

DANIAN AND CAMPANIAN/MAASTRICHTIAN COCCOLITHS FROM NÛGSSUAQ, WEST GREENLAND

KATHARINA PERCH-NIELSEN

PERCH-NIELSEN, K.: Danian and Campanian/Maastrichtian Coccoliths from Nûgssuaq, West Greenland. *Bull. geol. Soc. Denmark*, vol. 22 pp. 79-82. Copenhagen, January, 17th, 1973.

For the first time, fossil calcareous nannoplankton has been found in Greenland and as far north as 70° 35' N. The coccolith assemblage found in West Greenland represents late Danian and includes also a few reworked Campanian/Maastrichtian coccoliths.

Katharina Perch-Nielsen, Institut for Historisk Geologi og Palæontologi, Østervoldgade 10, DK-1350 København K, May 1st, 1972.

Several attempts have previously been made by the author to find fossil calcareous nannoplankton in the Danian sediments from Nûgssuaq in West Greenland (see Pl. 1), from where Rosenkrantz (1970) described rich marine faunas, Hansen (1970) reported on planktonic foraminifera and Szczechura (1971) on ostracoda. Professor Rosenkrantz (Mineralogical Museum, Copenhagen) kindly furnished the author with samples collected by him and co-workers during The Danish Nûgssuaq Expeditions 1938-39 and the expeditions by the Geological Survey of Greenland under his leadership. Most of the foraminifera described by Hansen (1970) were found in sediment filling gastropods from the Sonja Lens of the Sonja Member (see Pl. 1). Samples from these gastropods were investigated for coccoliths, but none was found. Recently the fine material left from the washing out of macrofossils from the Sonja Lens has yielded a fairly rich coccolith assemblage relatively poor in specimens. Also in material taken directly from the subarkose, coccoliths were now found.

The Sonja Lens was a fossiliferous, uncemented lens of subarkose. It measured about 7 by 0.7 m and was completely excavated by Professor A. Rosenkrantz and co-workers in 1958. The Sonja Member is a deltaic deposit consisting of layers of loose sand, sandstone, conglomerate and black shale deposited by a river. The rich marine fossil content in the Sonja Lens is considered to be reworked from nearby marine late Danian deposits. The Sonja Member overlies black, bituminous shales and is unconformably

overlain by a series of black, bituminous shales containing calcareous concretions. At this locality, the south west wall of Agatkløft, the Danian sediments are overlain by Quaternary deposits.

Calcareous nannoplankton

The following genera and species were found:

Coccoliths	fine fraction	whole sample
Maastrichtian (reworked)		
<i>Micula staurophora</i> (Gardet) Stradner	3	
<i>Watznaueria barnesae</i> (Black) Perch-Nielsen	2	
<i>Prediscosphaera cretacea</i> (Archangelsky) Gartner	1	
<i>Arkhangelskiella cymbiformis</i> Veksina	1	
<i>Eiffellithus turrisseiffeli</i> (Deflandre) Reinhardt	1	
Danian		
<i>Prinsius</i> sp.	50	7
<i>Micrantholithus</i> sp.	4	1
<i>Braarudosphaera bigelowi</i>		1
<i>Crepidolithus</i> ? sp.	1	
<i>Thoracosphaera</i> sp.	common	common
<i>Thoracosphaera operculata</i> Bramlette & Martini	6	5
<i>Zygodiscus sigmoides</i> Bramlette & Sullivan	3	2
<i>Cruciplacolithus tenuis</i> (Stradner) Hay & Mohler	2	
<i>Chiasmolithus danicus</i> (Brotzen) Hay et al.	1	1
<i>Ericsonia cava</i> Hay & Mohler	5	3
<i>Neochiastozygus modestus</i> Perch-Nielsen	3	1

The preservation of the coccoliths in the investigated material is rather poor. The late Cretaceous forms show about the same quality of preservation as the Danian coccoliths. Only very small coccoliths of the genus *Prinsius*, probably similar to *P. martinii* Perch-Nielsen, were found. Both single segments and a whole pentalithe of *Micrantholithus* sp. and *Braarudosphaera bigelowi* were encountered. A few very well preserved *Thoracosphaera operculata* were found. Fragments of walls of *Thoracosphaera* sp. seem common but might be walls of organisms as shown on Pl. 1: 4H. These show a part of an unknown organism with a similar wall structure as in *Thoracosphaera*, but with several holes or caverns. *Z. sigmoides*, *C. tenuis*, *C. danicus*, *E. cava* and *N. modestus* are smaller than specimens of the same species from Denmark (Perch-Nielsen 1968, 1969, 1971).

Discussion and conclusions

The late Danian age of the Sonja Member has been suggested by the findings of a *Tylocidaris* related with *T. vexillifera* Schlüter in overlying layers; *T.*

vexillifera characterizes the late Danian in Denmark and southern Sweden (Rosenkrantz 1970). The planktonic foraminifera *Globoconusa daubjergensis*, *Subbotina trilocolinoides*, *S. pseudobulloides* and *Globigerina compressa* from the Sonja Member itself, also support a late Danian age for the Sonja Lens (Hansen, 1970).

The Danian coccolith assemblage found in the Sonja Lens belongs to NP 3, the *Chiasmolithus danicus* Zone of the "Standard Tertiary Calcareous Nannoplankton Zonation" of Martini, 1971. The presence of *N. modestus* suggests a high part of this zone which is represented in the late Danian of Denmark. The absence of *N. saepes* and *Chiasmolithus bidens* as well as the very small size of the coccoliths of *Prinsius* suggest the age to be early late Danian which agrees with the finding of the *Tylocidaris* spines in slightly younger strata. Compared to the coccolith assemblage of the type Danian in Denmark, the Greenlandish assemblage is only slightly poorer in species. *Micrantholithus* sp. as found here, with very long arms, has not been found in the Danish Danian. The presence of this form not known from the Danish Danian and the observation of small coccoliths in clay aggregates also renders unlikely the possible contamination of the investigated sample of the fine fraction of the Sonja Lens in the laboratory of Professor Rosenkrantz, where it was separated from the coarse sediment. The presence of the same species in a rock sample also suggests that the presence of calcareous nannoplankton in West Greenland is primary.

Of the few reworked late Cretaceous coccoliths, *A. cymbiformis* is only known from the late Campanian and the Maastrichtian, while the other species occur throughout the late Cretaceous. *Nephrolithus frequens* Gorka, the index coccolith of high latitude late Maastrichtian was not found. The presence of *A. cymbiformis* suggests erosion of late Campanian and/or Maastrichtian layers nearby. This is in agreement with the observations by Rosenkrantz (1970), that the Maastrichtian in Agatdal was completely removed by the transgression of the Danian sea and that the basal conglomerate contains fossiliferous concretions of both Campanian and Maastrichtian age.

The finding of a varied coccolith assemblage comparable to European, North African and New Zealand assemblages at a latitude of 70°35' N in the Danian, underlines the usefulness of calcareous nannoplankton for worldwide correlation of marine sediments.

Dansk sammendrag

For første gang er der fundet coccolither i Grønland og det så langt mod nord som 70° 35' N. Coccolitherne blev fundet i Sonja Linsen fra Sonja Member i Agatkløften på Nûgssuaq, og prøverne blev stillet til rådighed af professor A. Rosenkrantz.

Coccolithselskabet indeholder fem oparbejdede øvre kridtarter og flere arter fra øvre danien som *N. modestus*, der i Danmark findes i nedre del af øvre danien. *N. saepes*, som er typisk for øverste danien, blev ikke fundet. Forekomsten af et forholdsvis rigt coccolithselskab, som kan sammenlignes med europæiske, nordafrikanske og New Zealandske på en bredde af 70° 35' N i danien understreger coccolithernes værdi for langdistance korrelationer af marine aflejringer.

References

- Hansen, H. J. 1970: Danian Foraminifera from Nûgssuaq, West Greenland. *Meddr Grønland* 193 (2), 132 pp.
- Martini, E. 1971: Standard Tertiary and Quaternary Calcareous Nannoplankton Zonation. *Proc. II Planktonic Conference, Roma 1970*, 739-785.
- Perch-Nielsen, K. 1968: Der Feinbau und die Klassifikation der Coccolithen aus dem Maastrichtien von Dänemark. *Biol. Skr. Dan. Vid. Selsk.* 16 (1), 96 pp.
- Perch-Nielsen, K. 1969: Die Coccolithen einiger Dänischer Maastrichten- und Danien-lokalitäten. *Meddr dansk geol. Foren.* 19, 1, 51-68.
- Perch-Nielsen, K. 1971: Neue Coccolithen aus dem Paleozän von Dänemark, der Bucht von Biskaya und dem Eozän der Labrador See. *Bull. geol. Soc. Denmark* 21, 51-66.
- Rosenkrantz, A. 1970: Marine Upper Cretaceous and lowermost Tertiary deposits in West Greenland. *Bull. geol. Soc. Denmark* 19, 406-453.
- Rosenkrantz, A. & Pulvertaft, T. C. R. 1969: Cretaceous-Tertiary Stratigraphy and Tectonics in Northern West Greenland. *Mem. Amer. Ass. Petrol. Geol.* 12, 883-898.
- Szczechura, J. 1971: Paleocene Ostracoda from Nûgssuaq, West Greenland. *Meddr Grønland* 193 (1), 42 pp.

Plate 1

Fig. 1. Index map, the hatched area showing the geographical position of Nûgssuaq.

Fig. 2. Map showing the geology of Nûgssuaq and the Danian locality at Agatkløft that yielded coccoliths. The sediments include limnic Cretaceous, marine Senonian and early Paleocene (from Rosenkrantz & Pulvertaft 1969).

Fig. 3. Section from the south wall of Agatkløft with the fossiliferous Sonja Lens enlarged (from Hansen 1970).

Fig. 4. Calcareous nannoplankton and a part of an unknown organism from the fine fraction of the Sonja Lens. Light microscope photographs under crossed nicols. Magnification ca. 1500 x. A, B, C: *Neochiastozygus modestus*. D: *Ericsonia cava*. E, F: *Prinsius* sp. G: *Zygodiscus sigmoides*. H: Part of unknown organism. I: *Prediscosphaera cretacea*. J: *Arkhangelskiella cymbiformis*. K: *Thoracosphaera operculata*. L, M: *Micrantholithus* sp.

