It was found by Mr. Jack Bender in the North Quarry of the Medusa Portland Cement Quarry (recently abandoned), north of Brint Road and west of Centennial Road, Lucas County, Ohio, about three miles west-southwest of Sylvania, Ohio, and about two miles south of the Ohio-Michigan border. The quarry buildings of the Medusa Company and the France Stone Company, together with a few nearby houses, is sometimes referred to as the village of Silica.

SYSTEMATIC DESCRIPTION

Class CRINOIDEA
Subclass CAMERATA Wachsmuth & Springer
Order DIPLOBATHRIDA Moore & Laudon

The general history of the camerates has been worked out by Moore & Laudon (1943, p. 76–82). In its general form, a many-plated subconical cup with raised rays and depressed interbrachial areas, Ameliacrinus is a primitive type of dicyclic camerate. It exhibits an unusual combination of evolutionary stages. Its primitive characters include RR separated by IBrBr or XX, rays composed of numerous plates and their branches incorporated in the cup as far as the arms, prominent median series of plates in the posterior interray, and the base of the cup acuminate rather than indented. A distinctly progressive feature is the biserial arrangement of the arm brachials. The lower IBrBr plates are primitive in being small and numerous but progressive in having a regular arrangement. In the majority of its characteristics, therefore, Ameliacrinus is more closely allied with Ordovician species of Raphano- crinus and Archaeocrinus than with its contemporary species of Thylacocrinus and Sphaerotocrinus.

Familial placement of the new genus seems reasonably certain, despite certain exceptional features. Ameliacrinus has a median series of analcs in common with the Reteocrinidae, but can be distinguished by the regularity of its lower IBrBr. It has IBB confined to a basal concavity like those of the Rhodocrinitidae, but differs from that family in having a subconical cup and a wide posterior interray with a median series of plates. It has ray and anal ridges.
and depressed IBrBr like those of the Ptycho-
ocrinidae, but can be distinguished from that 
family by its separated RR and biserial arms. 
On the other hand, *Ameliacrinus* can be readily 
accommodated in the Archaeocrinidae, mainly 
because of the latitude of characters included 
in the family description.

Family **Archaeocrinidae** Moore & Laudon 
Moore & Laudon (1943, p. 82) give the 
following diagnosis of the family:

Dicyclic; cup high; RR separated all around; 
median ray ridges present in Ordovician genera;

IBrBr regular, depressed; anal area not markedly 
depressed, and median anal ridge generally not 
present; arms uniserial and biserial . . . Ordovician-

They further stated that the Silurian and De-
vonian genera *Wilsonicrinus, Paulocrinus, Thy-
lacocrinus,* and *Sphaerotocrinus* were included 
"with full knowledge that eventually it may be 
necessary to assign them to one or more new 
families." Certainly, these genera cannot be 
described as having depressed IBrBr.

The inclusion of my new genus in the Ar-
chaeocrinidae entails a change in the diagnosis

**TEXT-FIG. 1—Ameliacrinus benderi* n. gen. and n. sp. Plate diagram of holotype based on camera lucida draw-
ings. Arms not complete.**

**EXPLANATION OF PLATE 1**

Both figures × 4

**FIGS. 1–2—Ameliacrinus benderi* n. gen. and n. sp. Holotype UMMP 57174. 1, view of specimen on small 
slab, cup inclined to obscure posterior interray; lightly coated with sublimate of ammonium chloride; im-
pression of presumed columnals at top of figure. 2, lateral view centered on A ray; rather heavily coated 
with ammonium chloride to obscure flecks of pyrite, background blocked out to emphasize shape. Un-
retouched.**
regarding the limitation of median ray ridges to Ordovician genera, for although the rays are not sharply crested in *Ameliacrinus*, they are strongly elevated in the median parts so that they are “round-backed” like those in *Reteocrinus* (presumably the ancestral genus from which later dicyclic camerates evolved).

**Ameliacrinus** n. gen.

*Type species.*—By monotypy, *Ameliacrinus benderi* n. sp.

*Diagnosis.*—Archaecrinid crinoid with median anal series, strongly elevated median ray ridges, and depressed IBrBr areas; IBB plates confined to basal cavity, concealed by articulation of column; arms biserial, ten, unbranched.

*Remarks.*—The new genus shows more resemblances to *Archaeocrinus* and *Rhaphanocrinus* than to other genera of the Archaeocrinidae. Like *Archaeocrinus*, it has a median vertical series of XX plates in the posterior interray and biserial arm BrBr; it differs drastically in the deeper depression of its interbrachial areas, much smaller IBrBr plates, and smaller IBB. Like *Rhaphanocrinus*, *Ameliacrinus* has depressed interbrachial areas, small polygonal IBrBr, tiny concealed IBB, and non-bifurcating arms; it can be readily separated from *Rhaphanocrinus* by its median series of XX plates and its biserial arm BrBr. From all other genera of the family, the new genus can be distinguished by the shape of its cup and the nature of its IBrBr plates.

Very primitive features persist in the ventral part of the cup. The upper IBrBr in each interray did not develop regularity, resembling somewhat the little irregular plates in the ancestral family Reteocrinidae.

**Ameliacrinus benderi** n. sp.

*Holotype.*—Only specimen known, UMMP 57174.

*Description.*—Cup relatively high, pentagonally turbinate. Rays broadly rounded, protuberant; interbrachia (interradial areas) depressed. Base in lateral view formed by BB (pl. 1, fig. 2). IBB five, equal, together forming a small, flat-surfaced pentagon set well within basal indentation (text-fig. 2), in complete specimen concealed by articulation of column. Each IB subtriangular, its corners extending from center of base on one B to that of adjacent B (pl. 3, fig. 6).

BB five, subequal, large, forming complete circlot (pl. 3, fig. 6); each B hexagonal in lateral view (pl. 1, fig. 2), seven-sided in dorsal inclined view due to re-entrant angle to accommodate halves of distal sides of two IBB (pl. 3, figs. 1, 3, 5). B of CD interray with wide ventral side to fit against large X, (pl. 3, fig. 1); BB of other interrays with narrow ventral side to fit against very small IBr, (pl. 2, figs. 2, 4; pl. 3, figs. 3, 5). Each B, therefore, bounded by two RR, two other BB, X, or IBr,, and (within its base) two IBB, its longest sides adjoining other BB of the circlot. Each
B plate broadly rounded, its sides only slightly depressed and its corners indented in pits (text-fig. 1).

RR five, subequal, separated from one another by 1BrBr or by XX. Each R with its dorsal angle inserted between two BB, its ventral side bordered by PBr, and its sides bordered by two 1BrBr or by X, and one lateral X (text-figs. 1–2; pl. 2, figs. 1, 3, 5; pl. 3, figs. 2, 4). Each R broadly rounded, prominent, forming the base of a raised ray; corners adjacent to 1BrBr strongly indented in pits (some closely spaced corners sharing a common pit); dorsal corner (B-R-B junction) marked by a small, discrete, triangular pit with sides normal to the sutures.

PBr, succeeding each R, roughly hexagonal, with parallel dorsal and ventral sides, laterally modified according to number of bordering 1BrBr or XX plates (pl. 2, figs. 1, 3, 5; pl. 3, figs. 2, 4). Each PBr, about three-fourths the height of underlying R, broadly rounded with indentation or pits at the several lateral corners (junctions with 1BrBr or XX), the wide central elevation continuous with R below and PBr2 above (pl. 2, fig. 3).

PBr, axillary, roughly pentagonal, slightly larger and wider than PBr, but smaller than R, its broad central part rounded and continuous with ray ridges to PBr, and two SBrBr, above (text-fig. 1; pl. 2, fig. 3). Each PBr, plate with widest sides adjoining PBr, and SBrBr, laterally modified by various 1BrBr sutures.

SBr, more or less quadrate, wider than high, continuing ray ridge toward arm. SBr, larger than SBr, axillary, branching heterotomously, giving rise on its inner face to arm BrBr and on its outer ventral face to a short ramule (apparently the same structure as an arm pinnule). ISBrBr filling small area between paired SBrBr (text-fig. 1), normally one relatively large ISBr, two somewhat smaller ISBrBr, and two or three small, irregular ISBrBr; ISBrBr polygonal but irregular, with central tubercle, very similar to 1BrBr at the same level of the cup (pl. 2, fig. 3).

Posterior interray wider than other interrays, with a prominent series of raised median plates (text-fig. 1; pl. 3, fig. 6); in dorsal view, cup appearing to be six-rayed (pl. 3, fig. 6). X, roughly hexagonal, its dorsal border with B parallel to its ventral border with X, its dorso-lateral sides fitting against RR, and its ventro-lateral sides against lateral XX plates. X, about 0.85 the height and width of X; X, nearly the same height and about 0.85 the width of X (text-fig. 2); succeeding plates not exposed. X, X, and X, forming an elevated, broadly rounded vertical series up from B of CD interray. Lateral XX plates irregularly polygonal, not symmetrical on left and right sides of median series; lower lateral plates large, with depressed corners and radial ridges from central elevation to sides; intermediate plates with less distinct ridges; upper plates small, each with central elevation or tubercle.

1BrBr plates filling depressed area above B and between rays (except in posterior interray). Lower 1BrBr regular and polygonal, each with radial ridges from central elevation to sides; upper 1BrBr irregular, smaller, each with rather sharp central node or tubercle (pl. 2, figs. 2, 4). Normally, one 1Br, two 1BrBr, three 1BrBr, and three or four 1BrBr, in each interbrachial area, above which rows irregular and disrupted.

Arms (not counting ramule or pinnule attached to each SBr2) long, two per ray, gently tapering, each uniserial for five or six BrBr beyond SBr2, thereafter biserial. Outer surface of arm evenly rounded (pl. 1, fig. 1). Pinnules

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**EXPLANATION OF PLATE 3**

All figures × 8; coated with sublimate of ammonium chloride

**Figs. 1–6—Ameliacrinus benderi** n. gen. and n. sp. Holotype UMMP 57174. 1–5, dorsally inclined views of alternating interrays and rays from CD interray through AE interray; I, posterior (CD) interray; prominent series of median plates; X in contact with R on each side; 2, D ray; contrasting XX plates on right of ray and 1BrBr plates on left of ray; 3, DE interray; many tiny crystals of pyrite replacing parts of 1BrBr; 4, E ray; IBBr plates forming flat pentagon set well within basal concavity, partly obscured by pyrite; 5, AE interray; 1BrBr plates in rows through 1BrBr, thereafter becoming progressively irregular. 6, dorsal (basal) view, posterior interray uppermost; each IB subtriangular, its distal side bordered by two BB; BB forming circle, but RR separated. Unretouched.
long, gently tapering, alternating on arm, each attached to the wide outer side of a wedge-shaped arm Br; more than 40 close-set pinnules on each side of arm, hence more than 400 pinnules per crinoid. Each pinnule composed of over 20 pinnulars; basal pinnular more or less square, succeeded by graduated series of pinnulars much longer than wide in outer view, each with subcylindrical expanded distal edge and broad flat sides (pl. 2, fig. 2).

Column known only from impression aligned with base of cup and from dislocated, badly pyritized section; column apparently subpentagonal and heteromorphic (pl. 1, fig. 1).

LITERATURE CITED

