

Zeitschrift: Eclogae Geologicae Helvetiae
Herausgeber: Schweizerische Geologische Gesellschaft
Band: 63 (1970)
Heft: 2

Artikel: Oligocene calcareous nannoplankton biostratigraphy
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Register: Check list of species
DOI: <https://doi.org/10.5169/seals-163869>

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six serrate ridges consisting of subparallel laths which point in the direction of the tip of the apical spine and form a 20–45° angle with the axis of the spine. The serrate margin of the apical spine can be discerned in the light microscope.

Remarks: This species differs from *Sphenolithus predistentus* BRAMLETTE & WILCOXON in having serrate ridges on the apical spine and in showing nearly complete extinction between crossed nicols when the apical spine is parallel to either nicol. The surface sculpture of *Sphenolithus predistentus* is smooth, and in polarized light the apical spine is brightly illuminated even when parallel to either nicol.

Holotype: IMS-A 608 504 [A 891].

Paratype: A 613-L 001 A + B [A 892, A 893].

Length of Holotype: 6.5 μ .

Occurrence: *Sphenolithus tribulosus* n. sp. occurs with *Sphenolithus predistentus* in the *E. subdistichus* Zone and in the *Cc. margaritae* Zone of Alabama, but is rare in the *Sph. predistentus*–*Sph. distentus* Zone of Trinidad. (NOTE: *Sphenolithus tribulosus* n. sp. is not listed on the range charts.)

Check list of species

Unless stated otherwise only the type reference is given. If another reference is mentioned, the reason is indicated by the following abbreviations:

EM: good electron micrograph

LM: good light micrograph

D: detailed description

Coccolithus joensuui ROTH & HAY in HAY et al., 1967, pp. 445–446, pl. 6, fig. 5.

Coccolithus paralitos ROTH & HAY in HAY et al., p. 446, pl. 6, fig. 6.

Coccolithus parvulus (DEFLANDRE & FERT) STRADNER [= *Tremalithus parvulus* DEFLANDRE & FERT, 1954, p. 154, pl. 14, fig. 6]. EM: STRADNER & EDWARDS, 1968, p. 16, pl. 7, figs. 1–2.

Coccolithus sarsiae BLACK, 1962, p. 125, pl. 8, fig. 2, pl. 9, figs. 2–6.

Cruciplacolithus tarquinius ROTH & HAY in HAY et al., 1967, p. 446, pl. 6, fig. 8.

Chiasmolithus californicus (SULLIVAN) HAY & MOHLER [= *Coccolithus californicus* SULLIVAN, 1964, p. 180, pl. 1, figs. 7a–d]. EM: HAY & MOHLER, 1967, p. 1527, pl. 196, figs. 18–20, pl. 198, fig. 5.

Chiasmolithus consuetus (BRAMLETTE & SULLIVAN) HAY & MOHLER [= *Coccolithus consuetus* BRAMLETTE & SULLIVAN, 1961, p. 139, pl. 1, figs. 2a–c]. EM: HAY & MOHLER, 1967, p. 1526, pl. 196, figs. 23–25, pl. 198, fig. 16.

Chiasmolithus grandis (BRAMLETTE & RIEDEL) n. comb. [= *Coccolithus grandis* BRAMLETTE & RIEDEL, 1954, p. 391, pl. 38, figs. 1a–b]. LM, D: BRAMLETTE & SULLIVAN, p. 140, pl. 2, figs. 1a–b, 2a–c, 3.

Reticulofenestra dupouyi (DEFLANDRE & FERT) HAY, MOHLER & WADE [= *Discolithus dupouyi* DEFLANDRE & FERT, 1952, p. 2101, Text-fig. 1. DEFLANDRE & FERT, 1954, p. 142, pl. 14, figs. 1, 9, 10, 12]. EM: STRADNER & EDWARDS, 1968, p. 20, pl. 15.

Reticulofenestra gartneri ROTH & HAY in HAY et al., 1967, p. 449, pl. 7, fig. 1.

Reticulofenestra insignita ROTH & HAY in HAY et al., 1967, p. 449, pl. 7, figs. 2–3.

Reticulofenestra oamaruensis (DEFLANDRE) STRADNER [= *Discolithus oamaruensis* DEFLANDRE in DEFLANDRE & FERT, 1954, p. 139, pl. 12, figs. 1–2]. EM: STRADNER & EDWARDS, 1968, pp. 21–22, pl. 16–18, Text-fig. 2B.

Cyclolithella inflexa (KAMPTNER ex DEFLANDRE) LOEBLICH & TAPPAN [= *Cyclolithus inflexus* KAMPTNER ex DEFLANDRE in PIVETAU, 1952, p. 110, fig. 50]. EM: STRADNER & EDWARDS, 1968, p. 25, pl. 7, fig. 4.

Pyrocyclus hermosus ROTH & HAY in HAY et al., 1967, p. 448, pl. 6, figs. 10–12.

Cyclococcolithus bolii ROTH, 1969, p. 465, pl. 1, figs. 3–4.

Cyclococcolithus inversus (DEFLANDRE) HAY, MOHLER & WADE [= *Cyclococcolithus leptoporus* var. *inversus* DEFLANDRE in DEFLANDRE & FERT, 1954, p. 150 (pro parte), pl. 9, figs. 4–5]. EM: STRADNER & EDWARDS, 1968, pp. 25–26, pl. 26–27.

- Cyclococcolithus margaritae* ROTH & HAY in HAY et al., 1967, p. 446, pl. 6, fig. 9.
- Rhabdosphaera perlonga* (DEFLANDRE) BRAMLETTE & SULLIVAN [= *Rhabdolithus perlongus* DEFLANDRE in DEFLANDRE & FERT, 1954, p. 150, pl. 12, figs. 34–35, Text-fig. 86]. LM: BRAMLETTE & SULLIVAN, 1961, p. 146, pl. 5, figs. 1–3.
- Rhabdosphaera tenuis* BRAMLETTE & SULLIVAN, 1961, p. 147, pl. 5, figs. 14a–b.
- Cretarhabdus lentus* STRADNER in STRADNER & EDWARDS, 1968, pp. 33–34, pl. 44, fig. 7, ext-fig. 6.
- Transversopontis obliquipons* (DEFLANDRE) HAY, MOHLER & WADE [= *Discolithus obliquipons* DEFLANDRE in DEFLANDRE & FERT, 1954, p. 139, pl. 11, figs. 1–2]. EM: PERCH-NIELSEN, 1967, p. 27, pl. 3, figs. 6–8.
- Transversopontis pulcher* (DEFLANDRE) HAY, MOHLER & WADE [= *Discolithus pulcher* DEFLANDRE in DEFLANDRE & FERT, 1954, p. 142, pl. 12, figs. 17–18]. EM: PERCH-NIELSEN, pp. 27–28, pl. 3, figs. 9–11.
- Transversopontis zigzag* ROTH & HAY in HAY et al., p. 450, pl. 7, figs. 4–6.
- Zycolithus pyramidus* PERCH-NIELSEN, 1967, p. 29, pl. 5, figs. 1–5.
- Scapholithus fossilis* DEFLANDRE in DEFLANDRE & FERT, 1954, p. 165, pl. 8, figs. 12, 16, 17.
- Syracosphaera clathrata* ROTH & HAY in HAY et al., 1967, pp. 449–450, pl. 7, fig. 9.
- Zygrhablithus bijugatus* (DEFLANDRE) [= *Zycolithus bijugatus* DEFLANDRE in DEFLANDRE & FERT, 1954, p. 148, pl. 11, figs. 20–21, Text-fig. 59]. EM: GARTNER & SMITH, 1967, p. 5, pl. 8, figs. 1–6.
- Braarudosphaera bigelowi* (GRAN & BRAARUD) DEFLANDRE [= *Pontosphaera bigelowi* GRAN & BRAARUD, 1935, p. 388, fig. 67]. EM: HAY & TOWE, 1962a, pp. 426–428, fig. 1.
- Braarudosphaera rosa* LEVIN & JOERGER, 1967, p. 170, pl. 3, figs. 6a–b, 7.
- Micrantholithus vesper* DEFLANDRE, 1950, p. 1157, Text-figs. 5–7. EM: HAY, MOHLER & WADE, 1966, p. 395, pl. 12, fig. 4.
- Discoaster adamanteus* BRAMLETTE & WILCOXON, 1967, p. 108, pl. 7, fig. 6.
- Discoaster aulakos* GARTNER, 1967, p. 2, pl. 4, figs. 4–5.
- Discoaster barbadiensis* TAN SIN HOK, 1927, p. 415. D: BRAMLETTE & RIEDEL, 1954, p. 398, pl. 39, figs. 5a–b. LM: HAY et al., 1967, pl. 1, figs. 9–11. EM: HAQ, 1969, pp. 6–7, pl. 3, figs. 4–7.
- Discoaster cubensis* FURRAZOLA-BERMEDEZ & ITURRALDE-VINENT, 1967, p. 10, pl. 2, figs. 6–7.
- Discoaster deflandrei* BRAMLETTE & RIEDEL, 1954, p. 399, pl. 39, fig. 6, Text-figs. 1a–c. LM: HAY et al., 1967, pl. 2, figs. 6–9.
- Discoaster lidzi* HAY in HAY et al., 1967, p. 452, pl. 2, figs. 1–3.
- Discoaster obtusus* GARTNER, 1967, p. 2, pl. 3, figs. 1–6.
- Discoaster saipanesis* BRAMLETTE & RIEDEL, 1954, pp. 398, pl. 39, fig. 4. EM: HAY, MOHLER & WADE, 1966, p. 396, pl. 11, figs. 8–9, pl. 13, fig. 1. LM: HAY et al., 1967, pl. 1, figs. 4–6.
- Discoaster saundersi* HAY in HAY et al., 1967, p. 453, pl. 3, figs. 2–6.
- Discoaster tani tani* BRAMLETTE & RIEDEL, 1954, p. 397, pl. 39, fig. 1.
- Discoaster tani ornatus* BRAMLETTE & WILCOXON, 1967, pp. 112, 114, pl. 7, fig. 8.
- Discoaster tinguarensis* FURRAZOLA-BERMEDEZ & ITURRALDE-VINENT, 1967, p. 9, pl. 2, figs. 3–4.
- Trochaster simplex* KLUMPP, 1953, p. 385, pl. 16, fig. 7, Text-fig. 4/2. D, LM: MARTINI, 1958, p. 368, pl. 5, figs. 25a–b.
- Sphenolithus predistentus* BRAMLETTE & WILCOXON, 1967, p. 92, pl. 1, fig. 6, pl. 2, figs. 10–11.
- Sphenolithus radians* DEFLANDRE in GRASSÉ, 1952, p. 446, figs. 343J–K, 363A–G. LM: DEFLANDRE & FERT, 1954, p. 49, pl. XII, figs. 36–38, Text-figs. 109–112.
- Isthmolithus recurvus* DEFLANDRE in DEFLANDRE & FERT, 1954, p. 196, pl. 12, figs. 9–13, Text-figs. 119–122. EM: HAY, MOHLER & WADE, 1966, pp. 396–397, pl. 12, figs. 1–3, pl. 13, fig. 3.
- Lanternithus minutus* STRADNER, 1962, p. 375, pl. 2, figs. 12–15. D, LM: LOCKER, 1967, pp. 361–362, pl. 365, figs. 1–8. EM: GARTNER & BUKRY, 1969, pp. 1217–1218, pl. 139.
- Corannulus germanicus* STRADNER, 1962, p. 366, pl. 1, figs. 21–30.

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