The biostratigraphic distribution of nearly 60 diatom species in a 67.1-meter, continuously piston cored middle Eocene (Lutetian) section is documented. The first and last appearance datums of nine stratigraphically important species are illustrated. These datums may be of use in regional correlations of Lutetian sediments in the South Atlantic Ocean.

INTRODUCTION
This report presents data on the stratigraphic distribution of fossil marine diatoms in a 67.1-meter, continuously cored middle Eocene section recovered at DSDP Site 512 on the Falkland Plateau in the Southwest Atlantic Ocean. The section represents the longest diatomaceous middle Eocene section yet cored in the South Atlantic; it therefore provides important new biostratigraphic and biogeographic information on fossil marine diatoms for a time interval and geographic region from which they were previously not well known.

Prior to the recovery at Site 512 of a long middle Eocene section, the only available data on high-latitude South Atlantic middle Eocene diatoms were those derived from Islas Orcadas piston core 1678-43 (author's notes), which is only 188 cm long. The core includes a 128-cm interval assigned to the Globigerapsis index Zone of Jenkins (1971) (see Site 511 site chapter), but it is so short it as to be of little value in determining the biostratigraphic succession of middle Eocene diatoms.

The long section at Site 512 was continuously cored using the newly developed hydraulic piston corer (HPC), so that core disturbance and microfossil mixing are minimal. Moreover, foraminifers and radiolarians which are present in the sediment allow independent dating of the core, which is thus an excellent data source for middle Eocene diatom biostratigraphy in the South Atlantic.

Background
Hole 512 is located at 49°52.194'S; 40°50.713'W on the northeastern part of the Maurice Ewing Bank at the eastern extremity of the Falkland Plateau. Hole 512A is located nearby at 49°52.170'S; 40°50.710'W. Water depth at the drill site is 1844 meters. Hole 512 was continuously cored with the HPC for 77.9 meters or a total of 19 cores. One conventional (rotary-drilled) core was recovered from Hole 512A in the interval from 81.5-89.3 meters sub-bottom, or just below the deepest penetration of Core 19 in Hole 512.

MIDDLE EOCENE DIATOMS
Observations
The occurrence and relative abundance of nearly 60 diatom species have been determined for the middle Eocene section of Site 512 (Fig. 1). Sixteen diatom species are considered to be characteristic of the middle Eocene section of Site 512 because of their abundance, distinctive characteristics, or limited stratigraphic range (Fig. 1).

Of the 16 characteristic species, 7 range throughout the section; these are the Pyxilla prolongata group, Melosira architecturalis, Triceratium unguiculatum, Trinacria simulacrum, Tubiformis unicornis, Asterolampra uraster, and Craspédodiscus moelleri. Coscinodiscus oligocenicus group, Pseudotriceratium chenevieri, and Trinacria excavata f. inflata range...
from Hole 512, Core 6 through Cores 14, 12, and 11, respectively.

The highest occurrence of *T. excavata f. is* in Hole 512, Core 9, of *Rylandsia biradiata* in Hole 512, Core 10. Both species range down through Hole 512A, Core 2.

### Table 1. Abundance categories used in this chapter.

<table>
<thead>
<tr>
<th>Specimen Counts</th>
<th>Category</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Very rare</td>
<td>VR</td>
</tr>
<tr>
<td>2-5</td>
<td>Rare</td>
<td>R</td>
</tr>
<tr>
<td>6-10</td>
<td>Frequent</td>
<td>F</td>
</tr>
<tr>
<td>11-50</td>
<td>Common</td>
<td>C</td>
</tr>
<tr>
<td>51-100</td>
<td>Abundant</td>
<td>A</td>
</tr>
<tr>
<td>101-500</td>
<td>Very abundant</td>
<td>VA</td>
</tr>
<tr>
<td>501-1000</td>
<td>Dominant</td>
<td>D</td>
</tr>
</tbody>
</table>

*a Based on counts per field of view during two traverses of 22 × 22 mm cover slip at ×400 of one slide of unsieved material and one slide of Fraction 2 (38–63 μm) (see Gombos and Ciesielski, this volume, for discussion).

### Table 2. Stratigraphic distribution and relative abundances of diatom species in middle Eocene samples from Holes 512 and 512A.

**Note:** Miocene (Samples 512-1-1, 89-90 cm to 512-5-2, 74-76 cm) not studied. For explanation of letters, see Table 1.

**Bergonia angelica** ranges from Hole 512, Core 10 through Core 18. **Brightwellia imperfecta** exhibits a short range from Hole 512, Core 15 through Core 16. **Rhizosolenia sp.** ranges from the middle of Hole 512, Core 17 down through Hole 512A, Core 2. **Crasspedodiscus ellipticus** appeared only in Hole 512A, Core 2.

### DISCUSSION

At present, continuous core data on the stratigraphic distribution of middle Eocene diatoms from high-latitude regions of the South Atlantic are not available for comparison with data from Holes 512 and 512A, and no high-latitude South Atlantic diatom zonation can be proposed at this time.

The only reports available on low- and mid-latitude middle Eocene diatoms of the South Atlantic are those by Gleser and Jousé (1974), who described the diatom assemblage in one core from Hole 13 in the tropical Atlantic, and by Fenner (1979), who studied a longer but discontinuous section in Hole 356 in the subtropical Atlantic. Because of the many coring gaps in Hole 356, Fenner did not attempt to construct a zonal scheme.

As part of her study, Fenner (1979) reviewed all available literature on Eocene diatoms and found that most Eocene diatom species are widely distributed geograph-
ically. Comparison of the middle Eocene diatom assemblage of Site 512 with Fenner’s (1979) data from Site 356 and other areas tends to confirm this observation. Exceptions include the presence of species such as *Bergonia anglica*, *Trinacria excavata f. inflata*, *Asterolampra uraster*, and *Rhizosolenia* sp. in the middle Eocene of Site 512 but not in lower-latitude sites in the Atlantic. The distribution of these species may be restricted to the higher latitudes.

Eleven discrete diatom datums observed in the middle Eocene section of Site 512 may be useful for correlation, at least locally in the region of the Falkland Plateau. All 11 datums occur within the *Globigerinasphaera index zone* of Jenkins (1971) and are illustrated in Figure 1. The datums include, in ascending order, the lowest stratigraphic occurrence of *Bergonia anglica*, *Brightwellia imperfecta*, *Coscinodiscus oligocenensis* group, *Pseudotriceratium chenevieri*, and *Trinacria excavata f. inflata*; and, in descending order, the highest stratigraphic occurrence of *Trinacria excavata f. tetragonon*, *Bergonia anglica*, *Ryandiasa bidentata*, *Brightwellia imperfecta*, *Rhizosolenia* sp., and *Crasedodicus ellipticus*. The highest occurrence of *C. ellipticus* occurs very near the boundary between the *G. index index zone* and the *Pseudogloboquadrina primitiva Zone* of Jenkins (1971).

Evidence for reworking of older diatom into the middle Eocene of Site 512 is indicated by the sporadic occurrence of the late Paleocene species *Hemiaulus incurvus* in Hole 512, Cores 6 through 11 (see Table 2).

### CONCLUSIONS

At present the Eocene diatoms of the high-latitude South Atlantic are not well known. The recovery of a 67.1-meter, continuously piston cored middle Eocene (Lutetian) section from DSDP Site 512 on the Falkland Plateau provides the best available record of diatom biostratigraphy during that time in the high-latitude South Atlantic. The recovered section provides important new data on the occurrence of nearly 60 diatom species in upper Lutetian sediments. Eleven appearance and extinction datums of nine species have been identified in the section. These datums may be of use in correlating middle Eocene sections in the Falkland Plateau region.

#### Table 2. (Continued).

<table>
<thead>
<tr>
<th>Diatom Species</th>
<th>Appearance/Extinction</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Pseudotriceratium chenevieri</em></td>
<td>R</td>
<td>Stage</td>
</tr>
<tr>
<td><em>Trinacria excavata f. inflata</em></td>
<td>R</td>
<td></td>
</tr>
</tbody>
</table>
Figure 1. Stratigraphic distribution of selected middle Eocene diatom species in DSDP Holes 512 and 512A on the Falkland Plateau. Miocene (Cores 1-5) not studied.

TAXONOMIC LIST
Genus Asterolampra Ehrenberg, 1844

Asterolampra acutiloba Forti, 1912
(No illustration)
References. Forti, 1912, in Tempère and Peragallo, 1912, p. 337, nos. 696-698; Forti, 1913, p. 1564, pl. 3, figs. 1, 5-6, 9.
Remarks. The occurrence of this Miocene species in the upper part of the middle Eocene section in Hole 512 may be attributable to contamination.

Asterolampra affinis Greville, 1862
(Plate 1, Fig. 1)
References. Greville, 1862, p. 48, pl. 8, figs. 26-27; Schrader and Fenner, 1976, text-figure 40, nos. 4, 10; Gombos, 1980, p. 234.

Asterolampra distincta Barker and Meakin, 1944/45
(Plate 1, Figs. 9-10)
Remarks. This species is extremely rare in Hole 512.

Asterolampra grevillei (Wallich) Greville, 1860
(Plate 1, Fig. 2)
References. Greville, 1860, p. 113, pl. 4, fig. 21; Rafts in Pritchard, 1861, p. 853; Rattray, 1890, p. 644; Wolle, 1890, pl. 81, fig. 15; De Toni, 1894, p. 1405; Peragallo, 1897-1908, p. 405, pl. 110, fig. 3; Hustedt, 1930, p. 489, fig. 274; Gombos, 1975, p. 315, pl. 6, figs. 2, 8, 9; Fenner, 1978, p. 511, pl. 18, fig. 3.

Asterolampra insignis Schmidt, 1888
(No illustration)
References. Schmidt, 1888, pi. 137, figs. 1-3; Schrader and Fenner, 1976, p. 965, pl. 21, fig. 15; Gombos, 1979, p. 592, pl. 25, figs. 2, 4; Fenner, 1979, p. 511; Gombos, 1980, pp. 235-236, pl. 10, fig. 48; pl. 13, fig. 52.
Remarks. This is the most common species of Asterolampra in Hole 512.

Asterolampra marginata (Brightwell) Greville, 1862
(No illustration)
References. Greville, 1862, p. 50, pl. 8, fig. 30; Gombos, 1980, p. 237, pl. 1, figs. 1-3; pl. 9, figs. 44-45.

Asterolampra transmarginata Gombos, 1980
(No illustration)
Remarks. Extremely rare in Hole 512.
Asterolampra marylandica Ehrenberg, 1844  
(No illustration)

References. Ehrenberg, 1844, p. 76, fig. 10; Hustedt, 1930, p. 485, fig. 271.

Asterolampra uraster Grove and Sturt, 1887  
(Plate 1, Figs. 4-8)

References. Grove and Sturt, 1887, p. 143, pl. 7, figs. 4-5; Gombos, 1980, p. 239, pl. 3, fig. 19.

Remarks. Rare, but consistently occurs throughout the middle Eocene section in Hole 512.

Asterolampra vulgaris Greville, 1862  
(No illustration)

References. Greville, 1862, p. 47, pl. 7, figs. 17-20; Schmidt, 1888, pl. 137, figs. 10, 12; pl. 202, figs. 14-16; Schrader and Fenner, 1976, p. 592, pl. 25, figs. 1, 3, 5; Gombos, 1980, pp. 239-240, pl. 4, figs. 20-24.

Asterolampra sp.

(Plate 1, Fig. 3)

Remarks. This small species (27 µm in diameter) is characterized by three rays which together form an isosceles triangle; the inner margins of the areolated segments are straight, and in the middle of the long side of the isosceles triangle there is one large areola. This species is very rare in Hole 512 and may be a variety of Asterolampra uraster within whose range it occurs.

Age. middle Eocene.

Genus BERGONIA Tempère

Bergonia anglica Gombos, in press  
(Plate 2, Figs. 5-8)

Remarks. This species differs from Bergonia barbadensis by having single ray-slits; the rays are situated near each other at one side of the valve. A characteristic middle Eocene diatom.

Genus BRIGHTWELLA Raffs, 1861

Brightwellia elaborata Greville, 1861  
(No illustration)

Reference. Greville, 1861, p. 73, pl. 9, fig. 1.

Remarks. Rare in the lower part of the middle Eocene section in Hole 512.

Brightwellia imperfecta Jousé, 1974  
(Plate 3, Fig. 5)

Reference. Jousé, 1974, p. 56, pl. 2, figs. 5-7.

Remarks. A distinctive species with a short range in Hole 512.

Genus COSCINODISCUS Ehrenberg, 1838

Coscinodiscus bulliens Schmidt, 1886  
(No illustration)

Reference. Schmidt, 1886, pl. 61, fig. 11.

Coscinodiscus marginatus Ehrenberg, 1841  
(Plate 4, Fig. 14)

Reference. Hustedt, 1930, pp. 416-418, fig. 223.

Coscinodiscus oligocenicus Jousé, 1974  
(Plate 2, Figs. 1-4)

Reference. Jousé, 1974, p. 348, pl. 1, figs. 6-8, 16.

Remarks. There seems to be quite a bit of variation in this species. For this study I have included all forms similar to those illustrated by Jousé (1974) within a Coscinodiscus oligocenicus group.

Coscinodiscus praeentitus Fenner, 1976  
(No illustration)

Reference. Fenner in Schrader and Fenner, 1976, p. 972, pl. 14, figs. 7-9, 12; pl. 27, fig. 8; pl. 35, fig. 24; pl. 36, fig. 5.

Genus CRASPEDODISCUS Ehrenberg, 1844

Craspedodiscus cossinodiscus Ehrenberg, 1844  
(No illustration)

References. Ehrenberg, 1844, p. 266; Kolbe, 1954, p. 36, pl. 1, fig. 4; Gombos, 1975, p. 316, pl. 4, figs. 5-6, 11-12; Schrader and Fenner, 1976, p. 974.

Remarks. Very rare and sporadic in Hole 512.

Craspedodiscus ellipticus (Greville) Gombos, in press  
(No illustration)


Synonyms. Coscinodiscus obliquus Greville, 1866, p. 9, pl. 1, figs. 9, 10; Schmidt, 1886, pl. 66, figs. 10-11; Walker and Chase, 1886-1887, p. 4, pl. 5, fig. 4; Rattray, 1890, p. 568.

Remarks. Very rare in Hole 512.

Craspodiscus splendidalis (Greville) Gombos, in press  
(Plate 3, Figs. 6-7)

References. Gombos (in press), pl. 2, figs. 9, 11.

Synonyms. Porosdiscus splendialis Greville, 1865, p. 46, pl. 5, fig. 5; Walker and Chase, 1886-1887, p. 2, pl. 5, fig. 5; Rattray, 1890, p. 671.

Remarks. Common to abundant throughout the middle Eocene of Holes 512 and 512A.

Genus ETHMODISCUS C. Aspl.  
(Ethmodiscus rex (Wallich) Hendey, 1953)

(No illustration)


Synonym. Coscinodiscus rex Wallich in Rattray, 1890, p. 568.

Remarks. Very rare in Hole 512.

Genus GONIOTHECIUM Ehrenberg, 1841

Goniotheceum odontella Ehrenberg, 1844  
(No illustration)

References. Karsten, 1928, p. 301, fig. 419A; Schrader and Fenner, 1976, p. 983, pl. 6, figs. 1-2, 4; Fenner, 1979, p. 320, pl. 26, fig. 7; pl. 27, fig. 1.

Genus HEMIAULUS Ehrenberg, 1844

Remarks. This large and complex genus is represented by a great number of species in the material from Holes 512 and 512A. I have not attempted to differentiate all species since that would involve a revision of the genus. Such a study is beyond the scope of this initial report.

Hemialius claviger Schmidt, 1889  
(No illustration)

Reference. Schmidt, 1889, pl. 143, figs. 5-6.
Hemiaulus incurvus Schibkova, 1959  
(No illustration)

References. Schibkova in Krotov and Schibkova, 1959, p. 124, pl. 4, fig. 8; Gombos, 1977, p. 549, pl. 16, figs. 6-7; pl. 17, figs. 1-3.

Remarks. This species is typical of the upper Paleocene of the Falkland Plateau (Gombos, 1977). Its presence in the middle Eocene sediment of Hole 512 suggests that it has been reworked from another locality on the Falkland Plateau.

Genus MELOSIRA Agardh, 1824  
Melosira architropicalis Brun, 1892  
(No illustration)

References. Brun in Schmidt, 1892, pl. 177, figs. 49-50; Hajós, 1976, p. 824, pl. 1, figs. 5-6; Schrader and Fenner, 1976, p. 989, pl. 14, fig. 13; pl. 29, figs. 7-8; pl. 35, figs. 1-4; Gombos, 1977, p. 595, pl. 26, figs. 5-7; Fenner, 1979, p. 524, pl. 16, figs. 7-12.

Synonym. Cyclotella hannaé Kanaya, 1957, pp. 82-84, pl. 2, fig. 17; Forti, 1909, p. 528, pl. 19, fig. 8.

Remarks. This species is common throughout the middle Eocene of Holes 512 and 512A.

Genus ODONTOTROPIS Grunow, 1884  
Odontotropis sp.  
(No illustration)


Genus PSEUDOTRICERATIUM Grunow, 1882  
Pseudotriceratium chevoni (Meister) Gleiser, 1975  
(Plate 2, Figs. 10-12)

References. Gleiser, 1975, pl. 2, fig. 4; Schrader and Fenner, 1976, p. 994, pl. 11, figs. 7-9; pl. 26, fig. 5; Strelnikova in Jousé et al., 1979, p. 51, figs. 152-153.

Synonym. Triceratium chevenyi Meister, 1937, p. 261, pl. 5, fig. 2.

Genus PTEROTHECA (Grunow) Forti, 1909  
Pterotheca aculeifera (Grunow) Forti, 1909  
(No illustration)

References. Grunow in Van Heurck, 1882, pl. 83, figs. 13-14; Grunow in Van Heurck, 1886, p. 430, fig. 151; Kanaya, 1957, pp. 109-110, pl. 8, figs. 1-2; Schrader and Fenner, 1976, p. 994, pl. 43, figs. 1-4; Gombos, 1977, p. 596, pl. 23, figs. 1-2; Fenner, 1979, p. 527, pl. 17, figs. 8-21.

Remarks. Rare, but consistently occurs throughout the middle Eocene of Holes 512 and 512A.

Pterotheca danica (Grunow) Forti, 1909  
(Plate 3, Fig. 9)

References. Forti, 1909, p. 13; Hanna, 1927, p. 119, pl. 20, fig. 11; Proschkina-Lavrenko, 1949, p. 203, pl. 75, fig. 9.

Pterotheca major Jousé, 1955  
(No illustration)

Reference. Jousé, 1955, p. 101, pl. 6, fig. 2; text-figure 1.

Remarks. All forms with broadly expanded bases were included in this taxon.

Pterotheca spada Tempère and Brun, 1889  
(No illustration)

References. Tempère and Brun in Tempère and Brun, 1889, p. 50, pl. 1, fig. 17; Forti, 1909, p. 13.

Genus PYXILLA Greville, 1865  
Pyxilla prolungata Brun, 1893  
(No illustration)

References. Brun, 1893, p. 176, pl. 24, fig. 7; Laporte and Lefebvre, 1929, pl. 7, fig. 46; McCollum, 1975, p. 535, pl. 11, figs. 4-6.

Synonyms. Pyrgopyxis prolungata (Brun) Hendey, 1969, p. 5; Gombos, 1977, p. 596, pl. 21, figs. 1-7; pl. 22, fig. 11; Fenner, 1979, p. 528, pl. 19, fig. 8.

Remarks. Hendey (1969) erected the genus Pyrgopyxis to accommodate species which are similar to those of the genus Pyxilla Greville but which form pairs through attachment of the hornlike apical processes of the valves by inserting small marginal spurs into notches. Hendey (1969, p. 2) did not believe that the type specimen of Pyxilla (i.e., P. barbadensis Greville) possessed such attachment spurs and notches; thus he believed that the forms with such apparatuses constituted a separate genus. Upon close scrutiny of the type slide, Dr. R. Simonsen (pers. comm.) observed an attachment spur on the type species of Pyxilla. It is understandable that previous workers did not observe the spur, because it is located on one side of the hornlike process and may be difficult to see if the valve is oriented with the spur downward.

The taxonomy of the genus is in need of review and revision, for the limits of the various species and varieties are not very clear. In the material from Holes 512 and 512A, the genus is represented, primarily, by broken fragments of valves which are probably P. prolungata. Therefore I have included all fragments from the present material in a P. prolungata group on the range chart (Fig. 1). The most important stratigraphic aspect of the P. prolungata group is its last occurrence in the lower upper Eocene (see Gombos and Ciesielski, this volume).

Genus RHIZOSOLENIA Ehrenberg, 1841  
Rhizosolenia praebarboi Schrader, 1973  
(No illustration)

References. Schrader, 1973, pp. 709-710, pl. 24, figs. 1-3; Schrader and Fenner, 1976, p. 997, pl. 7, fig. 10; pl. 24, figs. 1-3.

Synonyms. Rhizosolenia sp. B Gombos, 1977, p. 596, pl. 23, figs. 7; R. interposita Hajós, 1976, p. 827, pl. 21, fig. 8; R. sp. 1 Strelnikova in Dzinaridze et al., 1979, p. 5, figs. 4, 6.

Remarks. Schrader and Fenner (1976) report this species as ranging from upper Oligocene to middle Miocene in the Norwegian Sea. In Hole 512 it is rare and sporadic through the middle Eocene.

Rhizosolenia sp.  
(Plate 3, Fig. 8)

Remarks. This species, which was observed only as incomplete specimens, is characterized by a thick apical extension, 25 µm long and 10 µm in diameter; the surface has parallel hyaline strips which separate areas of minute punctuation. The species is characteristic of the Lutetian and lower Bartonian in Hole 512.

Genus RYLANDSIA Greville, 1861  
Rylandsia biradiata Greville, 1861  
(Plate 3, Fig. 10)

References. Greville, 1861, p. 67, pl. 8, fig. 1; Gombos, 1980, p. 242, pl. 6, figs. 32-36; pl. 14, figs. 55-56; pl. 15, figs. 57-58.
Genus **SCEPTRONEIS** Ehrenberg, 1844

*Sceptroneis* cf. *S. ligulatus* Fenner, 1979

(No illustration)

**Reference.** Fenner, 1979, p. 531, pl. 31, figs. 8-10.

**Synonym.** Genus and species indeterminate (C) Gombos, 1977, p. 599, pl. 12, fig. 8.

**Remarks.** Two types of valves were observed in Hole 512—those with and those without a structured surface, as Fenner (1979) also noted in samples from the middle Eocene of Hole 356 on the São Paulo Plateau. Both types are included together on the range chart (Fig. 1). The hyaline valves range throughout the middle Eocene section in Hole 512, whereas the structured valves range from Core 6 to Core 13, Section 1. Both are rare and sporadic.

*Sceptroneis pesplanus* Fenner and Schrader, 1976

(No illustration)

**Reference.** Fenner and Schrader in Schrader and Fenner, 1976, p. 998, pl. 22, figs. 30-31; pl. 25, figs. 10-11; Fenner, 1979, p. 531, pl. 26, fig. 16; pl. 27, fig. 16.

Genus **STEPHANOPLYXIS** Ehrenberg, 1844

*Stephanopyxis grunowii* Grove and Sturt, 1888

(No illustration)

**References.** Grove and Sturt in Schmidt, 1888, pl. 130, figs. 1-6; Hanna, 1927, p. 33, pl. 4, fig. 12; Hajós, 1976, p. 824, pl. 3, figs. 3-4; pl. 4, figs 1-2; Gombos, 1977, p. 597, pl. 28, figs. 3-5; pl. 31, figs. 1-2; 7; pl. 32, figs. 1-3.

**Remarks.** Common through the middle Eocene section of Holes 512 and 512A.

*Stephanopyxis turris* (Greville and Arnott) Ralfs, 1861

(No illustration)

**References.** Ralfs in Pritchard, 1861, p. 826, pl. 5, fig. 74; Hustedt, 1930, pp. 304-307, figs. 140-144.

**Remarks.** This nondiagnostic species and its varieties are frequent to common through the middle Eocene in Holes 512 and 512A.

Genus **TRICERATIUM** Ehrenberg, 1841

*Triceratium capitatum* Greville, 1861

(No illustration)

**Reference.** Greville, 1861, p. 43, pl. 4, fig. 10.

**Remarks.** One specimen was observed in Sample 512-10-2, 32-34 cm.

*Triceratium inconspicuum* v. *triobata* Fenner, 1978

(No illustration)


**Synonyms.** *Triceratium inconspicuum* Greville (? in Schmidt, 1882, pl. 77, figs. 25-28; Kanaya, 1957, pp. 100-101, pl. 7, figs. 1-4.

*Triceratium macroporum* Hajós, 1968

(No illustration)

**References.** Hajós, 1968, pl. 35, figs. 1-10; Jousé, 1974, p. 349, pl. 2, fig. 12.

**Remarks.** Jousé (1974) observed one specimen in *Vitiaz* core 5996/5 from the tropical Pacific Oligocene. Hajós (1968) observed it in the middle Miocene of Hungary. The species is characterized by large, sparse areolae with very small pores interspersed. There is some variation in valve outline from nearly straight sides to rather convex sides; in some specimens the angles are subcapitate. Rare and sporadic in Holes 512 and 512A.

*Triceratium* cf. *T. rutilandicum* Tempère, 1890

(Plate 1, Fig. 12; Plate 2, Fig. 9)

**Reference.** Tempère, 1890, p. 33, pl. 3, fig. 6.

**Remarks.** Because the photographic illustration of *Triceratium ruuslandicum* presented by Tempère (1890) is somewhat indistinct, it was not possible to match the illustrations herein with his. The specimens observed in the present material exhibit considerable variation in prolongation of the angles. The surfaces of the valves are covered with puncta of differing sizes, some quite elliptical in shape.

*Triceratium unguiculatum* Greville, 1864

(No illustration)

**References.** Greville, 1864, p. 85, pl. 11, fig. 9; Gombos, 1977, pp. 598-599, pl. 33, figs. 1, 3; pl. 34, figs. 1-6.

Genus **TRINACRIA** Heiberg, 1863

*Trinacria excavata* Heiberg, 1863

(No illustration)

**References.** Heiberg, 1863, p. 51, pl. 4, fig. 9; Hustedt, 1930, pp. 887-888, fig. 532.

**Remarks.** Rare in material from Holes 512 and 512A.

*Trinacria excavata f. *tetragona* Schmidt, 1888

(Plate 4, Fig. 11)


**Synonym.** *Solium exsulctum* sensu Wilt in Schmidt, 1888, pl. 152, figs. 24-25.

**Remarks.** This very distinctive species is potentially a valuable stratigraphic marker for the middle Eocene. In Hole 512 its highest occurrence is in Core 9, Section 3. Below that level it is rare to frequent.

*Trinacria simulacrum* Grove and Sturt, 1887

(No illustration)

**References.** Grove and Sturt, 1887, p. 144, pl. 13, fig. 46; Schmidt, 1888, pl. 127, fig. 14; Hajós, 1976, p. 829, pl. 15, figs. 1-4; Gombos, 1977, p. 599, pl. 35, figs. 1-2, 4; pl. 36, figs. 1-4; Fenner, 1979, p. 536, pl. 29, fig. 2; pl. 31, fig. 2.

**Remarks.** Rare to abundant in the middle Eocene of Holes 512 and 512A.

**INCERTAE SEDIS**

Genus and species uncertain #1

(Plate 7, Figs. 1-6)

**Remarks.** This species is elliptical in outline; the valve surface is covered with fine, subparallel rows of puncta. There are three prominent elevations, one at each end of the valve from which hyaline horns arise and one in the middle of the valve from which an elongate labiate process arises. Spread between the elevations is a hyaline crest through which a variable number of spines project at irregular intervals. No complete examples of this species were observed, only fragments such as those illustrated herein. Formal naming of this species is withheld pending more detailed analysis with the scanning electron microscope and observation of more complete specimens.

**Age.** Middle Eocene.

Genus and species uncertain #2

(Plate 8, Figs. 1-5)

**Remarks.** Similar to but somewhat shorter than Genus and species uncertain #1 (see preceding entry), except for the absence of spines in the hyaline crest.

**Age.** Middle Eocene.

**DESCRIPTIONS OF NEW TAXA**

A new genus, two new species, and a new form are described in the following section. The new taxa are listed alphabetically in a separate section for easy reference.

**Hemiaulus vitreus** n. sp.

(Plate 4, Fig. 1-4)

**Description.** Valves elliptical and hyaline, with scattered puncta; two long, hyaline horns with discontinuous grooves. No complete specimens were observed, so that the nature of the valve margin or the tips of the horns could not be determined. Distance between horns of holotype 27 µm.

**Remarks.** The hyaline nature of the valves distinguishes this species from most other *Hemiaulus* (cf. *H. caracteristicus* Hajós, 1976).
Holotype. Author's slide D283R3; specimen is circumscribed on slide and is illustrated in Plate 4, Figs. 5–10.

Repository. Hustedt Collection, Bremerhaven, Federal Republic of Germany, catalog number Zu2/74.

Type locality. Deep Sea Drilling Project Site 512 (49°52.19'S; 40°50.71'W), located on the northeastern part of the Maurice Ewing Bank at the eastern extremity of the Falkland Plateau.

Type stratum. Sample 512-9-3, 64–66 cm; 34.56 meters below the sediment surface.

Age. Middle Eocene.

Trincaria excavata Heiberg f. inflata n. f. (Plate 4, Figs. 5–10)

Description. Similar to Trincaria excavata Heiberg f. tetragona Schmidt, 1888, but differs from that form by having inflated angles; length of one side of holotype measured from tip of one angle to another 52 µm; length of diagonal of holotype 57 µm; surface covered with puncta, not of uniform size, in radial arrangement, 6 in 10 µm.

Remarks. In Hole 512 this form exhibits a different range from Trincaria excavata f. tetragona (see Fig. 1) and may have evolved from it.

Holotype. Author's slide D283R3; specimen is circumscribed on slide and is illustrated in Plate 4, Figure 10.

Repository. Hustedt Collection, Bremerhaven, Federal Republic of Germany, catalog number Zu2/74.

Type locality. Deep Sea Drilling Project Site 512 (49°52.19'S; 40°50.71'W), located on the northeastern part of the Maurice Ewing Bank at the eastern extremity of the Falkland Plateau.

Type stratum. Sample 512-9-3, 64–66 cm; 34.56 meters below the sediment surface.

Age. Middle Eocene.

Genus TUBAFORMIS n. gen.

Definition. Valves subconical or domeshaped with a single, thick, tapering, curved extension emanating from the apex; valve surface partially punctuate. Genotype: Tubaformis unicornis n. sp. (see following sp.).

Tubaformis unicornis n. sp.

(Plate 5, Figs. 1–6; Plate 6, Figs. 1–2)

Description. Valves subconical with a single, long, thick, tapering extension emanating from the apex. Margin of valve is punctate, with some of the puncta loosely arranged into radially oriented rows; remainder of puncta are randomly distributed in the marginal area, some of the puncta loosely arranged into radially oriented rows; remainder of puncta are randomly distributed in the marginal area, 6 in 10 µm.

Remarks. No similar species could be found in the literature. This species occurs throughout the middle Eocene section in Hole 512, being most common in the lower part of the section. I noticed it also on a slide from Barbados in the British Museum Greville Collection (slide BM 2045), proving its broad distribution during the middle Eocene.

Holotype. Author's slide DSDP 512-10CC; specimen is circumscribed on slide and is illustrated in Plate 5, Figure 1.

Repository. Hustedt Collection, Bremerhaven, Federal Republic of Germany, catalog number Zu2/73.

Type locality. Deep Sea Drilling Project Site 512 (49°52.19'S; 40°50.71'W), located on the northeastern part of the Maurice Ewing Bank at the eastern extremity of the Falkland Plateau.

Type stratum. Sample 512-10CC; 38.3 meters below the sediment surface.

Age. Middle Eocene.

REFERENCES


MIDDLE EOCENE DIATOMS

Plate 5. (All magnifications ×500.) 1–6. *Tubaformis unicornis* n. sp. (1) Holotype. Sample 512-10,CC (2–6) Sample 512-10,CC.
Plate 6. 1-2. *Tubaformis unicornis* n. sp., (1) Sample 512-15-3, 15-17 cm (bar = 20 \(\mu\)m). Same specimen as Fig. 1. Sample 512-15-3, 15-17 cm (bar = 10 \(\mu\)m).