

EPERISOCRINUS NEW GENUS (CRINOIDEA, INADUNATA):
TYPE SPECIES *DELOCRINUS MISSOURIENSIS* MILLER
AND GURLEY, 1890¹

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Abstract. Reexamination of the holotype specimen of *Delocrinus missouriensis* showed that it is referable to the Erisocrinidae, rather than to the Catacrinidae, the family to which *Delocrinus* is presently assigned. A new genus, *Eperisocrinus*, with *Delocrinus missouriensis* the type species, is proposed, based on the following characters: Dorsal cup with radial plates having articular facets and obtuse proximal angles, essentially as in *Erisocrinus* but differing in having a considerably higher basal impression; infrabasal plates much more reduced and steeper walled adjacent to the stem; larger basal plates; interbasal and interradial sutures nearly equal in length; and anal X represented on outer wall of cup.

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In 1890, when Miller and Gurley proposed the genus *Delocrinus*, and designated *Poteriocrinus hemisphericus* Shumard as the type species, they described and attributed to the genus a second species, *Delocrinus missouriensis*. Recent study of the holotype of *Delocrinus missouriensis* demonstrates that it is an erisocrinid and only distantly related to the Catacrinidae, the family to which *Delocrinus* is presently assigned.

Two specimens were referred to *D. missouriensis* at the time of its initial description. One of these, a dorsal cup, UC 6233A, was declared the holotype (*lectotype*) of the species by Moore and Plummer (1940) and is the subject of this discussion. The second, UC 6233B, part of a crown preserving long primibrach spines and a portion of the stem, had the anal plates buried in matrix at the time of the original description. Since then the dorsal cup and arms have been skillfully extricated from the matrix (*possibly by Moore himself*). The cup bears three anal plates; this crown quite evidently represents a species of *Plaxocrinus* but treatment of it is beyond the scope of the present article.

Specimens cited in this discussion are distinguished by numbers, or numbers combined with letters, which are preceded

by acronyms that identify the institution in which they are repositied. These acronyms and the institutions to which they apply are as follows: UC, Field Museum of Natural History; UI, University of Illinois, and UT, University of Texas.

SYSTEMATIC PALEONTOLOGY

Class: CRINOIDEA Miller, 1821

Subclass: INADUNATA Wachsmuth and Springer, 1897

Order: CLADIDA Moore and Laudon, 1943

Suborder: POTERIOCRININA Jaekel, 1918

Family: ERISOCRINIDAE Wachsmuth and Springer, 1886

Genus: *EPERISOCRINUS*, n.g.

DIAGNOSIS. Dorsal cup with radial plates having articular facets and obtuse proximal angles essentially as in *Erisocrinus*, but differing in having (1) a considerably higher basal impression; (2) infrabasal plates much more reduced, and steeper walled adjacent to the stem; (3) larger basal plates; (4) interbasal and interradial sutures nearly equal in length, and (5) anal X represented on outer wall of the cup.

ETYMOLOGY. From the Greek epi= beside + *Erisocrinus*, the genus.

TYPE SPECIES. *Delocrinus missouriensis* Miller and Gurley, 1890.

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LOCALITY AND HORIZON. Kansas City, Missouri, Upper Coal Measures (Missourian).

EPERISOCRINUS MISSOURIENSIS
(MILLER AND GURLEY)

Figs. 1-4

Delocrinus missouriensis (part) Miller and Gurley, 1890a, p. 14, pl. 2, fig. 12-13 (not fig. 11); 1890b, p. 12, pl. 2, fig. 12-13 (not fig. 11); 1890c, p. 336, pl. 2, fig. 12-13 (not fig. 11); *Delocrinus missouriensis* Miller and Gurley, Moore and Plummer, 1940, p. 255, 256, fig. 57a; Moore and Laudon, 1944, p. 173, pl. 62, fig. 24; pl. 65, fig. 14.

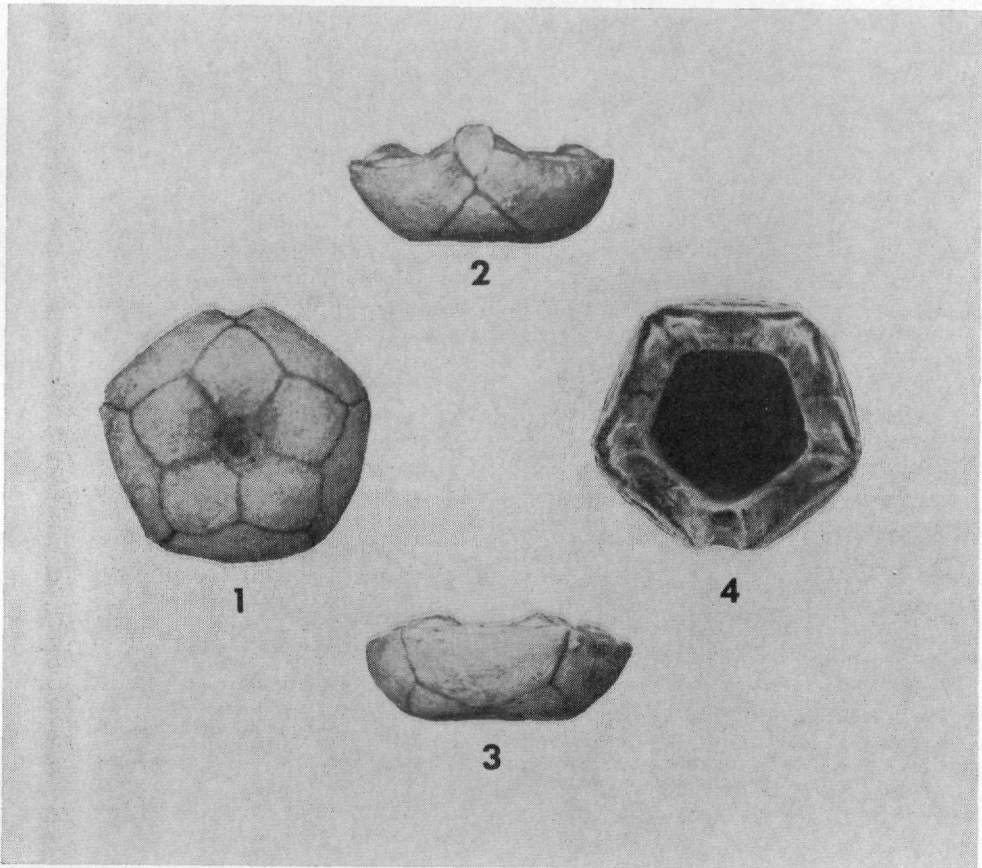
DIAGNOSIS. Same as that of genus (see above).

DESCRIPTION AND COMPARISONS. Because they are obscured by secondary de-

posits, the sutures of the holotype dorsal cup, UC 6233A, are difficult to discern. I have resorted to tracing them in pencil to indicate them in the photographs from which my illustrations were taken.

At first glance this dorsal cup resembles those of various species of *Delocrinus*, the genus to which it has been assigned since 1890. The cups of those species, however, are less pentagonal in dorsal and ventral views than that of UC 6233A. The outline of this specimen is also interrupted by a sharp interradiar notch in dorsal view; the notch is less prominent in ventral aspect (fig. 1, fig. 4).

In height of basal impression UC 6233A likewise approaches species which have been attributed to *Delocrinus*; the height is nearly $\frac{1}{3}$ that of the cup. Nevertheless, in erisocrinids, as exemplified by the genus *Erisocrinus* proper, a very shallow



FIGURES 1-4. *Eperisocrinus missouriensis* (Miller and Gurley). Holotype, UC 6233A. Fig. 1, dorsal view; fig. 2, posterior view; fig. 3, anterior view; fig. 4, ventral view. All approximately twice natural size. External sutures traced in pencil prior to photographing.

basal impression is not entirely characteristic. In UI X-264, the specimen selected as the lectoholotype of *Erisocrinus typus* Meek and Worthen by Knapp (1969) the impression is quite apparent and it is also clearly distinct in UT K-4732, the holotype of *Erisocrinus erectus* Moore and Plummer (1940). In *Erisocrinus knoxvillensis*, the impression is more pronounced than in *Erisocrinus typus* (Strimple 1975, pl. 1, fig. 11). The higher cavity of *Eperisocrinus missouriensis* is simply an exaggeration of the shallower cavities found in species of *Erisocrinus*.

The infrabasals of *Eperisocrinus missouriensis* are very much reduced, more so than in any species of *Erisocrinus*, and they would be barely visible on the dorsal surface if the stem of UC 6233A were in place. As in *Erisocrinus typus* and *Erisocrinus knoxvillensis* the C infrabasal is the most prominent plate of that circler. These plates slope steeply downward and flare outward slightly from their origin at the summit of the stem impression. For most of their length they must have constituted a very slightly rounded, almost pentagonal wall around the stem.

To my knowledge, it has not been noted previously that the crenulae in *Erisocrinus* extend downward along the walls of the stem impression and are not confined to the summit of the impression. Strimple's illustrations (1975, pl. 1) of *Erisocrinus typus* (fig. 8) and *Erisocrinus knoxvillensis* (fig. 11) demonstrate this quite clearly. Despite the crude preparation of this region of UC 6233A, the steep infrabasal plates still retain traces of crenulae, distributed much as in the two species figured by Strimple.

In keeping with the reduced infrabasals, the basals of *Eperisocrinus missouriensis* are relatively large, larger than in any species of *Erisocrinus*, and the interbasal sutures are longer, practically as long as the interrarial sutures. The basals extensively wall the basal impression, whereas in most species of *Erisocrinus* they barely participate in the impression (*Erisocrinus knoxvillensis* appears to be an exception to this).

For the most part, the basals of *Eperisocrinus missouriensis* are flat or a

little concave within the impression, but (except for the CD basal) are slightly or moderately convex at the basal plane. The CD basal lies above the basal plane and is nearly flat from side to side in that region. Beyond the basal plane the basals take on the contour of the radials, sloping out and flaring, and are only slightly convex. As in most species of *Erisocrinus*, the basals occupy the greater part of the dorsal surface of the cup and their distal borders are rounded.

The radials originate in the vicinity of the basal plane, but because the basals are convex, the proximal tips of the basals lie above the basal plane, not in it. In the prolongation of the proximal tips of the radials toward the base of the cup, *Eperisocrinus* resembles *Erisocrinus erectus* Moore and Plummer, 1940. But one of the most striking erisocrinid characteristics of *Eperisocrinus* consists in the very obtuse proximal angles of the radial plates (about 140°); much wider than the same angles in species of *Delocrinus*, with the possible exception of *Delocrinus vulgatus* Moore and Plummer, 1940.

The radial walls are outflaring to about the same extent as in *Erisocrinus knoxvillensis*, but much less than in *Erisocrinus terminalis* Strimple (1962), which represents the extreme in this respect. The radials, except the posterior two, are about twice as wide as long and, except in length, have all the characteristics of *Erisocrinus*. There is practically no outswelling of the outer radial wall below the summit; it bends in very slightly as it approaches the articular surface.

The entire radial articular surface is definitely *Erisocrinus*-like. At best the facet is little deeper than the inner wall of the radial at the summit of the plate; this contrasts with the deeper facet in *Delocrinus*, which extends inward beyond the radial wall, rimming the body cavity. The outer marginal ridge faces outward, bows downward, does not extend to the full width of the facet and its inner wall bears fine denticles. The outer ligament furrow is expanded transversely, lies well below the transverse crest and its inner wall is denticulate. The external ligament pit is slitlike and moderate in transverse extent. The transverse crest

is denticulate, visible in lateral view of the cup, narrows adjacent to the external ligament, then expands but gradually narrows again into delicate lateral extremities that do not extend to the full width of the plate.

The lateral furrows are conspicuous, with broadly rounded, shallow floors, which rise a little in their course mediad. The oblique ridges are very prominent, subvertical, and appear to retain traces of denticles. Just behind (i.e. inward from) each oblique ridge there are indications of a small transverse valley, such as one found in the same region in *Erisocrinus*. The adsutural valleys are quite broad, widen inward and slope upward with the lateral ridges, which are strongly elevated. The muscle areas, sloping outward and mediad, are visible in lateral view of the cup. The intermuscular notch is V-shaped and the intermuscular furrow short. It leads outward to a swollen median area which rises up internal to the transverse ridge, opposite the external ligament pit.

The articular surfaces of the radials of this specimen are worn, but it takes little imagination to see, in the inner ligament area, the resemblance in shape to "a moth or butterfly with outstretched wings" noted by Moore and Plummer (1940, p. 154) in this area of the radials of *Erisocrinus typus*.

Anal X is bent inward, rests within a distinct interrarial notch, and its external surface is concave from side to side. The flanks of the posterior radials rise up adjacent to this plate, which projects only slightly above them. Dorso-ventrally, anal X is practically wedge-shaped, although its greatest width is slightly above the radial surfaces. This plate comes to a tip below, where the sides of the posterior radials meet, cutting it off from junction with the CD basal. The distal portion of that basal is not truncate; the sides meet at an acute angle at the interrarial suture. However, it is interesting to note that the internal faces of anal X and the CD basal, fronting the body cavity, show the arrangement normal for *Delocrinus*; distally the CD basal is truncate and anal X rests squarely on that truncate surface. I have been careful to verify the disposi-

tion of these plates of the posterior interradius; previous descriptions have not noted these features and accompanying illustrations were inaccurate. Distally, anal X bears a single articular facet, mainly facing upward, but inclined at a low angle toward the body cavity.

DIMENSIONS. Linear measurements, in mm, taken on the holotype, UC 6233A, are as follows: Dorsal cup height, 5.5, width 17.6 (H/W ratio 0.31); basal impression height 2.0, width 7.1; AB basal length 5.8, width 6.0; A radial length, 5.5, width 10.7; interbasal suture length 3.4; interrarial suture length 3.5; Anal X height 3.4, width 2.7.

DISCUSSION

Eperisocrinus missouriensis is the exception, among known erisocrinids, in that it shows a relatively high basal impression. There has been some tendency in the past to single out *Erisocrinus* as an example of regressive evolution, on the assumption that the shallow basal impression represents a reversion from a high basal impression possessed by some ancestral stock. For my part, I am inclined to regard the shallow impression found in such species as *Erisocrinus typus* to be representative of the ancestral condition. The divergences from *Erisocrinus* exhibited by *Eperisocrinus* are in such close harmony with the higher basal concavity of this genus as to indicate that the entire structure of the basal cup precluded any reversion to the type of cup characteristic of *Erosocrinus*.

After years of trying to reconcile various specimens of *Delocrinus* with the holotype of *Eperisocrinus missouriensis*, the long-time failure on the part of others to recognize the true affinity of the species is readily understandable. After all, in gross morphology, the dorsal cup resembles that of *Delocrinus*. This may explain the extreme rarity of the taxon. (Except for the monotype that represents the type species, I have seen no other specimen that I could refer to the genus with confidence). It may be that in assuming some of the morphological characteristics of *Delocrinus*, *Eperisocrinus* also entered into competition with species of that highly diverse genus. In such

case, it was quite likely an unequal contest and *Eperisocrinus* probably lost out and became extinct in short order.

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