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Objekttyp: **Article**

Zeitschrift: **Eclogae Geologicae Helvetiae**

Band (Jahr): **73 (1980)**

Heft 1

PDF erstellt am: **25.09.2024**

Persistenter Link: https://doi.org/10.5169/seals-164942

Eclogae geol. Helv.	Vol. 73/1	Pages 1-7	2 plates	Basle, March 1980

New Tertiary calcareous nannofossils from the South Atlantic

By KATHARINA PERCH-NIELSEN[1])

ABSTRACT

Three new calcareous nannofossils, *Deutschlandia gaarderae*, *Sphenolithus elongatus* und *S. quadrispinatus* from the Pliocene, Eocene and Miocene respectively, are described.

ZUSAMMENFASSUNG

Drei neue kalkige Nannofossilien aus dem Pliozän, dem Eozän und dem Miozän werden beschrieben: *Deutschlandia gaarderae*, *Sphenolithus elongatus* und *S. quadrispinatus*.

Introduction

During the biostratigraphic study of samples collected on Deep Sea Drilling Project Leg 39 in the South Atlantic, several new calcareous nannofossil species were found. Some were described in the Initial Report (PERCH-NIELSEN 1977, and PERCH-NIELSEN & FRANZ 1977), while three more are presented here.

Systematic descriptions

Deutschlandia LOHMANN 1912

Generotype: *Deutschlandia anthos* LOHMANN, Recent, Atlantic Ocean.

Deutschlandia gaarderae n. sp.

(Pl. 1, Fig. 1-10, 16)

Holotype: Pl. 1, Fig. 3, 8 (Negatives 6-2334/9 and 6-2334/8, ETH SEM Archive, Hönggerberg, Zürich).
Type locality: DSDP Site 357, Rio Grande Rise, South Atlantic (Sample 2-4, 70 cm).
Type level: Pliocene, NN 15, *Reticulofenestra pseudoumbilica* Zone.
Diagnosis: Large form of *Deutschlandia* with a high central cone.

Description. - The proximal shield consists of an almost flat ring of thin, slightly S-formed elements. The 20-30 elements lie side by side, apparently with no overlap-

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ping as i.e. in *Coccolithus*, but with some interlocking. The general outline of the coccolith is circular, the ends of the elements forming a zig-zag line, however. The central area is surrounded on the distal and the proximal side by a collar of small elements, usually fewer in number than the elements of the distal shield. No proximal shields were found and probably none exist. Distally, the central area is covered by a cone consisting of usually eight more or less L-shaped elements. In proximal view it can be seen that the cone is hollow. No coccosphere was found.

Remarks. - *D. gaarderae* is larger than Recent *Deutschlandia* measured by Gaarder (personal communication, 1978): 6–7 microns and 3–4.6 microns respectively. Also, the central cone is higher than in the Recent forms, but in both, it usually consists of eight elements. The number of elements in the distal shield is also higher in *D. gaarderae* than in Recent members of the genus.

In some specimens, the central cone broke off, leaving a central opening (Pl. 1, Fig. 1, 2). Separated central cones can be mistaken for sphenoliths, while cone-less shields may be mistaken for single shields of *Calcidiscus leptoporus.*

Occurrence. - *D. gaarderae* was so far only found in one sample of Middle Pliocene age. It is the first Pliocene species of this genus, which, in Recent specimens, also features a proximal layer of quite different coccoliths. None of these coccoliths were found in the sample containing the here described distal-layer coccoliths of *Deutschlandia.*

Sphenolithus DEFLANDRE 1952

Generotype: *Sphenolithus radians* DEFLANDRE 1952

Sphenolithus elongatus n. sp.

(Pl. 1, Fig. 14, 15; Pl. 2, Fig. 5–11)

Holotype: Pl. 2, Fig. 5, 6 (Negatives 6-2302/6 and 3202/5, ETH SEM Archive, Hönggerberg, Zürich).
Type locality: DSDP Site 356, São Paulo Plateau, South Atlantic (Sample 9-2, 70 cm).
Type level: Middle Eocene, NP 14/15, *Discoaster sublodoensis/Nannotetrina fulgens* Zones.

Diagnosis. - Species of *Sphenolithus* with a very low, small shield and a very long central process.

Description. - The proximal shield consists of a low number - four to six - of small elements forming a truncated cone. This cone is topped by a single, very long, central process.

Remarks. - The single, undivided central process in *S. elongatus* is longer than the central process of any other species of *Sphenolithus.* In the type specimen, the spine is about 25 × as high as the proximal shield. This sphenolith is easily overlooked, the long spines being taken as simple calcite laths.

Occurrence. - *S. elongatus* was only found in the Middle Eocene (NP 14/15) of DSDP Site 356 in the South Atlantic.

Sphenolithus quadrispinatus n. sp.

(Pl. 1, Fig. 11-13; Pl. 2, Fig. 1-4)

Holotype: Pl. 2, Fig. 2 (Negative 6-2278/2, ETH SEM Archive, Hönggerberg, Zürich).
Type locality: DSDP Site 357, Rio Grande Rise, South Atlantic (Sample 3-6, 70 cm).
Type level: Late Miocene, NN 10, *Discoaster calcaris* Zone.

Diagnosis. - Species of *Sphenolithus* with a proximal shield consisting of columns, one to two tiers of lateral elements and four spines.

Description. - The proximal shield consists of eight to ten columnar elements arranged to form a cylindrical rather than a conical base for the one or two tiers of lateral elements. The latter are blocky and support four long spines.

Remarks. - *S. quadrispinatus* differs from other similar sphenoliths by the presence of four spines. *S. capricornutus* has only two spines and a conical proximal shield. *S. abies*, *S. heteromorphus* and *S. belemnos* have only a single central process. Specimens of *S. quadrispinatus* where all four spines are preserved in their full length are very rare. Damaged specimens can however, still be distinguished from i.e. *S. capricornutus* by the different shape of the proximal shield.

Occurrence. - *S. quadrispinatus* has only been found in the Upper Miocene (NN 10) of DSDP Site 357 in the South Atlantic, where it occurs in low numbers.

Comments

The new species described here may not be very important stratigraphically. The presence of *Deutschlandia* in the Pliocene, however, gives this Recent genus a history of some four million years and it seems surprising that this fossil form was not described earlier.

The genus *Sphenolithus* now has more than 25 distinguishable species and ranges from the Late Paleocene to the Middle Pliocene, a time span of about 57 million years. ROTH et al. (1971) reviewed the then 15 species but could offer no more ideas about the evolutionary relationships between the species than had already been suggested by BRAMLETTE & WILCOXON (1967): a lineage from *S. predistentus* via *S. distentus* to *S. ciperoensis* and a possible link between *S. moriformis* and *S. abies*. No new ideas have been proposed and/or come to my attention since and none can be offered here either.

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Plate 1

Fig. 1-10, 16 *Deutschlandia gaarderae* n.sp. from the Pliocene of DSDP Site 357, Rio Grande Rise, South Atlantic, Sample 2-4, 70 cm. Figures 3, 8 = holotype. Figure 1 is an isolated cone which might be mistaken for a sphenolith. Figures 2, 7 and 9 show proximal views, Figures 3, 8, 10 and 16 are distal views.

Fig. 11-13 *Sphenolithus quadrispinatus* n.sp.

Fig. 14, 15 *Sphenolithus elongatus* n.sp.

Magnification: Fig. 4-6, 11-15: $\times$ 3,200. Fig. 1, 2: $\times$ 5,000, Fig. 3, 7: $\times$ 6,000, Fig. 8, 9, 16: $\times$ 15,000, Fig. 10: $\times$ 10,000.

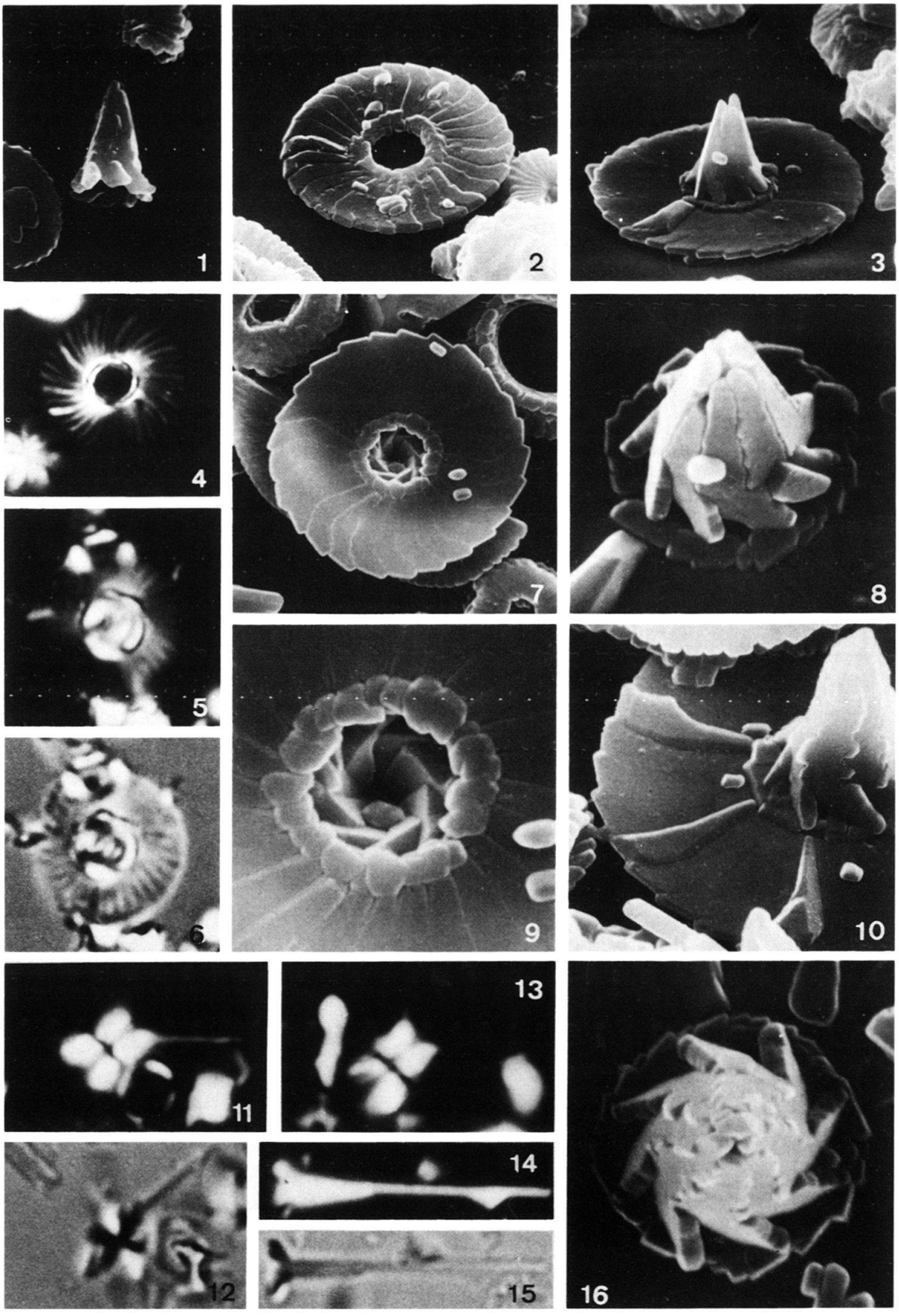
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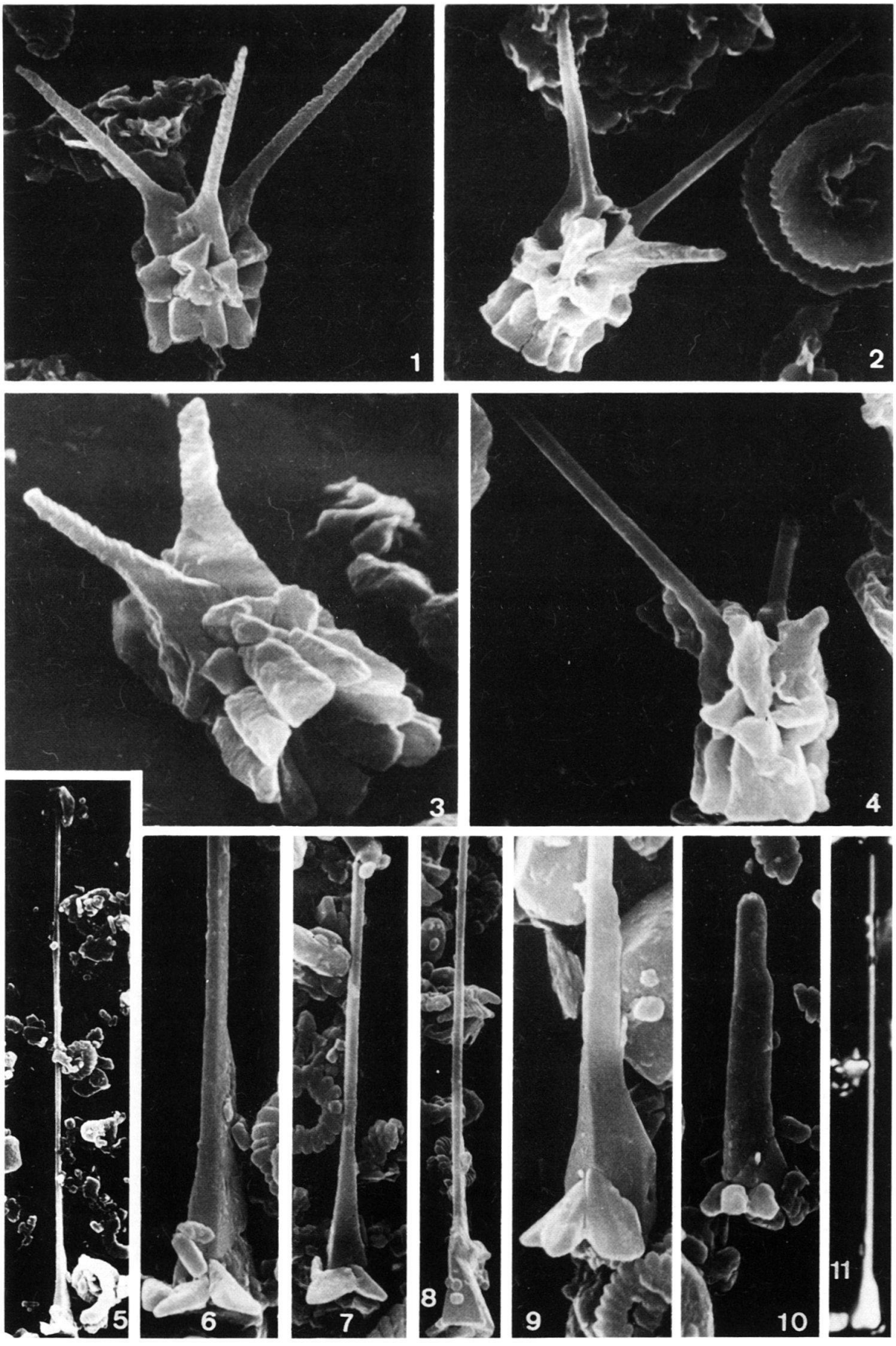
Plate 2

Fig. 1-4 *Sphenolithus quadrispinatus* n.sp. from the Upper Miocene of DSDP Site 357, Rio Grande Rise, South Atlantic, Sample 3-6, 70 cm. Figure 2 = holotype.

Fig. 5-11 *Sphenolithus elongatus* n.sp. from the Middle Eocene of DSDP Site 356, São Paulo Plateau, South Atlantic, Sample 9-2, 70 cm. Figures 5, 6 = holotype.

Magnification: Fig. 1: × 5,600, Fig. 2: × 6,300, Fig. 3: × 9,800, Fig. 4: × 7,000. Fig. 5: × 2,100, Fig. 6, 9, 10: × 7,000, Fig. 7: × 5,600, Fig. 8: × 4,900, Fig. 11: × 3,200.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