Martinosigra elongata n. g. et n. sp. a New Echinoid from the White Chalk of Denmark.

By

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In his work "The Echinoidea of the Danish Ingolf Expedition" II. 1907 (2) Th. Mortensen establishes a new Echinoid genus *Echinosigra* (plate 1, fig. 1), the species of which have an appearance very odd for Echinoids. The genus is distinguished by its test being divided into 4 separate parts, which may be designated "head" "neck", "body" and "tail". The "head" comprises the plates of the apical system, with the genital pores, together with parts of the Ambulacra and the Interambulacra. The highly invaginated mouth is situated on the lower side of the "neck", whereas the inflated "body" contains the intestine and the gonads. The anal opening is on the upper side of the short "tail".

This genus belongs to the order *Spatangoidea* and there under to the suborder *Meridosternata*, which is distinguished by the first pair of plates in the posterior Interambulacrum being situated one behind the other, and not side by side as in the suborder *Amphisternata*. Within the *Meridosternata* it belongs to the family *Pourtalesiidæ*, which is characterised by the mouth being situated vertically in a deep invagination.

The two recent species of *Echinosigra* are small forms measuring 18—37 mm in length. The tests are, especially in the middle part, thin and very fragile. They have been found at great depths (1515—3220 m) on completely quiet and soft bottom.

Though it is evident that such extreme forms with their apical system situated on the anterior end of a long, slender "neck" must

be the final stage of a long evolutional series, the earlier links of which must have had a far less developed "neck" and a less distinctly divided "body", we know already from the Senonian White Chalk some Echinoid remains belonging to the family *Pourtalesiidæ* and closely related to *Echinosigra*. Compared with the two recent forms one of the Senonian species shows even a higher degree of differentiation, the "neck" region being much longer and more slender.

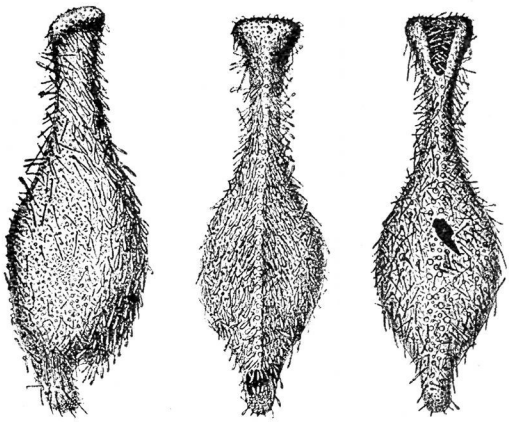
Senonian forms belonging to the *Pourtalesiidæ* have been described in detail by TH. WRIGHT (*4*, pagg. 305—308), namely two species, which he refers to the genus *Infulaster* v. HAGENOW viz: *Infulaster excentricus* (ROSE), agreeing closely with v. HAGENOW's species from the Pomeranian White Chalk (*I. Hagenowi* BORCHARDT), and *Infulaster rostratus* (FORBES) which shows much more agreement with MORTENSEN's genus *Echinosigra*, having a long, slender "neck" terminating in a »head«, carrying the apical system. There can be no doubt that these forms belong to the family *Pourtalesiidæ*, according to their form and appearance, although it is impossible to make out with certainty the arrangement of the separate plates in the "head" and "neck".

WRIGHT (*4*, pag. 305) gives the following description of the genus *Infulaster*, partly based upon v. HAGENOW's manuscript:

> "Genus *Infulaster* Hag. Mss. 1851.
> Cardiaster, FORBES. 1852.
> Infulaster, DESOR. (with diagnosis). 1858.
> » ZITTEL. 1879.
>
> Test narrow, oblong, of an irregular ovato-cordate form. Anterior half very much elevated, rising into a prominent vertex, situated nearly above the anterior border; the anteal sulcus narrow, deep, and directed obliquely downwards and backwards, with two prominent angular borders, which rise above the upper surface. Plates smooth, covered with very small granules; a few primary tubercles near the vertex and at the sides, and in the centre of the under surface; a sub-anal fasciole is seen only on some fine specimen".

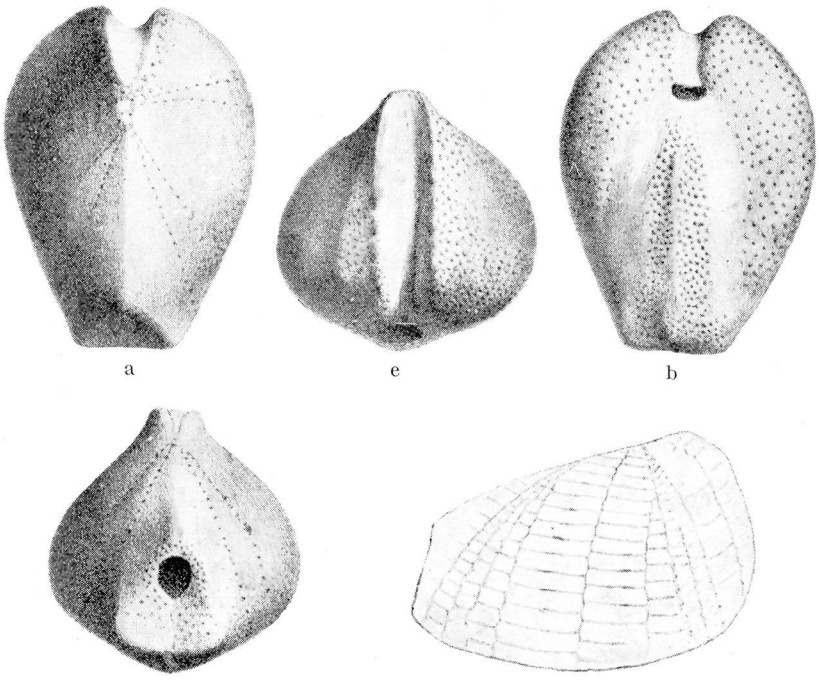
WRIGHT mentions *Infulaster excentricus* (ROSE) (pl. LXX, fig. 1, a—k, reproduced here as plate 1, fig. 2), which, judging from the figures, differs from *Pourtalesia* in having a deep anteal sulcus extending from the apical disc to the peristome and in the absense of a "tail'. *I. excentricus* is said to have much resemblance to *Infulaster*

Plate 1.



a b c

Fig. 1. *Echinosigra paradoxa* MRTSN. From MORTENSEN *3*, fig. 210. a. Side view. b. Dorsal side. c. Ventral side. x 1.5 Recent.



a e b

d c

Fig. 2 *Infulaster excentricus* (ROSE). From WRIGHT *4*, plate LXX. a. Upper surface. b. Under surface. c. Lateral view. d. Posterior end and periprocte. e. Anterior end and anteal sulcus. Natural size. From the White Chalk of Norfolk.

aster Hagenowi BORCHARDT, the genotype of *Infulaster*, from the White Chalk of Northern Germany.

The other species mentioned by WRIGHT: *Infulaster rostratus* (FORBES) pl. LXX, figg. 2a—f; 3a, differs so much from *Infulaster excentricus* that it must be considered necessary to make it the type of a new genus.

FORBES' original description (*1*, pl. X, pag. 3) runs as follows:

"The striking feature of this form is the rhomboidal profile which it exibits in consequence of the obliquity of the anteal and posteal truncations, both inclining forwards at considerable angles. The anteal ambulacral sulcus is very deep, long, and narrow; it rises obliquely to a great height in consequence of the elevation of the apical disk upon a sort of beak. The genital plates are assembled just below its summit, which is notched by the turning over, as it were, of the anteal furrow. The details of the lateral ambulacra, in consequence of their being completely plane and very obscure, can with difficulty be distinguished. The rostrum bends forward slightly in its upper part. The summit of the back is more or less sharply carinated, and declines rapidly with a faint concave curve, until it terminates in the summit of the very oblique and rapidly declining posterior truncation, in the uppermost part of which, at rather less than the total height of the body, is the anus, placed at one end of a groove. The whole of the dorsal surface of the test is covered with granules interspersed with scattered minute tubercles, which become more numerous on the slightly tumid cheeks. The fasciole is strongly and distinctly marked and passes from beneath the anus over the cheeks. The base is flattened, and, except on the ambulacral spaces, is strongly tuberculated. The mouth is very small and far forward.

The largest specimen which I have seen measures 8/12ths of an inch in length of base; 6/12ths in breadth; 5/12rhs in height at the anal truncation, and when perfect must have been 10/12ths in height at the anteal sulcus."

It appears from the above descriptions that *Infulaster rostratus* (FORBES) differs in so many respects from *I. excentricus* and *I. Hagenowi* that it can hardly be accepted as belonging to the genus *Infulaster*. It should therefore be regarded as the genotype of a new genus for which I propose the name *Martinosigra* in honour of Dr. TH. MORTENSEN, the founder of the genus *Echinosigra*. The new genus is closely related to *Echinosigra* but differs from it by

posessing a long, posterior sulcus at the upper end of which the anus is situated. Further, in *Echinosigra* the mouth is situated on the anterior part of the "neck" at the bottom of the short sulcus, while in *Martinosigra* it is situated in the middle of the expanded part of the "body", at the end of the very long sulcus.

Genus *Martinosigra* n. g.

The genus is characterized by its rhomboidal profile; the upper, foremost angle is extended into a long beak or neck at the end of which the apical system, with the genital pores, is found. The lower, posterior angle is also somewhat extended. The mouth is situated approximately in the middle of the underside, more or less invaginated, at the posterior end of the very long, anteal sulcus, which extends along the under side of the whole "neck", rising at the anterior end towards the apex. The anal opening approximately in a central position on the upper side of the "body", at the anterior end of a posterior sulcus. A sub-anal fasciole is present.

The genotype of this new genus is the species described by FORBES and WRIGHT:

Martinosigra rostrata (FORBES).
Plate 2, fig. 1.

An additional species has been discovered in the Senonian of Denmark, viz.:

Martinosigra elongata n. sp.
Plate 2, fig. 2.

In the Danish White Chalk remains of a *Martinosigra* have been found. The first locality in which these fossils were found was in the chalk pit Rørdal in the neighbourhood of Aalborg, Northern Jutland. The White Chalk here is harder than the White Chalk in Sealand, but yet the fossils can be washed out. Most of the fossils are well known from other White Chalk localities in Denmark, but there are some species which seem to be characteristic of this locality. There are i. a. a *Graphularia*, some Gorgonellas, some Asteroids and a few new Bryozoan species, which have not been found elsewhere. In faunal respects this chalk is not much like the other chalk occurrences from the neigbourhood of Aalborg, but it is much more in accordance with the White Chalk from the Eastern part of Denmark. *Belemnitella mucronata* was missing at Rørdal.

Later on I succeeded in finding similar Echinoid remains in the northern part of Møns Klint on the island of Møn in a cliff named Store Taler. The White Chalk here was of the usual kind and did not contain any other peculiarities. *Belemnitella mucronata* was abundant.

All the specimens found consist of the rostral parts, comprising the apical system and the long "neck" with the anteal sulcus and the carinate dorsal side. In the best preserved specimens the "neck" has been broken off at the place where it joins the expanded part of the "body". As the surfaces of fracture are not formed by cleavage planes of calcite it seems most probable that the crushing of the tests has taken place in Senonian time. The investigation of the finer details in these Echinoid remains is very difficult, owing to the fact that the limitation of the separate plates is invisible, but in the main the species may be described as follows:

The apical system has its position on the upper side of the "head" and seems to posses 4 genital pores. The foremost, unpaired ambulacrum is depressed to a sulcus, broad in front then tapering and extending along the expanded part of the "body" to the mouth. In the foremost broad end of the sulcus the close-set foot pores can be seen, whereas in the narrow part they can be discerned only with difficulty. The raised edges of the sulcus are formed by the 2 foremost interambulacra carrying a row of comparatively large, primary tubercles. The foremost paired ambulacra seem likewise to have carried primary tubercles, which in a curved series stretch along the side of the "head". The division of the plates of the "neck" into ambulacra and interambulacra is not discernible, it can only be ascertained that the posterior, unpaired interambulacrum forms a sharp keel on the back of which a row of comparatively large tubercles can be discerned. Moreover the whole surface is covered with close-set granules.

In their main features these fragments agree so exactly with corresponding parts of *Martinosigra rostrata* that it is without doubt that they belong to a species very nearly related to the English species. The distinguishing features are above all the difference in length of the "neck". In *M. rostrata* the length of the "neck" is 3—4 times as long as the width of the "head", whereas in *M. elongata* it is 6—7 times as long. Another difference is that in *M. elongata* there are rows of primary tubercles along the 3 edges of the triangular "neck", wheras in *M. rostrata* these edges seem to be smooth.

Plate 2.

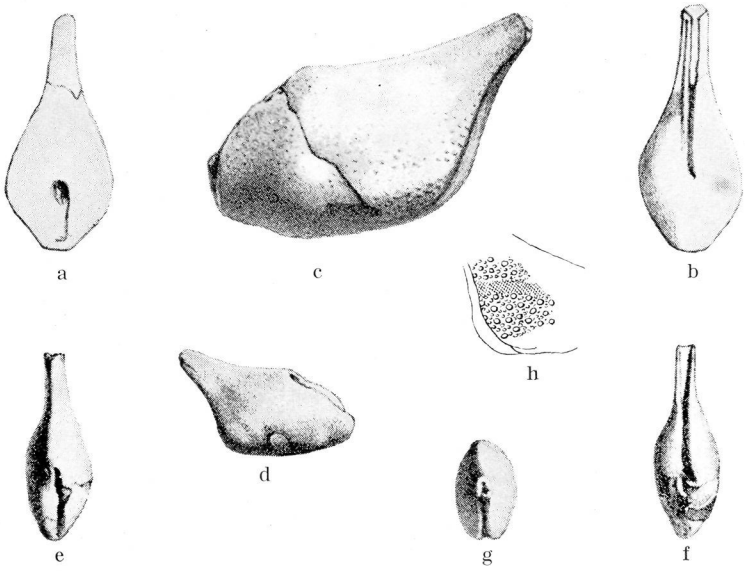


Fig. 1. *Martinosigra rostrata* (FORBES) from WRIGHT *4*, plate LXX, except fig. h, which has been taken from FORBES *1*, plate X. a and b. Outline, partly restored, of a large specimen from Norfolk Chalk. c—g. Different views of a specimen from Chalk near Plumstead. c x 2. h. Part of the cheek and fasciole.

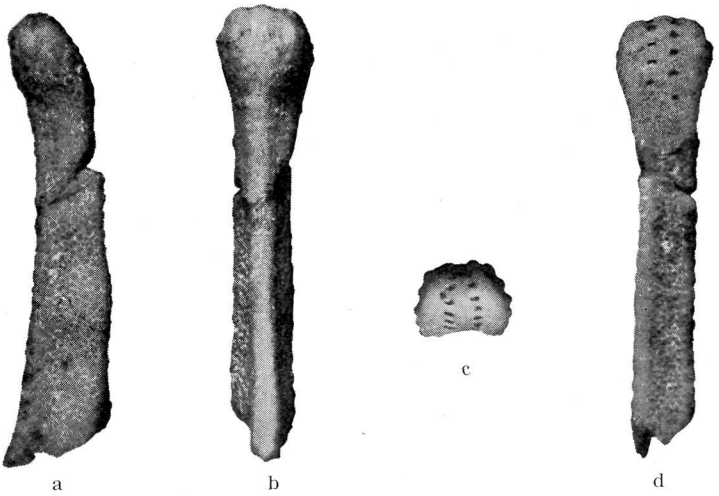


Fig. 2. *Martinosigra elongata* n. sp. A nearly complete "neck". a. Side view. b. Dorsal side. c. Front view. d. Ventral side. x 7. From the White Chalk of the cliff Store Taler in the island of Møn. CHR. HALKIER phot.

Occurrences: As already mentioned all remains of *Martinosigra elongata* have been met with in the White Chalk, but so far only in two localities, situated rather far from each other: Rørdal at Aalborg and Store Taler in the cliff of Møn. In both localities these remains are rather numerous, and so it can be maintained, with some certainty, that they do not occur in other chalk localities investigated by me, such as Stevns Klint on the whole stretch from Kulsti Rende to Rørvig and some White Chalk localities in Jutland near Aalborg and the Mariager fiord (the chalk pits "Dania" and "Norden"), Blegkilde and so on.

The reason why the *Martinosigra* remains have been found in two localities only it is yet impossible for me to explain. The recent *Echinosigra* species occur at great depths (1515—3220 metres) living on a completely quiet and soft bottom. The White Chalk of the two localities in question does not in any respect differ lithologically from other Danish White Chalk deposits, which are believed to have been laid down in more shallow water (about 500 m).

Finally I whish to tender my best thanks to Dr. TH. MORTENSEN for his very valuable help in identifying these peculiar Echinoid remains.

LITERATURE

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