Additional Crinoid Specimens from the Shellrock Formation (Upper Devonian) of Iowa

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Well preserved crinoids from the Shellrock Formation (Upper Devonian) of Iowa are extremely rare. Several well preserved specimens collected by one of us (Levorson) have led to new generic assignments of the species originally described as Nassiocrinus goldringae Belanski, 1928, to Glossocrinus goldringae, n. comb., and of Hexacrinus springeri Thomas to Cerasmocrinus springeri, n. comb. The latter is the type species of Cerasmocrinus, new genus.

INDEX DESCRIPTORS: Iowa Devonian Crinoids; Shellrock Formation Crinoids; Glossocrinus goldringae; Cerasmocrinus springeri; Hexacrinus springeri.

SYSTEMATIC PALEONTOLOGY

Subclass INADUNATA Wachsmuth & Springier, 1855
Order CLADIDA Moore & Laudon, 1943
Suborder POTERIOCRININA Jaekel, 1918
Superfamily RHENOCRINIDAE Jaekel, 1918
Family RHENOCRINIDAE Jaekel, 1918
Genus GLOSSOCRINUS Goldring, 1923
GLOSSOCRINUS GOLDRINGAE (Belanski), Strimple and Levorson, new combination

Plate 1, figures 7, 8.


Diagnosis. Crown elongate, slender, arms do not adjoin when closed. Cup tall, conical, evenly expanded; infrarabas readily visible in side view of cup; radiating folds which extend from plate to plate are weak, with rays represented mainly by depressions at plate corners; radial articular facets do not completely fill distal faces (peneplyenial); three anal plates in normal (primitive) arrangement. Anal sac tall, slender, median ridge formed by thick plates starting at terminal (IX) and extending length of sac; flanked by thin narrowly plicated plates on each side with plications perpendicular to axis of tube. Arms slender, uniserial, pinnular, with each brachial bearing a stout pinnule on alternating sides; one bifurcation usually takes place high in the arms with primibrachids 7-9. Proximal columns pentalobate, alternatingly expanded.

Discussion. Glossocrinus naplescensis Goldring, 1923, type species of the genus from the Upper Devonian of New York, has pronounced radiating ridges or folds on the cup plates.

Figure 1.
1-6. Cerasmocrinus springeri (Thomas, 1924).
1-3. Holotype (SUI 3722) calyx viewed from posterior (C-D interray), DÉ interray and BC interray, X2.5.
4-6. Hypotype (SUI 80010) calyx viewed from CD interray, E ray and BC interray, X2.5.
7-8. Glossocrinus goldringae (Belanski, 1928).
7. Highly magnified portion of hypotype (SUI 80007) showing median ray of anal sac flanked by thin narrowly plicated sac plates, X4.45.
8. Hypotype crowns (SUI 80007a-b), that to left (a) viewed from anterior, to the right (b) young specimen viewed from C ray, with three anal plates visible to the left (albeit secundanal [anal X] almost obscured) and right side of anal sac well exposed above X4.0.

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SHELLROCK FORMATION CHINOIDS

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a comparatively short cup, and first arm branching takes place about primibrachs 5-6. *G. goldringae* has a much taller cup, and the arms branch with primibrachs 7-9, both of which conditions are considered to be more primitive than *G. naplesensis*, *G. cornellianus* (Williams) is more closely related, in having a moderately tall cup and branching with primibrachs 8-9, but completely lacks radiating folds on cup plates.

As explained by Strimple and Levorson, 1969, *Nassoviocrinus* typically has a quadrangular primanal (radial), resulting in two anal plates in the posterior interray, as opposed to a pentagonal primanal, resulting in three anal plates in the posterior interradius, but differs from *Quantoxocrinus* in having a strong median ridge composed of thick uniserial plates extending the length of plications.

Low narrowly plicated plates on posterior interradius, interradials of moderate size, resting in strong primibrachs 8-9, *Quantoxocrinus*, *crinus*.

**Cassonepals** (Angelin, 1878) is composed of equidimensional plates lacking plications.

**Hypotypes.** Collected by C. O. Levorson, deposited in the Levorson Collection, cat. SUI 80005, 80008, 80007, Geology Department, The University of Iowa, Iowa City.

Subclass CAMERATA Wachsmuth & Springer, 1855

Order MONOBATHRIDA Moore, 1952

**Superfamily** DESMIDOCRINACEA Angelin, 1878

**Family** DESMIDOCRINIDAE Angelin, 1878

Genus CERASMOCRINUS Strimple & Levorson, new genus

Type species. *Hexacrinus springeri* Thomas, 1924.

**Name.** From Greek *Kerasma* for mixture, with reference to the uncertain (mixed) affinities of the genus.

**Description.** Calyx tall, cylindrical, with 3 tall basals prominent in side view. Primanal in line with radials, followed above by 3 plates and subsequently by 4 smaller plates. Interradials of moderate size, resting in strong notches in distal portion of radials, followed above by 2 or 3 plates and joined with fixed primibrachs 1 and 2. Secundibrachs 3 appear to be the last of the fixed brachials. Radial articular facets are narrow (angustary). Column is round.

**Discussion.** There is small likelihood that *Cerasmocrinus* evolved from the typically Silurian *Desmidocrinus*, because the basal plates are much more prominent in side view; however, there are many other characteristics indicating close relationship, such as the primanal followed by three plates, interradial area in calyx composed of few plates, and two fixed secundibrachs in each half ray. *Desmidocrinus* is more primitive in that interradials are larger and are lower in the cup, and fixed terribrachs are present in all species.

Primibrachs are not incorporated in the cup to form a calyx in hexacrinitids, but they are commonly joined with interradial terminal plates. A trend toward this more advanced condition is indicated but not attained by *Cerasmocrinus*.

**Occurrence.** Upper Devonian, Iowa.

CERASMOCRINUS SPRINGERI (Thomas, 1924), new combination

Plate 1, Figs. 1-6.

**Synonomy.** *Hexacrinus springeri* Thomas, 1924; *Desmidocrinus springeri* Strimple, 1963.

**Description.** Same as for genus.

**Discussion.** *Cerasmocrinus springeri* is closer to *Hexacrinites intercroupularis* (Phillips, 1841), the type species of *Hexacrinites*, which is from Middle Devonian rocks of England, than to most American species assigned to the genus. However, interradial plates of the hexacrinitids do not appreciably penetrate the interradial area of the cup, which is considered as a definitive feature by Ubaghs (in press, Section T, Echinodermata, *Treatise on Invert. Paleo.*). The illustrated steinkern of *Arthrocantha granosa* Goldring (1923, pl. 37, fig. 12) shows an interradial plate apparently firmly united with the radials, although it does not penetrate between the radials, as well as being joined with primibrachs 1 and 2. It appears that *A. granosa* does have fixed primibrachs, contrary to the familial definition.

Except for the tall basal circlet, *Cerasmocrinus springeri* appears to have closer affinities with the desmidocrinids than with the hexacrinitids, as has been previously discussed under the generic discussion.

**Hypotype.** Collected by C. O. Levorson, deposited in the Levorson Collection, cat. SUI 80010, Geology Department, The University of Iowa, Iowa City.

**References Cited**

All cited references may be found in BASSLER, R. S., and MOODEY, M. W., 1943, Bibliographic and faunal index of Paleozoic pelmatozoan echinoderms: *Geol. Soc. Amer. Special Paper* 45, 734 p., with the following exceptions:
