

***RISTNACRINUS*, A NEW ORDOVICIAN
CRINOID FROM ESTONIA**

BY

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WITH A NOTE BY F. A. BATHER †

WITH TWO PLATES AND ONE FIGURE IN THE TEXT

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This new form of crinoidea was discovered in the middle part of the D₁-stage (Jõhvi- or Jewe-stage; cf. A. Öpik 1930) at Ristna, about 65 km to the west of Tallinn. Cape Ristna is an excellent locality of the Jõhvi limestone and marl, with many partly silicified fossils. Our crinoid was discovered in graptolith bearing (*Dictyonema* and *Climacograptus* marl limestone from the sea bottom, about 30 cm below the surface), near the western part of the outcrop of Cape Ristna. *Ristnacrinus* like columnar ossicles appear in the Kukruse limestone and oil shale (C₂—C₃) and the Keila (D₂) limestone.

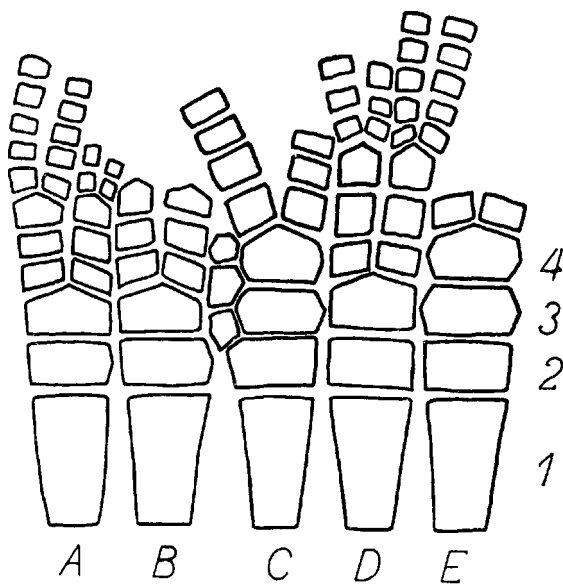


Fig. 1. *Ristnacrinus marinus* n. gen. & n. sp. Analysis of the calyx $\times 3$. The same specimen (type) see Plate II, Fig. 2. The right posterior (C) and the right anterior radius (E) have four, and the others have only three plates; only the plates of the basal circlet are in complete and conformable contact along the sutures. We cannot see this on other plates. Almost all the plates of the second ring (2) are of quadrangular size. The A₂, B₂ and C₂ plates of the third circle are pentagonal, the C₃ and E₃ — hexagonal.

Ristnacrinus differs from all other crinoidea in wanting alternation of the calyx plates, which consequently follow the

radii and have a round bipartite stem. The ossicles of the stem (Plate I, Fig. 2) have a singular median ridge.

The holotype is a nearly complete crown Plate II, Fig. 2 and Fig. 1.

There are a nearly complete crown (the type), a total individual with stem and crown (Pl. 1, Fig. 1), two not so well preserved calyces, some fragmentary stems and many isolated ossicles.

The crown measured 2,5 cm in extension, and was conical to subcylindrical in form. The distribution and the form of the plates is given in Fig. 1. The basalia (or infrabasalia or subradialia, circlet 1 in Fig. 1) are rather long, but the radialia and superradialia are a half shorter. The radii are unlike, for the right posterior and the right anterior radius have four plates. The fourth plates are the superradials. The arms branch but little and seem to be dichotomous. Three analia have adapted themselves to the right posterior radial and the superradials. The stem is round. The first fifteen proximal ossicles of the stem are alternately biconvex and biconcave and striated radially. The left segments of the stem have an original structure. They have upon each surface only one diametrical ridge (Plate I, Fig. 2) with a low sulcus and a swollen border.

Comparison with other crinoidea. Only *Caleidocrinus* Waagen and Jahn have such a radial-like arrangement of the plates. This genus has more branched arms, the same number of plates in each radius and no diametrical ridges upon the ossicles, and there are to be seen many interradians and interbrachials. Therefore the anal side of the *Caleidocrinus* is not clearly enough developed (comp. W a c h s m u t h in Zittel-Eastman, p. 206).

The most important characteristic of *Ristnacrinus* is the consistent following of the radii in the arrangement of the plates. Therefore it is not possible to find an uniform method of annotation for the plates of the calyx of *Ristnacrinus*. According to Bather's letter, the basalia are lost, so that it should be a monocyclic form. Nothing hinders us from taking the lowest cycle of the plates as the basalia. If we like we may consider the rings of the plates which are left as radialia; or, annotating the lowest plates as infrabasalia, the following ring may be considered as basalia and radialia, or as radialia and super-

radialia only. In the last case the basalia would have disappeared, which also seems to be the opinion of Bather. So it is not possible to fix the character of the basis and calyx of *Ristnacrinus* in the common manner. The same is true of *Caleidocrinus*, evidently a near relative of *Ristnacrinus*.

According to its general character, *Ristnacrinus* may be placed under the *Heterocrinidae* (compare following letter of F. A. Bather). The relation of *Ristnacrinus* to *Paractocrinus* Jaekel is of only an outward character. The plates of the last form are not arranged in radii but in spirals.

The author of this paper informed Dr. F. A. Bather (British Museum) about the peculiar characters of the *Ristnacrinus*, which are interesting also for the more general system of the crinoids. Unfortunately the death of this famous palaeontologist interrupted the correspondence.

This important letter of Dr. F. A. Bather is given here almost in full: —

„My dear Colleague, thank you for submitting to me the photographs and diagram of your exceedingly interesting crinoid from the D₁ beds of Estland. I do not know any genus in which the cup plates follow the radial lines so regularly. Those that come nearer to it appear to be certain forms from the Ordovician near Leningrad, which Jaekel has very briefly described and figured and placed in the family *Paractocrinidae* in *Palaeont. Zeitschrift*, III, pp. 25, 26, and also page 22. At first your crinoid reminded me of *Ottawacrinus* since in at least two rays of *Ottawacrinus typus* the basals are in a line with the radials, and the photograph of your crinoid might be taken from that point of view. I do not know what evidence you have for the complete diagram, but I suppose you have seen all round the crown.¹⁾

The structure of your crinoid and of the other forms mentioned is of considerable interest from the point of view of the origin of the difference between *Dicyclica* and *Monocyclica* as well as of the distinction between radials and brachials. Yakovlev has attempted to show that the parts may be twisted so as to put those in a line which are usually alternated,

¹⁾ Only the photographs in Pl. I, Fig. 1 and 2, and the drawing, Fig. 1 in our text, were sent to F. A. Bather.

but I do not find that he has referred to any genera likely to be connected with your crinoid.

The fulcral ridge of the stem with its bifascial articulation is also peculiar. I do not know of any crinoids as old as this that have such a stem joint. There is an early development of this kind of articulation in the cambrian cystid *Macrocystella mariae*. The stem as shown in your photographs does not suggest such an articulation unless, possibly, towards the distal end, which is not very clear in your photograph. I suggest that this particular structure may be confined to the distal portion of the stem, and that the more proximal regions have the more normal form of joint.²⁾ I suppose that you have more than one specimen of this crinoid, but I do not see on the photograph anything that corresponds to the enlarged photograph of the stem ossicles.

I think it is also quite possible that your crinoid is allied to the Heterocrinidae. You mention *Caleidocrinus*; you are probably aware that Jaekel (1902, Internatnl. Zool. Congr., V, p. 1075) placed this in the neighbourhood of *Iocrinus*, and that Springer (1920, Crinoidea Flexibilia, p. 442) quite independently made it a synonym of *Iocrinus*. I do not think I would refer your specimen to *Iocrinus* itself, but it has certain resemblances to *Ectonocrinus* and to *Heterocrinus*, and perhaps to *Homocrinus* Hall, with geotype *H. parvus* (see Kirk, 1914). In making any such comparison I should suppose that the basals have disappeared in one way or another, that the five plates at the bottom are inferradials³⁾ and that the five plates immediately above them are superradials. In that case the proximal anal plate would be borne by the right posterior superradial, exactly as it is in all these Heterocrinidae. Your crinoid has an additional plate in the right posterior and right anterior radius. There is a similar inequality of numbers in several of these genera, though apparently not in the right anterior radius."

"P. S. When I first looked at your photograph it

²⁾ Following this opinion of Dr. Bather the author of this paper studied more closely the structure of the stem of *Ristnacrinus*, and indeed there were in the proximal part the expected "normal" conditions (compare the description of the stem).

³⁾ (= infraradials).

reminded me of *Herpetocrinus* (see my Gotland Crinoids, 1893); that also is allied to the Heterocrinidae. In *Herpetocrinus* the proximal region of the stem is normal, but as it approaches the distal end a transverse fulcral ridge appears with further considerable modifications. I have for some time been seeking the ancestor of *Herpetocrinus* in the Ordovician, and I have a form that may possibly be considered in that connection, but I have not yet had time to work the whole matter out. I just mention this as it is possible that you might be able to throw more light on the stem structure in your crinoid.²⁾"

Literature.

- O. Jaekel, "Phylogenie und System der Pelmatozoen", *Palaeontologische Zeitschrift*, Bd. 3, 1918.
- W. Waagen et Jahn, "Famille des Crinoides" in "Système silurien etc." par Barrande. Prague 1899.
- F. A. Bather, "The Crinoidea of Gotland", *Kongliga Svenska Vet.-Akad. Handlingar*, Bd. 25, 1892.
- Ch. Wachsmuth, "Crinoidea" in "Text-Book of Paleontology" by Eastman-Zittel. 1913.
- E. Kirk, "Notes on the Fossil Crinoid Genus *Homocrinus* Hall", *Proceedings of the U. S. National Museum*, Vol. 46, 1914.
- F. Springer, "The Crinoidea *Flexibilia*", *Smiths. Instit.* 1920.

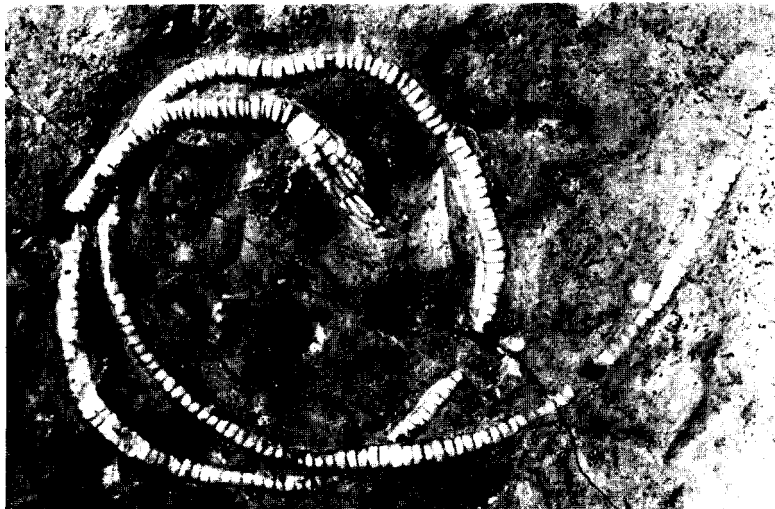


1



2

Photo A. Ö.



1



2

Photo A. Ö.

Explanation of the plates.

Plate I.

1. *Ristnacrinus marinus*, a nearly complete specimen, normal size. Same specimen Plate II, Fig. 1. The matrix is a gray limestone with many dark graptolith fragments.

2. *Ristnacrinus marinus*, isolated ossicles of the stem, magn. $\times 10$ diameters, showing the median elevation and marginal ridge.

Plate II.

1. *Ristnacrinus marinus*, same specimen as Plate I, Fig. 1. The crown and the proximal part of the stem. Magn. $\times 3$ diam.

2. *Ristnacrinus marinus*, the type specimen, magn. $\times 4,3$ diam. The lower part of the basal ring is defective. Same specimen see Fig. 1 in the text.