PROCEEDINGS OF THE UNITED STATES NATIONAL MUSEUM

issued by the

SMITHSONIAN INSTITUTION
U.S. NATIONAL MUSEUM
Washington : 1934

Vol. 83 No. 2972

CORYNECRINUS, A NEW DEVONIAN CRINOID GENUS [1]

By Edwin Kirk

United States Geological Survey

In the collections of the United States National Museum was found an inadunate crinoid labeled, in Carl Rominger's handwriting, "*Poteriocrinus*?, Helderberg group, Clark Co., Indiana." It was almost completely embedded in hard crystalline limestone. The structures exposed, however, indicated a crinoid of unusual type, and preparation of the specimen proved it to be referable to a new genus, which is here described as *Corynecrinus*. The crinoid proves to have structural features of considerable interest, and in its relationship seems to be nearer certain European Devonian forms than any otherwise known in America.

The specimen shows the greater part of the dorsal cup, about 5 mm of the proximal portion of the column, the anal tube to a length of some 15 mm, and three of the arms to the first bifurcation, having a length about equal to that of the anal tube as preserved. The exposed surface of the specimen was somewhat weathered, intensifying fractures in the plates and in some instances making it difficult to distinguish the fractures from sutures. On the whole, however, the crinoid is in an excellent state of preservation.

CORYNECRINUS, new genus

Corynecrinus is a dicyclic inadunate crinoid here referred to the new family Lecythocrinidae, of the suborder Cyathocrinoidea. The genotype is *Corynecrinus romingeri*, new species.

[1] Published by permission of the Director, U.S. Geological Survey.

71630—34

The dorsal cup is obconical and made up of thin plates. The infrabasals form a low ring that is practically concealed by the column. The basals are large, particularly the posterior, which is considerably higher and broader than the others. The radials have a horseshoe-shaped arm-facet with a width about three-fifths that of the upper face of the radial. The outstanding characteristic of the arms is the large number of primibrachs. The brachials are perforated by an axial canal, and the food-groove is closed by a double series of covering plates. There is no special anal plate, two of the tube plates resting directly on the upper sloping shoulders of the posterior basal. The anal tube is long, slender, and composed of a few vertical series of plates. The column is large, thin walled, and quadripartite and may have had a multilocular structure.

Corynecrinus is most nearly comparable to *Lecythocrinus* J. Müller, to which it doubtless is closely related. The dorsal cup of *Corynecrinus*, obconical to subcylindrical in shape, is in marked contrast to the low bowl-shaped cup of *Lecythocrinus*. The most obvious difference is in arm structure, the numerous primibrachs of *Corynecrinus* being a striking and unusual feature. The anal tube of *Corynecrinus* is composed of relatively few ranges of comparatively large plates as compared with *Lecythocrinus*. The column is relatively larger in *Corynecrinus* and with a thinner wall. If a multilocular structure was present the dividing partitions were much thinner. The cross section of the column in *Corynecrinus* is subcircular rather than quadrangular.

The genotype comes from the Jeffersonville limestone (Onondaga, Middle Devonian) of Clark County, Ind., and adds another form from the Onondaga of North America that shows close relationships with the Middle Devonian crinoid fauna of Germany.

CORYNECRINUS ROMINGERI, new species

The dorsal cup is obconical and as preserved is slightly compressed, giving a somewhat greater breadth at the arm-bases than would be normal. This is in part compensated for by a slipping and partial overlap of the left anterior radial on the left posterior radial. As preserved the dorsal cup has a diameter of 6 mm at the base, 9 mm at the level of the arm-bases, and a height of 7.6 mm.

The infrabasals are small and almost completely concealed by the column. It is probable that the infrabasals show on the exterior as small triangular points at the lower interbasal angles and a narrow band for the rest of the circuit. The sutures do not show clearly, and it is difficult to differentiate between what might be an infrabasal ring or the proximal columnal. The posterior basal is large relative to the others, having a height of 4.8 mm as against a height of 4 mm for the adjacent basal to the left. The posterior basal is heptagonal

in outline, supporting two tube plates on its upper sloping shoulders. The other basals are pentagonal in outline with a maximum width slightly in excess of the height. The radials have a width approximately equal to the height. The horseshoe-shaped arm-facet has a width about three-fifths that of the upper surface of the radial. The right and left posterior radials abut laterally against the first pair of tube plates, and each supports a tube plate of the second range on its inner upper shoulder. The plates of the dorsal cup appear to have been devoid of ornamentation.

Nothing is known of the arms beyond the first bifurcation. In the left posterior ray the primaxil is the tenth brachial, in the left anterior ray the ninth, and in the right posterior ray probably the tenth. The arms were apparently isotomous in their division. In the left posterior ray the primibrachs range in length from 1.3 mm to nearly 2.2 mm and have an average width of about 1.7 mm. The arms are nonpinnulate, and the food-groove is covered by a double row of covering plates. The brachials are perforated by an axial canal.

The anal tube is subcylindrical in section with a diameter of about 3 mm a few millimeters above the top of the dorsal cup. In its upper portion as preserved it is apparently composed of five vertical series of tube plates which in part are laterally apposed and in part imbricate. At the base of the anal tube two of the tube plates rest on the upper, sloping, subequal shoulders of the posterior basal without the interposition of a special anal plate. In the second range there are three tube plates. Of these the outer pair rest in part on the upper inner sloping shoulders of the right and left posterior radials.

The column is subcircular in section, with a very wide lumen. At a distance of 5 mm from the cup the column has a diameter of approximately 5 mm. At this point the columnar wall has an average thickness of but 0.5 mm in its thinner portions. A camera lucida outline drawing of the column in cross section is given on the plate. From this it can be seen that the lumen has a tetramerous structure. The exact outline of the inner wall is obscure, owing in part to crushing and perhaps in part to solution. There are four approximately equidistant ridges projecting from the wall into the lumen. These were grooved medially. To either side of the groove appear to have been lateral extensions, giving the ridge the appearance of a bifid column in section. It is possible that these flanges connected laterally, forming discrete camerae. If so, the encircling walls were probably very thin. The columnals are low, one of the thickest seen measuring but 0.7 mm in height.

The specific name is given in honor of Dr. Carl Rominger, one of the pioneers in mid-western American Devonian paleontology, to whose collecting ability we owe the present specimen.

Horizon and locality.—As noted above, Rominger's original label reads "Helderberg group, Clark County, Indiana." From the lithology of the matrix and the associated corals it is evident that the specimen was collected in the Jeffersonville limestone (Onondaga, Middle Devonian), probably from the lower coral zone.

Type.—U.S.N.M. no. 90094.

LECYTHOCRINIDAE, new family

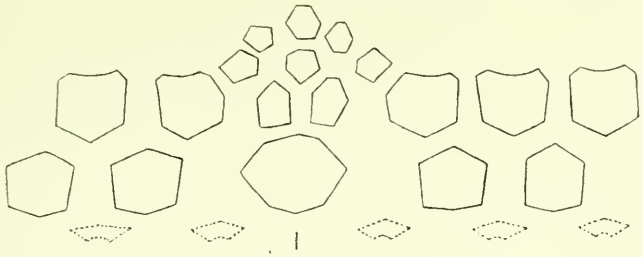
The family Lecythocrinidae is referable to the Cyathocrinoidea and is nearly related to the Gasterocomidae. *Lecythocrinus* has previously been placed in the Cyathocrinidae by Bather (1900) and following him in the equivalent subfamily Cyathocrininae by Springer (1913). Jaekel (1918) placed *Lecythocrinus* in the Gasterocomidae. Two genera are here referred to the family Lecythocrinidae, *Lecythocrinus* J. Müller and *Corynecrinus*, new genus. Both are from approximately equivalent horizons in the Middle Devonian.

The column has a large lumen that may be divided by partitions into a central canal and four peripheral canals. There is no differentiation of a special anal plate, two of the proximal tube plates normally resting directly on the posterior basal. The anal tube is long and relatively slender.

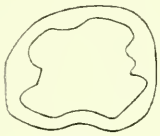
The family differs from the Cyathocrinidae in the character of the column and the lack of a special anal plate. From the Gasterocomidae the Lecythocrinidae differ mainly in the possession of an anal tube, although it is probable that the brachial structures also differed widely.

Inasmuch as there is considerable bibliographic confusion in regard to the status of *Lecythocrinus*, which I have chosen as the type of the new family, it seems desirable briefly to give the history of the genus.

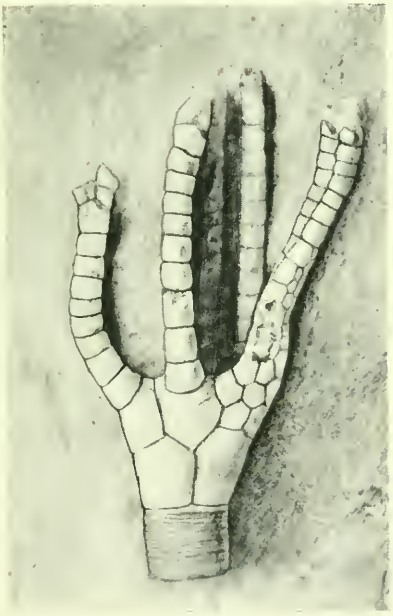
J. Müller (1858, p. 196) proposed the new genus *Lecythocrinus* with *L. eifelianus*, new species, as the only species referred to it. This must of necessity be the genotype. Schultze (1867) figured the original specimen of Müller and gave additional figures of other specimens. He did not recognize either the genus *Lecythocrinus* or the species *eifelianus* of Müller, placing the genus in synonymy with *Taxocrinus* and the species in synonymy with his "new species" *T. briareus*. The excuse for the latter high-handed measure was that Müller's species was based on an abnormal specimen. Wachsmuth and Springer (1880, p. 313; sep., p. 88) cite *Lecythocrinus* as "Zittel (not Joh. Müller)" and follow Schultze in throwing *L. eifelianus* in synonymy with Schultze's *T. briareus*. Wachsmuth (1896, p. 156) cites *Lecythocrinus* as "Müller, emend. Zittel" and in a footnote says in part: "The type-specimen upon which this genus was founded (*L. eifelianus* Müll.)" etc. He also labels figure 261, page 157, which is a copy of Schultze's restoration of the species, "*Lecythocrinus eifelianus* Müll." Bather (1900, p. 175) quotes *Lecythocrinus* as



1



2



3

4

CORYNECRINUS ROMINGERI, NEW GENUS AND NEW SPECIES.

1, Analysis of plates, ×2. 2, Camera lucida drawing of section of column, ×4. 3, Left posterior radius, ×2. 4, Posterior interradius, ×2. (Magnifications approximate.)

"Müller (1858, em. Zittel, 1879 = *Taxocrinus briareus*, Schultze, 1866)." Springer (1913, p. 221) quotes the genus as "Joh. Müller (*Taxocrinus briareus* Schultze)." It seems imperative to restore Müller's *Lecythocrinus eifelianus* to good standing, with *Taxocrinus briareus* Schultze as a synonym. As to the authority for the genus, this must rest with J. Müller.

The restoration of *Lecythocrinus eifelianus* Müller given by Schultze (1867) as figure 1*b* on plate 4 is probably a composite of two different genera. The shape of the arm ossicles and apparently the size and proportions of the anal tube seem to have been taken from the specimen illustrated as figure 1*f* on the same plate, which is probably not referable to *Lecythocrinus*. Careful preparation of a specimen of *Lecythocrinus eifelianus* from Gerolstein in the Springer collection shows the anal tube to be relatively slender and probably shorter than as restored by Schultze.

The presence of an anal tube in the Lecythocrinidae with apparently no special anal plate in the dorsal cup is of very great interest. Such structures possibly indicate the origin of a ventral tube by a process at variance with that commonly postulated for most of the Inadunata. Without going into the highly controversial subject of the origin of crinoid anal structures it nevertheless seems worth while to point out certain possible trends in the evolution of the ventral tube as shown by the group under consideration.

To begin with it is naturally open to question whether anal *x* is not present as one of the plates which I call tube plates. Müller's original type of *Lecythocrinus eifelianus* as figured by Schultze (1867, pl. 4, fig. 1*a*) shows a posterior interradius that is essentially cyathocrinoid. Figure 1*i* on the same plate, with which the specimen in the Springer collection agrees, and the type of *Corynecrinus romingeri* all have two subequal plates resting on the upper sloping shoulders of the posterior basal. With the exception of the Gasterocomidae, I have met with but two instances among the Cyathocrinoidea where the posterior basal supports two subequal plates. These are evidently abnormal, but, as is often the case, variations from the normal may indicate possible normal evolutionary trends. Angelin (1878, pl. 23, fig. 13) figured a specimen of "*Cyathocrinus glaber* Ang." in which the posterior interradius is much like that of *Corynecrinus* in that the large posterior basal supports tube plates instead of the single large anal characteristic of *Cyathocrinus*. Bather (1893, p. 139) states that the original of this figure could not be found. In regard to the structure of the posterior interradius he says: "The peculiarity in its structure, if we assume some degree of correctness in the figure, appears to have been the absence of anal *x*, or what is more probable, its fusion with the posterior basal." With the accuracy of the drawing questioned and the original specimen misplaced, there is little use in doing other

than calling attention to the figure. I have seen a similar structure in *Crotalocrinus cora* Hall in the collections of the United States National Museum. Here instead of the normal anal plate two subequal plates rest on the posterior basal.

Were the structures figured by Angelin correct, I still would not subscribe to Bather's explanation that anal *x* had fused with the posterior basal. Absent it might be, but as in the case of the specimen of *Crotalocrinus cora* I would rather assume that a tube plate had migrated downward to a level with anal *x*. I agree that so far the same explanation might be given for the structures found in *Lecythocrinus* and *Corynecrinus*. In this case Müller's type would be considered the norm and the two plate condition variants from the normal structure.

I suggest, however, that the anal structures of the Lecythocrinidae may have evolved from a type essentially like those found in the Gasterocomidae, crinoids to which I believe the Lecythocrinidae are closely related. The lateral anal opening of such a form as *Gasterocoma* may notch the distal face of the posterior basal or be separated from it by small plates. In one specimen of *Gasterocoma antiqua* Goldfuss in the Springer collection two plates rest on the upper sloping shoulders of the posterior basal. A posterior view of the specimen could easily pass as a view of *Lecythocrinus* in which the ventral tube had been broken away. In some specimens of *Gasterocoma* there is a well-defined anal pyramid of small plates much like the structures to be found in certain of the early Cyathocrinoidea such as *Carabocrinus*. It seems to me quite reasonable that the ventral tube of the Lecythocrinidae might have arisen as a simple prolongation of such an anal protuberance. Subsequently a single tube plate may have become centered on the posterior basal, as I conceive to be the case in Müller's type of *Lecythocrinus eifelianus*, and give a remarkable simulacrum to a true anal *x*.

LITERATURE CITED

Angelin, Nils Peter.

1878. Iconographia crinoideorum in stratis sueciae siluricis fossilium, 62 pp., 29 pls.

Bather, Francis Arthur.

1893. The Crinoidea of Gotland. Pt. 1: The Crinoidea Inadunata. Svenska Vet.-Akad. Handl., vol. 25, no. 2, 200 pp., 10 pls.

1900. The Echinoderma. Pt. 3 of E. R. Lankester's "A treatise on zoology", 344 pp., 47 figs.

Jaekel, Otto.

1918. Phylogenie und System der Pelmatozoen. Pal. Zeitschr., vol. 3, no. 1, pp. 1–128, 114 figs.

Müller, Johannes.

1858. Über einige Echinodermen der Rheinischen Grauwacke und des Eifeler Kalkes. Monatsb. Akad. Wiss. Berlin, phys.-math. Klasse, 1858, pp. 185–198.

Schultze, Ludwig.

1867. Monographie der Echinodermen des Eifler Kalkes. Denkschr. Akad. Wiss. Wien, math.-nat. Classe, vol. 26, pt. 2, pp. 113–230, 13 pls.

Springer, Frank.

1913. Cystoidea, Blastoidea, and Crinoidea, *in* Zittel-Eastman's "Text-book of paleontology", ed. 2, vol. 1, pp. 145–243, figs. 228–346.

Wachsmuth, Charles.

1896. Crinoidea, *in* Zittel-Eastman's "Text-book of palaeontology", vol. 1, pt. 1, pp. 124–177, figs. 219–291. (The same text and pagination are to be found in the edition of 1900.)

Wachsmuth, Charles, and Springer, Frank.

1880. Revision of the Palaeocrinoidea. (Pt. 1: The families Ichthyocrinidae and Cyathocrinidae.) Proc. Acad. Nat. Sci. Philadelphia for 1879, pp. 226–378, pls. 15–17. (Authors' separate, pp. 1–153, pls. 1–3.)

U. S. GOVERNMENT PRINTING OFFICE: 1934