Erisocrinids (Crinoidea-Inadunata) from Middle Pennsylvanian Rocks of Iowa and Colorado

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Erisocrinids (Crinoidea-Inadunata) from Middle Pennsylvanian Rocks of Iowa and Colorado

H. L. STRIMPLE

The primary purpose of the present paper is documentation of a specimen of *Erisocrinus* found in Desmoinesian rocks near Knoxville, Marion County, Iowa, and mentioned by Knapp, 1969, in discussion of a proposed subfamily *Erisocrininae*, as well as to consider some related matters. The specimen in question is described as *Erisocrinus knoxvillensis*, n. sp. Subfamilial taxa have not been accepted in the section dealing with the Pterocrinina, of which *Erisocrinus* is a member, in Section T of the Treatise on Invertebrate Paleontology (in preparation) but the remarks of Knapp (ibid., p. 359) affect the family *Erisocrinidae* Miller, 1889, and are repeated here: “It is possible that *Erisocrinus* may have been derived from a crinoid bearing upflared infrabasals as figured by Tischler (1963, p. 1066, Text-Fig. 6A, B) from the Madera Formation. However, recently a cup has been found in the Desmoinesian of Iowa, which is identical to *Erisocrinus* but has a distinct basal concavity.” The import of this statement is that Knapp was posulating that the ancestor of *Erisocrinus*, and many other inadunate crinoid genera of Pennsylvanian age, was the Mississippian genus *Phanocrinus* which normally has a distinct basal concavity. In fact Knapp (ibid., p. 351) proposed an order Declinida on this premise. I personally opposed the very concept of the order Declinida, and it has been universally rejected.

Strimple and Moore (1971, p. 9) suggested the family *Erisocrinidae* represents a direct lineage leading from the geologically older family Scytalocrinidae, which is the current concept, and the principal was suggested as an alternative by Knapp. Erisocrinids having mildly upflared infrabasals were referred to *Exaetocrinus* Strimple and Watkins (1969, p. 181); however, those authors thought such forms were regressive because only species of Missourian (Upper Pennsylvanian) age were known at that time. The previously mentioned specimen from the Madera Formation was illustrated with rough line drawings by Tischler, 1963, as *Erisocrinus typus* and was not seriously considered by this writer until examined at first hand. The specimen is now described as *Exaetocrinus maderaensis*, n. sp.

Another specimen, identified by Tischler, 1963, as *Erisocrinus typus* from the Madera Formation, appears to be clearly related to *Paradelocrinus wapanucka* Strimple (1961b, p. 225), which species is from the Wapanucka Formation (Morro) of Pontotoc County, Oklahoma. Knapp (ibid., p. 352) proposed the genus *Pontotocrinus*, with *P. wapanucka* as the type species, which was synonymized with *Erisocrinus* by Moore and Strimple (1973, p. 61). Although *Pontotocrinus* will not be accepted as a valid genus in the forthcoming Section T, Echinodermata, of the Treatise on Invertebrate Paleontology, this writer considers it to be a viable taxon. The specimen from the Madera Formation is described as *Pontotocrinus coloradoensis*, n. sp.

**SYSTEMATIC PALEONTOLOGY**

Subclass INADUNATA Wachsmuth and Springer, 1855
Order CLADIDA Moore and Landon, 1943
Suborder POTERIORCRININA Jaekel, 1918
Superfamily ERISOCRINACEA Wachsmuth and Springer, 1856
Family ERISOCRINIDAE Wachsmuth and Springer, 1886
Genus ERISOCRINUS Meek and Worthen, 1865
ERISOCRINUS KNOXVILLENsis Strimple, new species

Plate 1, Figures 9-11; Text-Figure 1.

Description—Cup truncate cone-shaped with pronounced basal concavity, regularly pentagonal-shaped when viewed from above or below. Infrabasals downflared and extending only slightly beyond columnar cicatrix. Proximal portions of moderately large basals form walls of basal concavity, flexing to form basal plane of cup and forming part of the lateral cup walls. Large radials form most of cup height but the proximal ends are well above the basal plane. Distal edges of radials are sharply defined. Articular facets are subhorizontal except where elevated to form a socket for the triangular-shaped rudimentary anl plate in the CD interray. The columnar cicatrix is slightly impressed and is circular in outline.

Measurements of holotype in millimeters: height of cup 6.0, width 4.1; width of columnar attachment scar 2.9; width of infrabasal circle 4.3; width of CD (posterior) basal 5.0, length 4.7; width of A (anterior) radial 9.1, length 4.8; length of D radial articular facet at DE suture 3.6.

Discussion—*Erisocrinus typus* Meek and Worthen, 1865, is the type species of *Erisocrinus* Meek and Worthen (1865, p. 174); it was based on two syntypes from near Springfield, Illinois. Knapp (1969, p. 360, Text-Fig. 14b) designated the smaller undistorted specimen as the lectoholotype and illustrated it with a cross-section. The specimen is photographically...
ERISOCRINIDS OF IOWA AND COLORADO

Text-Figure 1. Camera lucida sketches of cup plates of Erisocrinus knoxvillensis, n. sp. a. Radial plate from interior showing articular facet at top with stippled areas demonstrating slits passing from adsutural area into body cavity, X12. b. Radial plate, with basal plate below, from end showing depressed ligamental areas and fossae, as well as the previously mentioned slit passing under articular facet, X25.

cally illustrated here (Plate 1, Figs. 6, 8). Moore and Plummer (1940, p. 151) considered the horizon of the type of specimens to be lower Middle Pennsylvanian, which equates with Atokan or Lower Desmoinesian age. Knapp (ibid., p. 360) considered it to be “basal Missourian?” in age, which seems more reasonable.

E. knoxvillensis differs from E. typus in having a more pronounced basal concavity; the columnar scar is proportionately larger; infrabasals do not extend beyond the cicatrix as far; and the distal ends of radials are further above the basal plane than found in E. typus. Most of the characteristics of E. knoxvillensis are closely similar to those of E. georgeae Strimple and Watkins (1969, p. 180) from the Soldiers Hole Member, Big Saline Formation, Atokan, of Mason County, Texas, with the exception of the basal concavity exhibited by the former species, and the proximal tips of the radial plates, which more closely approach the basal plane than in the latter species.

Holotype—SUI 32481, collected by W. Youngquist, repositioned in the Geology Department Repository, The University of Iowa, Iowa City.

Occurrence—Unnamed limestone, Desmoinesian, Middle Pennsylvanian; SE4 sec. 35, T.76N., R.20W., about three-fourths of a mile northwest of Knoxville, Marion County, Iowa.

The exact age represented by the limestone from which E. knoxvillensis was recovered is difficult to ascertain. Mikesh and Glenister (1966, p. 276, 277) in study of Solenochilus springeri from northeast of Knoxville concluded that strata in that area lay within the Cherokee Group, and almost certain-
Plate 1. Erisocrinids from Iowa, Colorado and Missouri. 1, 2. *Pontotocrinus coloradoensis*, n. sp., holotype cup from Madera Formation, Colorado, viewed from CD interray (posterior) and from base, X3. 3-5. *Exactocrinus maderaeensis* n. sp., holotype cup from Madera Formation, Colorado, viewed from anterior (X2), summit and base, X3. 6-8. *Erisocrinus typus* Meek & Worthen, lectoholotype cup from Missourian Stage, Missouri, viewed from CD interray, summit and base, X3. 9-11. *Erisocrinus knoxvillensis*, n. sp., holotype cup from Desmoinesian Stage, Iowa, viewed from CD interray, summit and base, X3.
ERISOCRINIDS OF IOWA AND COLORADO

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MEEK, F. B., and WortHEN, A. H. 1865. Note in relation to a
Genus EXAETOCRINUS Strimple and Watkins, 1969
EXAETOCRINUS MADERAENSIS Strimple, new species
Plate 1, Figures 3-5.

description—cup bowl-shaped with slightly convex base.
Five infrabasals extend well beyond the small slightly at­
tachment area and are slightly upflared. Basals are large with
gentle curvature. Radials are very large and are gently
curved. The perimeter of the cup is sharply defined by the
distal edges of radials when viewed from above and the out­
line is somewhat pentagonal, almost as pronounced as found
in typical erisocrinus. Interarticular notch for rudimentary
anal plate is rather large and expands sharply as it approach­
es the body cavity.

Measurements of holotype in millimeters: maximum width
of cup 17.7, height 8.7; width of infrabasal circle 7.4, height
12.0; width of AE basal 5.7, length 4.6; width of A radial 9.8,
length 6.0; diameter of proximal columnal (preserved in
place) 2.5; length of interbasal suture of A ray 1.0, B ray 1.8.

discussion—exaetocrinus represents a holdover from the
cone-shaped cup of ancestral scyalocrinus. The cup has lost
all anal plates and has changed to a low bowl shape as in
erisocrinus but the infrabasals have remained slightly up­
flared. E. lustrum (Strimple, 1951) from the Iola Formation,
Kansas City Group, Missourian (Upper Pennsylvanian),
exposed in the quarry of the Lehigh Cement Company just
south of Iola, Kansas, has a taller cup with more evenly ex­
panded sides than found in E. maderaensis.

It appears that E. maderaensis evolved directly from a
species like stuartwellerocrinus praecedet Strimple, 1961a,
from the Wapanucka Formation, Morrowan of Pontotoc
County, Oklahoma. S. praecedet has a broad bowl-shaped
cup, and large radial plates the proximal tips of which reach
the basal plane; an anal plate is retained in the cup. The anal
plate has lost contact with the CD (posterior) basal. S. pra­
ecedet is atypical of Stuartwellerocrinus but is also atypical of
Exaetocrinus, both of which genera typically have more cone­
shaped cups. It seems possible that a divisionary lineage is
represented by these two species with E. lustrum Strimple,
1951, a possible participant. However, all three species are
monotypic so that no action is taken at this time.

Holotype—UMPL 37543, reposited Paleontology Museums,
University of Michigan, Ann Arbor, Michigan.

Occurrence—Madera Formation, Desmoinesian, Lower
Pennsylvaniaian; Huerfano Park, Colorado.

Genus PONTOTOCRINUS Knapp, 1969
PONTOTOCRINUS COLORADOENSIS Strimple, new species
Plate 1, Figures 1-2.

Description—cup moderately low, bowl-shaped with circu­
lar outline when viewed from above or below, base planate
except for sharply impressed columnar socket. Curvature of
cup sides even and gentle. Infrabasals extend well beyond
columnar impression. Basals large, extending into lateral walls
of cup. Radials very large and long so that proximal tips are
close to the basal plane. Round proximal columnal is pre­
served in place and is slightly smaller than the invaginated
socket.

Measurements of holotype in millimeters: normal cup width
13.0; width in anteroposterior radius 12.8; cup height 6.6.

discussion—the infrabasal circle is not regularly distribu­
ted in that the D infrabasal is longer than other infrabasals.
Pontotocrinus coloradoensis differs from P. wapanucka in
lacking even a slight basal concavity and in the irregularity
of infrabasal plates.

Holotype—UMPL 37544, reposited Paleontology Museums,
University of Michigan, Ann Arbor, Michigan.

Occurrence—Madera Formation, Desmoinesian, Middle
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literature Cited

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