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PROCTOTHYLACOCRINUS BERRYORUM, A NEW CRINOID
FROM THE MIDDLE DEVONIAN ARKONA SHALE
OF ONTARIO

BY

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PROCTOTHYLACOCRINUS BERRYORUM, A NEW CRINOID
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ABSTRACT—A *Proctothylacocrinus* recently discovered in the Arkona Shale has some characteristics in common with each of the two previously described species and other characteristics which are unique. Like the type species, *P. longus*, the new crinoid has broad ridges connecting RR and BB plates and only faint ridges between RR. Like *P. esseri*, it has a relatively wide dorsal cup and narrow ridges radiating from the RA. It differs from both *P. longus* and *P. esseri* in the following: (1) no scalloped edge on the IBB cirlet, (2) no median ventral ridge extension on each IB (projecting into the B-IB-B concavity), (3) relatively long IB-IB sutures, (4) no small deep pit at the IB-B-IB junction, (5) plates in adjacent rows of the anal sac arranged opposite instead of alternate, and (6) three ribs to each side of a sac plate (instead of two). In addition, its column is more nearly round than that of the other two species. Only the holotype is known.

INTRODUCTION

NEARLY A YEAR AGO, Mr. and Mrs. Melvin Lee Berry, of 238 North Avenue, Mt. Clemens, Michigan 48043, informed me that they would soon come to the Museum of Paleontology with a crinoid that was "really nice." It proved to be the first specimen of *Proctothylacocrinus* discovered in the Arkona Shale of Ontario. Mrs. Berry very quickly retrieved her specimen before my astonishment wore off. She entered it in an exhibition in October, 1970. Shortly thereafter, the Berrys returned and donated the crinoid to our collections.

The specimen has a well-preserved cup, the proximal section of the column, and most of the anal sac. Each arm retains some PBrBr, but none has articulated plates beyond the level of SBrBr₄.

Much of the preparation was done by Mrs. Berry before the exhibition. To examine the posterior side of the cup, I freed it from the matrix and lightly cleaned it with dolomite powder from our Airdent machine.

Actually, it was Charlene who picked up the crinoid on the muddy slope at Hungry Hollow in August, 1969. However, I wish to name the species for both her and her husband Mel. Hence, it is *Proctothylacocrinus berryorum*.

In preparation of this paper I had the willing assistance of Mrs. Helen Mysyk, Mrs. Gladys Newton, and Mr. Karoly Kutasi. The holotype and only specimen is deposited and

catalogued in the Museum of Paleontology, The University of Michigan, as UMMP 58656.

LOCALITY

Middle Devonian Arkona Shale, upper part of formation, probably in upper 15 feet, exposed on north bank of Ausable River at Hungry Hollow, about 400 yards downstream (west) of the old iron bridge (shown on Park-hill 40P/4 West Half Sheet, Canada, Army Survey Establishment, 3d ed., 1956), about 1¼ miles east-northeast of Arkona, in Williams Township, Middlesex County, Ontario.

SYSTEMATIC DESCRIPTION

Subclass INADUNATA Wachsmuth & Springer
Order CLADOIDEA Moore & Laudon
Suborder DENDROCRINOIDEA Bather
Family PROCTOTHYLACOCRINIDAE Kier
Genus PROCTOTHYLACOCRINUS Kier

PROCTOTHYLACOCRINUS BERRYORUM n. sp.

Pls. 1, 2

Description.—Dorsal cup relatively wide, flaring upward from IBB cirlet, like that of *P. esseri*. IBB set in cirlet considerably wider than the columnar facet (pl. 2, fig. 3). IB-IB junctions much longer than those of either *P. longus* or *P. esseri*, nearly equal to one-third the height of the overlying BB. Base of each IB almost straight, not scalloped. Area of IB between IB-IB junctions forming an evenly

TABLE 1—COMPARISON OF THREE SPECIES OF *Proctothylacocrinus*.

Character	<i>P. longus</i>	<i>P. esseri</i>	<i>P. berryorum</i>
Dorsal cup	Relatively narrow	Relatively wide	Relatively wide
Base of IBB	Scalloped	Scalloped	Nearly straight
IBB	Median ventral ridge extension	Median ventral ridge extension	No median ventral ridge extension
IB-IB sutures	About 1/6 the height of BB	About 1/6 the height of BB	About 1/3 the height of BB
IB-B-IB junction	Small deep pit	Small deep pit	Shallow indentation, no trace on B
B-B ridges	None or very insignificant	Prominent	Intermediate
R-B ridges	Broad	Narrow, high	Broad
R-R ridges	Faint, low	Distinct, narrow	Faint, low
RA ridges	Broad	Narrow	Narrow
Reinforced proximal plates of anal sac	X ₁ -X ₅ , RX ₁ -RX ₄	X ₁ -X ₃ , RX ₁ , RX ₂	X ₁ -X ₄ , RX ₁ -RX ₃
Plates in proximal part of anal sac	Only slightly wider than high	Very wide and low	Much wider than high
Sac plates of adjacent rows	Alternating	Alternating	Opposite
Ridges to each side of sac plate	Two	Two	Three
Larger columnals	Shallow indentations, nearly decagon-shaped	Distinctly indented, decagram-shaped	Very shallow indentations, nearly round

convex trapezoid; ventral part of plate acuminate, sloping into spacious B-IB-B concavity.

BB large, forming complete circlet, having the usual shapes for the genus. Basal (dorsal) apex of each B not indented by a sharp pit, as in *P. longus* and *P. esseri*. Surface of each B elevated in a broad Y, with the vertical stem of the Y especially wide and prominent (pl. 1, fig. 2; pl. 2, fig. 1) and the bifurcations leading to the RR narrower and more sharply defined, but nevertheless broader than those in *P. esseri*. B-B ridges much lower and less conspicuous (pl. 1, fig. 2; pl. 2, figs. 1, 2). Ridges to RA and X₁, distinct and high (pl. 1, fig. 3; pl. 2,

fig. 2), that to X₁ rather wide and that to RA rather narrow.

RR definitely smaller than BB. RR circlet interrupted by RA, X₁, and RX₁. Central convexity of each R distally forming four ridges: R-B ridges broad and high, R-R ridges very broad and low, R-X₁ ridge sharp and narrow (pl. 2, fig. 2), R-RA ridge narrow, and R-RX₁ ridge (R of C ray with a fifth ridge) high and narrow. RR facets large, occupying fully three-fourths of the upper border on each R, sub-circular.

RA nearly as large as adjacent R, pentagonal with narrow radiating ridges (pl. 1, fig. 3).

EXPLANATION OF PLATE 1

Figures × 4, except as noted; specimen coated with sublimated ammonium chloride

Proctothylacocrinus berryorum n. sp. Holotype UMMP 58656. 1, specimen on matrix with AB interray uppermost; the A ray has plates as high as SBr₄, although more distal plates of some rays lie detached on the slab; × 1. 2, view centered DE interray; the R of the D ray has a low broad ridge leading to the R of the E ray, but a much more sharply defined narrow ridge leading to X₁; the B-B ridges are much lower and broader than those in *P. esseri*; the IBB have no median ventral ridge extension projecting into the B-IB-B concavity. 3, view centered on RA; RA, X₁, and RX₁ have more sharply defined radiating ridges than other plates of the cup. 4, distal end of anal sac showing irregularities in the alignment of plates; the anal opening is surrounded by a margin of small irregular plates.

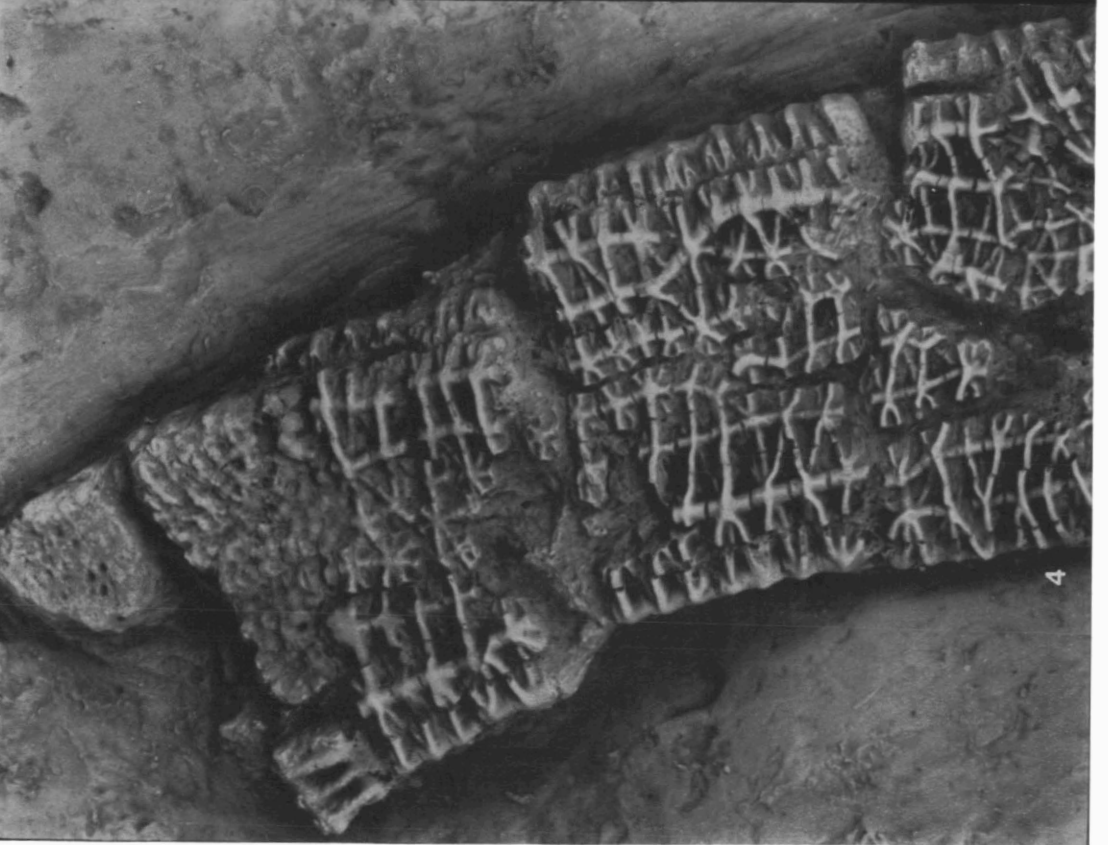
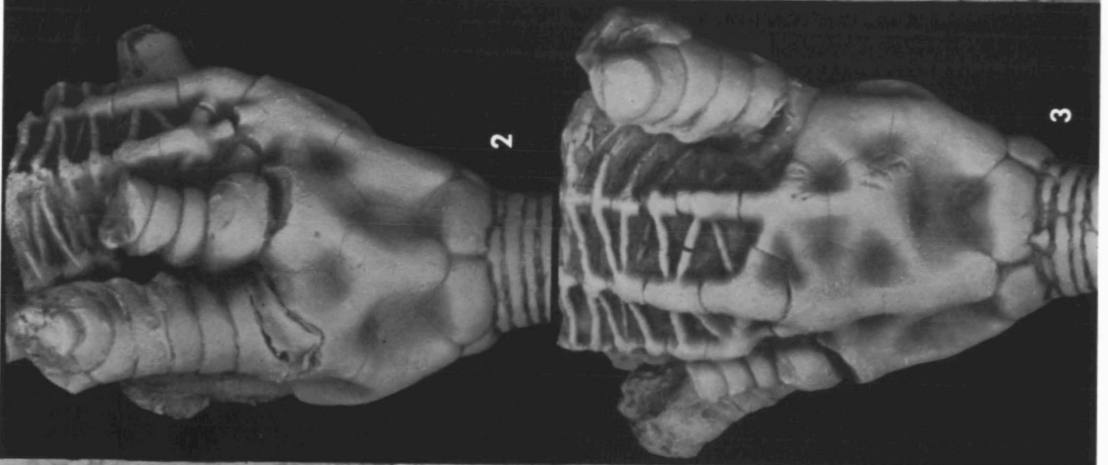


PLATE 1

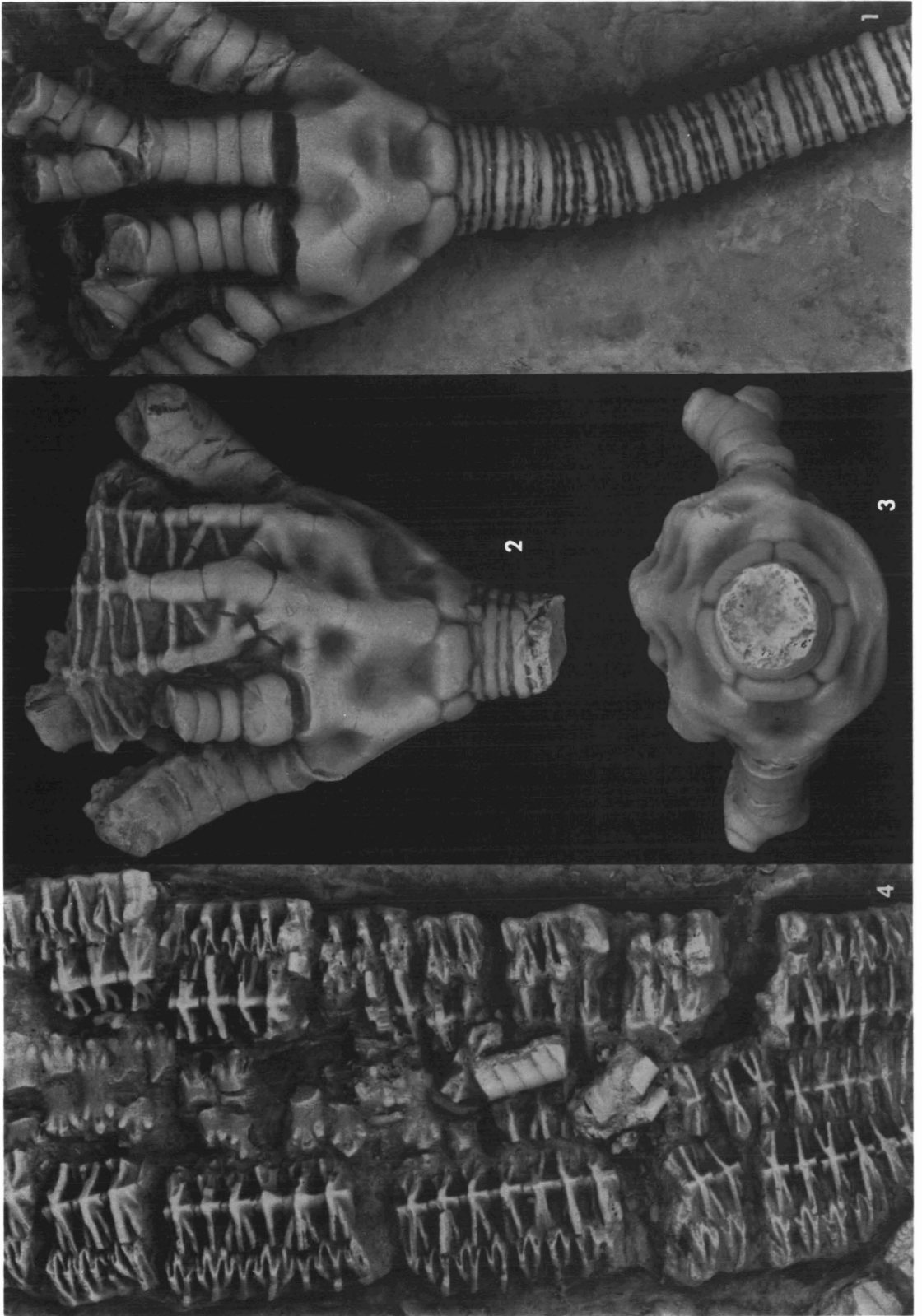


PLATE 2

X_1 as large as adjacent R, with distinct radiating ridges (pl. 2, fig. 2), an especially prominent ridge continuing onto X_2 . In this specimen, X_1 supporting RX_1 , X_2 , and two series of plates on the left side; the last perhaps an anomaly. RX_1 only slightly smaller than RA below, strongly constructed with radiating ridges. Median reinforcing ridges on proximal plates of LX, X, and RX rows, tapering rapidly and indistinguishable from other sac-plate ridges at about the level of LX_2 , X_4 , and RX_3 .

Anal sac large and long, occupying the whole tegmental region. Plates in the proximal part of the sac very regularly arranged in vertical rows (pl. 2, fig. 4); those in distal part of sac showing several irregularities (pl. 1, fig. 4). Terminus of sac, the area around the anus, composed of numerous little irregular plates. Most sac plates much wider than high, arranged opposite to the plates in the adjacent rows. Each large sac plate oblong with 8 ridges: one to each side and one to each corner. Lateral ridges in many plates aligned with the corresponding ridges of plates in adjacent rows.

Arms robust, hemicylindrical, tapering very gradually. PBrBr ending at PBr_5 or PBr_4 , giving rise to only slightly smaller SBrBr.

Proximal section of column (over 65 columnals) nearly the same diameter throughout its length. Large columnals (nodals) nearly

round, the ten indentations very inconspicuous. Other features of column like those described for *P. esseri* (Moore & Jeffords, 1968, p. 34, 35; Kesling, 1968, p. 134).

Remarks.—The only previously known species of *Proctothylacocrinus* have been adequately described: the type species, *P. longus* Kier, by Kier (1952, p. 72, 73) and Kesling (1965, p. 78–80), and *P. esseri* Kesling by Kesling (1965, p. 77, 78; 1968, p. 133–138). The characteristics of these species are compared and contrasted with those of the new *P. berryorum* in table 1.

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EXPLANATION OF PLATE 2

All figures $\times 4$; specimen coated with sublimated ammonium chloride

Proctothylacocrinus berryorum n. sp. Holotype UMMP 58656. 1, view of cup on matrix, with AB interray uppermost; note cyclical disposition of columnals. 2, posterior view (CD interray), centered on X_1 showing reinforcement of proximal anal plates in the posterior region. 3, basal (dorsal) view, showing protuberant edges of IBB circlet beyond columnar attachment; X_1 is at top of figure. 4, proximal section of anal sac, showing regular arrangement of plates; each sac plate has three ridges to each side, the median of which adjoins the corresponding ridge of the plate in the adjacent row; note depth of ridges (crenulations) at edges of sac plates.

