PHYMOSOMA MAASTRICHTENSIS SPEC. NOV., A FOSSIL ECHINOID FROM THE CRETACEOUS OF MAASTRICHT (ECHINACEA, PHYMOSOMATOIDA, PHYMOSOMATIDAE)

by

H. ENGEL

Wyenberg 12, Almen, Netherlands

With one plate

A beautifully preserved fragment of the test of a fossil Echinoid from the Maestrichtian Cretaceous, found at Belvédère, Caberg and kept in the Natuurhistorisch Museum, Maastricht under no. 1340, differs from the other species of the genus *Phymosoma*, hitherto described (cf. Fell & Pawson, 1966: U 395). It is a great pleasure to dedicate the description of this obviously new species to my friend and colleague Leo Brongersma in remembrance of the many and wide contacts we enjoyed since I tried and initiated him into the secrets of zoological museumwork, while as a student he occupied an ever increasing space in my room at the Zoological Museum of Amsterdam University.

The fragment of this *Phymosoma* includes an ambulacrum and an interambulacrum and remnants of the adjacent ones. It is complete adorally, but incomplete near the apex. The height of the test must have been about 13 mm. The mouth is slightly but distinctly sunken. The ambulacrum is at the ambitus about 7 mm wide, the interambulacrum about 10.5 mm. A reconstruction of the ambitus circumference gives a horizontal diameter of 23 mm and a peristome of 12.5 mm diameter, while the periproct may also have been of about that size. In the ambulacrum a row of 14 tubercles is present, in the interambulacrum 12 tubercles. There must have been some more, as may be deduced from the size of the tubercles near the top of the fragment, as well as from the fact that at this adapical end of the test fragment the ambulacrum is 4 mm wide and the interambulacrum 6½ mm, while at the peristome the A is 3½ mm wide, the I A 4 mm. The tubercles are imperforate and in two of them distinct traces of the crenulation were detected.

In the interambulacrum two distinct rows of primary tubercles are seen, and distinct rows of secondary tubercles are also present. At the ambitus each I A plate has a secondary, more than half the size of the primary tubercle, outwards of the latter near the upper margin of the plate, a smaller one outwards of this near the lower margin of the plate, an even smaller one in the inner top corner, and again smaller ones in the inner lower and the

outer top corner, and one or two below this along the outer margin. These are all separated by a single, exceptionally double, line of scrobicular granules of different sizes. Sometimes they are missing where two scrobicules meet. As the tubercles diminish in size from the ambitus towards apex and peristome, the smaller ones gradually disappear; in the two upper I A plates only, however, the smaller secondaries are really absent, as also in the last three lower I A plates. Thus the main row of secondaries is present on all the plates, while the row of smaller ones, lying slightly outwards of these, is somewhat shorter on both sides. Others might perhaps describe these smaller secondaries as mammelonate granules. They are, however, distinctly different from these. The row of larger inner secondaries is present from the top down to about two plates from the peristome. Hence there are more secondaries than usual in the other species of the genus, perhaps a consequence of the smaller primary tubercles leaving more room. The naked space near the apex in the middle of the I A is not distinct, but, as said, the apical part of the I A is missing. The gill slits are distinct, though very shallow. The sutures between the I A plates are rather distinct and slightly deepened.

Each ambulacrum bears two rows of primaries. Small secondaries are found in an undulating double row along the distinct middle suture, which consists of mostly a larger tubercle in the upper corner of each plate and for the rest smaller ones or granules. These inner rows continue from the top down to about two plates from the peristome. The same is found between the primaries and the pore zones, from the top down to about three or four plates from the peristome, though these rows are less distinct. A horizontal row of granules may be present between the primaries, especially at the ambitus. The horizontal sutures are sometimes visible.

The pore zones are uniserial from the top down to 6 plates from the peristome, where an irregular doubling of the pore pairs begins. The series forms more or less distinct curves round the primary tubercles, but where there are secondary tubercles between a primary tubercle and the pore zone, the pore pairs tend to shift laterally, thus causing irregularities in the row of pores. The inner pore of each pair is larger and rounder than the outer pore. All over the series, however, the composing plates extend throughout the width of the area. It is only near the peristome, where the pore pair arrangement becomes diplopodous, that one of the plates is excluded from the inner margin of the series. So our test does not show the usual biserial arrangement of the pore pairs above the ambitus (but as said, the upper part of the ambulacrum is missing). The series must be called uniserial, though pore pairs do not form one straight row. When we design the different places of the pore pairs in the zone from the inside outwards with *a, b, c,* respectively,

we can describe a row of pore pairs from above to below as follows. First plate, 3 pairs, placed *a, b, b*; 2nd plate, 4 pairs, *a, a, b, b*; 3rd plate, *a, b, c, b, a*; 4th plate, *b, a, b, b, b*; 5th plate, *c, a, c, b, c, b*; 6th plate, *b, b, a, b, b*; 7th plate, *b, b, b, c, a*; 8th plate, *a, a, c, a, b*; 9th plate, *b, a, c, a, c*, the first *c* and second *a* nearly biserial; 10th plate, *a, c, a, b*, of which the second *a* is in one horizontal line with *c*, biserial; 11th plate, *a, c, a, c*, the median *c* and *a* biserial; 12th plate, *a, c, a, c*, the median *c* and *a* biserial; 13th plate, *a, b, c, a*, the first *a* biserial with the last *c* of the 12th plate, the last *a* biserial with *c* of its own plate; 14th plate, *c, a, c*, the first two biserial; 15th plate, *a, b, a*, pores not distinct.

In the other ambulacrum the 14th plate has two pairs placed *a, c*, nearly biserial, while the first pore pair of the 15th plate is placed so much inwards as to form a biserial row with these two. The two other pairs of this plate may be indicated *a, c*, biserial.

The fragment shows on its inner side the typical thickening of the middle part of the A, mentioned by Ravn, 1928: 57 for *Ph. corollare*.

This arrangement seems more akin to that of *Phymosoma* than to the wholly uniserial of *Porosoma* and *Rachiosoma*. It is impossible to say, how much of the test near the apex is missing, certainly not very much, but this part might contain biserial pore pairs.

Our specimen seems most closely related to *Phymosoma koenigi* Desor (cf. Cotteau, 1865: 678, pls. 1167, 1168; Wright, 1870: 131, pl. xxii fig. 5, pl. xxiii figs. 1, 3, pl. xxiv, pl. xxv fig. 3; Lambert, 1911: 10; Krenkel, 1928: 27, pl. iii figs. 11-13; Smiser, 1935: 32), but our specimen is smaller, higher (though Wright figures two elevated specimens), it does not show a marked difference in size of tubercles between upper and lower side, while the distribution of secondary tubercles throughout the length of the I A and the presence of the other secondaries (mammelonate granules), as described above, differs from that in *Ph. koenigi*, as also from that in the closely related *Ph. granulosum* (Goldfuss, 1829: 122, pl. xl fig. 7) (cf. Cotteau, 1865: 684, pl. 1169; Wright, 1870: 129, pl. xxiii figs. 2a-d; Schlüter, 1883: 8; Ravn, 1928: 55, pl. vi figs. 3, 6-10), which was described from Maastricht, and has the secondaries only below the ambitus. Moreover, the diplopodous area of the A seems to be absent in our specimen.

Our specimen also shows some relationship to the variable *Ph. magnificum* Agassiz (cf. Cotteau, 1865: 635, pls. 1155-1157; Wright, 1870: 137, pl. xxv figs. 1, 2; Schlüter, 1883: 17; Ravn, 1928: 52, pl. v figs. 11-12), but this species is typically diplopodous above and has a large naked space in the I A near the apex, differing moreover in other minor points of the tuberculation.

It is not easy to decide whether our specimen is only a variety of *Ph.*

koenigi. In that case, however, *Ph. ornatissimum* (Agassiz) (cf. *Cidarites variolaris* Goldfuss, 1829: 123, pl. xl fig. 9; Müller, 1847: 7; *Ph. ornatissimum* Schlüter, 1883: 18; Lambert, 1911: 10, sub *Ph. koenigi*; ?Ravn, 1928: 57, fig. 12; Kongiel, 1939: 33, pl. iii figs. 21-22), which also shows relationship to our species, and was described from Vaals by Müller, may likewise prove to be identical, as was the opinion of the older authors.

Our species is also related to *Ph. tiara* Agassiz (cf. Cotteau, 1865: 674, pl. 1166; Lambert, 1911: 34, pl. ii fig. 9; Smiser, 1935: 32); it has, however, fewer primaries in a row and the distribution of the secondaries and miliaries also differs, as does the height. It also shows relationship to *Ph. corollare* Agassiz (cf. Cotteau, 1865: 669, pl. 1165; 1874: 645; Wright, 1870: 134, pl. xxvi figs. 7-10; Ravn, 1928: 57), especially as it is described by Ravn without diplopodous pores near the apex (not thus in Wright) and with the thickened median part of the A on the inner side, but our specimen differs in being higher, as well as in the secondary tuberculation, in the number of primaries and in the size of the peristome.

Ph. princeps Hagenow (cf. Schlüter, 1883: 22, pl. 6 figs. 1-5; Krenkel, 1928: 24, pl. iii figs. 6-7) differs in the deep areoles with a curious ring, in the diplopodous arrangement of the pores and in the secondary and miliary granulation.

More closely related in the distribution of tubercles and granules is *Ph. taeniatum* Hagenow (cf. Schlüter, 1883: 23, pl. 7 figs. 1-5; Krenkel, 1928: 26, pl. iii figs. 1-5; Ravn, 1928: 54, pl. vi figs. 1-2), but it has a diplopodous arrangement of the pores near the apex. Schlüter's figures show no horizontal row of granules between the areoles, but Ravn's does. Moreover, the test is much lower.

The monopodous *Ph. pentagonale* Jos. Müller (1859: 6, pl. 7 fig. 3; Schlüter, 1883: 28), though not well known, has a characteristic pentagonal form.

Ph. subconicum Ravn (1928: 59, pl. vi fig. 5) may be related to our species because of its higher form, but the I A plates seem narrower, probably owing to the larger tubercles, hence it misses the second row of secondaries outwards of the I A primaries, and the miliary space also seems narrower; it has a long naked space in the upper median part of the I A field and it has diplopodous A near the apex.

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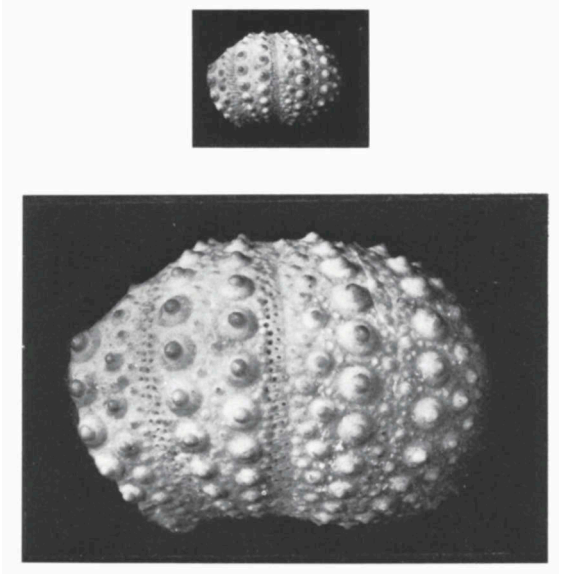

Phymosoma maastrichtensis spec. nov, holotype, from Caberg, prov. Zuid-Limburg, the Netherlands. Museum Maastricht, no. 1340, fragment of test. Top: natural size; bottom: the same specimen, × 3.