

Braarudosphaera pentagonica n.sp., a new *Braarudosphaera* from the lowermost Tertiary of Geulhemmerberg (Geulhem, The Netherlands)

Hartmut Mai¹, Helmut Willems², and Katharina von Salis Perch-Nielsen²

¹Universität Bremen, Fachbereich 5, Geowissenschaften, Klagenfurter Straße, D-28359 Bremen, Germany

²ETH Zürich, Geologisches Institut, ETH-Zentrum, CH-8092, Zürich, Switzerland

ABSTRACT: From the lowermost Danian, *Biantholithus sparsus* zone, the new calcareous nannofossil species *Braarudosphaera pentagonica* n.sp. is described. It is composed of 12 pentaliths, each built of five segments with a pentagonal outline. All sutures between the pentaliths are zigzag shaped. Proximal and distal faces (plate 2, figs. 3, 4) are of the same pentalith, illustrations obtained by the new "turn over technique" introduced by Mai 1995.

INTRODUCTION

The K/T boundary section of Geulhemmerberg, The Netherlands, is a 1.25m sequence of fine-grained calcareous arenites with a few thin clay intercalations which represents the latest Maastrichtian and earliest Danian according to Romein et al. (in press). One of the clay layers, about 4cm thick (sample G4A of the standard profile), contains a remarkable number of well preserved coccospheres from the upper Maastrichtian and lower Tertiary. Among the coccospheres, a new species of *Braarudosphaera* was found.

SYSTEMATIC PALEONTOLOGY

Family BRAARUDOSPHAERACEAE Deflandre 1947

Genus BRAARUDOSPHAERA Deflandre 1947

Braarudosphaera pentagonica, n.sp.

(Plate 1, figs. 1-6; text-fig. 1; plate 2, figs. 1-5)

Derivation of name: Pentagonos (Greek): pentagonal, the single calcite elements of the pentaliths have five edges.

Holotype: (plate 1, fig. 1), sample G4A, photo no. 1426, deposited under the no. G 1426 in the Department of Geosciences, FB 5, University of Bremen, Germany.

Type locality: Geulhemmerberg (Geulhem), The Netherlands.

Type stratum: Sample no. G4A, lower Tertiary of the K/T section Geulhemmerberg, 14cm above the K/T boundary.

Dimensions: Diameter of holotype coccosphere 20µm, single pentalith 8µm.

Paratypes: (Plate 1, figs. 3-6, Plate 2, figs. 1, 3, 5), sample G4A, photos nos. 1417, 1423, 1427, 1428, 1504, 1398, 1725.

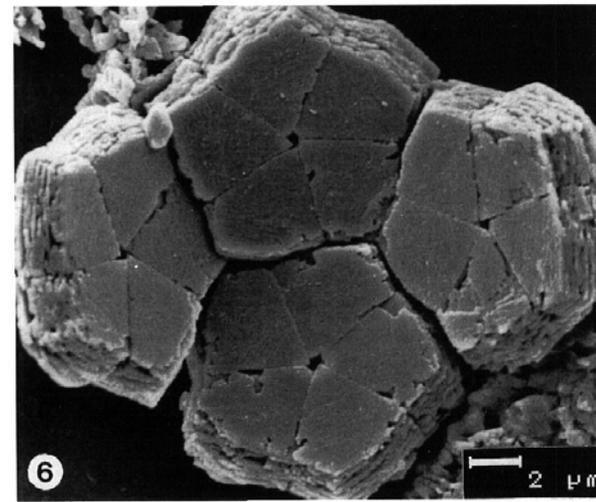
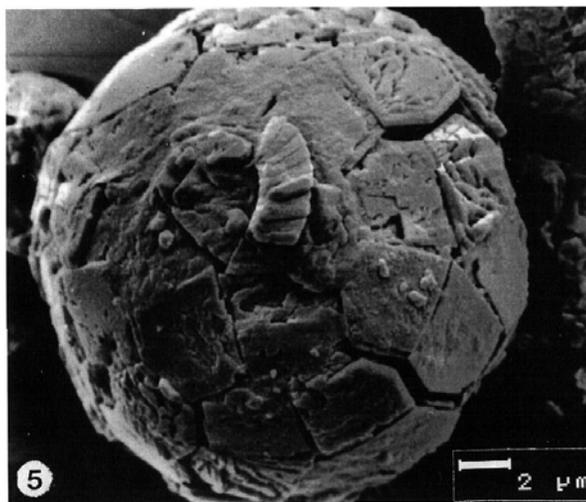
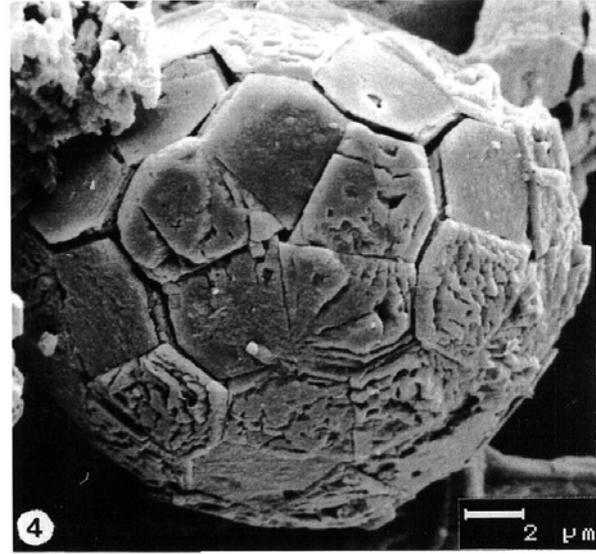
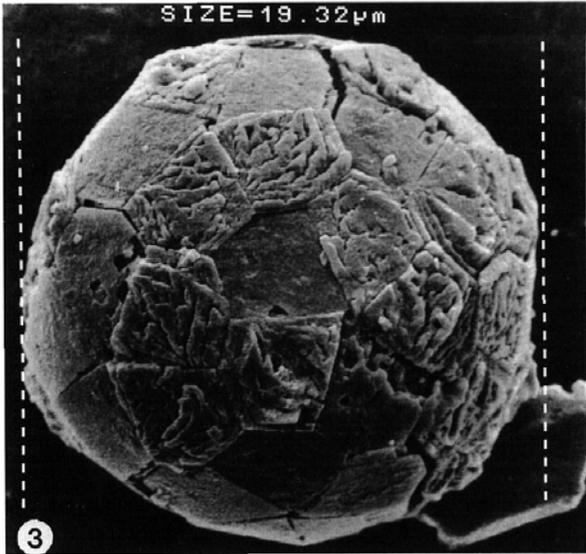
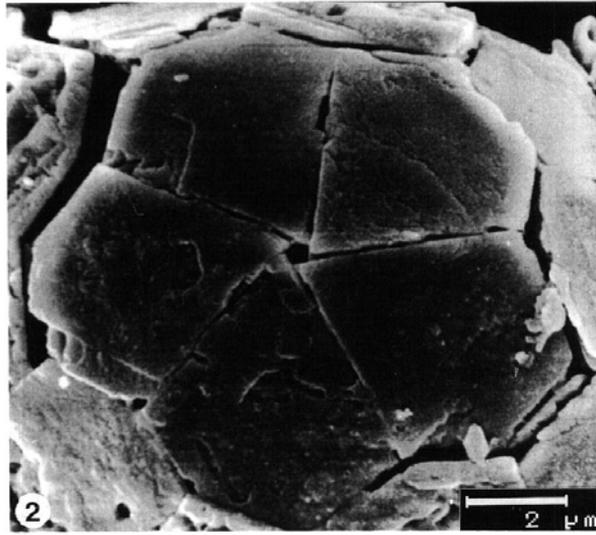
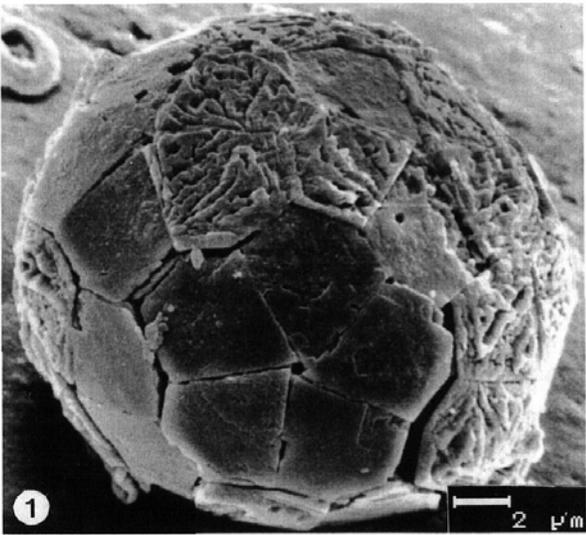
Diagnosis: A species of *Braarudosphaera* with 12 pentaliths built of 5 pentagonal segments. The shape of the sutures between the pentaliths is an irregular zigzag line.

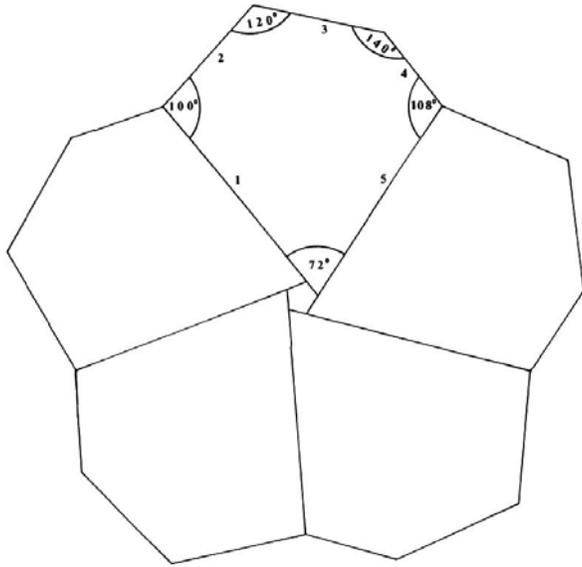
Description of pentaliths: The pentaliths are built of five tangentially arranged pentagonal calcite units. As seen from proximal view (plate 1, fig. 6; plate 2 figs. 4, 5) each single unit is a block of many calcite laminae interfingering with the adjacent unit. The calcite laminae show a successive increase in size from proximal to distal position, which results in the outer edges being slightly inclined towards the proximal side. In proximal view the segments are more similar to *Braarudosphaera bigelowii*, but they are clearly convex and show a central opening. From distal view (text-fig. 1; plate 1, fig. 2; plate 2, figs. 1-3) the angle towards the center is 72°, followed in clockwise direction by 100°, 120°, 140°, 108°. The angle of the edges of the pentagonal hole is 108°. The sides are of unequal lengths, if the length of side 1 is 100%, side 2 is 55.2°, side 3 55.2%, side 4 39.8%, and side 5 92% of side 1. Side 1 is parallel to side 4. The longer side 1 connected to side 5 creates a central pentagonal hole with a side length of 8% of side 1. The measurements and deductions were performed on the enlarged detail of paratype V (plate 2, fig. 2).

PLATE 1

- 1 *Braarudosphaera pentagonica* n. sp., coccosphere, Holotype
- 2 *Braarudosphaera pentagonica* n. sp., pentalith, detail of 1
- 3 *Braarudosphaera pentagonica* n. sp., Paratype 1

- 4 *Braarudosphaera pentagonica* n. sp., Paratype 2
- 5 *Braarudosphaera pentagonica* n. sp., Paratype 3
- 6 *Braarudosphaera pentagonica* n. sp., open sphere, Paratype 4





TEXT -FIGURE 1
Geometry of single pentalith.

Description of coccospheres: The coccospheres available for study are composed of 12 pentaliths and resemble a spherical pentagonal dodecahedron. All sutures between the individual pentaliths are zigzag-shaped. The articulation of the pentaliths on the sphere — covering the surface without any gaps — is formed by the connection of side 2 of one pentalith with side 3 of the adjacent one. These sides are the only ones with equal lengths.

Differentiation: *Braarudosphaera pentagonica* differs from all the other species of *Braarudosphaera* by being composed of pentaliths with pentagonal segments. The similar *Braarudosphaera primula* (Black 1972), another species with a central pentagonal opening, has segments which are smoothly rounded at the extremity.

Braarudosphaera bigelowii and most other cretaceous and tertiary species of *Braarudosphaera* have tetragonal segments (Aubry 1989, Perch-Nielsen 1985). The pentaliths of *Braarudosphaera pentagonica* are convex on their distal surface, whereas the distal faces of *B. bigelowii* pentaliths are concave. The sutures of *B. pentagonica* form a zigzag line, on *B. bigelowii* they are straight (plate 2, fig. 6).

Occurrence: Common in sample G4A, lowermost Danian *Biantholithus sparsus* zone, K/T section Geulhemmerberg.

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PLATE 2

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| 1 <i>Braarudosphaera pentagonica</i> n. sp., pentalith distal, Paratype 5 | 4 <i>Braarudosphaera pentagonica</i> n. sp., pentalith prox., Paratype 6 |
| 2 <i>Braarudosphaera pentagonica</i> n. sp., detail of 1 | 5 <i>Braarudosphaera pentagonice</i> n. sp., open sphere, Paratype 7 |
| 3 <i>Braarudosphaera pentagonica</i> n. sp., pentalith distal, Paratype 6 | 6 <i>Braarudosphaera bigelowii</i> , open sphere |

