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The stratigraphic position of the Lower Oligocene Yrieu Sands (Southwestern France), based on calcareous nannofossils and a new *Helicosphaera* species

By ETIENNE STEURBAUT[1])

ABSTRACT

The study of calcareous nannofossils from two outcrops of the Yrieu Sands in the Aquitanian Basin has led to the recognition of Nannofossil Zone NP21. The Yrieu Sands can thus be correlated with the Grimmertingen Sands and with the type-Latdorfian. *Helicosphaera moorkensii*, a new *Helicosphaera* species from the Yrieu Sands, is described.

RÉSUMÉ

L'étude des nannofossiles calcaires de deux affleurements des Sables d'Yrieu dans le Bassin d'Aquitaine nous a permis de reconnaître la zone NP21 à nannofossiles. Les Sables d'Yrieu peuvent donc être mis en corrélation avec les Sables de Grimmertingen et avec le Latdorfien-type. *Helicosphaera moorkensii*, une nouvelle espèce du genre *Helicosphaera*, est décrite.

Introduction

During the last years several Oligo-Miocene deposits from the Aquitanian Basin have been sampled for otoliths and other fish remains (STEURBAUT 1981). Preliminary investigations of these samples have shown that most of them yield rich and fairly well preserved nannofloras. Up to now only two samples from the Yrieu Sands have been fully examined. The first one was collected at Saint-Martin-de-Seignanx, near the old watermill on the northwestern side of Lake Yrieu, known as the "Moulin d'Yrieu" (map XIII-43, Saint-Vincent-de-Tyrosse; $x = 296.525$, $y = 148.450$); the second one at Saint-André-de-Seignanx, a little southwards of the hamlet Turbine (map XIII-43, Saint-Vincent-de-Tyrosse; $x = 299.100$, $y = 148.825$). In both outcrops the Yrieu Sands consist of blue-greyish, silty, fossiliferous fine sands alternating with thin limestone banks.

The stratigraphic position of the Yrieu Sands has been a controversial topic. According to POIGNANT (1967, p.35) the deposits exposed on the northern and northwestern side of Lake Yrieu (e.g. at Moulin d'Yrieu) have to be assigned to the Late Eocene, since they do not contain the foraminiferid *Nummulites intermedius*,

[1]) National Fund for Scientific Research (Belgium), Geological Institute, Krijgslaan 281/S8, B-9000 Gent, Belgium.

while those situated further northwards (e.g. at Turbine) would belong to the Oligocene. These conclusions were refuted by KIEKEN & THIBAULT (1975, p. 19), who found identical foraminifera assemblages in the outcrops of the Yrieu Sands, indicating an Early Oligocene age.

Results of the nannofossil studies

Both examined associations of the Yrieu Sands are characterized by the presence of *Ericsonia subdisticha* (ROTH & HAY 1967) ROTH 1969, *Ericsonia formosa* (KAMPTNER 1963) ROMEIN 1979, *Reticulofenestra umbilica* (LEVIN 1965) MARTINI & RITZKOWSKI 1968, *Lanternithus minutus* STRADNER 1962, *Helicosphaera intermedia* MARTINI 1965 and *Sphenolithus tribulosus* ROTH 1970, whereas *Isthmolithus recurvus* DEFLANDRE 1954, *Discoaster barbadiensis* TAN SIN HOK 1927 and *Discoaster saipanensis* BRAMLETTE & RIEDEL 1954 seem to be missing. This justifies the assignment of both associations to the Early Oligocene Nannofossil Zone NP21 of MARTINI (MARTINI 1971) or to the Early Oligocene *Ericsonia subdisticha* Subzone (CP 16a) of OKADA & BUKRY (OKADA & BUKRY 1980; BUKRY 1981a and 1981b). Hence, the Yrieu Sands can be correlated with the Grimmertingen Sands (Lower Oligocene of the Belgian Basin; see MARTINI & MOORKENS 1970) and with the type-Latdorfian (see MARTINI 1969 and MARTINI & RITZKOWSKI 1968).

In addition to the above-mentioned nannofossils, several *Helicosphaera* species have been recognized, of which one is new to science. Helicosphaerid coccoliths are rather common in most Tertiary deposits. About 40 species have been described so far. On the whole they have short vertical ranges, which make them excellent tools for biozonation. Their biostratigraphical usefulness has already been emphazised by several authors (HAQ 1973; MÜLLER 1981 and BALDI-BEKE 1982). JAFAR & MARTINI (1975) have discussed the validity of the genus *Helicosphaera* and commented on the nomenclatural status of several species.

Description of *Helicosphaera moorkensii* n. sp.

Genus *Helicosphaera* KAMPTNER 1954

Type species *Helicosphaera carteri* (WALLICH 1877) KAMPTNER 1954

Synonym *Helicopontosphaera* HAY & MOHLER 1967

Helicosphaera moorkensii n. sp.

(Plate, Fig. 1-9)

Holotype. - Plate, Fig. 1 (negative 0680/00, S.E.M. Archief R.U.G., St.-Pietersnieuwstraat, Gent, Belgium).

Paratypes. - Plate, Fig. 2-9 (negatives 66.908, 0751/00, 66.428, S.E.M. Archief, R.U.G.; negatives 1 till 5 L.M., Laboratorium voor Paleontologie, R.U. Gent, Belgium).

Locus typicus. - Saint-Martin-de-Seignanx, site "Moulin d'Yrieu", Aquitaine, southwestern France (x = 296.525; y = 148.450).

Stratum typicum. - Yrieu Sands, Early Oligocene, NP21 or CP 16a.

Derivatio nominis. - In honour of Dr. Th. Moorkens (Essen, BRD) who contributed much to our knowledge of the Grimmertingen Sands.

Diagnosis. - Medium-sized helicosphaerid with elliptical outline, horseshoe-shaped proximal shield consisting of a not clearly differentiated central area, lacking central openings.

Description. - *Helicosphaera moorkensii* is a medium-sized, elliptical helicosphaerid, without distinct flange. The proximal shield is large, horseshoe-shaped and clearly truncated at the top. Both shields consist of radially oriented elements. Those from the proximal shield seem to radiate from the nondifferentiated central area, which is nearly parallel to the long axis of the coccolith and has no central openings. In cross-polarized light, the distal shield is rather faint and far less conspicuous than the proximal one. The bright proximal shield is intersected by two V-shaped extinction bands, each starting from one end of the central area, when viewed at 45° to the polarization directions (Plate, Fig. 6). Viewed at 90°, the proximal shield is darker, and the extinction bands are more diffuse and nearly aligned (Plate, Fig. 8).

Dimensions. - 11 to 13 µm (holotype: 13 µm).

Remarks. - *Helicosphaera moorkensii* is similar to *Helicosphaera gertae* BUKRY 1981, known from the Lower Miocene of the Philippine Area (see BUKRY 1981b: p. 463, Pl. 5, Fig. 5–13 and Pl. 6, Fig. 1–4). It differs from the latter by its more elliptical outline, its smaller dimensions and by its higher length-to-width ratio of the rim periphery (L/W = 1.40 to 1.54; while in *H. gertae* this ratio ranges from 1.17 to 1.26). *Helicosphaera moorkensii* can also be distinguished from *H. compacta* BRAMLETTE & WILCOXON 1967 by its general shape and by the configuration of its proximal shield, which lacks the two typical central openings (BRAMLETTE & WILCOXON 1967, p. 105).

Distribution. - Up to now only known from the Yrieu Sands, Early Oligocene (NP21) of the Aquitanian Basin.

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Plate

Helicosphaera moorkensii n.sp.

Specimens from the Yrieu Sands, NP21, site "Moulin d'Yrieu", Saint-Martin-de-Seignanx, southwestern France.

Fig. 1 Holotype, SEM Neg. 0680/00, proximal view.

Fi. 2-4 Paratypes, SEM Neg. 66.908, 0751/00 and 66.428, proximal views.

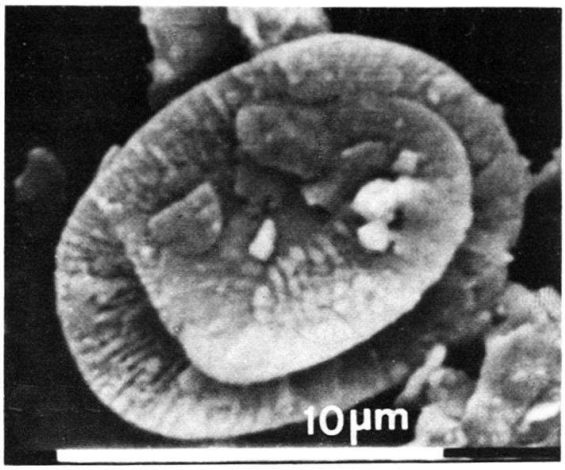
Fig. 5 Paratype, LM, transmitted light, proximal view.

Fig. 6 Same specimen, LM, cross-polarized light, viewed at 45° to the polarization directions.

Fig. 7 Paratype, LM, transmitted light, proximal view.

Fig. 8 Same specimen, LM, cross-polarized light, viewed at 90° to the polarization directions.

Fig. 9 Paratype, LM, transmitted light, proximal view.



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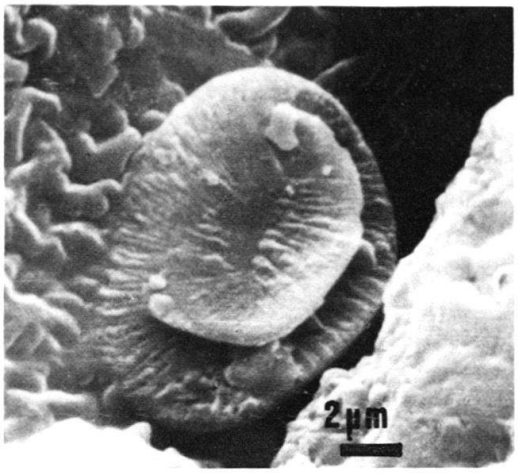

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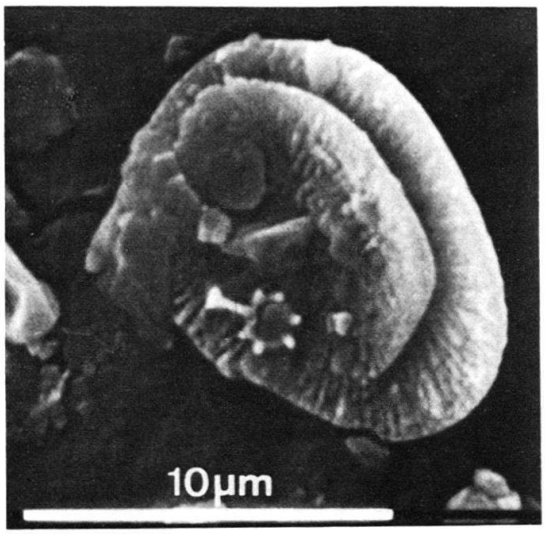

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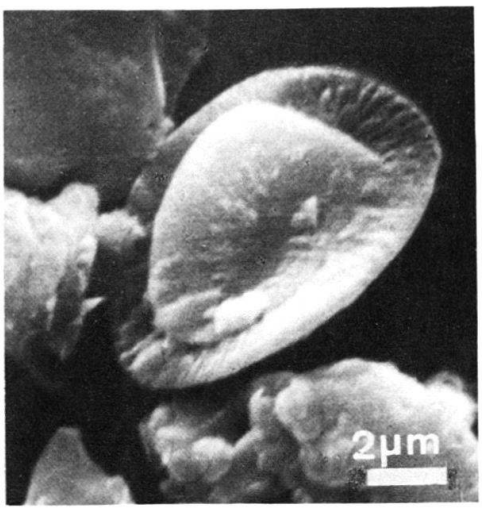

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10µm

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