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The Crinoid Genus *Sygcaulocrinus* from IowaHARRELL L. STRIMPLE¹

HARRELL L. STRIMPLE. The crinoid genus *Sygcaulocrinus* from Iowa. *Proc. Iowa Acad. Sci.* 81(3): 116-118, 1974.

Attention is called to the synonymy of *Ectenocrinus elongatus* Thomas and Ladd, 1926, with *Sygcaulocrinus typus* Ulrich, 1924, both from the Ft. Atkinson Member, Maquoketa Formation (Ordovician), and to the probable bottom dwelling habitat of the species. Comparison is made with some Upper Paleozoic crinoids

which are known to have been bottom dwellers. An accident in preparation of a specimen disclosed the solid base of the cup and the solid summit of the proximal columnal, both of which are illustrated.

INDEX DESCRIPTORS: *Sygcaulocrinus*, Bottom Dweller, Ordovician, Winneshiek County.

In Geological Survey of Canada, Memoir 138, Upper Ordovician Faunas of Ontario and Quebec, by Foerste, 1924, several Ordovician inadunate crinoids were described by Ulrich (p. 82-101). Among them was a peculiar little crinoid from the Ft. Atkinson dolomite at Ft. Atkinson, Winneshiek County, Iowa, which was described as a new genus, *Sygcaulocrinus*, with *S. typus* Ulrich, 1924, as the type species.

Thomas and Ladd, 1926, were apparently unaware of the study by Ulrich in Foerste, 1924, and described the same species as *Ectenocrinus elongatus* Thomas and Ladd. Bassler and Moodey, 1943, placed *E. elongatus* in synonymy with *Sygcaulocrinus typus*.

Three hypotype specimens have subsequently been found by the writer a few miles south of Ft. Atkinson. A most interesting phenomenon is the development of three or four large solid rapidly tapering proximal columnals. They are obviously for the purpose of adding weight to the base of the crown. Subsequent columnals are quite small and, if functional, could only have acted as a tether. Present evidence, consisting of eight specimens, indicates the main portion of the column was denticulated. It is postulated that the crinoid was a bottom dweller with the remanent stem including the large proximal columnals implanted in calcareous mud. This type of specialization has been observed in several genera of Upper Paleozoic age among dicyclic inadunates.

Denticulation of the stem has been observed among species of *Cryphocrinus*, in which the basals become excessively thickened; *Exochocrinus* and *Staphylocrinus*, in which infra-basals fuse and together with the basals become very thick; and *Agassizocrinus* and *Paragassizocrinus*, in which the infra-basals completely surround the remanent stem and form a cone. All the above genera are from the Chesteran (Upper Mississippian) except the last, which is of Pennsylvanian age.

SYSTEMATIC DESCRIPTION

Class CRINOIDEA Miller, 1821

Subclass INADUNATA Wachsmuth and Springer, 1855

Order DISPARIDA Moore and Laudon, 1943

Superfamily HOMOCRINACEA Kirk, 1914

Family HOMOCRINIDAE Kirk, 1914

Genus SYGCAULOCRINUS Ulrich, 1924

SYGCAULOCRINUS TYPUS Ulrich, 1924

Figure 1, a-h

Description of genus and monotypic species (after Ulrich, 1924, p. 98, 99): "In having a round, tripartite, *thin-plated, downwardly tapering column, three compound radials, and two primibrachs the peculiar crinoid on which this genus is founded shows its near relationship to, and also strongly suggests its derivation from, *Ectenocrinus*. The arms, however, above the primibrachs, are much smaller and divided at longer intervals—so sparsely, in fact, that the result suggests the heterotomic method prevailing in *Heterocrinus* rather than the paratomic which occurs in *Ectenocrinus* and *Drymocrinus*. Still, the branching of the arms in *Sygcaulocrinus* is essentially paratomic, differing from its more usual expression only in that the lateral divisions (ramuli) are exceedingly few—only two or possibly three on each side of a ramus. The proximal anal plate seems very small and lies in a minute notch between the top angles of the two posterior radials.

The most striking peculiarity of the genotype is the extraordinary development of the three upper disks of the column. These, in thickening and widening gradually from the normal thin columnals beneath them, form a cone that passes without constriction into the cup and exceeds the latter in height. The result is a calyx that, in general aspect, reminds one greatly of such Mesozoic crinoids *Apiocrinus* and *Bourgetticrinus*."

Remarks: the holotype of this species has not been studied, but other specimens, including the cotypes of *Ectenocrinus elongatus*, Thomas and Ladd, 1926, which is considered by Bassler and Moodey, 1943, to be synonymous with *S. typus*, and the anal plate is considerably larger than illustrated and described by Ulrich. It is very likely that the anal plate (anal X) was disturbed and the anal notch was compressed in preservation of the holotype. The anal plate is out of position in about half the specimens observed.

Ulrich (ibid., Figure 10B) diagrammatically illustrated AB and AE basals as being fused (see Figure 1g), whereas other specimens show those plates to be divided. The pattern of cup plates, including position of compound radials (infer- and superradials in series), is therefore the same as found in *Homocrinus* Hall.

In preparation of a small hypotype (SUI 37922), the proximal columnals broke free at the base of the cup and it was discovered that the lumen was closed above the base of the basals. There is a small irregularly circular dark spot near the apex of AB basal but the very nature of the juncture between basals shows that the plates have grown subsequent to closure

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* Proximal columnals are solid calcite, not "thin-plated."

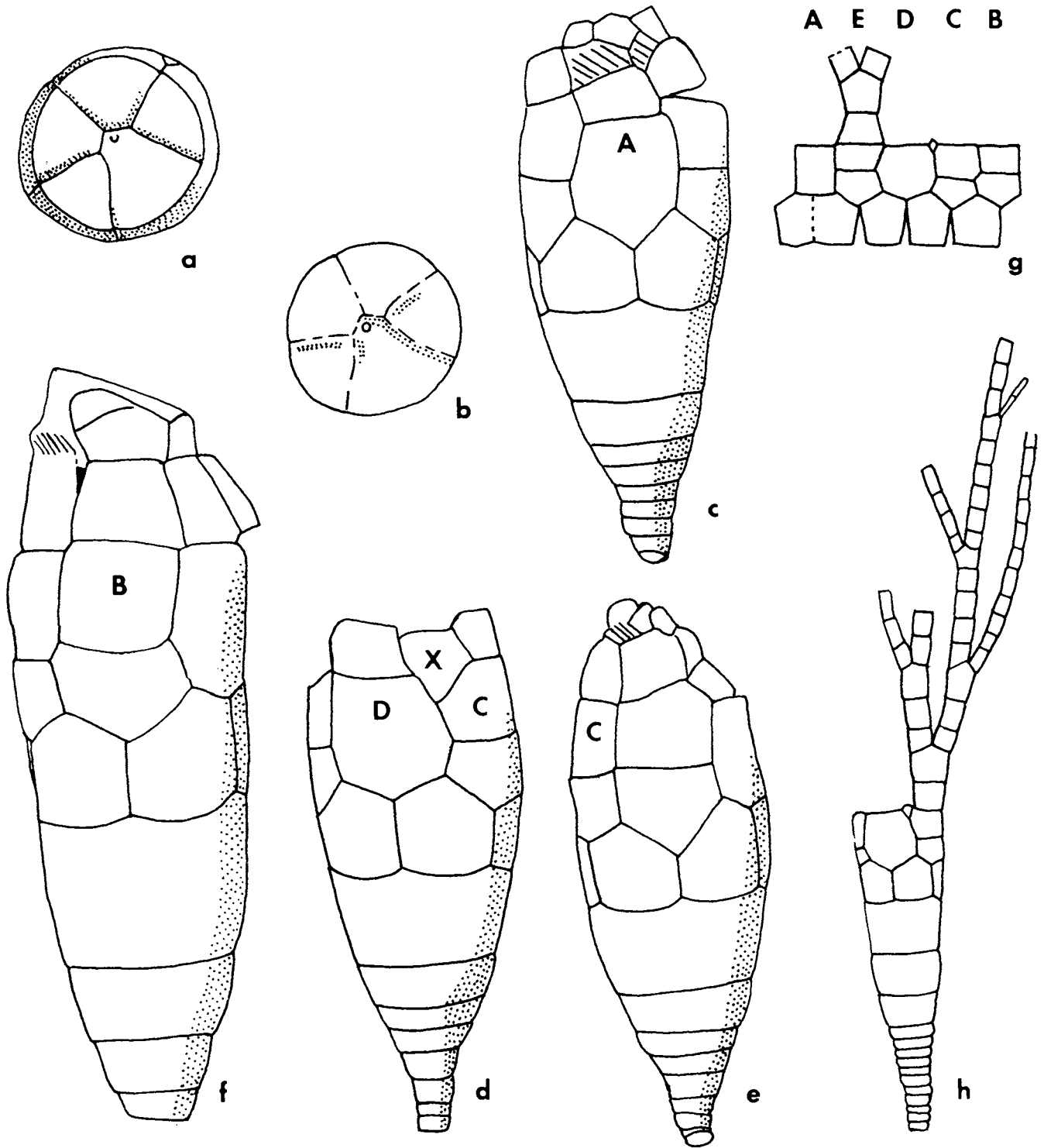


Figure 1. *Sygcaulocrinus typus* Ulrich from the Ft. Atkinson dolomite (Ordovician) of Iowa. a-e. Camera lucida drawings of hypotype (SUI 37922): base of cup with columnals removed (CD basal at top); summit of proximal columnal; cup with portion of stem (column) and lower arm segments attached viewed from A ray; same viewed from D ray; same viewed from B ray; X10. f. Camera lucida drawing of hypotype (SUI 3772) studied by Thomas and Ladd viewed from B ray; X10. g. Diagrammatic cup structure of holotype (after Ulrich) with modern letter designation for ray shown above. h. Illustration of holotype viewed from D ray (after Ulrich).

of the nerve canal. If the small dark spot represents an open canal (lumen), it is the first recorded lumen which penetrates a single plate. The lumen is always the central point affecting all plates of a circlet. The basal sutures repose in the bottom of V-shaped grooves at the base of the cup and elevated ridges on the proximal columnal fit into the basal grooves.

Ulrich reported three large tapering proximal columnals, whereas there may be four. Subsequent columnals are small, short and taper slowly. It is surprising that as many columnals are preserved as have been observed, since they are no longer connected by nerves to the central nervous system (chambered organ). The atrophied stem could not have been actively movable without nerves, and the solid lower basals and large, solid proximal columnals suggest the animal reposed in the calcareous mud on the ocean floor with the base encased in the mud. A similar habitat was adopted by *Agassizocrinus* of late Mississippian age and *Paragassizocrinus* of Pennsylvanian age; however, most of the stem was desiccated and the remanent partially resorbed and completely surrounded by accelerated growth of the infrabasals in both of those genera.

Occurrence: Ulrich (ibid., p. 99) gave the occurrence of the holotype (by monotypy) as Wykoff Limestone, Richmond (Maquoketa) Group, Ft. Atkinson, Iowa. The hypotypes of Thomas and Ladd (1926, p. 14) are listed as being from

the Ft. Atkinson limestone (Middle Maquoketa) at Ft. Atkinson, Iowa. All are probably from the dolomitic Ft. Atkinson Member, Maquoketa Formation, either from the old quarry proper or from quarried rock used in building the old fort at Ft. Atkinson, Iowa. Three hypotypes, SUI 37921-37923, were collected by the author from the Ft. Atkinson Member in a road cut on a county road south of Ft. Atkinson, Iowa.

Repositories: the holotype of *Sygcaulocrinus typus* is deposited in the National Museum of Natural History, Washington, D.C. All other specimens considered herein are deposited in the Geology Department Repository, The University of Iowa, Iowa City, Iowa, and catalogued with an SUI prefix.

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