

ART. V. AN UPPER DEVONIAN SPECIES  
OF AOROCRINUS

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(PLATE VI)

Species of *Aorocrinus* have been described from the Middle Devonian (Hamilton beds) and the lower Mississippian (Waverly, Kinderhook, Keokuk, Burlington). Recently an Upper Devonian species was submitted to the writer by E. R. Eller of the Carnegie Museum. This species is added to the list, even though differing from the other described species in the maximum number of arms to the ray, because in the character of the arms and the dorsal cup it fulfils the requirements of this genus more than of any other. The tegmen, part of the dorsal cup, and column, are missing but the species is very characteristic and additional specimens could be identified without difficulty. The genus *Aorocrinus* was created by Wachsmuth and Springer (Crinoidea Camerata of North America, 1897, vol. II, p. 470) for species previously referred to *Dorycrinus* and *Gennæocrinus*, and in the discussion was characterized as an immature *Dorycrinus*, preceding it in time and foreshadowing the peculiarities of that genus.

***Aorocrinus multicostatus* sp. nov.** (Plate VI, figs. 1-4)

This species is based upon a single, incomplete, but characteristic specimen. Half of the dorsal cup and arms are preserved as a cast.

The *dorsal cup* when complete was probably turbinate and distinctly rounding at the sides since the ridges on the radial series are not prominent. Basals fused to three elements; inconspicuous, extending little beyond the column. Radials hexagonal or heptagonal in shape, depending upon their relation to the basals, of medium size and wider than high. First primibrach quadrangular, less high and narrower than the radial; primaxil pentagonal smaller than the primibrach. The rays preserved have been interpreted to be the anterior, right anterolateral, and right posterior. In the anterior and right anterolateral rays the primaxil gives rise on the right to a secundi-



axil and on the left to two secundibrachs. In the left half-ray both inner and outer arms show four wedge-shaped tertibrachs and then become closely biserial. In the right half-ray the inner arm has four wedge-shaped tertibrachs and then becomes closely biserial; the outer arm has three tertibrachs, the third axillary, each of the resulting arms showing two or three wedge-shaped quatribrachs before the arms become biserial. The brachials appear to be incorporated up to the third or fourth wedge-shaped tertibrach in the left half-ray and the first or second quatribrach in the right half-ray. The right posterior ray is incompletely preserved. The primaxil bears on the right two secundibrachs, the second axillary. The secundaxil gives rise on the outside to four wedge-shaped tertibrachs and then the arm becomes closely biserial; on the inside to three tertaxils, the third giving rise to two arms. This branching is the reverse to that seen in the anterior and right anterolateral rays where the outer arm branches a second time. The left half-ray in the right posterior radius is not preserved.

The interbrachials are few in number and are separated from the tegmen by the arching of the brachials above, except probably in the anal interradius which is not preserved. The primary interradiol is large, reaching up nearly to the top of the primaxil and is followed by two plates, with one in the next range. One interradius (right anterior) seems to show the succession three, two, one. There are four interbrachials between the half-rays, two intersecundibrachs and two intertertibrachs. The right half-ray shows two intertertibrachs and one interquatribrach; the left half-ray shows two intertertibrachs. Only the base of the anal plate is shown, but this indicates that the anal plate is larger than the radials.

No part of the *tegmen* is preserved.

The total number of *arms* can only be estimated. There are five arms in the anterior and right anterior rays and therefore probably in the left anterior ray. The right posterior ray shows three arms in the right half-ray and could therefore have a total of four, five or six; but with the type of branching seen in the other rays at least five is to be expected. The compactly biserial arms are strong for the size of the species, one from each opening and unbranched throughout their length, as far as preserved (40 mm). They are slender at their origin and taper again distad. The rounded backs flatten somewhat at a distance of 10 mm. The pinnules are shown well in the anterior ray. They are long and slender and composed of long ossicles.



The *column* is round and the little that is preserved indicates thin ossicles.

The *ornamentation* is quite striking. A distinct ridge, less prominent because of the radiating ridges on the other plates, extends up the radial series to the free arms. All of the plates of the dorsal cup, even those in the higher interradial areas, are marked with strong ridges radiating from center to center of the plates where they show a tendency to become nodose. The ridges are most prominent in the interradial areas, particularly on the primary interradials.

*Horizon and locality:* From the Upper Devonian sandstone along the road between Center City, McKean County, and Kinzua, Warren County, Pa. Collected by E. N. Wallis.

*Type:* Holotype and only known specimen in the collection of the Carnegie Museum, Pittsburgh, Pa., number 11064.

*Remarks:* At first glance *A. multicostatus* suggests "*Actinocrinus*" *daphne* described by Hall from the Waverly (Mississippian) of Ohio (Preliminary Report on Waverly Crinoids of Ohio: 17th Rept. N. Y. State Cabinet Nat. Hist., 1864, p. 52; Crinoidea of the Waverly Group: Pal. Ohio, Vol. II, p. 163, pl. 11, fig. 11). It differs in the number of arms, number and size of the interradial plates, and to a less degree in the character of the ornamentation.

Among Devonian species *A. multicostatus* resembles *A. formosus* in shape of cup, but suggests *A. armatus* in the size of the primary interbrachial. From all described species of the genus it differs in the number of the arms and the strong and distinctive ornamentation of radiating ridges.



## EXPLANATION OF PLATE VI

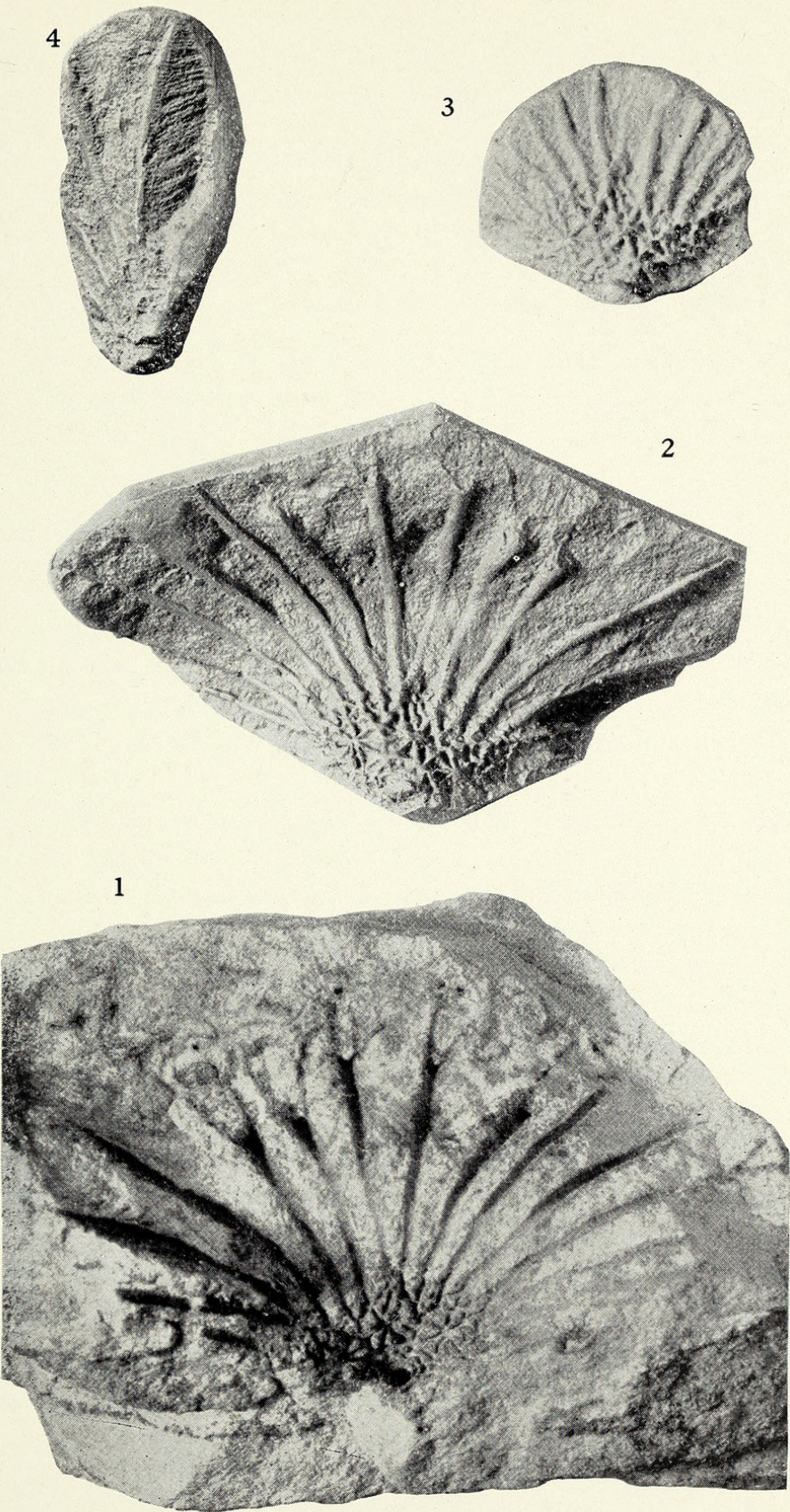
*Aorocrinus multicostatus* Goldring

Photographs by E. J. Stein

New York State Museum, Albany, N. Y.

- FIG. 1. Cast of specimen showing half of dorsal cup and arms.  
FIG. 2. Plasticine "squeeze" of the same.  
FIG. 3. Plasticine "squeeze" of only the dorsal cup and bases of the arms, showing to better advantage the basals and lower arm plates.  
FIG. 4. Plasticine "squeeze" of arm in anterior (?) ray, showing the character of the pinnules.









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