

MAASTRICHTIAN OSTRACODS FROM DENMARK

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The ostracod fauna from the Maastrichtian white chalk in Denmark forms an integrated part of the ostracod faunas described from the Upper Cretaceous of north-western European basins, which have been intensively studied within the last decades. Several large monographs have been published, among others by Veen (1932, 1934 - 1936, 1938), Bonnema (1940, 1941), Szczechura (1964, 1965), Deroo (1966) and Herrig (1966).

A thesis on the ostracods from the Maastrichtian white chalk of Denmark was written by the present author (Jørgensen, 1970) and as one of the results of this study two new species were described and a biostratigraphic zonation on basis of ostracods was established (Jørgensen, 1974, 1976, 1978). The ostracods from the Maastrichtian of Denmark show close affinity to the fauna from the Lower Maastrichtian chalk of Rügen, East Germany, described by Herrig (1966). The reader is referred to that paper for detailed taxonomy and synonyms.

FAUNA COMPOSITION AND ECOLOGY

The material studied originates from 20 outcrops or boreholes, 19 Danish and 1 Swedish, which fairly well represent the Maastrichtian sequence of white chalk in the Danish Basin (Fig. 1).

The ostracod fauna includes 95 species representing 34 different genera (Jørgensen, 1978). The fauna is characterized by a remarkably uniform composition throughout the strata studied. The genera *Bairdia*, *Cytherella*, *Cytherelloidea* and *Argilloecia* are present in all samples examined and are represented by several species and a large number of individuals. These genera dominate the fauna quantitatively.



Fig. 1. Map of Denmark showing the localities studied in the present paper.
1. Bjerre, 2. Eerslev, 3.Vokslev, 4. Rørdal, 5. Danmark,
6. Ellidshøj, 7. Gudumholm, 8. Vive, 9. Dania, 10. Spentrup,
11. Karlstrup, 12. Copenhagen TUBA 13, 13. Saltholm 13, 14. Limhamn,
15. Stevns, 16. St. Stejlebjerg, 17. Hvidskud, 18. Hvide Klint,
19. Hasselø, 20. Gedser.

Accessory species belong to the genera Krithe, Phacorhabdotus, Neocythere, Xestoleberis and Bythoceratina. Representatives of these genera may be rare or even absent in some samples, but occur in large number in a few samples where they constitute more than 15% of the entire number of specimens.

The genus *Bythoceratina* is a particularly important element in the fauna. It contains 19 different species, i.e. approximately 20% of the total number of species recorded, and is morphologically the most variable genus in the material studied. The genus is represented in most samples, but by varying number of species and individuals.

All other genera have a rather scattered and patchy distribution. The majority of these genera are represented by few species only, and the number of individuals never exceeds 15% of the total number of specimens in a sample. Several are present only in very few samples. Though the rare species comprise only a minority of the total number of individuals, they make up more than 70% of the species recorded.



Fig. 2. Graph of Fischer- α diversity indices for the ostracod fauna from the Maastrichtian white chalk, Denmark. All values obtained are based on 100 g samples, which simultaneously gives the fauna density. Explanations: x: samples from Møn and Falster, i.e. loc. 16-18,20. o: samples from loc. 1-11,15. \blacksquare : Samples from loc. 12-14. Δ : Samples from the Maastrichtian chalk of Rügen, DDR.

The main characteristic of the fauna is the rather uniform composition. However, the density varies considerably, both vertically and horizontally in the sections studied (Fig. 2). A comparison between ostracod density and the size of the entire benthic invertebrate fauna reflected by the relative size of the wash residue of samples does not reveal any correlation between these two parameters (Jørgensen, 1978).

According to known bathymetric distributions of the respective genera, the chalk ostracod fauna indicates epicontinental sublittoral environments. The lack of typical plant dwellers indicates that the fauna studied characterizes environments below limits of algal growth. Furthermore, there are no indications that sedimentation in the studied sections took place within the euphotic zone (Håkansson *et al.*, 1974).

The diversity of the fauna is comparatively high, but there exists a significant geographical variation within the area studied (Fig. 2). A relatively highly diverse ostracod assemblage is found on the islands of Møn and Falster, located at the south-eastern extension of the Ringkøbing-Fyn High at the border of the North German Basin. A significantly lower diversity is generally recorded from the axial part of the Danish Basin. Furthermore, a continued trend of decreasing diversity is seen as the Fennoscandian Border Zone is approached. The geographical variations are significant at all stratigraphic levels studied (Fig. 3). It is believed that the diversity variations are governed by the environments, primarily the bathymetric conditions in the Maastrichtian sea.

STRATIGRAPHY

On the basis of ostracods a biostratigraphic subdivision of the Danish Maastrichtian chalk can be established by two species only, *Bythoceratina dania* Jørgensen, 1976 and *Bythoceratina umbonatoides* (Kaye, 1964). The distribution of the two species in comparison with the known stratigraphy of the Danish Maastrichtian is shown in Fig. 4.

B. umbonatoides is recorded from every locality that includes the brachiopod zones 1-8 and is one of the most frequent *Bythoceratina* species in this part of the sequence. *B. dania* characterizes the uppermost Maastrichtian, being found in brachiopod zones 9-10 only (Jørgensen, 1976). The species is quantitatively most frequent from localities in Jylland.



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Fig. 3. Graph of Simpson diversity indices for the Maastrichtian ostracod fauna from two sections in the Danish Basin. x: Rørdal Quarry and borehole. o: Hvidskud, Møn.

Fig. 4. The biostratigraphic zonation of the Danish white chalk.

CONCLUSION

The homogenous composition, the large number of species and the relatively high diversity of the ostracod fauna indicate a mature and well-balanced community in middle and outer shelf environments. This is most likely related to the basinal chalk facies that dominates the Danish Maastrichtian. The relatively stable environments have involved slight changes only in the faunal composition for a comparatively long span of time, and consequently the stratigraphic significance of the ostracods is rather diminutive. However, the diversity variations recorded indicate some environmental dissimilarities with the Danish Basin, probably due to the bathymetric conditions in the Maastrichtian sea.