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New Flexible Crinoids from The Upper Devonian of North Central Iowa

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HARRELL L. STRIMPLE and C. O. LEVORSON. New Flexible Crinoids from the Upper Devonian of North-Central Iowa. *Proc. Iowa Acad. Sci.*, 78(1):9-11, 1971.

SYNOPSIS. Complete crinoid dorsal cups and crowns are virtually unknown from the Lime Creek Formation and Amana beds except for one partial crown of *Dactylocrinus stellatimbasalis*

(Thomas) 1924. A partial and a complete crown and one dorsal cup belonging to *Apodactylocrinus* Strimple and Levorson, new genus, are described as *A. keithi* Strimple and Levorson, n. sp. and *A. amanaensis* Strimple and Levorson, n. sp.

INDEX DESCRIPTORS: Crinoids, Lime Creek formation, *Apodactylocrinus*, n.gen., *A. keithi*, n. sp., *A. amanaensis*, n. sp.

Numerous crinoid stem sections and disarticulated parts are found in the Lime Creek Formation, but very few complete crowns have been discovered. The junior author in July, 1962, collected a single specimen in the stripping piles of the Rockford Brick and Tile Company of Rockford, Iowa. It was a nearly complete crown, and is described here as *Apodactylocrinus keithi*, n. sp. The exact horizon the specimen came from cannot be determined; however, based on the lithology of the matrix surrounding the specimen and the associated taxa, it is very likely from near the base of the *Strophonelloides hybridus* Zone or upper *Spirifer* (=Cyrtospirifer) *whitneyi* Zone. Belanski, (1931) reported the *Dactylocrinus stellatimbasalis* Zone to be 102 inches below the top of the *Spirifer whitneyi* Zone and mentioned an abundance of *Orthopora* sp., which forms were also common in the material from the immediate vicinity.

A small partial crown collected by Allen Graffham and a dorsal cup collected by M.A. Stainbrook from the Amana Beds in a low road cut west of High Amana, Iowa County, Iowa are thought to be congeneric. The species is more advanced than *A. keithi* in that the interbranchials are considerably smaller and have completely lost contact with the dorsal cup. It is described as *Apodactylocrinus amanaensis*, n. sp. The Amana beds are considered to be about the same age as the Lime Creek Formation and the Independence Formation, Upper Devonian.

SYSTEMATIC PALEONTOLOGY

Class CRINOIDEA
Subclass FLEXIBILIA
Order SAGENOCRINOIDEA
Family SYNEROCRINOIDEA

Genus APODACTYLOCRINUS Strimple and Levorson, new genus

Type species. Apodactylocrinus keithi STRIMPLE AND LEVORSON, n. sp.

Description. This genus differs from *Dactylocrinus* in that the posterior interradius (C-D) is more advanced; i.e., the C-D basal is no longer than other basals and the anal plate rests in a shallow notch between C and D radials. In *Dactylocrinus* the anal plate rests on the truncated distal face of an elongated posterior basal, well within the cup. Elimina-

tion of anal plates from the dorsal cup is considered to be evolutionary.

The name is derived from the Greek Apo = from, combined with *Dactylocrinus*.

APODACTYLOCRINUS KEITHI Strimple and Levorson,
new species
(Fig. 1 b,d,f)

Description. Crown small, subglobular in shape, with an overall length of 17 mm. and width of 15 mm. Dorsal cup bowl shaped, composed of five basals equal in size and angle, with proximal edges concealed and abruptly curved inward and upward to form a basal depression 1.5 mm. in depth. A round crenellate column, 2.5 mm. in diameter, is attached. When viewed proximally the basal plates are arranged so as to form a perfect five pointed star. Five large radials (RR), equal in size and shape, wider than high, in contact all around except where the proximal points of the IBrr form an angle of 90° with the distal corners of two adjoining radials. RR are pointed proximally and rest between the wide angles produced by two points of the basal star.

There are five interbranchials (IBrr), four of which are uniform in size and shape, the fifth being somewhat smaller and apparently being the posterior side (CD inter-ray). The posterior IBr is hexagonal, 1.8 mm. in height, 1 mm. in width, while the four remaining IBrr are heptagonal with a height of 2.5 mm. and width of 1.6 mm. All are situated in line with the points of the basal star.

Primibrachs are two; primibrach 1 is quadrangular in shape and four times as wide as high. Primibrach 2 axillary, equal in width to primibrach 1. Secundibrach 3 axillary. Nine tertiary brachs are preserved and a few distal plates appear to be missing. All plates of each ray are laterally in contact with adjoining rays except where the IBrr are situated. The distal angle of the posterior IBr is in contact with diagonal sutures on the lower right and left corners of the right and left posterior axillaries of adjunct rays. The right and left sides of posterior IBr are in even contact with adjacent primibrachs 1 and the proximal ends rest in a notch formed by posterior (C - D) radials. The proximal angles of the four remaining IBrr also rest in notches between radials, however the distal angles do not reach secundibrachs; instead they join with diagonal lateral sides of adjacent primibrachs 1.

Arms 20, stout, short, and uniserial. The first branching on all rays occur on primibrach 2. The outer corners of secundibrach 1 are deeply depressed, which depression carries on to the distal extremities to distinctly isolate each ray from the

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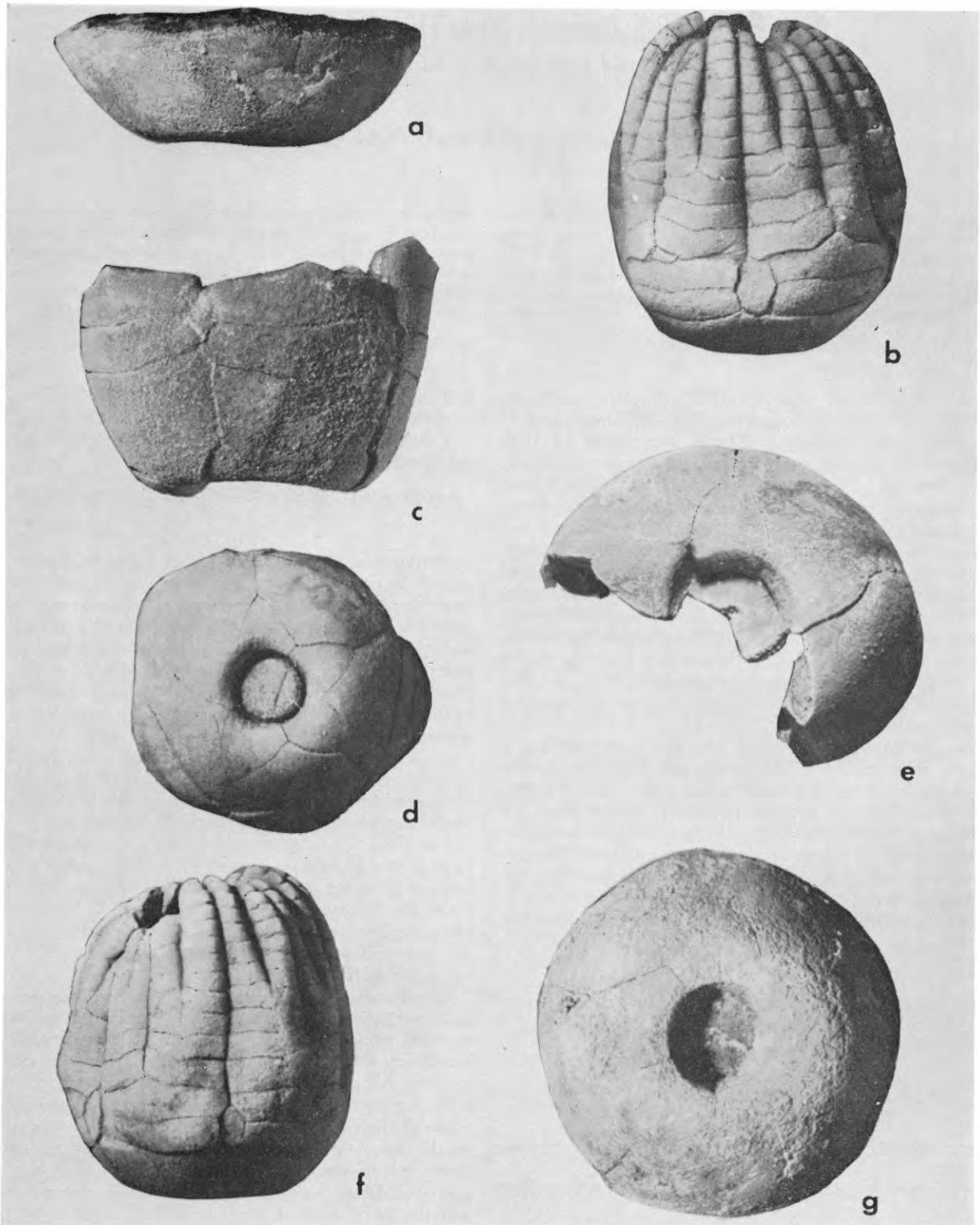


Fig. 1. *a,c,e,g.* *Apodactylocrinus amanaensis*, n. sp. *a,g.* Paratype (SUI 34342) dorsal cup viewed from side and base, X5. *c,e.* Holotype (SUI 34343) partial crown viewed from side and base, X4.5. *b,d,f.* *Apodactylocrinus keithi*, n. sp. Holotype (SUI 80000) complete crown viewed from posterior, *f*, base and side *b,d*, X3.5.

adjoining rays. The second and final branching occurs on secundibrach 3.

All surfaces are finely granular or frosted appearing, faintly on the dorsal surfaces and increasing in intensity through primibrach 1 after which point it is uniform to the distal extremities. All sutures are flush with the surface and quite distinct, except for a portion of the dorsal cup affected by weathering where they are faintly delineated.

Remarks. *Apodactylocrinus keithi* is slightly larger than *Dactylocrinus stellatimbasalis* Thomas and appears to differ in only two respects. The first of these differences is the shape of the posterior (CD) basal. In *Apodactylocrinus keithi* the CD basal is about the same size as the other basals and has a similar shape. In *Dactylocrinus stellatimbasalis* the CD basal is slightly larger and longer than the other basals and truncated at its apex for contact with a small heptagonal anal plate which is, in turn, followed by one or two smaller plates. The presence of anal X in the cup of *D. stellatimbasalis* separates the right and left posterior basals, whereas in *Apodactylocrinus keithi* all basals are in contact, producing regular symmetry.

The species is named *keithi* for Keith Levorson.

Holotype. Collected by C. O. Levorson, deposited in the Levorson Collection, cat. SUI 80000, Geology Department, The University of Iowa, Iowa City.

Occurrence. Upper Cerro Gordo Member, probably from near the base of the *Strophonelloides hybridus* Zone or upper *Cyrtospirifer whitneyi* Zone, Lime Creek Formation, Upper Devonian; Rockford Brick and Tile Company pit, Rockford, Iowa.

APODACTYLOCRINUS AMANAENSIS Strimple
and Levorson, new species
(fig. 1 a,c,e,g)

Description. The holotype is a partial crown which is remarkably similar to *A. keithi* even to the slender basal plates and even curvature of the basal concavity. Differences lie in the interbrachial areas where the single interbrachial of each ray is considerably reduced in size, has completely lost con-

tact with the cup and rests at the juncture of primibrach 1 and primibrach 2. One shoulder of a radial may be slightly more elevated than the adjacent radial and the proximal corner of a primibrach rests in the notch. This development has been observed in one ray of both specimens.

The paratype is a dorsal cup which does not exactly agree with all characters of the holotype in that the basals are proportionately wider and there is sharper curvature into the basal concavity. The paratype (dorsal cup) could easily pass for a lecanocrinid except for the absence of any anal plates.

Measurements in millimeters

	Holotype	Paratype
Height of dorsal cup	4.3	4.5
Width of dorsal cup	11.8	12.4
Depth of basal concavity	1.8	1.5
Diameter of stem attachment	3.0	3.2
Width of basal	2.1	3.9
Length of basal (along surface curvature)	4.5	4.0
Width of radial (avg.)	6.2	6.7
Length of radial	4.8	4.2
Height of interbrachial	1.3	—
Width of interbrachial	0.9	—

Types. Holotype, SUI 34342, collected by Allan Graffham, paratype, SUI 34343, collected by M.A. Stainbrook. Repository, Geology Department, The University of Iowa, Iowa City, Iowa.

Occurrence. Amana beds, Upper Devonian, road cut on Hwy. 220 just west of High Amana (SE ¼ SE ¼ sec. 24, T. 81 N., R. 10 W., Iowa County), Iowa. The holotype is known to be from the upper portion of the Amana beds.

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