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

BY

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

ROBERT V. KESLING

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 & Chilman (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 *Raphanocrinus* 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 anals 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 Ptychocrinidae, 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.

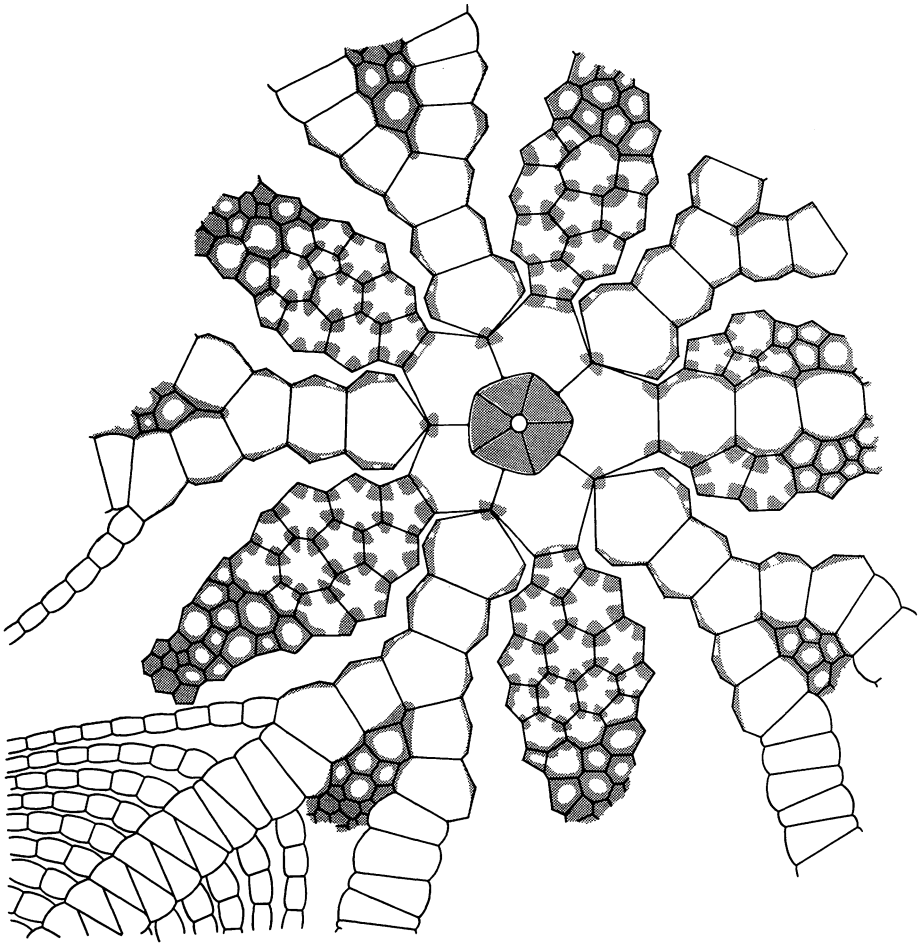
Family ARCHAEOCRINIDAE Moore & Laudon

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-Devonian.

They further stated that the Silurian and Devonian genera *Wilsonicrinus, Paulocrinus, Thylacocrinus,* 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 Archaeocrinidae entails a change in the diagnosis



TEXT-FIG. *1—Ameliacrinus benderi* n. gen. and n. sp. Plate diagram of holotype based on camera lucida drawings. 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; impression 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. Unretouched.

PLATE 1

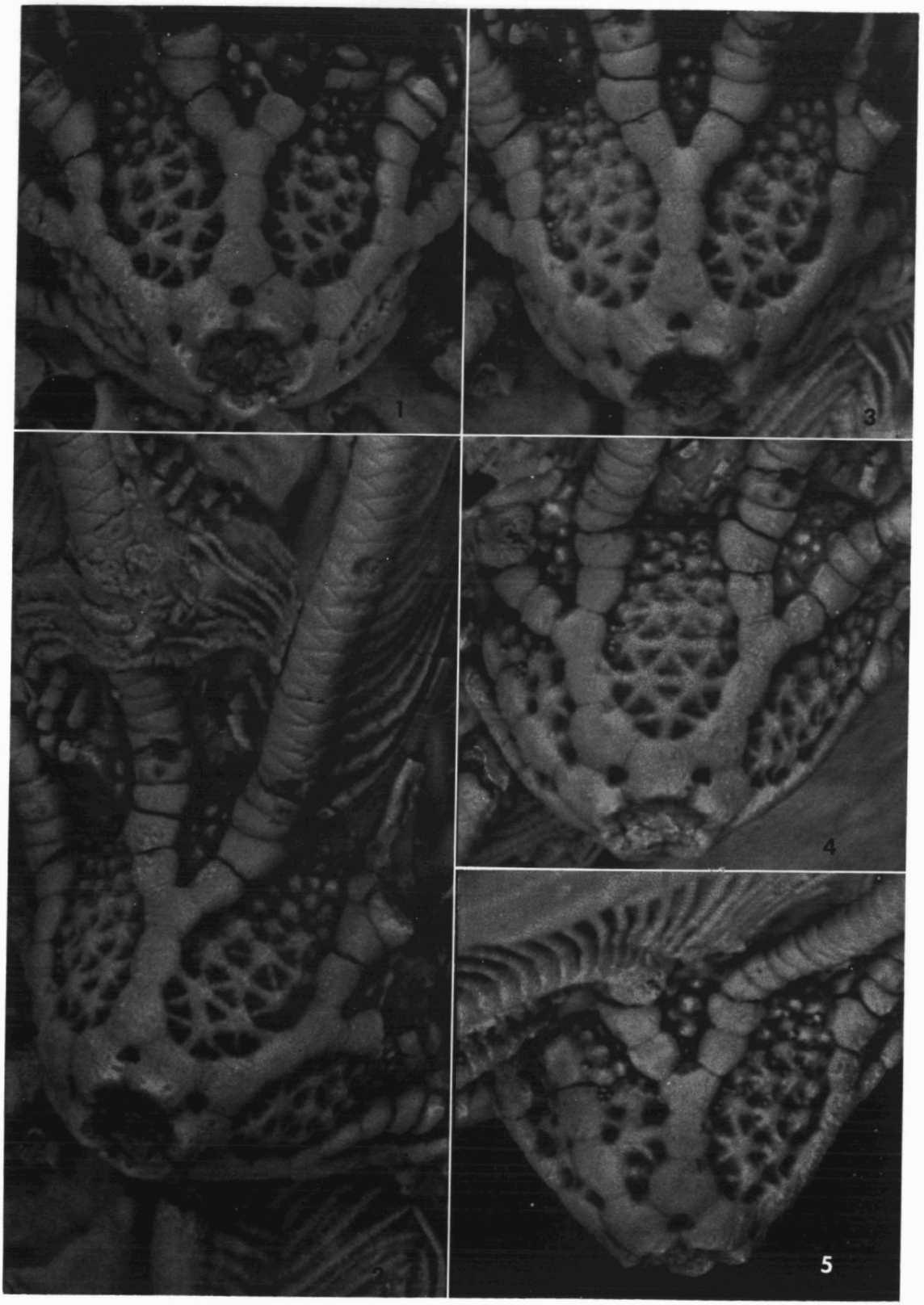


PLATE 2

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).

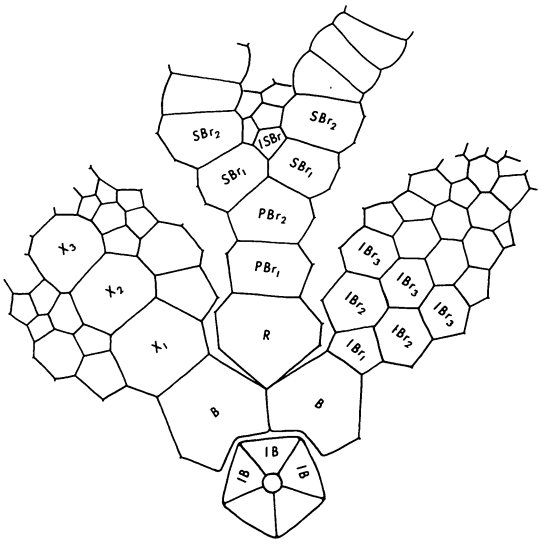
AMELIACRINUS n. gen.

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

Diagnosis.—Archaeocrinid 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 nonbifurcating 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.



TEXT-FIG. 2—*Ameliacrinus benderi* n. gen. and n. sp. Labeled diagram of posterior (CD) interray, C ray, and BC interray. Arms not complete.

AMELIACRINUS BENDERI n. sp.
Text-figs. 1–2; pls., 1–3

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 circlet (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_1 (pl. 3, fig. 1); BB of other interrays with narrow ventral side to fit against very small IBr_1 (pl. 2, figs. 2, 4; pl. 3, figs. 3, 5). Each B, therefore, bounded by two RR, two other BB, X_1 or IBr_1, and (within its base) two IBB, its longest sides adjoining other BB of the circlet. Each

EXPLANATION OF PLATE 2
All figures × 8; coated with sublimate of ammonium chloride

FIGS. *1–5*—*Ameliacrinus benderi* n. gen. and n. sp. Holotype UMMP 57174. Dorsally inclined views of alternating rays and interrays from A ray through C ray. *1,* A ray; right half of ray broken off at end of SBr_1. *2,* AB interray; outer facets of $SBrBr_2$ on A and B rays bearing ramules or pinnules; arms becoming biserial five or six BrBr beyond SBr_2. *3,* B ray; ISBrBr inserted between SBrBr. *4,* BC interray; lower IBrBr regular, upper plates irregular and ornamented only by central node or tubercle. *5,* C ray; ray bounded on left by lateral plates of posterior interray, on right by depressed interbrachial area. Unretouched.

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 IBrBr or by XX. Each R with its dorsal angle inserted between two BB, its ventral side bordered by PBr_1, and its sides bordered by two IBrBr or by X_1 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 IBrBr 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_1 succeeding each R, roughly hexagonal, with parallel dorsal and ventral sides, laterally modified according to number of bordering IBrBr or XX plates (pl. 2, figs. 1, 3, 5; pl. 3, figs. 2, 4). Each PBr_1 about three-fourths the height of underlying R, broadly rounded with indentation or pits at the several lateral corners (junctions with IBrBr or XX), the wide central elevation continuous with R below and PBr_2 above (pl. 2, fig. 3).

PBr_2 axillary, roughly pentagonal, slightly larger and wider than PBr_1 but smaller than R, its broad central part rounded and continuous with ray ridges to PBr_1 below and two $SBrBr_1$ above (text-fig. 1; pl. 2, fig. 3). Each PBr_2 plate with widest sides adjoining PBr_1 and $SBrBr_2$, laterally modified by various IBrBr sutures.

SBr_1 more or less quadrate, wider than high, continuing ray ridge toward arm. SBr_2 larger than SBr_1, 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 $ISBr_1$, two somewhat smaller $ISBrBr_2$, and two or three small, irregular $ISBrBr_3$; ISBrBr polygonal but irregular, with central tubercle, very similar to IBrBr 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_1 roughly hexagonal, its dorsal border with B parallel to its ventral border with X_2, its dorsolateral sides fitting against RR, and its ventrolateral sides against lateral XX plates. X_2 about 0.85 the height and width of X_1; X_3 nearly the same height and about 0.85 the width of X_2 (text-fig. 2); succeeding plates not exposed. X_1, X_2, and X_3 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.

IBrBr plates filling depressed area above B and between rays (except in posterior interray). Lower IBrBr regular and polygonal, each with radial ridges from central elevation to sides; upper IBrBr irregular, smaller, each with rather sharp central node or tubercle (pl. 2, figs. 2, 4). Normally, one IBr_1, two $IBrBr_2$, three $IBrBr_3$, and three or four $IBrBr_4$ in each interbrachial area, above which rows irregular and disrupted.

Arms (not counting ramule or pinnule attached to each SBr_2) long, two per ray, gently tapering, each uniserial for five or six BrBr beyond SBr_2, 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; *1,* posterior (CD) interray; prominent series of median plates; X_1 in contact with R on each side; *2,* D ray; contrasting XX plates on right of ray and IBrBr plates on left of ray; *3,* DE interray; many tiny crystals of pyrite replacing parts of IBrBr; *4,* E ray; IBB plates forming flat pentagon set well within basal concavity, partly obscured by pyrite; *5,* AE interray; IBrBr plates in rows through $IBrBr_3$, thereafter becoming progressively irregular. *6,* dorsal (basal) view, posterior interray uppermost; each IB subtriangular, its distal side bordered by two BB; BB forming circlet, but RR separated. Unretouched.

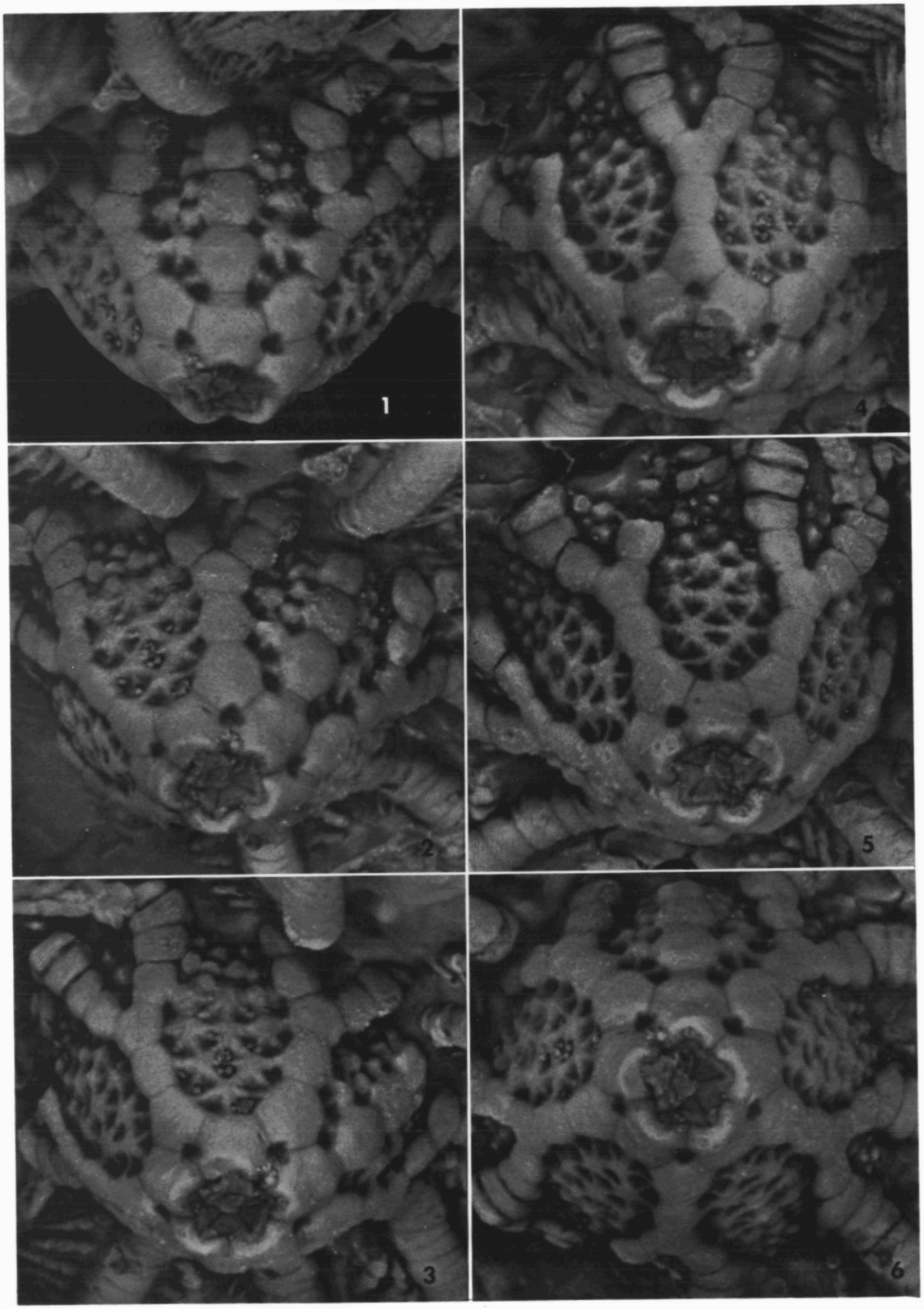

PLATE 3

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).

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