BULLETIN NO. 7 OF THE ILLINOIS STATE MUSEUM OF NATURAL HISTORY. NEW AND INTERESTING SPECIES OF PLAEOZOIC FOSSILS

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649439478

Bulletin No. 7 of the Illinois State Museum of Natural History. New and Interesting Species of Plaeozoic Fossils by Wm. F. E. Gurley & S. A. Miller

Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

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By S. A. MILLER and Wm. F. E. GURLEY.

Springfield, Illinois,
December 5, 1895.

SPRINGFIELD, ILL.,
Ed. F. Hartman, State Printer.
1895.

ILLINOIS STATE MUSEUM

OF

NATURAL HISTORY.

SPRINGFIELD, ILLINOIS.

NEW AND INTERESTING SPECIES OF PALÆOZOIC FOSSILS.

BY S. A. MILLER AND WM. F. E. GURLEY.

SUBKINGDOM ECHINODERMATA.

CLASS CRINOIDEA.

ORDER PALÆOCRINOIDEA.

FAMILY ACTINOCRINIDÆ.

BATOCRINUS POLYDACTYLUS, n. sp.

Plate I, Fig. 1, view of calyx, arms and part of the column, azygous area on the right.

Species above medium size. Clayx short, saucer-shaped, about four times as wide as high; interradial areas slightly flattened; surface granular. Column medium size and composed of alternately larger and smaller plates.

Basals form an hexagonal disc. less than twice the diameter of the column, bearing a low rim around the depression for the attachment of the column. First primary radials more than twice as wide as high. Second primary radials quadrangular, nearly three times as wide as high. Third primary radials not much larger than the second, twice as wide as high, pentagonal, axillary, and support upon the upper sloping sides the secondary radials. In each lateral ray and in the ray opposite the azygous area there are two secondary radials, the last of which are axillary and bear three tertiary radials, the last one being axillary and bearing two arms; which gives to each of these rays eight arms. The ray on the right of the azygous area bears three secondary radials, the last one being axillary and bearing two arms, which gives to this ray four arms. The ray on the left of the azygous area bears, on the

distal side, three secondary radials. the last of which is axillary, and on the proximal side two secondary radials, the last of which is axillary, and bears on the distal side two tertiary radials, and on the proximal side three tertiary radials, the last one being axillary, giving to this ray five arms. There are, therefore, thirty-three arms in this species. The arms are composed of a double series of interlocking plates that are deeper than wide in the lower part, but commence to spread, at the upper third, and become perfectly flat, in the upper part, as they do in *Eretmocrinus*, but without the usual increase in width. The plates of the arms do not seem to lengthen, but instead of closing, so as to have an ambulacral furrow on the inner side, they become perfectly flat on both sides, or concave externally. Pinnules dense.

There are three regular interradials in each area, one large, the other two small, but of unequal length. There are seven azygous interradials, the first one heptagonal, in line with the first primary radials, and of about the same size. It is followed by three plates, in the second range, the middle one being the longer and larger one. On each side of the upper part of the middle plate there is a small plate that separates it from the radial series. Above the middle plate of the second range, there is an elongated plate that extends an angle to the top of the calyx. The vault is not exposed, but it bears a long slender proboscis, the end of which is broken off at the top of the specimen illustrated.

This specie will be distinguished by its depressed calyx, and thirty-three arms or seventeen ambulacral orifices, in the vault, and by the flattening of the arms in the superior part. This latter character, in a greater degree, possibly, has been regarded as a generic character in *Eretmocrinus*. This species and others hereinafter described show that the flattening of the arms is not of generic importance. Many species of *Batocrinus* show the tendency of the arms to expand or flatten toward the superior ends.

Found in the Keokuk Group, at Boonville, Missouri, and now in the collection of S. A Miller.

BATOCRINUS SAMPSONI, n. sp.

Plate I, Fig. 2, azygous view of a specimen compressed so as to show calyx and arms; Fig. 3, lateral view of another specimen having part of the arms removed, showing vault, proboscis and the incurving part of the arms, some of which are broken off.

Species medium size. Calyx obconoidal, twice as wide as high; each radial series where unworn bears a slight angular ridge from the basal plates to the free arms; interradial areas flattened but very little; surface granular; truncated for a small column.

Basals form an hexagonal disc, one-half wider than the diameter of the column, and having a height less than the distance from the column to the margin. First primary radials wider than high, upper face slightly arcuate for the reception of the second radials. Second primary radials quadrangular, about twice as wide as high. Third primary radials pentagonal, a little larger than the second, not quite twice as wide as high, axillary, and support upon the upper sloping sides the secondary radials The distal side of each third primary radial, adjoining the azygous area, bears four secondary radials, the last of which is axillary, and supports upon each upper sloping side a free arm; the proximal side of each bears two secondary radials, the last of which is axillary and supports upon the distal side two tertiary radials, the last one being axillary and supporting upon each upper sloping side a free arm; the proximal side of each secondary radial bears three tertiary radials that support a single arm. This arrrngement gives to each of these rays five arms. In each lateral ray there are two secondary radials, the last one being axillary and supporting the tertiary radials. In one of these each distal series supports four tertiary radials, the last one being axillary and supporting upon each upper sloping side a free arm, and each proximal series supports three tertiary radials, the last of which supports a free arm which gives to this lateral ray six arms. In the other lateral ray, one of the distal series supports three tertiary radials, the last one being axillary and supporting upon each upper sloping side a free arm; the other distal series and each proximal series, support three tertiary radials each of which

supports a free arm, which gives to this lateral ray five arms. In the ray opposite the azygous area there are four secondary radials, the last of which is axillary and supports upon each upper sloping side a free arm, which gives to this ray four arms. There are, therefore, twenty-five arms, in this species. The arms are composed of a double series of interlocking plates that are deeper than wide, in the lower part, but flatten out above as they do in *Eretmocrinus*, but without the usual increase in width. Pinnules long and dense.

There are three regular interradials in each area, one large, the other two smaller and somewhat elongated. There are six azygous interradials, the first one heptagonal, in line with the first primary radials, and the largest plate in the calyx. It is followed by three plates, the central one being smaller than the lateral ones; and these by two elongated plates that connect with the plates of the vault. The vault is conoidal and larger than the calyx, and bears a long subcentral proboscis. The plates of the vault and proboscis are large and smooth.

This species will be distinguished by its general form, and twenty-five arms that are flattened toward their terminal ends. This latter character belongs to all species that have been referred to *Eretmocrinus*. This species and others herein described show that the flattening of the arms is not of generic importance, though, in a marked degree, it is no doubt of specific value. We have, heretofore, shown that the other characters ascribed to *Eretmocrinus* are possessed by different species of *Batocrinus* and that one and all are not of generic value.

Found in the Keokuk Group, at Boonville, Missouri, and now in the collection of S. A. Miller. The specific name is in honor of F. A. Sampson, the well known naturalist of Sedalia, Missouri.

BATOCRINUS VETERATOR n. sp.

Plate I, Fig. 4, view of calyx and arms opposite the azygous side, a little depressed, and arms broken off at the upper end.

Species medium size. Calyx obconoidal, two and a half times as wide as high; no radial ridges; plates slightly convex; sutures distinct, somewhat beveled; surface granular; column small.

Basals form an hexagonal disc twice as wide as the diameter of the column and having a height less than half the distance from the column to the margin. First primary radials one-half wider than high, and superior face nearly straight. Second primary radials quadrangular, about three times as wide as long. Third primary radials pentagonal, a little larger than the second, about three times as wide as long, axillary, and support on the upper sloping sides the secondary radials. In the ray opposite the azygous area there are three secondary radials on one side and an axillary plate that bears two arms; on the other, there are two secondary radials, the last of which is axillary and bears, upon one side, a tertiary plate, which supports a single arm, and upon the other a tertiary plate, which is followed by an axillary plate that bears two arms. There are, therefore, five arms in this ray. One of the lateral rays is constructed in the same manner and bears five arms. In the other lateral ray there are two secondary radials in each series, the last of which are axillary and bear, upon one side, two tertiary radials that support a single arm on each, and upon the other side two tertiary raidials, the last being axillary and supporting two arms. There are, therefore, six arms in this ray. The ray on the right of the azygous area also supports six arms, while the ray on the left of the azygous area supports seven arms, the proximal one being a single arm and the other three double arms. By this arrangement there are twenty-nine arms in this species. The arms are long and very slightly flattened toward the superior ends. Pinnules very dense.

In the regular interradial areas there are only two plates, one following the other. In the azygous interradial area the first plate is heptagonal, in line with the first primary radials and of about the same size. It is followed by three plates in the second range, which nearly fill the area, above these the sutures are indistinct in each of our specimens, but, apparently, there is only one plate, making five plates in this area. The vault is not disclosed in our specimens, but two of them show the broken ends of the proboscis, which is quite small.