

Cretaceous Crinoidea.

Preliminary report on the species found in Denmark.

By

H. WIENBERG RASMUSSEN.

The study of Cretaceous crinoids in Denmark was continued by Dr. K. BRÜNNICH NIELSEN after the publication of his monograph in 1913. On his death he left a large collection comprising several new species, and specimens giving new information about species already known. He also left notes which were to form the basis of a publication of these observations. The present writer has undertaken a restudy of this and other Danish collections, and it is his hope to extend the study also to Cretaceous crinoids from other areas, which he has so far mainly studied on the basis of literature and specimens in Danish collections.

Since the study of these faunas cannot be finished within a short time the writer feels it to be of some value now to give a preliminary report on some of the results and nomenclatorial corrections resulting from the study of the species found in Denmark (and Greenland). One new genus, *Lipocrinus* is established. The figures, descriptions and discussions will be given in the monograph. It is also the writers' hope that this report will be taken as an invitation to cooperate, so that no material or information of importance will be overlooked.

The following information can be given on the species found in Denmark.

Isocrinus carinatus (ROEMER), 1840. Synonymy: *Pentacrinites agassizii* HAGENOW, 1840, and *P. klodenii* HAGENOW, 1840. ? *Pentacrinites lanceolatus* ROEMER, 1840 (indet.). (Priority of ROEMER 1840-41, part I 1840 being published before HAGENOW 1840, cfr. W. RASMUSSEN 1950 p. 106). The species is known from Lower Maastrichtian in Denmark. Specimens from the Upper Maastrichtian in Denmark (Stevns Klint) belong to a closely related species or subspecies.

I. fionicus (BR. NIELSEN), 1913. Complete calices are found. They show that the basalial are considerably smaller than in the reconstruction showed by BR. NIELSEN. The stems combined with *I. longus* belong to this species. Lectotype: NIELSEN pl. 8 fig. 49-51. L.-U. Danian.

I. longus (BR. NIELSEN), 1913. Only one basal is known of this species, the stem belonging to *I. fionicus*. Lectotype: BR. NIELSEN pl. 8 fig. 7-11. U. Danian.

I. obsoletus (BR. NIELSEN), 1913. Stem, calyx and proximal arm plates are known of this species. The stem was formerly connected with *I. divergens*. Lectotype: BR. NIELSEN pl. 10 fig. 4-8. U. Danian.

- I. divergens* (BR. NIELSEN), 1913. Radialia and primibrachialia known. The stems, or some of them, belong to *I. obsoletus*. Lectotype: BR. NIELSEN pl. 9 fig. 12-15. L.-U. Danian.
- I. campanularis* (BR. NIELSEN), 1913. Only radialia known. L.-U. Danian.
- I. miliaris* (BR. NIELSEN), 1913. Stem known, nodal joints being also found. There are less than five (1-3) large cirri attached to the outer surface of each nodal joint. Lectotype: BR. NIELSEN pl. 9 fig. 47-48. L. Danian.
- I. convexus* (BR. NIELSEN), 1913. Stem known, nodal joints being also found. There are less than five (1-3) small cirri attached to the outer surface of each nodal joint. U. Danian.
- I. n. sp. 1.* (*aff. carinatus*). U. Maastrichtian.
- I. n. sp. 2.* L. Maastrichtian.
- I. n. sp. 3.* U. Danian.
- I. rejstrupianus* (BR. NIELSEN), 1913. Synonym: *Pentacrinus kagstrupianus* BR. NIELSEN, 1913. These two types are now known from the same zones of the Danian. Some of the differences are due to incorrectness of the figures. The same, or a closely related species, is found in the Senonian. This species is not, as presumed by SIEVERTS-DORECK on the basis of the figures, closely related to *Metacrinus*. The axial canal does not branch until within the radialia and does not come out on the upper side of the basal, but on the outer surface. The radialia have been not above but outside the basalia covering a part of these. The uncovered lateral part of the basal is more or less granulated. The structure of this calyx is thus in some degree similar to Liassic Pentacrinidae. ?Senonian. L.-U. Danian.
- Austinocrinus bicoronatus* (HAGENOW), 1840. Synonymy: *A. rothpletzi* STOLLEY, 1892. *A. meyni* STOLLEY, 1892. *A. zitteli* STOLLEY, 1892. ?*Isocrinus holsaticus* JAEKEL, 1904. The figures and information given by STOLLEY 1892 indicate the identity of these species of *Austinocrinus*, and the same opinion is a result of a study of specimens from Lägerdorff and Møn. The few stem joints found at Møn (Campanian or L. Maastrichtian) show both the *bicoronatus* and the *rothpletzi* form. *I. holsaticus* is found at a locality where *A. bicoronatus* is the dominating or only species of Pentacrinidae.
- Lipocrinus* nov. gen. ($\lambda\iota\pi\omega$ prefix for $\lambda\epsilon\tau\pi\epsilon\omega$ to leave or omit: referring to the alternicirrate character).
- Genotype.—*Pentacrinus subbasalliformis* SOWERBY, in WETHERELL 1840. Diagnosis.—Stem pentagonal or pentalobate to cylindrical. Joint-faces show an ornament varying form that typical of *Balanocrinus* to more or less like *Isocrinus*. Nodal joint with less than five cirri attached to the lower edge of the joint. Basalia rather small. I Br 1-2 and II Br 1-2 are synostoic. I Br 2 is axillary.
- Species.—Among the species belonging to this genus are:
- Miocene: *L. cubensis* (VALETTE), in ROIG 1926. *L. lorioli* (NOELLI), 1900. *L. haitiensis* (SPRINGER), 1925.
- Oligocene: *L. dollini* (TERMIER), 1949.
- Eocene: *L. subbasalliformis* (SOWERBY), 1840. *L. didactylus* (ARCHIAC),

1846. *L. n. sp.* (SIEVERTS-DORECK 1944 p. 138: *B. subbasaltiformis*, Denmark).
- L. buchii* (ROEMER), 1840. Synonymy: *Pentacrinites buchii* HAGENOW, in ROEMER 1840. *Pentacrinites bronni* HAGENOW, 1840. *Pentacrinus peroni* LORIOI, in PERON 1889. *Balanocrinus africanus* LORIOI, in PERON 1889. As in the case of *I. carinatus* this species was first published by ROEMER. He mentions HAGENOW as the author, no doubt referring to their correspondence. At any rate the description as well as the name is different from that given by HAGENOW himself later in 1840. ROEMER must therefore be taken as the author. Stem, calyx and proximal arm plates are found in Denmark. The calyx shows great resemblance to the calyx of *I. holsaticus* and *L. paucicirrhus*. U. Senonian.
- L. stelliferus* (HAGENOW), 1840. (= *P. stelliferus* HAGENOW, in GEINITZ 1888). This species was never figured, and has never since been mentioned. On basis of the description it is identified in Denmark. Stem, calyx and arms are found. U. Senonian.
- L. paucicirrhus paucicirrhus* (BR. NIELSEN), 1913. Lectotype: BR. NIELSEN pl. 6 fig. 39-41. L. Danian.
- L. paucicirrhus crassus* (BR. NIELSEN), 1913. II Br 2 seems not to be axillary. The differences between these two greatly varying subspecies are small and only found by statistical methods. There is found no regularity in the number of cirri (1-4) internodal joints (5-32) or in the alternation of cirri. Lectotype: BR. NIELSEN pl. 7 fig. 43-44. U. Danian.
- L. n. sp.* Danian. West Greenland.
- Bourgueticrinus hagenowii* (GOLDFUSS), 1840. Synonymy: *B. verrucosus* BR. NIELSEN, 1913. *B. bulbiformis* BR. NIELSEN, 1913. *B. turris* BR. NIELSEN 1913. The specimens found in Denmark show very great variation, including the aberrant forms here regarded as synonymous, and forms foreshadowing *B. danicus* and some of its variations. Calices in which the proximale is lost show a great resemblance to *Mesocrinus suedicus* CARPENTER, 1881. This species is most likely the basal and radial ring of one of the variable species *B. hagenowii* or *B. ellipticus* (MILLER), 1821. The only specimen of *Mesocrinus* is thus the apparently pathological specimen which is the type of *M. fischeri* (GEINITZ), 1875. U. Senonian.
- B. danicus* BR. NIELSEN, 1913. Synonym: *B. curvatus* BR. NIELSEN, 1913. In some cases fine sutures are seen separating the fused stem joints which form the proximale. The number of stem joints forming the proximale is from two to four. There is a great variation in the outline of the calices. Lectotype: BR. NIELSEN pl. 3 fig. 3-4. Danian.
- B. "Brünnichi Nielsenii"* ØDUM, 1923. This name is invalid, being trinomial. Several specimens are known, some of them apparently forming a transition from *B. danicus* or *B. hagenowii*. A valid name should not be introduced until the study of these forms is finished. Danian. ?Senonian.
- Democrinus maximus* (BR. NIELSEN), 1915. A great number of specimens show the variation and ontogeny of this species. Lectotype: BR. NIELSEN fig. 1 a-c, the larger calyx. L.-U. Danian.

- Bathyrinus n. sp.* Stem, calices and primibrachials are found of a species which can with certainty be referred to the genus *Bathyrinus*, and may only by detailed analysis of the dimensions be distinguished from living species. Danian.
- Rhizocrinus? dubius* (BR. NIELSEN), 1913. A new and better preserved calyx of this species has been found. The affinity to *Rhizocrinus* or *Democrinus* is not yet solved. Senonian.
- Rhizocrinus? spp.* Three new species are known, one Senonian, one Danian and one Senonian-Danian. These strange species show some affinity to *Rhizocrinus*.
- Solanocrites danicus* (BR. NIELSEN), 1913. Synonym: *Glenotremites parvicavus* GISLÉN, 1924. *G. parvicavus* was based on the figure of a centro-dorsal with a very narrow cavity. This figure, however, is not correct. BR. NIELSEN pl. 11 fig. 4-6 apparently belong to *C. semiglobularis*. It seems more natural to include this species in the present genus than in *Palaeantedon*. Lectotype: BR. NIELSEN pl. 11 fig. 1-3. The name *Solanocrinus* is a junior synonym of *Solanocrinites* GOLDFUSS, 1831. (In the same way *Pentacrinus* is a synonym of *Pentacrinites* BLUMENBACH, 1810). Danian.
- S. granulatus* (BR. NIELSEN), 1913. This species, which was regarded by GISLÉN as unidentifiable, is now represented by calices and proximal arm plates. It shows a close affinity to *S. danicus*. U. Danian.
- Amphorometra conoidea* (GOLDFUSS), 1839. Synonymy: *A. brydonei* GISLÉN, 1924. ? *Glenotremites parvus* GISLÉN, 1924. ? *A. alta* GISLÉN, 1925. Senonian.
- Conometra semiglobularis* (BR. NIELSEN), 1913. Also the radial ring is known of this species. BR. NIELSEN pl. 12 fig. 39-41 is possibly *C.? faxensis*. Lectotype: BR. NIELSEN pl. 12 fig. 36-38. Danian.
- C.? faxensis* (BR. NIELSEN), 1913. Lectotype: BR. NIELSEN fig. 26 in the text. U. Danian.
- C.? brünniichi* (ROSENKRANZ), 1945. Uppermost Danian.
- Semiometra plana* (BR. NIELSEN), 1913. Synonym: *S. pommerania* GISLÉN, 1924. The radial ring was only known in Senonian specimens from British collections. The calices now found in the Danian combine characteristics of the British *S. plana*, and *S. pommerania*. The subspecies *stellata* GISLÉN, 1925, which can hardly be distinguished from *S. impressa* (CARPENTER), 1881, is not found in Denmark. Senonian-Danian.
- Hertha cava* (BR. NIELSEN), 1913. Synonym: *Hertha succica* GISLÉN, 1924. Lectotype: BR. NIELSEN pl. 11 fig. 51-53. Danian.
- H. pygmea* GISLÉN, 1924. Senonian.
- Cyathidium holopus* BR. NIELSEN, 1913. The species seems not to have been validly established until 1913. The large triangular II Br 1 has on its inner side a groove with a side branch to an articular facet for the pinnule on the abaxial side of the inner surface. The main branch ends in an articular facet, not a syzygy, for II Br 2 a little above the middle of the plate. The impressions in the distal part of II Br 1 indicate the presence of at least 4 small distal secundibrachials which were completely covered by the II Br 1 when they closed the calyx. II Br 2 is distin-

guished by the large ligament surface forming an angle with the muscular fossae. Lectotype: BR. NIELSEN pl. 4 fig. 7. U. Danian.

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POSTSCRIPT

A recent publication by SIEVERTS-DORECK, *Mitteilungen Geol. Staatinst. Hamburg* 1953, shows that *Austinocrinus bicoronatus* is not found together with *A. rothpletzi* at Lägerdorf. These two species cannot therefore be identical. The species found in Denmark together with *A. bicoronatus* seems to be the variety of *A. rothpletzi* mentioned by SIEVERTS-DORECK.