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## A Crinoid from the Pennsylvanian Essex Fauna of Illinois

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### CRINOIDEA

The only crinoid crown so far discovered from the Middle Pennsylvanian concretions of the Francis Creek shale of the Mazon Creek area, Illinois, is described and illustrated. The specimen is not assigned to family, genus or species because it is immature; its arms branch on the third primibrach, which is unusual for a Pennsylvanian inadunate crinoid; and uncertainty exists that the posterior side of the dorsal cup is exposed. The pathway of the aboral nervous system can be traced within some of the arm and cup plates. Long slender cirri that are proximally directed toward the crown may indicate an epiplanktonic mode of life.

Class Crinoidea Miller, 1821

Sub-class Inadunata Wachsmuth and Springer, 1897

Order Cladida Moore and Laudon, 1943

Sub-order Poteriocrinitina Jaekel, 1918

Family, Genus, and Species Unknown

Figures 81-83

*Description.*—Crown small, explanate; dorsal cup low cone-shaped, wider than high, with straight sides. Infrabasals 5, low, relatively large, visible in side view distally and flat proximally; basals spear-shaped, small, wider than high, with narrow interbasal sutures; radials large, wider than high, with distinct notches between distal edges of adjacent radials; radial facets distinctly narrower than radials, sloping slightly outward; either the posterior side of the cup is buried in matrix or a minute anal plate is preserved almost out of the cup between distal edges of two radials. Arms uniserial, branching isotom-

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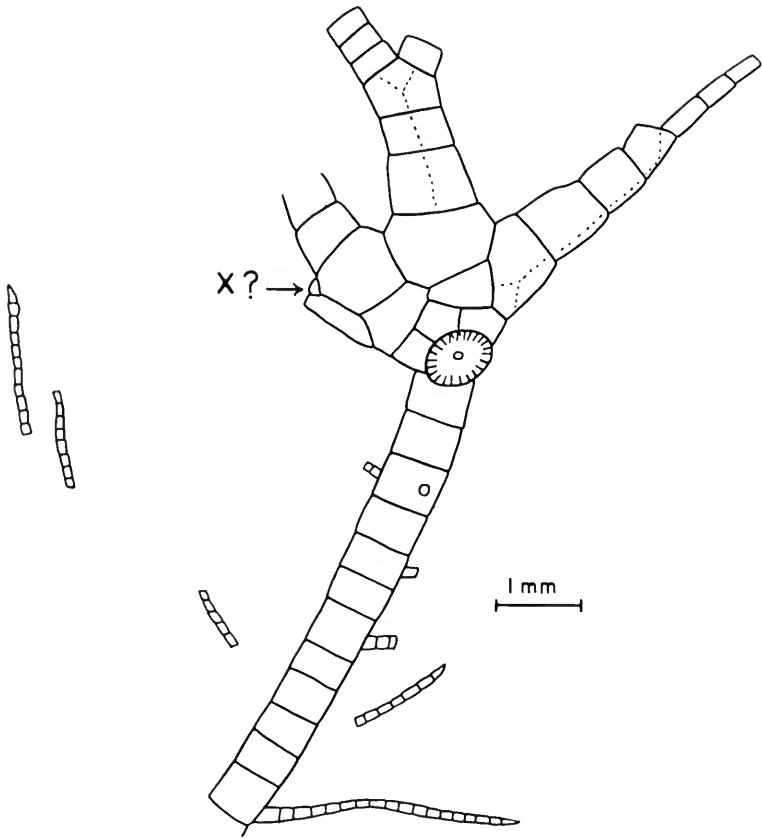


FIG. 81. Line drawing of crinoid specimen from Mazon Creek area, Illinois. *x?* indicates questionable anal plate, and dotted lines indicate observed trace within cup and arm plates of aboral nerves. The stem has been dislocated from its attachment at the base of the cup.

ously at least one time on primibrach 3; three secundibrachs above premaxil preserved in most complete branch. Column round, lumen round, columnals high, with long slender, round, proximally directed cirri preserved on every second columnal below cup.

The single known specimen, consisting of a split nodule with plate and counterplate of the crinoid specimen, was collected from the Essex nodule locality (Johnson and Richardson, 1966) by Mr. David R. Cooper of Evergreen Park, Illinois. Mr. Cooper has generously deposited the specimen in Field Museum of Natural History. It is specimen No. PE 13946. I am grateful to both Mr. Cooper and Dr. E. S. Richardson, Jr. of Field Museum for making the specimen available.





FIG. 82. Crinoid specimen in concretion,  $\times 2$ .

*Measurements.*—Height of dorsal cup, 2.5 mm.; width of dorsal cup, 3.8 mm.; width of infrabasal circle, 1.6 mm.; width of column just below cup, 0.8 mm.; distance from top of radial to tip of axillary primibrach 3, 2.5 mm.; width of primibrach 1, 1.3 mm.; exposed length of column, 8 mm.; length of longest exposed cirrus, 11 mm.

*Remarks.*—There are three reasons for hesitation in assigning this crinoid to a family, genus or species. On the left side of the exposed part of the dorsal cup there is a small, triangular portion of replaced ossicle that is separated from adjacent radial plates on either side by a narrow band of white mineral, like all other discrete plates of the specimen (x? in Fig. 81). If this small piece is an anal plate, it has been almost completely eliminated from the cup and records an evolutionarily advanced arrangement of anal plates in the cup. There is a possibility that this small piece is formed by a filled-in crack in one of the radial plates, and is therefore fortuitous, and that the posterior side of the cup is not exposed. The specimen is too small, the replaced ossicles too soft and delicate, and the matrix too hard to permit excavation completely around the cup.

The second uncertainty contributing to lack of systematic placement of the specimen below suborder is the presence of three primibrachs in each of the exposed arms. The vast majority of Pennsylvanian inadunate crinoids have either one or two primibrachs, or the



FIG. 83. Crinoid specimen in concretion,  $\times 8.4$ .

arms are unbranched. Only groups like the relatively primitive *Poteriocrinitidae* and some genera of the *Blothrocrinidae* have more than two primibrachs to a ray. These forms typically have three anal plates in the cup and are much more common in, and characteristic of, pre-Pennsylvanian crinoid faunas. Consequently, if the Essex crinoid does have a single, small anal plate, it could not be satisfactorily assigned to either of these families.

Finally, the specimen may be immature and therefore cannot be reliably assigned to an already-named genus based on adult characters. For instance, if the specimen is immature, the three primibrachs might fuse into one or two plates with continued growth, which would result in an entirely different familial and generic assignment. For these reasons the specimen is not assigned to rank below suborder Poteriocrinitina.

*Preservation.*—All ossicles of this crinoid are replaced by brown ferruginous material internally, with narrow layers of soft white kaolin (E. S. Richardson, Jr., pers. comm., Jan. 13, 1968) along all plate sutures (Fig. 83). The external surfaces of all plates presumably were also formed of this material that has been obliterated, so that presence or absence of external plate ornament cannot be determined.

The primibrachs exhibit a distinct longitudinal median line that extends from the proximal edge of primibrach 1 to the center of axillary primibrach 3, where the line divides and extends upward to adjacent secundibrachs. One radial plate has a similar line extending from the center of the radial-primibrach suture two-thirds of the way down the radial plate where it divides, one branch extending to each of the subjacent basals. These lines preserved in the interior of cup and arm plates record the course of principal nerves of the aboral or entoneural system of the crinoid (Hyman, 1955, p. 62).

*Paleoecology.*—One of the rather unusual aspects of this specimen is the presence of long, proximally directed cirri just below the crown. The majority of Paleozoic crinoids either have cirri confined to the distal root system or have laterally- or distally-directed cirri close to the crown on a pentagonal stem. A similar configuration of proximally-directed cirri has been observed in a few other unrelated crinoids, such as the Mississippian monobathrid camerate *Dichocrinus oblongus* Wachsmuth and Springer (Springer, 1926), and the cladid in adunate *Goniocrinus harrisi* (Miller) (Van Sant and Lane, 1964), and has also been observed by this author in an undescribed Devonian species of the inadunate family Gasterocomidae. In the latter two examples the cirri are sufficiently long and abundant to have partially hidden the crown, which may have had some advantage as camouflage from predators.

All of these crinoids, including the Essex specimen, have relatively small and lightly constructed crowns. It is possible that this convergent pattern of cirral arrangement may be the result of a similar life habit—these crinoids may have been epiplanktonic, attached by

distal cirri to floating seaweed or logs, and hanging upside down or obliquely downward in the water. Cirral growth near the crown may have then been geotropic in nature, resulting in proximally-directed cirri.

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