

A NEW OSTRACODE SPECIES FROM MAASTRICHTIAN WHITE CHALK OF DENMARK

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A new ostracode species, *Cytherelloidea tricostata*, is described from the Maastrichtian chalk of Denmark. Its relationship to other species from the Upper Cretaceous of northwestern Europe is discussed.

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The ostracode fauna from the Maastrichtian white chalk of Denmark has not yet been published (Jørgensen, 1970). The fauna from Denmark is almost identical with that from the Upper Lower Maastrichtian chalk on the Island of Rügen (DDR), which has been investigated thoroughly by Marsson (1880) and Herrig (1966).

Both Upper and Lower Maastrichtian strata are exposed in Denmark and are represented by white chalk. The stratigraphy of these deposits has been established in a series of publications (Troelsen, 1937; Birkelund, 1957; Surlyk, 1970; Surlyk & Birkelund, in print).

During the present author's study of the Maastrichtian ostracodes from Denmark a new species of the genus *Cytherelloidea* was encountered. This species and its pronounced sexual dimorphism are the subject of the present work.

Systematic description

Family Cytherellidae Sars, 1866

Genus *Cytherelloidea* Alexander, 1929

Cytherelloidea tricostata n. sp.

Pl. 1 Figs 1–14

? 1880 *Cytherella auricularis* (Bosquet, 1847) – Marsson: p. 33.

1966 *Cytherelloidea auricularis* (Bosquet, 1847) – Herrig: p. 748, pl. 6, figs 1–6.

Derivatio nominis: latin, tri-costata = three ridges' after the three ridges on the lateral surface of the valve.

Holotypus: left valve of adult female. The specimen is housed in Mineralogical Museum, Copenhagen, with the number MMH 13040.

Locus typicus: the cliff of Møn, Hvidskud, sample A28.

Stratum typicum: Maastrichtian.

Diagnosis

A *Cytherelloidea* with three longitudinal ridges on the lateral surface of the valve of which the two uppermost join at the posterior end. The intercostal surface is pitted.

Measurements of holotype: Length 0.68 mm, height 0.45 mm. Material. 341 valves, 2 carapaces and 16 fragments.

Description

Sexual dimorphism is pronounced and the sexes are therefore discussed separately.

The female (pl. 1, figs 1, 10–11, 14).

Shape. The outline of the valve is elongated and subrectangular in side-view. The dorsal and ventral margins are subparallel; the dorsal is straight to very slightly convex and the ventral is slightly concave. The anterior margin is broadly rounded while the posterior is truncated. The carapace is widest posteriorly.

Ornamentation. A wide marginal rim follows the entire periphery and is most distinct along the anterior margin. Three longitudinal ridges are present on the shell surface. The two upper ridges wind irregularly and enclose a subcentral pit which reflects the interior elevation of the muscle-scars. The two ridges have a tendency to branch on the anterior portion of the valve. Posteriorly they pass into the marginal rim forming a dorsal node. The third ventral ridge is slightly convex and merges posteriorly with the marginal rim into a ventral node. The two posterior nodes correspond to two internal depressions in the valve.

The lateral surface between the ridges and the rim is pitted, each pit with a diameter of about 3 μm . The peripheral part of the marginal rim possesses 2–3 parallel thin lists. The duplicature is formed like a list in continuation of the outer lamella along the entire periphery. Overlap exists, but is not prominent. The right valve is larger than the left one and possesses a contact groove around the periphery.

The hinge is adont. The central muscle-scars "feather-shaped" as is characteristic for the genus and are arranged in a double row on an elevated oval area of the internal surface of the valve. It has not been possible to distinguish the individual scars.

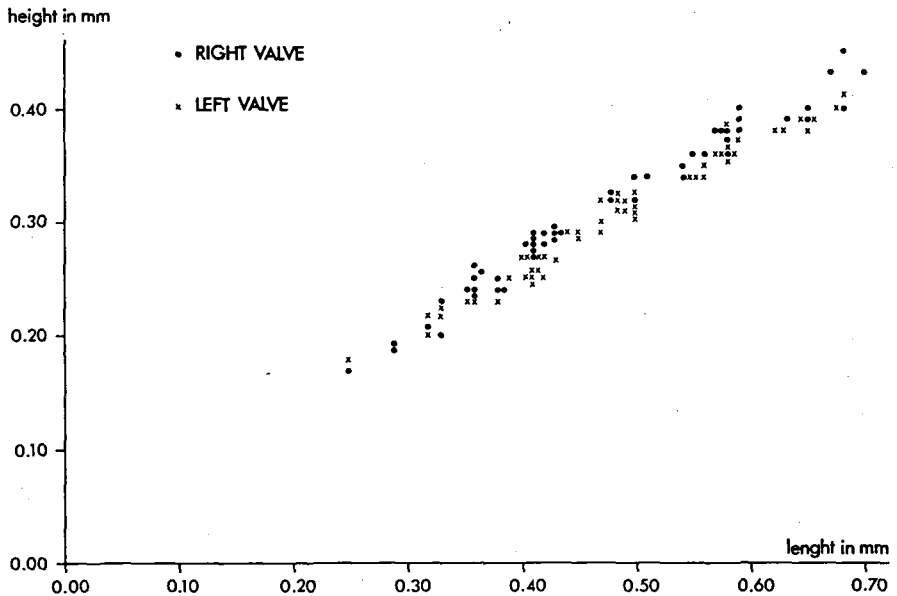


Fig. 1. Length-height diagram for *Cytherelloidea tricostata* n. sp. Core sample K31, Rørdal.

The sparse presence of small knobs or tubercles, each with a central hole, is the only evidence of pore canals in the specimens studied. The knobs are situated on the ridges, on the marginal rim as well as on the intercostal surface.

The male (pl. 1, figs 12–13).

The male is smaller than the female and differs in both shape and the primary ornamentation. The outline is more slim and the carapace has the same width from end to end. The dorsal and ventral margins are subparallel, but the ventral is slightly more convex than is the margin of the female.

By contrast to the female valve the marginal rim is almost equally distinct along the entire periphery. The posterior nodes and the interior depressions are both absent. The central ridge is hardly as distinct as in the female. There is no connection between the two uppermost ridges and the ventral ridge.

The structure of the hinge, duplicature, central muscle-scars, pore canals as well as the pitted lateral surface are identical in the two sexes.

The instars

Seven instars have been found in the material (table 1, fig. 1) and they are here labelled A–1 to A–7.

Table 1. Length and height dimensions for the entire material of *Cytherelloidea trico-stata* n. sp. grouped in left and right valves, females and males as well as growth stages.

Growth stage	Right valve		Left valve	
	Length mm	Height mm	Length mm	Height mm
Adult, female	0.70-0.67	0.45-0.40	0.68-0.67	0.41-0.40
Adult, male	0.66-0.63	0.40-0.39	0.66-0.62	0.39-0.38
A-1, female	0.59-0.57	0.40-0.36	0.58-0.57	0.38-0.36
A-1, male	0.56-0.54	0.36-0.34	0.56-0.54	0.35-0.34
A-2	0.51-0.48	0.34-0.32	0.50-0.47	0.32-0.29
A-3	0.44-0.40	0.29-0.27	0.45-0.40	0.29-0.24
A-4	0.38-0.36	0.27-0.23	0.38-0.35	0.25-0.23
A-5	0.33-0.32	0.23-0.20	0.33-0.32	0.23-0.20
A-6	0.29	0.19	-	-
A-7	0.25	0.17	0.25	0.18

The shape of A-7 is subcircular with a blunt tapering posterior margin (pl. 1, figs 8-9). There is no marginal rim. A single longitudinal ridge (which corresponds to the middle one of the adult) divides the valve into upper and lower parts. A fine riblet indicates the position of the dorsal ridge. The lateral surface is reticulate with a delicate network.

This network seems to be a common feature for the juvenile specimens of the genus *Cytherelloidea*. It is observed on *C. granulosa* (Jones, 1849) from the white chalk of Denmark and also reported from several species of *Cytherelloidea* from the chalk of Rügen (Herrig, 1966).

The shape of A-6 is more elongate than A-7 (pl. 1, fig. 7). Both the dorsal and the ventral ridges are present but as thin riblets. The central ridge is still the most prominent feature of the ornamentation. The sub-central pit has appeared. The lateral surface is ornamented by the above mentioned reticulation.

The shape of A-5 is subrectangular (pl. 1, fig. 6). All the ridges and the marginal rim are present now. The reticulation still covers the whole shell surface, but not as prominently as in the younger growth stages.

A-4, A-3, A-2 and A-1 resemble the adult male in fundamental features (pl. 1, figs 2-5). The valve develops into a more subrectangular shape and reminiscence of the delicate network is seen only as thin winding riblets, especially on the posterior margin of the valve.

The pitting of the shell surface is found on adult specimens only.

There are no signs of sexual dimorphism in the ornamentation of the instars, but the shape and size of instar A-1 show the separation into two groups as is the case of the adults (fig. 1). This would indicate that sexual dimorphism is present in instar A-1.

Discussion

C. tricostata is similar to *C. auricularis* (Bosquet, 1847) sensu Herrig (1966). Marsson (1880) also mentioned *C. auricularis* in his work on the ostracodes from Rügen, and it is most likely the same species. The Danish specimens are in good agreement both with the figures and the description given by Herrig (1966). The present author has compared Danish specimens with material from Rügen. He has also examined specimens of *C. auricularis* from the type area, which are housed in the British Museum, and they are distinctly different from the material from Denmark and Rügen.

C. auricularis was originally described by Bosquet (1847) from the Upper Cretaceous in the area of Maastricht (Holland), where he recognized it as a rare species. By contrast Veen (1932) later found that it was quite common in the Maastrichtian strata and gave a complete description of the species.

The difference between *C. auricularis* and *C. tricostata* is most prominent in the shape of the valve. *C. auricularis* has a characteristic triangular depressed area in the dorsal part of the posterior margin. Bosquet (1847, p. 366) characterized it as: "... Terminées en arrière par une partie comprimé étroite, subtriangle, oblique et obtuse." while Veen (1932, pp. 35-36) wrote: "Hinter ... findet sich ein flacher ungefähr dreiseitiger (bisweilen rechteckiger) Teil der Schale." Such a postero-dorsal depressed area is not present in *C. tricostata*, the posterior margin of which is almost truncate. The younger instars of *C. tricostata* have a weakly pointed postero-dorsal marginal corner, but this is unlike the posterior outline of *C. auricularis*.

Bosquet (1847) described the ridges as having an irregular course like a human ear (derivatio nominis: *auricularis*). Veen (1932) gave a more exact description of the ridges. Two prominent ridges, a dorsal and a ventral, run across almost the whole extension of the valve. Only the instars have two associated riblets, which are subparallel to the main ridges. This is contrary to *C. tricostata* in which adults as well as the older instars always have three longitudinal ridges of almost equal prominence.

Plate 1.

Figs 1-14. *Cytherelloidea tricostata* n. sp.

Figs 1-8. Outside views of right valves of adult female and the instars A-1 to A-7. x 50.

Fig. 9. Outside view of left valve of instar A-7. x 100.

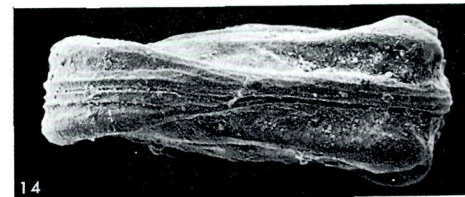
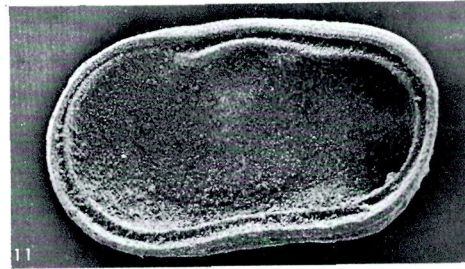
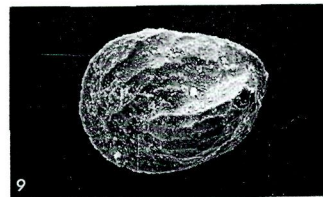
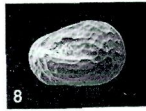
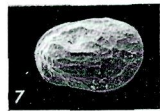
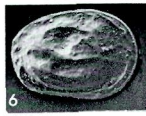
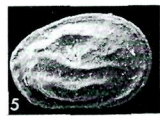
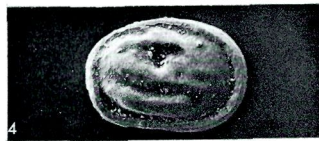
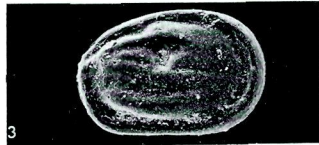
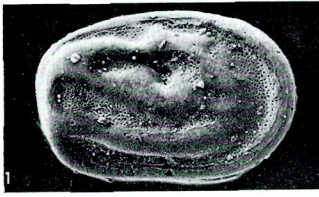
Fig. 10. Holotype. Outside view of left valve of adult female. x 100.

Fig. 11. Holotype. Inside view of left valve of adult female. x 100.

Fig. 12. Outside view of right valve of adult male. x 100.

Fig. 13. Inside view of left valve of adult male. x 100.

Fig. 14. Dorsal view of adult female carapace. x 100.



Kaye (1964, pl. 9, figs 12–13) figured two specimens of *Cytherelloidea obliquirugata* (Jones & Hinde, 1890) from the Campanian chalk of England. The specimens belong to the collection of Jones & Hinde housed in British Museum, London, and are closely related to *C. tricostata* with respect to the primary ornamentation.

The original description of *C. obliquirugata*, however, was most likely based on the right valve of a juvenile specimen, which has no similarity to specimens of *C. tricostata*. Both the number and the course of the ridges are different. The dimensions of the valve are furthermore quite different.

The arithmetic mean of the index H/L for the right valve of *C. tricostata* is $\bar{x} = 0.66$. The standard deviation expressed as $s = \sqrt{\frac{\sum (x - \bar{x})^2}{n-1}}$ is 0.03

and the interval $\bar{x} \pm 3s$ is 0.57–0.75. The dimensions of the holotype of *C. obliquirugata* (Jones & Hinde, 1890, p. 73) are L = 0.42 mm and H = 0.20 mm, which correspond to a H/L index of 0.52. This value falls clearly outside the interval $\bar{x} \pm 3s$ for *C. tricostata* calculated above.

The present author has examined the seven existing specimens of *C. obliquirugata* from the collection of Jones & Hinde, which were included in the material studied by Kaye (1964). The height and length were measured and the H/L index was found to vary between 0.52 and 0.60. Only one of the specimens had a H/L index large enough (H/L = 0.60) to range within the interval $\bar{x} \pm 3s$ calculated for *C. tricostata*. The conclusion is that *C. obliquirugata* has an outline which is distinctly more slender than that of *C. tricostata*.

The specimen of *C. obliquirugata* described by Kaye (1964) as an adult differs from *C. tricostata* by only having two distinct longitudinal ridges, a ventral and a dorsal, the middle one having almost disappeared. Furthermore, no pitting of the shell surface could be observed.

Occurrence and stratigraphic distribution

C. tricostata has a sporadic occurrence and has so far been reported only from the Maastrichtian strata in Northwestern Europe. It is found in limited numbers at several localities in the Danish white chalk (Maastrichtian) and is referred to as being very rare in the chalk of Rügen (Upper Lower Maastrichtian) (Herrig, 1966). The species has no stratigraphic significance in the Maastrichtian strata.

Dansk sammendrag

Der gives en beskrivelse af en ny ostracod art, *Cytherelloidea tricostata*, fra det danske skrivekridt (Maastrichtien). Artens stratigrafiske og geografiske udbredelse angives, og dens relationer til nærtstående arter fra Nordvesteuropas Øvre Kridt diskuteres.

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