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## Validation of *Chiasmolithus danicus* (BROTZEN, 1959)

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With 4 Figures and 1 Plate

*Calcareous nannofossils*  
*Paleocene*  
*Taxonomy*

### Zusammenfassung

Für den bisher ungültigen *Chiasmolithus danicus* wird ein Neotypus vorgestellt.

### Abstract

A neotype is chosen for *Chiasmolithus danicus* which was invalid until now.

The species now commonly known as *Chiasmolithus danicus* was first published in 1959 by BROTZEN as *Cribrosphaerella danica*. Because BROTZEN did not indicate a holotype the species was not validly published according to Art. 37.1 of the ICBN ("Publication on or after 1<sup>st</sup> Jan. 1958 of the name of a new taxon of the rank of family or below is valid only when the nomenclatural type is indicated."). So far this has gone unnoticed, and as the species concept seemed clear enough the lack of a holotype has not caused any problems yet. But now more species similar to *Chiasmolithus danicus* and occurring in more or less the same interval have been or are being described (PERCH-NIELSEN, 1985b), and confusion is bound to occur. As the species is widely used and has great stratigraphic importance it has become necessary to validate the species by selecting a type.

On the selection of a type, the ICBN gives the following rules:

7. 4: "If no holotype was indicated by the author who described a taxon, ... a lectotype or a neotype as a substitute for it may be designated. A lectotype always takes precedence over a neotype. An isotype, if such exists, must be chosen as a lectotype. If no isotype exists, the lectotype must be chosen from among the syntypes, if such exist. If neither an isotype nor a syntype or any of the original material is extant, a neotype may be selected."
- 7.15: "The type of the name of a taxon of fossil plants of the rank of species or below is the specimen whose figure accompanies or is cited in the valid publication of the name. If figures of more than one specimen were given or cited when the name was validly published one of those specimens must be chosen as the type."

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Both isotypes and syntypes are part of the original material. As the original material is no longer available (PERCH-NIELSEN, 1985a), it is not possible to select a type from that material. Art. 7.15 suggests that the figures accompanying the original publication should act as a type, but that is only binding if that original publication was valid (e.g. pre-1958, when a holotype was not yet compulsory). It might be recommended that the rule should be followed anyway, but in this case the photographs are so poor that no details are visible on them. For these reasons it seems best to select a neotype, trying to follow the original species concept as closely as possible.

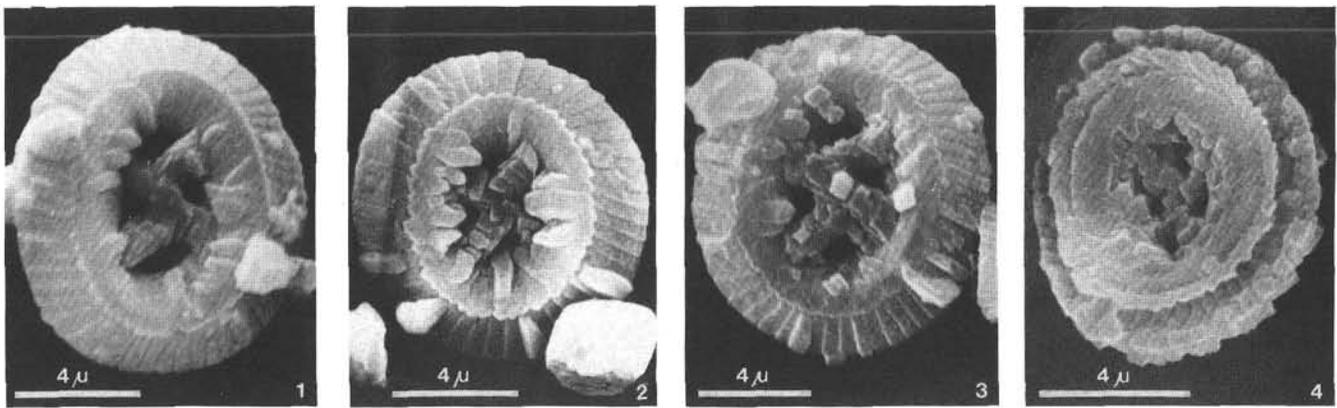
BROTZEN gave the following description:

"Oval, the margins with variable numbers of knots, between 18–24, generally 24. Central plate irregularly perforated, between margin and central plate a dividing zone, long axis 10–18  $\mu$  and short axis 8–11  $\mu$ . Margins breadth 2–2,5  $\mu$ ."

This new species is related to *Cribrosphaerella ehrenbergi* (ARCH.), which was figured originally 1912 in different figures (Pl. VI figs. 19–29). This first one is regularly perforated in the central part. Such types are also noted by GORKA 1957, who measured a long axis of 6  $\mu$  and the numbers of perforations as 29 in the central part. From this type the new species is well distinguished by the irregularity of the pores on the central part, their low numbers and the size of the margins divisions. The second type figured by ARCHANGELSKY is much larger and its long axis is possibly 12  $\mu$ . Its margin is more or less of the same shape as that of the new species. A dividing zone occurs in the Russian and the Swedish specimens. In the Swedish ones this zone is smaller than in the Russian species. The perforations of the central part are regular and smaller in the Russian species, than in the new one. Small plates with a diameter of only 7  $\mu$  occur besides the large specimens and these are of the same shape as the large ones."

It seems quite obvious that this description cannot help us to find out which of the morphotypes of the Danian *Chiasmolithus* representatives is the "real" *C. danicus*, as from the description alone one cannot even recognise it as a *Chiasmolithus*. The photographs accompanying the publication are therefore the only lead we have. The specimens are derived from the "lower part of the Upper Danian" of the Limhamn Quarry in Southern Sweden.

A sample from the Upper Danian "Zone with *Anaulites (Echinocorys) sulcatus*", MM 1416/7 (Mineralogical Museum Copenhagen Collection), was available for the present investigations. The following calcareous nannofossils



Figs. 1–4: *Chiasmolithus danicus*, sample KPN 55, *N. saepes* Zone from Limhamn, Sweden.

Fig. 3: Holotype.

Electron micrographs by H. STRADNER (GBA, Vienna).

were observed in the rich, quite well preserved assemblage: *Biantholithus sparsus*, *Biscutum* sp. (large), *Chiasmolithus danicus*, *C. edwardsii*, *C. inconspicuus*, *Cruciplacolithus intermedius*, *C. primus*, *C. tenuis*, *Cyclagelosphaera reinhardtii*, *Ericsonia cava*, *E. subpertusa*, *Markalius inversus*, *Neochiastozygus eosaepeus*, *N. modestus*, *N. primitivus*, *N. saepes*, *Neocrepidolithus fossus*, *Placozygus sigmoides*, *Prinsius dimorphosus*, *P. martinii*, *P. tenuiculum* and the Cretaceous species (reworked?) *Eiffelolithus turriseiffellii*, *Prediscosphaera cretacea*, *Tranolithus orionatus* and *Watznaueria barnesae*. The presence of *N. saepes* together with only low frequencies of *C. inconspicuus* assign this assemblage to the *N. saepes* Zone of v. HECK & PRINS (this volume). The presence of *N. eosaepeus* suggests the lower part of this zone to be represented. It is correlated to NP 3 of MARTINI (1971) by v. HECK & PRINS (this volume).

***Chiasmolithus danicus* (BROTZEN 1959)  
ex VAN HECK & PERCH-NIELSEN**

Plate 1, figs. 11–26, 33, 34; Text-Figs. 1–4

Basionym: *Cribrosphaerella danica* BROTZEN 1959, pp. 25, 26, fig. 9 (Invalid ICBN Art. 37.1)

Diagnosis: Placoliths with a central opening spanned by a robust X-shaped structure. The bars of the central structure are offset, and two of the bars are slightly curved. In cross-polarised light the central structure shows a strong birefringence. The shields are broad and strongly striated, and show a weak birefringence when viewed with cross-polarised light.

Description: The species shows a wide variety of morphotypes (pl. 1). The central structure may be fairly simple, with a variable amount of offset of two of the bars. In some cases the central structure is more complex, in the light microscope appearing as if it consists of six separate blocks. In some cases the bars of the central structure appear to be split lengthwise.

Remarks: The species differs from *Chiasmolithus edwardsii* (ROMEIN 1979) VAN HECK & PRINS this volume in having a central structure of which the bars are oriented approximately 45 degrees to the axes of the

ellipse, and in the offset position and curved shape of two of the bars. It differs from *Chiasmolithus edentulus* VAN HECK & PRINS this volume, *Chiasmolithus inconspicuus* VAN HECK & PRINS this volume and *Chiasmolithus bidens* (BRAMLETTE & SULLIVAN 1961) HAY & MOHLER 1967 in the crystal structure of its central X, resulting in a strong birefringence with cross-polarised light, and in the coarser striation of its shields. It differs from *Chiasmolithus consuetus* (BRAMLETTE & SULLIVAN 1961) HAY & MOHLER 1967 in having a more robust central structure and smaller central opening.

Holotype: Text-Fig. 3.

Type locality: Limhamn Quarry.

Type level: Danian, *N. saepes* Zone (≈NP3) of v. HECK & PRINS this volume.

Dimensions holotype: 12 µm.

Occurrence: In the Paleocene, zones NP3–NP6, worldwide. The species tends to be more frequent in boreal provinces.

Dimensions: 7–12 µm length.

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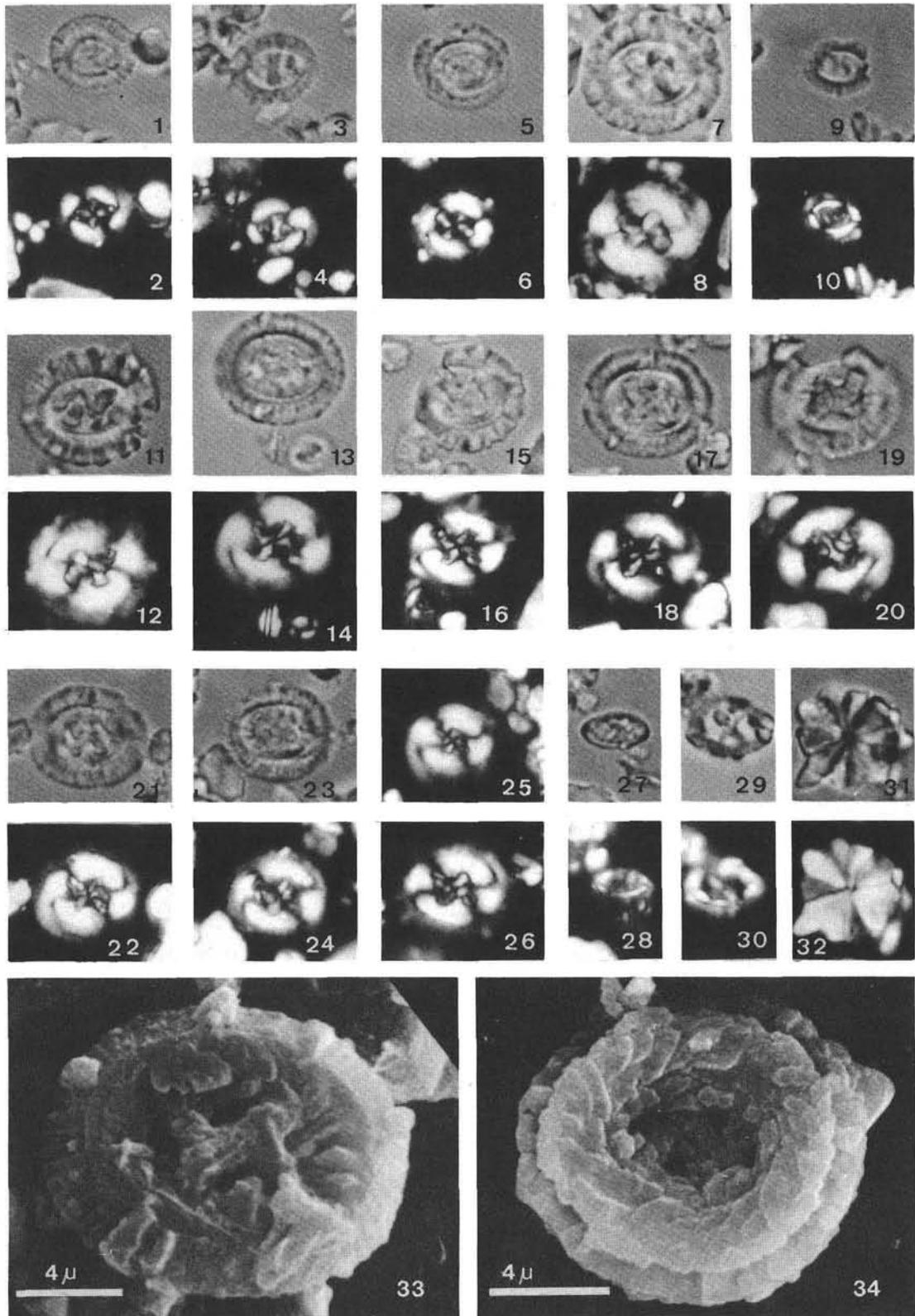


## Plate 1

- Figs. 1,2: *Cruciplacolithus tenuis*.  
Figs. 3,4: *Cruciplacolithus intermedius*.  
Figs. 5–8: *Chiasmolithus edwardsii*.  
Figs. 9,10: *Chiasmolithus inconspicuus*.  
Figs. 11–26: *Chiasmolithus danicus*. Note forms with simple as well as with composite bars.  
Figs. 27,28: *Neochiastozygus eosaepeus*.  
Figs. 29,30: *Neochiastozygus saepes*.  
Figs. 31,32: *Biantholithus sparsus*.  
Figs. 33,34: Distal and proximal view of *Chiasmolithus danicus*.

All coccoliths from sample KPN 55, *N. saepes* Zone from Limhamn, Sweden. Magnification of light micrographs ca. 2000×.  
Figs. 13,14, lower right: *Prinsius martinii*.

Electron micrographs by H. STRADNER (GBA, Vienna).



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