

The youngest Maastrichtian ammonite faunas from Nuussuaq, West Greenland

W. James Kennedy, Henrik Nøhr-Hansen and Gregers Dam

The Maastrichtian of Nuussuaq, central West Greenland, has yielded two successive ammonite faunas, here placed in sequence on the basis of new stratigraphical and dinoflagellate data. An older assemblage, with *Hoploscaphites angmartussutensis* (Birkelund 1965), *Phylloceras* (*Hypophylloceras*) *groenlandicum* Birkelund 1965, *Saghalinites wrighti* Birkelund 1965, *Baculites* cf. *B. meeki* Elias 1933, and *Baculites* sp. belongs to the *Cerodinium diebelii* palynofloral interval (9) of Nøhr-Hansen (1996), and occurs in reworked concretions in the so-called Danian Oyster-ammonite Conglomerate. A younger monospecific assemblage with *H.* aff. *H. angmartussutensis* (Birkelund 1965) occurs to within 10 m of the Cretaceous–Tertiary boundary, and belongs to the *Wodehouseia spinata* palynofloral interval (10) of Nøhr-Hansen (1996).

None of the ammonites collected to date occurs with *Palynodinium grillator* or *Disphaerogena carposphaeropsis*, dinoflagellate markers for the highest Maastrichtian in the area.

W.J.K., *Geological Collections, Oxford University Museum of Natural History, Oxford OX1 3PW, UK.*

H.N.-H. & G.D., *Geological Survey of Denmark and Greenland, Thoravej 8, DK-2400 Copenhagen NV, Denmark. E-mail: hnh@geus.dk; gd@geus.dk*

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It is to the monograph by Birkelund (1965) that we owe our knowledge of the Maastrichtian ammonite faunas of West Greenland, specifically those from the Nuussuaq (Nügssuaq in Birkelund 1965) area (Fig. 1). Following the stratigraphical and sedimentological investigations of Dam & Sønderholm (1994), the establishment of an Upper Cretaceous dinoflagellate stratigraphy by Nøhr-Hansen (1996), and description of the most northerly known Cretaceous–Tertiary boundary section at Annertuneg, on Nuussuaq, by Nøhr-Hansen & Dam (1997), it is possible to place the ammonite faunas in their correct stratigraphic sequence.

Biostratigraphy of the Nuussuaq Maastrichtian

Nøhr-Hansen (1996) established the following palynostratigraphy of the Maastrichtian on Nuussuaq:

Late Maastrichtian: *Wodehouseia spinata* interval (10)
Early Maastrichtian: *Cerodinium diebelii* interval (9)

At the Annertuneg section on the north coast of Nuussuaq (Figs 1, 2), the base of the succeeding Paleocene is marked by the appearance of *Senoniasphaera inornata*, in what appears to be an uninterrupted sequence in sedimentological terms (Nøhr-Hansen & Dam 1997, p. 853).

Birkelund (1965) recognized two Maastrichtian faunas from Nuussuaq, but was unable to reconstruct a composite sequence. The most extensive fauna came from the so-called Oyster-ammonite Conglomerate in Agatdalen (Fig. 1), interpreted by Birkelund as a Danian basal conglomerate containing a huge number of derived concretions, mainly of Maastrichtian age, in a shaly matrix containing Danian oysters and other pelecypods. On the basis of the oysters and other bivalves present in the muddy matrix of the conglomerate it has been possible to correlate the conglomerate

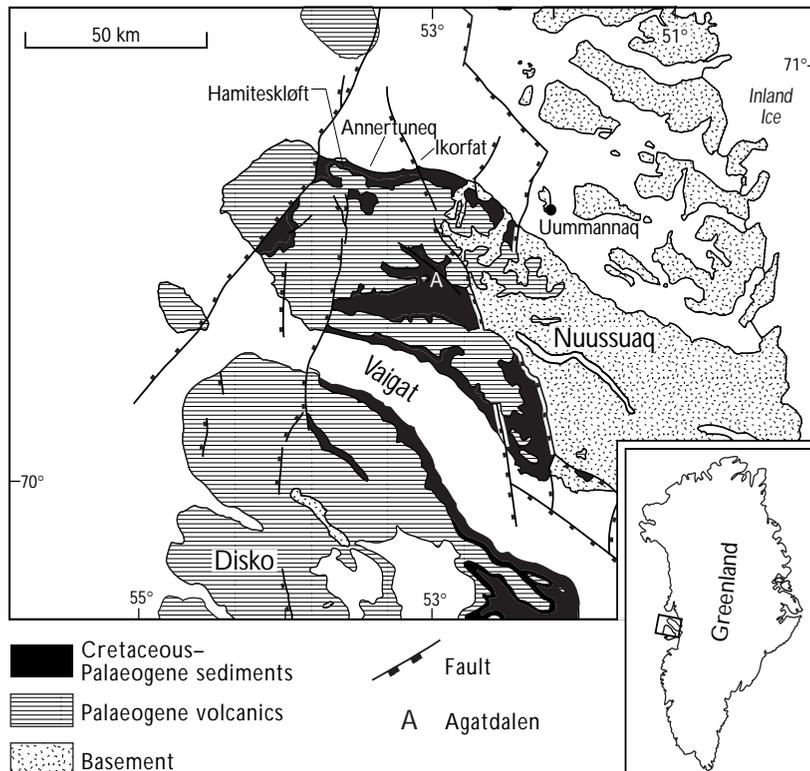


Fig. 1. Geological map showing the position of Nuussuaq and the Annertuneg Cretaceous–Palaeogene section in central West Greenland. Ice is shown white. Based on Survey maps.

with the Thyasira Member (Fig. 2; Rosenkrantz 1970) on the north coast of Nuussuaq. The derived Maastrichtian calcareous concretions in the Oyster-ammonite Conglomerate enclose a rich fauna including *Hypophylloceras* (*Neophylloceras*) *groenlandicum* Birkelund 1965, *Saghalinites wrighti* Birkelund 1965, *Baculites* cf. *B. meeki* Elias 1933, *Scaphites* (*Discoscaphites*) *waagei* Birkelund 1965, and *S. (D.) angmartussutensis* Birkelund 1965. In addition *Scaphites* (*Hoploscaphites*) cf. *S. (H.) ravni* Birkelund 1965, *S. (H.)* cf. *S. (H.) greenlandicus* Donovan 1953, *S. cobbani* Birkelund 1965 and *S. rosenkrantzi* Birkelund 1965 occur very occasionally and indicate that some concretions have been derived from the Campanian. The second fauna, from the Ikorfat pass (Fig. 1), 930 m above sea level and in Hamiteskløft some 15 km to the west, comprised what Birkelund called *Scaphites* (*Discoscaphites*) sp. aff. *S. (D.) angmartussutensis* Birkelund 1965 in sediments overlain by Tertiary pillow lava. *S. (D.) angmartussutensis* and *S. (D.)* aff. *S. (D.) angmartussutensis* were differentiated in that the latter has finer ribbing on the phragmocone, and, more immediately distinctive, broad folds in addition to fine ribs on the body chamber (e.g. compare Birkelund 1965, plate 40; plate 42, fig. 2; plate 43, fig. 1). Also linked to this occurrence were *Pseudophyllites* and *Diplomoceras*

from nearby localities. In her conclusions (1965, p. 161) Birkelund states that “The difference between the *S. (Discoscaphites)* assemblage at Ikorfat and that in the Danian Oyster-ammonite Conglomerate may be explained by a small difference in age. Because the Maastrichtian at Ikorfat directly overlies the Upper Campanian these Maastrichtian deposits are probably older than most of the Maastrichtian fauna preserved in the Oyster-ammonite Conglomerate”.

These views must now be revised. Figure 2 shows the log for the Annertuneg succession (modified after Nøhr-Hansen & Dam 1997, fig. 2). The top of the Conglomerate Member on the north side of Nuussuaq lies 122 m below the Cretaceous–Tertiary boundary as defined by the palynoflora. However, the conglomerate on the north coast of Nuussuaq yields no ammonites, but there are scattered ammonites from above the conglomerate (Fig. 2). All determinable specimens can be referred to what Birkelund called *S. (D.)* aff. *S. (D.) angmartussutensis*, here referred to *Hoploscaphites* Nowak 1911. They occur in a loose concretion collected 50 m above the top of the conglomerate (MMH 24530 from GGU 369906; Fig. 3A) and *in situ* at 112 m above the conglomerate (MMH 24531, 24532 from GGU 408892, 408893; Fig. 3B), only 10 m below the Cretaceous–Tertiary boundary.

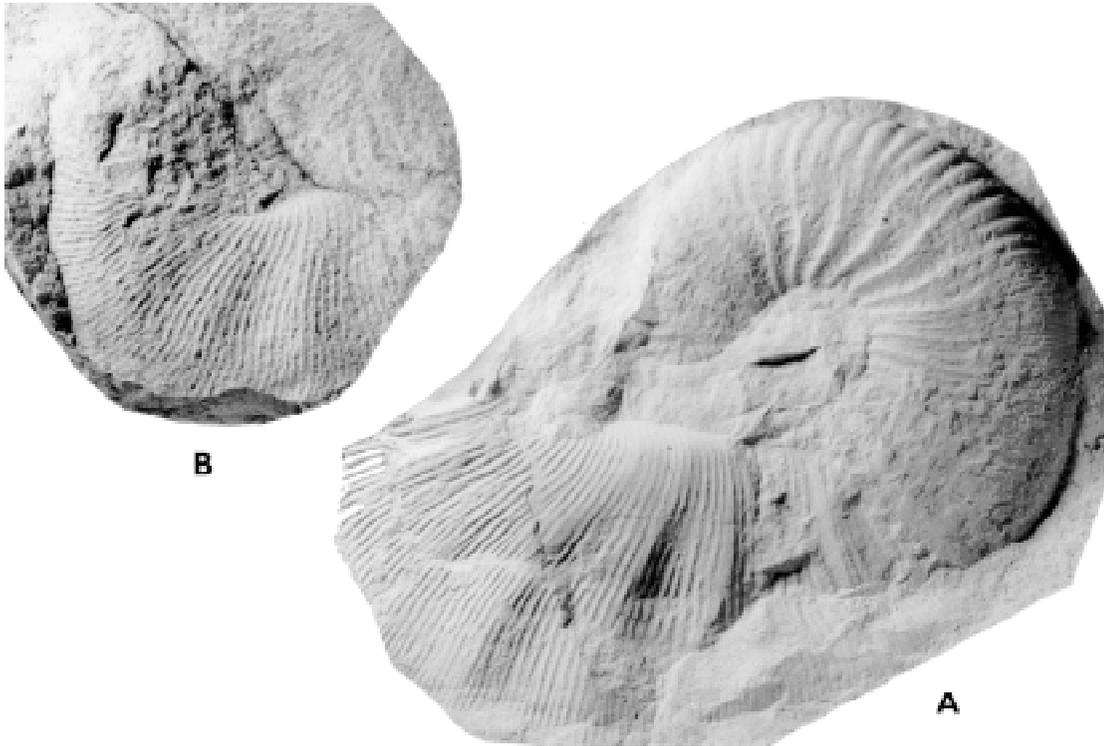


Fig. 3. *Hoploscaphites* aff. *H. angmartussutensis* (Birkelund 1965) from the Maastrichtian of Annertuneg. **A**: MMH 24530 (from GGU 366906), silicone cast from an external mould collected loose from 50 m above the top of the Conglomerate Member, 72 m below the Cretaceous–Tertiary boundary. **B**: MMH 24531 (from GGU 408892), collected *in situ* 112 m above the conglomerate, 10 m below the Cretaceous–Tertiary boundary. Figures $\times 1$. MMH refers to numbers of the Geological Museum, Copenhagen; GGU refers to numbers of the former Geological Survey of Greenland, now in the files of the Geological Survey of Denmark and Greenland.

Conclusions

The Maastrichtian ammonite faunas from Nuussuaq, West Greenland, described by Birkelund (1965) are reappraised on the basis of newly published stratigraphic, sedimentological and dinoflagellate data. A lower assemblage, characterised by *Hoploscaphites angmartussutensis* (Birkelund 1965) is known only from re-worked clasts in the Danian Oyster-ammonite Conglomerate in Agatdalen. The matrix of the holotype of *H. angmartussutensis* yields a flora indicating the Early Maastrichtian *Cerodinium diebelii* interval (9) of Nøhr-Hansen (1996). The succeeding sediments yield only *H. aff. H. angmartussutensis* (Birkelund 1965), collected loose at 50 m above the top of the Conglomerate Member on the north coast of Nuussuaq, and *in situ* 112 m above, 10 m below the Cretaceous–Tertiary boundary (Fig. 2). The matrix of concretions yielding this form, including Birkelund's original material, all yield dinoflagellates and pollen indicating the *Wodehouseia spinata* interval (10) of Nøhr-Hansen (1996). None of

the ammonites collected to date are associated with *Palynodinium grallator* or *Disphaerogena carposphaeropsis*, floral indicators for the uppermost Maastrichtian.

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