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5. UPPER CRETACEOUS CALCAREOUS NANNOFOSSILS FROM BROKEN RIDGE AND NINETYEAST RIDGE, INDIAN OCEAN[1]

Purtyasti Resiwati[2]

ABSTRACT

Drilling at Broken Ridge and Ninetyeast Ridge during Ocean Drilling Program Leg 121 yielded thick sections of Upper Cretaceous nannofossil-bearing sediments including calcareous chalk, limestone with chert, and volcanic ash.

The upper Campanian to Maestrichtian assemblages from Broken Ridge are austral in nature, containing many of the endemic Southern Ocean forms observed from the Falkland Plateau, Weddell Sea, and the Kerguelen Plateau. The absence of the *Lithraphidites praequadratus–L. quadratus* lineage and significant overlap of the first-appearance datum of *Nephrolithus frequens* and the last-appearance datum of *Reinhardtites levis* negate direct use of temperate zonation schemes for these sediments: the austral zonation is more effective but has lower stratigraphic resolution. The upper Campanian to Maestrichtian of Ninetyeast Ridge contains both austral and tropical forms in different horizons; the modified zonation of Sissingh (1977) is most effective in age-dating these sediments.

The Turonian-Santonian calcareous nannofossil assemblages are relatively sparse and poorly preserved. The absence of diagnostic species in the Turonian-Santonian sections is due to poor preservation and the unfavorable paleoenvironment of the rapid deposition of the thick ash in this interval. Biostratigraphic resolution is significantly impaired in this interval.

INTRODUCTION

Broken Ridge and Ninetyeast Ridge, along with the Kerguelen Plateau, have tectonic histories derived from the history of the Kerguelen/Ninetyeast Ridge hot spot in the context of the evolution of the Indian Ocean. Broken Ridge and Kerguelen Plateau were once a conjugate oceanic platform that formed from intraplate volcanism in the Early Cretaceous or mid-Cretaceous. Ninetyeast Ridge was interpreted to be a hot-spot trace of mid-Cretaceous to Oligocene age that was produced when the Kerguelen hot spot was either under the Indian plate, at the Indian plate boundary, or under portions of the Antarctic plate that were later transferred to the Indian plate by ridge jumps (Luyendyk, 1977; Luyendyk and Rennick, 1977; Peirce, 1978; Duncan, this volume; Royer et al., this volume).

Turonian to upper Maestrichtian nannofossil-bearing sediments were recovered from Sites 752–758 drilled on Broken Ridge and Ninetyeast Ridge during Ocean Drilling Program (ODP) Leg 121 (Fig. 1), during May–June 1988. Turonian–lowermost Campanian calcareous nannofossils were recovered at Site 755. Upper Campanian–upper Maestrichtian assemblages were recovered from Sites 752, 754, and 758. The Upper Cretaceous nannofossil assemblages from Broken Ridge and Ninetyeast Ridge are unusual and important in that they are mixtures of taxa that are characteristic of both the austral and temperate areas. This provides an opportunity for correlation of zonation schemes derived separately from both realms. The purpose of this report is to document the variations of the Cretaceous calcareous nannofossil assemblages from the Leg 121 sites and to provide a more detailed biostratigraphic zonation than that possible during the limited time for shipboard study.

Numerous descriptive and stratigraphic studies have demonstrated significant paleobiogeographic effects on the distribution of Upper Cretaceous calcareous nannofossils. Worsley and Martini (1970) first recognized the provincial nature of the Maestrichtian nannofossils *Micula murus* (temperate) and *Nephrolithus frequens* ("polar"). Thierstein (1976) recognized that certain Cretaceous taxa have distinct distributions that are best explained by latitudinal preferences, leading him to define additional provincial Cretaceous taxa. Thierstein (1981) examined and quantitatively analyzed 243 upper Campanian through Maestrichtian assemblages and documented significant provinciality exhibiting strong paleolatitudinal variations. Two taxa were

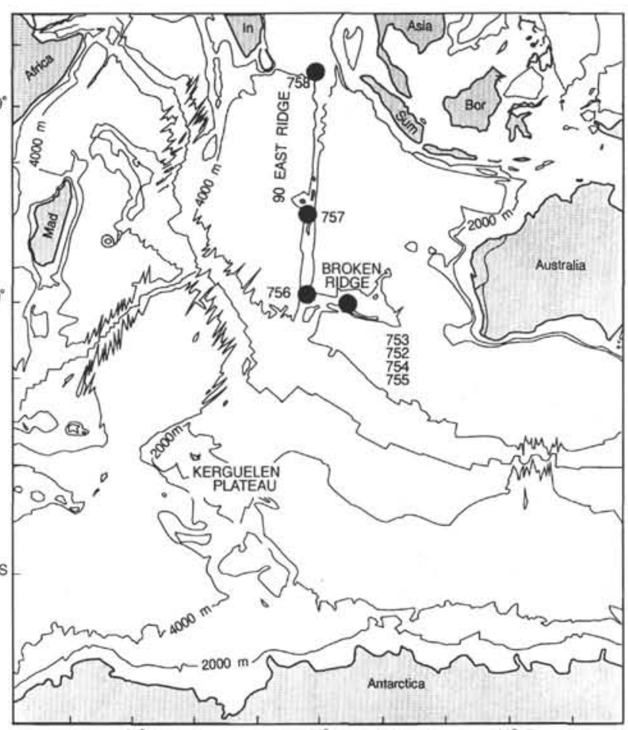

Figure 1. Location of Leg 121 sites.

[1] Weissel, J., Peirce, J., Taylor, E., Alt, J., et al., 1991. *Proc. ODP, Sci. Results,* 121: College Station, TX (Ocean Drilling Program).

[2] Dept. of Geology, University of Nebraska, Lincoln, NE 68588-0340, U.S.A.

identified as distinctly tropical and eight as distinctly boreal/austral.

Drilling on the Falkland Plateau during Deep Sea Drilling Project (DSDP) Legs 36 and 71 recovered distinctive high-latitude calcareous nannofossil assemblages (Wise and Wind, 1977; Wind, 1979a, 1979b; Wise, 1983; Wind and Wise, 1983). Campanian to Maestrichtian calcareous nannofossils from the Falkland Plateau are characterized by assemblages of *Kamptnerius magnificus*, *Monomarginatus* spp., *Nephrolithus* spp., *Eiffellithus turriseiffelii*, and different species of *Biscutum*. The distinctive nature of these assemblages led Wind (1979a) to propose an austral upper Campanian to Maestrichtian zonation based largely on the distribution of *Biscutum* spp. Wind and Wise (1983) were able to correlate the *Biscutum magnum* and *Biscutum coronum* Zones to the *Reinhardtites levis* and *Tranolithus phacelosus* Zones (late Campanian to early Maestrichtian) of the temperate zonation of Sissingh (1977, 1978).

Wise (1988) summarized the results of deep-sea drilling in the Southern Ocean and proposed a comprehensive zonation for the austral Cretaceous. Comparison of the Upper Cretaceous part of Wise's zonation with those of Sissingh (1977) and Roth (1978), derived from temperate locations, illustrates the lack of direct correlation between austral and temperate zonation schemes (Fig. 2). This is especially true for the upper Campanian and Maestrichtian, which are characterized by strong latitudinal provincialism.

Recent results from the Southern Ocean have reinforced these contentions. Pospichal and Wise (1990) documented the dominantly austral assemblages from Maud Rise in the Weddell Sea. They demonstrated that the upper two zones of the temperate zonation (*Arkhangelskiella cymbiformis* and *Nephrolithus frequens* Zones of Sissingh, 1977) could not be used in the southern Atlantic because of the markedly diachronous nature of the first-appearance datum (FAD) of *N. frequens* relative to the last-appearance datum (LAD) of *R. levis*. Watkins (in press) reached the same conclusion in his examination of assemblages from the central Kerguelen Plateau (Leg 120), where the FAD of *N. frequens* actually occurs prior to the LAD of *R. levis*.

These studies document the significant calcareous nannofossil provinciality that characterized the Campanian and Maestrichtian. Watkins (in press, table 4) summarized the paleobiogeographic affinities of key taxa for the Campanian-Maestrichtian of the Southern Hemisphere. His recommendations have been followed herein to assign paleobiogeographic affinities to specific taxa. The term "low latitude" is used to refer to taxa that are common in tropical and/or temperate (<45° paleolatitude) assemblages but absent or much less abundant in high-latitude assemblages. The reverse is true for usage of the term "high latitude." The term "austral" is reserved for those species that were restricted to the southern high latitudes during the Campanian-Maestrichtian.

METHOD AND PROCEDURES

Smear slides were prepared from raw sediment samples and examined using the polarizing light microscope to define the calcareous nannofossil assemblages. Tables 1–5 show the distribution and the preservational state of the nannofossils in the samples examined. The estimation of the abundance of calcareous

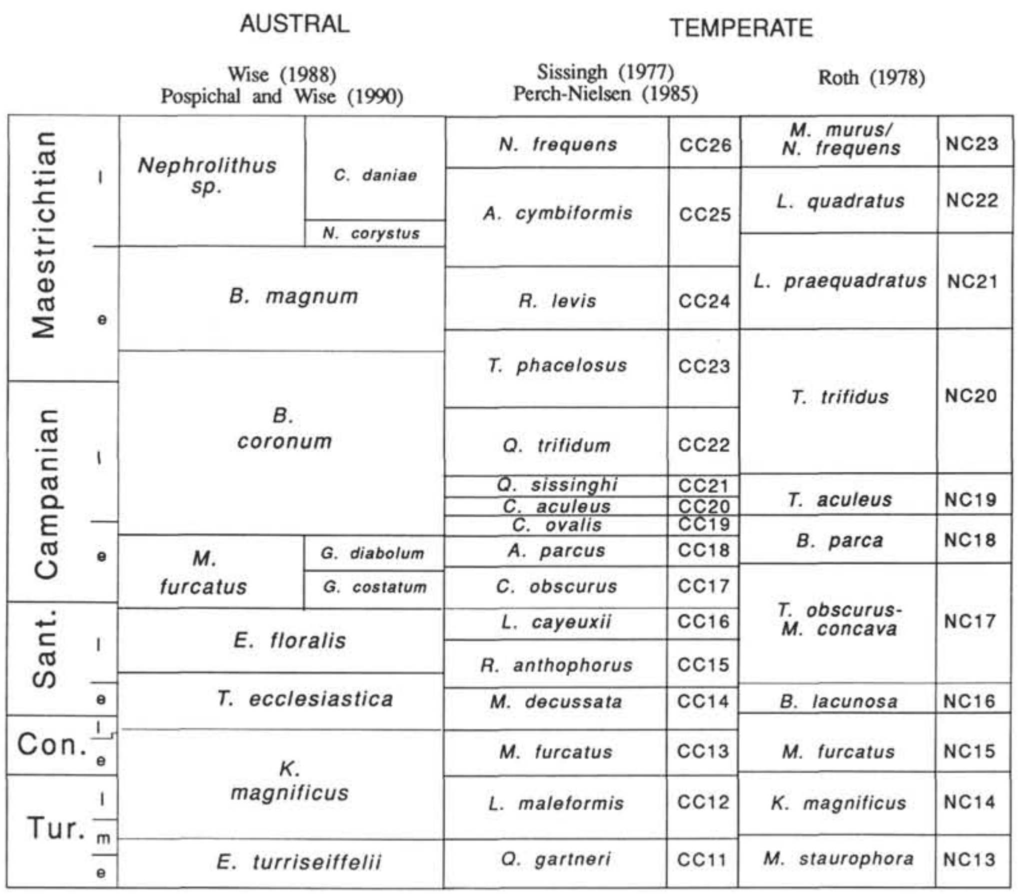

Figure 2. Comparison of nannofossil zonation schemes for the Upper Cretaceous.

nannofossils as a sediment component in the slide follows Watkins and Bowdler (1984):

A = abundant (nannofossils comprise >15% of the sediment);

C = common (nannofossils comprise 15%–5% of the sediment);

F = few (nannofossils comprise 5%–1% of the sediment);

R = rare (nannofossils comprise <1% of sediment);

EB = essentially barren (nannofossils comprise <<1% of the sediment, typically with fewer than 10 specimens per 100 fields of view at 1560×);

B = barren (no nannofossils observed in 100 fields of view at 1560×).

The abundance of individual species is estimated using Hay's (1970) method as modified by Watkins and Bowdler (1984):

A = abundant (at least 1 specimen per field of view at 1500×);

C = common (1 specimen per 2–10 fields of view at 1500×);

F = few (1 specimen per 11–100 fields of view at 1500×);

R = rare (1 specimen per 101–1000 fields of view at 1500×);

? = questionable presence of the species.

The state of preservation of the nannofossils was analyzed with a qualitative standard as follows:

G = good (specimens exhibit little or no secondary alteration);

M = moderate (specimens exhibit the effects of secondary alteration from etching and or overgrowth; identification of species not impaired);

P = poor (specimens exhibit profound effects of secondary alteration from etching and overgrowth; identification of species impaired).

Most of the calcareous nannofossils from the study area are poorly preserved; the scanning electron microscope (SEM) was used to examine some doubtful, poorly preserved forms.

BIOSTRATIGRAPHIC ZONATION

No single published Upper Cretaceous calcareous nannofossil zonation scheme can be used with full reliability because of the unusual mixture of low- and high-latitude forms found at Broken Ridge and, to a lesser degree, at the northern Ninetyeast Ridge sites. This is especially true of the upper Campanian and Maestrichtian sections. The zonation of Roth (1978) uses the FADs of *Nephrolithus frequens* and *Micula murus* (assumed to be simultaneous), *Lithraphidites quadratus*, *Lithraphidites praequadratus*, and *Quadrum trifidum* as markers for his NC zones (Fig. 2). Pospichal and Wise (1990) and Watkins (in press) demonstrated that the FAD of *N. frequens* is markedly diachronous in the Southern Ocean, approaching and even overlapping with that of *Reinhardtites levis*. This phenomenon is evident in the Maestrichtian of Sites 752 and 754 on Broken Ridge (as described in the following), rendering the FAD of *N. frequens* dubious for correlation. *M. murus* is seen only at the top of the Maestrichtian sequence at Site 758 (Ninetyeast Ridge). *L. quadratus* occurs only sporadically at Sites 752 and 758 and not at all at Site 754. *L. praequadratus* was not recognized reliably at any of the Maestrichtian sites on Leg 121, although other evidence indicates that sediments of the appropriate age are present at Sites 752 and 758. *Q. trifidum* and *Quadrum sissinghii* were present in reliable abundances at Site 758, but absent in coeval material from Site 752.

The calcareous nannofossil zonation scheme of Sissingh (1977) is the most appropriate one for the Turonian to Santonian assemblages from Site 755, but is less useful for the upper Campanian and Maestrichtian material. The reliance on the FAD of *N. frequens* (Fig. 2) for the upper Maestrichtian of the Sissingh (1977) zonation makes direct correlation with austral assemblages impossible (Pospichal and Wise, 1990; Watkins, in press). The LADs of *R. levis* and *Tranolithus phacelosus* appear to be reliable in both austral and temperate regions, although the FAD of *Q. trifidum* is useful only in temperate material (Wind and Wise, 1983; Watkins, in press).

The austral zonation of Wise (1988) is useful for the upper Campanian and Maestrichtian of the Broken Ridge sites, but is less applicable to Site 758 on Ninetyeast Ridge. This zonation (Fig. 2) relies heavily on the distribution of the high-latitude *Biscutum* species *B. magnum* and *B. coronum*, while avoiding the problem of *N. frequens* diachroneity. However, this heavy reliance on austral taxa limits its utility at Site 758, where the high-latitude *Biscutum* species are sporadic in occurrence.

In order to overcome some of these problems, I have chosen to use both the Sissingh (1977) and Wise (1988) zonations for the upper Campanian and Maestrichtian material from Broken Ridge. The Sissingh (1977) zonation is used for the low-latitude (5°N) material from Site 758 (Ninetyeast Ridge) and for the Turonian to Santonian material from Site 755. Modifications of the Sissingh (1977) zonation by Perch-Nielsen (1985) are used when additional biostratigraphic resolution is gained (as noted in the following "Site Summaries"). In addition, the upper two zones of the Sissingh (1977) zonation (the *Arkhangelskiella cymbiformis* and *N. frequens* Zones) are combined because of the unreliability of the FAD of *N. frequens* in the australly influenced assemblages from Broken Ridge. The LAD of *R. levis* is used to separate the combined *A. cymbiformis*/*N. frequens* Zone from the underlying *R. levis* Zone. The correlation of zones with Cretaceous stages is based on Perch-Nielsen (1979, 1985) unless otherwise mentioned in the text. The correlation of the stage to the absolute time scale is based on Kent and Gradstein (1985).

SITE SUMMARIES

Site 752

Site 752 lies near the crest of Broken Ridge, about 16 km north of the main southward-facing escarpment (Fig. 3). Two holes were drilled at this site. Hole 752B was drilled at 30°53.483′S, 93°34.652′E, in a water depth of 1086.3 m.

Upper Maestrichtian sediments were recovered in the interval between Sample 121-752B-11R-3, 73–74 cm, and the base of the section at this site. The Cretaceous section at Site 752, designated lithologic Subunit IIC (Peirce, Weissel, et al., 1989), consists of faintly mottled, light gray to light greenish hard chalk, characterized by cross-bedding, burrows, and some curved structures around shell fragments.

The Cretaceous calcareous nannofossils from this site generally exhibit moderate preservation. Some specimens suffer from overgrowth and etching, and some are broken. The nannofossils are rare to few in the uppermost part of the section (near the Cretaceous/Tertiary boundary) but are abundant to common in the majority of the section. The assemblages are relatively diverse in most of the section, except in the uppermost section, close to the Cretaceous/Tertiary boundary, where the assemblages contain only a few taxa. A complete Cretaceous/Tertiary boundary was recovered at Site 752. The Cretaceous/Tertiary boundary of this site is within Sample 121-752B-11R-3, 72–73 cm, based on the first occurrence of *Biantholithus sparsus* (Pospichal, 1989).

In general, the calcareous nannofossil assemblages are moderately diverse. They are dominated by austral and cosmopolitan taxa. High-latitude taxa present include *Misceomarginatus pleniporus*, *Monomarginatus pectinatus*, and *Biscutum magnum* (Table 1). *Kamptnerius magnificus* is abundant, as is typical of high-latitude assemblages. *Watznaueria barnesae* is very rare in the uppermost part of the section, and becomes common in the lower part of the section.

The interval between Samples 121-752B-11R-3, 73–74 cm, and 121-752B-17R-3, 105–106 cm, can be assigned to the combined *Arkhangelskiella cymbiformis*/*Nephrolithus frequens* Zone

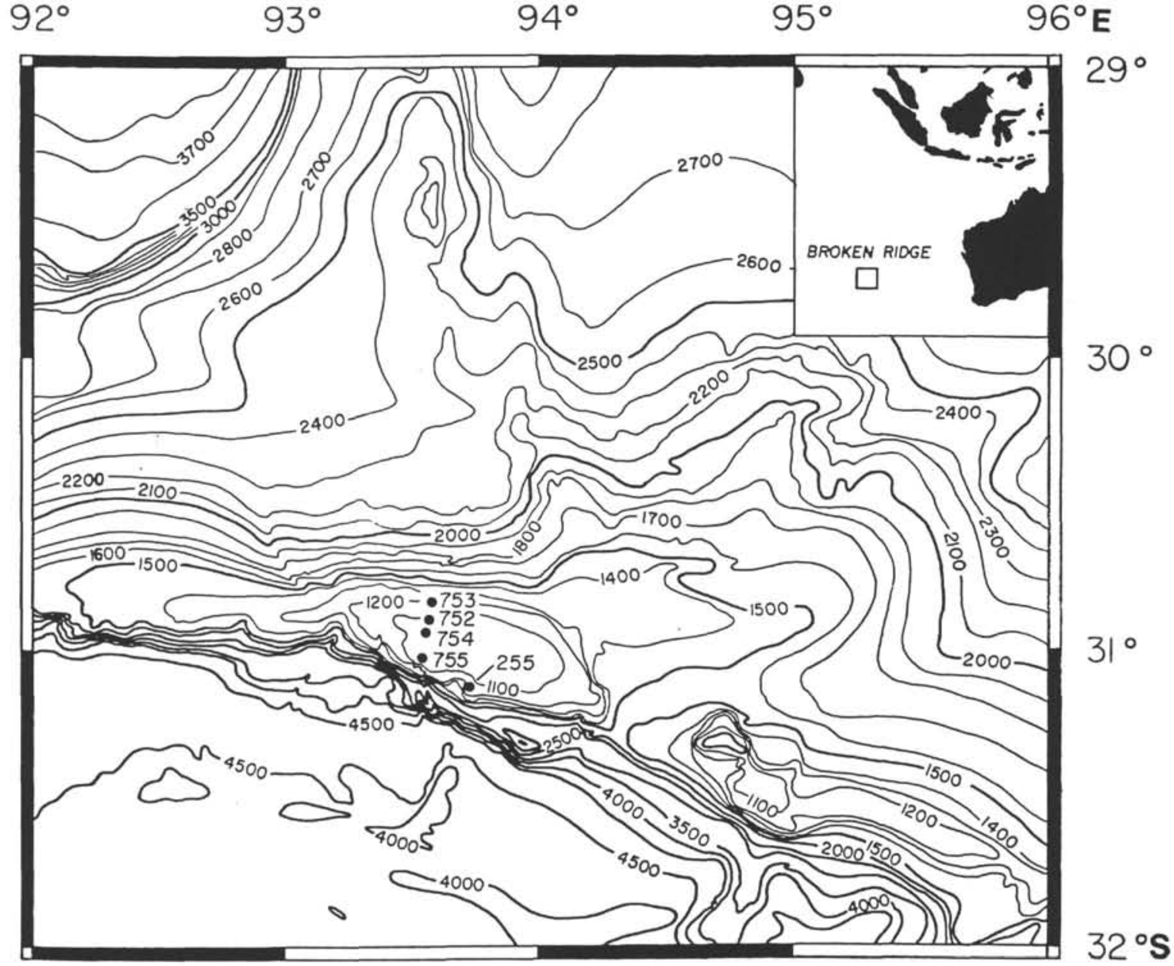

Figure 3. Leg 121 Broken Ridge Sites 752–755 (after Peirce, Weissel, et al., 1989).

of late Maestrichtian age based on the occurrence of *N. frequens* and *Lithraphidites quadratus* without *Reinhardtites levis* (CC25b-26, sensu Perch-Nielsen, 1985). The FAD of *N. frequens* can not be used in this section as *N. frequens* is found from the top of the Cretaceous down to below the last occurrence of *R. levis*. *L. quadratus* is very rare and inconsistent. *Micula murus*, a taxon that is usually found in the uppermost Maestrichtian of low-latitude assemblages, is apparently absent at this site.

The interval from Sample 121-752B-17R-3, 105–106 cm, through Section 121-752B-19R-CC contains *R. levis* (Table 1), indicating the *R. levis* Zone of Sissingh (1977). The presence of high-latitude taxa such as *B. magnum*, *Cribrosphaerella daniae*, and *Nephrolithus corystus*, as well as high abundances of *K. magnificus* and low abundances of *W. barnesae*, indicate the strongly austral affinities of these assemblages.

The use of the austral zonation of Wise (1988) reveals two zones in the Maestrichtian of Site 752. The interval from Samples 121-752B-11R-3, 73–74 cm, to 121-752B-16R-3, 103–104 cm, is assigned to the *N. frequens* Zone of Wise (1988) based on the presence of *N. frequens* without *B. magnum* or *R. levis*. This interval can be subdivided by use of the LAD of *N. corystus*, following the practice of Pospichal and Wise (1990). The LAD of *N. corystus* occurs at Sample 121-752B-13R-6, 42–43 cm.

The interval from Sample 121-752B-16R-CC through Section 121-752B-19R-CC contains *B. magnum* and *N. corystus*, indicating the *B. magnum* Zone (mid-Maestrichtian) of Wise (1988). The occurrence of *B. magnum*, *N. corystus*, *Monomarginatus* spp., *Misceomarginatus pleniporus*, and *Cribrosphaerella daniae*, as well as the high abundance of *K. magnificus* and the paucity of *W. barnesae*, indicates the austral affinities of these assemblages.

Site 754

Site 754 is approximately 14 km north of the south-facing escarpment of Broken Ridge on the transect of drilled sites across the crest of the ridge (Fig. 3). Two holes were drilled at the site. The approximately 20 m of lower Maestrichtian sediment recovered from Hole 754A in Cores 121-754A-17N to 121-754A-23N unconformably underlies the thick Cenozoic chalk section. The unconformable boundary of the Cretaceous and the Cenozoic is marked by loose "beachtype" chert gravel. Drilling at Hole 754A was terminated at 172.1 m below seafloor (mbsf) after five cores were recovered.

Hole 754B was washed down to the upper Eocene chalk. Chert gravel was encountered just above the Cretaceous sediments. Approximately 200 m of Cretaceous section was recovered in Cores 121-754B-5R to 121-754B-25R.

Three major lithologic subunits were designated in this Cretaceous section (Peirce, Weissel, et al., 1989). Uppermost Subunit IIA is a light gray to greenish gray chalk with planar and cross-bedded laminae that unconformably underlies the Tertiary. This subunit contains moderately to poorly preserved but common to abundant nannofossils. Subunit IIB consists of limestone with dark ash layers and chert pebbles. The calcareous nannofossils from this subunit are very rare and show moderate to poor preservation. Subunit IIC, the lowermost subunit at Site 754B, consists of alternating chert and weakly laminated and mottled gray to olive limestone. Calcareous nannofossils are very rare and poorly preserved in this subunit; some samples are barren.

The nannofossil assemblages are relatively diverse in the chalk and limestone subunits, becoming very sparse to barren in the alternating limestone and chert subunit (Tables 2 and 3). Many specimens suffer from overgrowth or etching. For example, many specimens of the genus *Nephrolithus* are overgrown or are missing the central area as a result of dissolution, leaving the vacant outer shield. This makes species assignment difficult. *Kamptnerius magnificus*, *Repagalum parvidentatum*, *Misceomarginatus pleniporus*, *Monomarginatus pectinatus*, *Biscutum magnum*, *Biscutum constans*, and *Biscutum dissimilis* are common constituents of these assemblages, indicating austral affinities. *Calculites obscurus* is common in the upper part of the section but becomes scarce in the lower part of the section (as the lithology changes into chalk and limestone), and it is absent in the chert-bearing limestone subunit.

Reinhardtites levis is found in all samples throughout the sequence at Site 754. Cores 121-754A-17N to 121-754A-23N and the interval from Samples 121-754B-5R-1, 0–1 cm, to 121-754B-12R-1, 42–43 cm, are assigned to the *R. levis* Zone (CC24) of Sissingh (1977) based on the occurrence of *R. levis* and the absence of *Tranolithus phacelosus*. The interval from Sample 121-754B-12R-1, 42–43 cm, to the base of the section (Core 121-754B-25R) is characterized by the same assemblage with the addition of *T. phacelosus*, placing it in the upper *T. phacelosus* Zone (lower Maestrichtian) of Sissingh (1977). Very rare specimens of *Aspidolithus parcus constrictus* occur in Samples 121-754B-24R-2, 20–21 cm, and 121-754B-25R-CC. These are believed to be reworked from other localities. The specimens assigned as *Reinhardtites anthophorus* during the shipboard work are more accurately classified as *Reinhardtites* sp. aff. *R. anthophorus* of Sissingh (1977) (Pl. 4, Fig. 4). This interval is correlated to paleomagnetic Chron 32 (Gee et al., this volume).

Two of the austral zones of Wise (1988) are recognized within the section at Site 754: the lower *Biscutum coronum* Zone and the upper *B. magnum* Zone. Cores 121-754A-17N to 121-754A-23N and the interval from Core 121-754B-5R to Sample 121-754B-9R-5, 118–120 cm, are placed in the austral *B. magnum* Zone based on the presence of *B. magnum* without *B. coronum*. The underlying interval from Section 121-754B-9R-CC through Core 121-754B-25R (total depth) contains both *B. magnum* and *B. coronum*, indicating the *B. coronum* Zone (lower Maestrichtian).

Site 755

Site 755 is about 4 km north of the south-facing escarpment of Broken Ridge, in a water depth of about 1057.9 m (Fig. 2). The objective of drilling at this site was to recover a particularly prominent seismic reflector that crops out at the tip of Broken Ridge. Owing to time constraints, however, drilling at Site 755 was terminated after penetrating to 208 mbsf.

Three major lithologic subunits of Turonian to early Campanian age were recovered from Site 755 (Peirce, Weissel, et al., 1989). The uppermost Subunit IIA was recovered in Cores 121-755A-5R to 121-755A-12R after penetrating a middle Miocene shelly, foraminiferal grainstone layer in the bottom of Core 121-755A-4R. Subunit IIA consists of gray to greenish volcanic ash interbedded with ashy limestone containing a trace of glauconite. Subunit IIB (Cores 121-755A-13R to 121-755A-17R) is volcanic ash that contains variable amounts of glauconite. Core 121-755A-18R to the bottom of the hole (Core 121-755A-19R) composes Subunit IIC, which consists of dark greenish gray tuffs with varying amounts of micrite.

The ash-rich Cretaceous sediments at Site 755 contain poorly preserved and very sparse assemblages of calcareous nannofossils (Table 4). The nannofossils are very rare in most of the section and Subunit IIC is sporadically barren. The poor preservation and low abundances make biostratigraphic assignment difficult.

The interval from Samples 121-755A-5R-1, 36–38 cm, to 121-755A-5R-1, 89–90 cm, contains assemblages with *Calculites obscurus*, *Lucianorhabdus cayeuxii*, and *Aspidolithus parcus*, indicating the *C. obscurus* Zone (CC17; lowermost Campanian). One of the most common taxa in these assemblages is *Helicolithus trabeculatus*. Watkins et al. (1989) and Watkins (in press) noted that this species commonly exhibits an abundance peak near the Santonian/Campanian boundary in Southern Ocean assemblages. If this is true for Broken Ridge (as it is for its conjugate, the Kerguelen Plateau), it implies that this interval lies near the Santonian/Campanian boundary.

The interval from Sample 121-755A-5R-2, 40–41 cm, through Core 121-755A-7R is assigned to the *Lucianorhabdus cayeuxii* Zone (CC16; upper Santonian). This zone is characterized by the occurrence of *Broinsonia furtiva*, *A. parcus*, *L. cayeuxii*, and *Quadrum gartneri*. The latter two taxa are very rare. *Marthasterites furcatus*, a taxon generally seen in coeval assemblages, was observed only in Samples 121-755A-6R-1, 14–15 cm, and 121-755A-6R-3, 46–47 cm. Watkins (in press) noted that *M. furcatus* is rare to absent in coeval assemblages of the conjugate Kerguelen Plateau.

The interval from Core 121-755A-8R through Sample 121-755A-10R-2, 21–22 cm, is in the *Reinhardtites anthophorus* Zone (CC15) of the upper Santonian. This zone is characterized by the occurrence of *R. anthophorus* without *L. cayeuxii*. Nannofossil abundance and preservation are poor in this interval.

The interval from Sample 121-755A-10R-2, 21–22 cm, through Core 121-755A-11R is assigned to the *Micula decussata* Zone (CC14; uppermost Coniacian to lower Santonian) based on the presence of the nominate taxon in the absence of *R. anthophorus*. The Coniacian/Santonian boundary is in this zone, slightly above the first occurrence of *M. decussata*. *M. furcatus*, *Lucianorhabdus maleformis*, *Eprolithus floralis*, and *Q. gartneri* are poorly preserved and very rare in this section.

The underlying sequence is characterized by ash-rich sediments barren of nannofossils or containing poorly preserved, sparse assemblages only. The lack of *M. decussata* from Core 121-755A-13R through the base of the section (Core 121-755A-19R) indicates a pre-early Coniacian age for these sediments. Although they occur inconsistently, *E. floralis*, *Eprolithus floralis* sp. 1, *Eprolithus floralis* sp. 2, and *Lithastrinus moratus* are present in this interval. These species are typical of the *L. maleformis* Zone (CC12) of the upper Turonian, although the *M. furcatus* Zone (CC13; lower Coniacian) may be present, as the lack of *M. furcatus* in this interval may be due to the paleoenvironmental restrictions. The presence of *K. magnificus*, *Gartnerago obliquum*, and *Eiffellithus eximius* indicates that the lowermost part of the section is still Turonian.

Site 758

Site 758 is the only site drilled on the Ninetyeast Ridge during Leg 121 that penetrated Cretaceous sediments. This site lies along the crest of Ninetyeast Ridge, midway between DSDP Sites 216 and 217. Hole 758A, which penetrated the Cretaceous, is at 5°23.049′N, 90°21.673′E, in a water depth of 2923.6 m. Total penetration at Hole 758A was 453.83 mbsf. Four lithologic units were designated in the approximately 230 m of upper Campanian to upper Maestrichtian sediments recovered (Peirce, Weissel, et al., 1989). The Cretaceous calcareous nannofossil assemblages in this section are more diverse than those found at the Broken Ridge sites, as a result of the addition of some low-latitude forms on Ninetyeast Ridge. Taxa characteristic of high-latitude, such as *Biscutum magnum*, *Biscutum dissimilis*, *Biscutum constans*, *Misceomarginatus pleniporus*, *Monomarginatus pectinatus*, and *Rep-*

Table 1. Maestrichtian calcareous nannofossils, Hole 752B.

Age		Nannofossil zone			Core, section, interval (cm)	Abundance	Preservation	*Ahmuellerella octoradiata*	*Arkhangelskiella cymbiformis*	*Arkhangelskiella specillata*	*Biscutum castrorum*	*Biscutum constans*	*Biscutum dissimilis*	*Biscutum magnum*	*Broinsonia enormis*	*Chiastozygus garrisonii*	*Chiastozygus litterarius*	*Chiastozygus* sp.	*Cretarhabdus angustiforatus*	*Cretarhabdus conicus*	*Cribrosphaerella ehrenbergii*	*Cribrosphaerella? daniae*	*Eiffellithus gorkae*	*Eiffellithus turriseiffelii*	*Gartnerago obliquum*	*Glaukolithus compactus*	*Helicolithus trabeculatus*	*Kamptnerius magnificus*	*Lithraphidites quadratus*	*Lithraphidites carniolensis*	*Lucianorhabdus cayeuxii*	*Markalius inversus*
Maestrichtian	late	CC26 — CC25	*N. frequens* — *A. cymbiformis*	*N. frequens*	11R-3, 73-74	R	M	R	R	R	.	.	.	.	F	.	.	.	F	?	.	.	.	.	.	.	.	R	.	.	F	F
					11R-4, 46-47	A	M	C	A	.	.	.	.	.	.	F	.	.	.	F	F	.	.	F	.	.	F	C	F	.	.	.
					11R-CC	A	M	C	.	.	.	.	.	.	.	F	.	.	.	.	.	R	.	F	.	.	.	F	?	.	F	.
					12R-1, 41-42	C	M	C	C	C	.	.	.	.	.	.	.	.	.	R	C	.	F	C	R	.	.	F	.	.	.	.
					12R-2, 41-42	A	M/P	.	.	.	.	.	.	.	F	R	.	R	.	R	.	.	.	.	.	.	.	C	.	.	C	.
					12R-3, 42-43	C	M	R	C	C	.	.	.	.	.	R	.	.	.	R	C	F	F	R	.	.	.	F	.	R	C	R
					12R-5, 42-43	C	M/P	.	C	C	.	.	.	.	.	R	.	F	.	R	F	.	R	R	R	R	.	C	.	.	C	.
					12R-CC	A	M/G	C	.	A	.	.	.	.	.	.	C	C	R	R	F	C	R	F	C	R	.	C	.	.	F	R
					13R-1, 48-49	A	M/G	.	.	A	.	.	.	.	.	R	.	.	.	C	F	R	.	R	C	.	.	A	.	R	C	.
					13R-3, 46-47	A	M/G	C	F	A	.	.	.	.	.	.	.	.	.	.	F	F	.	C	F	.	.	C	F	F	C	.
					13R-5, 45-46	C	M/P	R	F	F	.	.	.	.	.	R	.	.	.	F	R	R	.	F	R	R	.	A	.	.	C	R
					13R-6, 42-43	A	M	.	R	.	.	.	.	.	F	.	.	R	.	R	F	R	.	R	R	.	.	C	.	.	C	R
					13R-CC	A	M/P	F	F	C	.	.	.	.	.	C	.	.	.	C	F	.	.	C	F	.	.	A	.	R	C	.
					14R-1, 32-33	A	M/P	R	.	C	R	.	.	.	R	R	.	.	.	.	C	R	.	F	.	.	.	C	.	.	C	R
					14R-3, 43-44	C	P	.	R	R	R	.	.	.	F	R	.	.	R	.	.	.	R	R	.	.	.	C	.	F	C	R
					14R-5, 28-29	A	M/P	.	F	.	R	.	.	.	R	R	.	.	.	.	.	.	.	R	.	.	.	A	.	C	R	.
					14R-7, 22-23	A	M/P	.	F	F	.	.	.	.	.	R	.	R	.	F	F	R	.	R	.	.	.	C	.	?	A	.
					14R-CC	A	M/P	R	C	R	.	R	.	.	.	R	.	F	.	.	F	R	.	F	.	.	.	A	.	F	C	R
					15R-1, 27-28	C	M/P	.	C	C	C	R	.	.	.	C	.	R	.	R	F	.	.	R	.	.	.	A	.	F	A	R
					15R-3, 21-22	C	M/P	.	C	F	F	.	.	.	.	F	.	.	.	R	.	.	.	F	.	.	.	F	.	F	C	.
					15R-5, 92-93	C	M/P	.	F	F	.	.	.	.	R	.	.	.	.	.	R	R	.	F	R	.	.	C	.	F	F	R
					15R-CC	C	M/P	F	C	C	C	.	R	.	.	.	R	C	.	C	C	.	.	C	F	.	.	A	.	C	A	.
					16R-2, 66-67	C	M/P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.	.	F	.	.	A	.
					16R-3, 103-104	C	M	.	C	C	.	.	.	.	.	.	.	.	.	R	C	R	.	C	.	.	.	C	.	F	C	.
				B. magnum	16R-CC	C	M/P	F	C	.	.	.	.	R	R	F	.	R	.	R	F	R	F	C	F	.	.	C	.	F	C	.
					17R-1, 2-3	F	M/P	.	.	.	.	.	.	?	.	.	.	R	.	R	R	R	R	F	R	.	.	C	.	R	C	.
					17R-3, 105-106	C	M/P	C	F	F	C	R	.	.	.	C	.	.	.	F	R	F	F	C	R	R	.	C	.	F	C	.
	early	CC24	*R. levis*		17R-4, 6-7	C	M/P	.	R	.	.	F	R	.	.	R	.	.	.	.	F	.	.	F	.	R	.	F	.	.	F	.
					17R-5, 21-22	F	M/P	C	F	F	.	.	.	C	R	.	.	.	.	F	F	.	R	C	.	.	.	F	.	.	C	R
					17R-CC	A	M/P	C	.	C	.	.	F	C	.	.	.	R	.	.	F	F	.	C	.	F	.	C	.	F	C	R
					19R-1, 27-28	C	M	F	F	R	.	.	.	C	.	.	.	R	.	R	F	R	R	C	.	C	.	C	.	.	A	.
					19R-3, 44-45	A	M	C	.	.	.	.	R	F	.	R	.	.	.	R	F	R	F	F	.	C	.	C	.	F	A	.
					19R-CC	A	M/P	R	R	R	.	.	R	R	.	.	.	.	.	R	C	R	R	.	R	C	.	C	.	C	A	.

Note: Preservation: G = good, M = moderate, P = poor. Abundance: A = abundant, C = common, F = few, R = rare, ? = questionably present, B = barren, . = not present.

Age		Nannofossil zone			Core, section, interval (cm)	Abundance	Preservation	*Microrhabdulus decoratus*	*Micula decussata*	*Misceomarginatus pleniporus*	*Monomarginatus pectinatus*	*Monomarginatus quaternarius*	*Nephrolithus corystus*	*Nephrolithus frequens*	*Phanulithus obscurus*	*Placozygus fibuliformis*	*Placozygus sigmoides*	*Prediscosphaera arkhangelskyi*	*Prediscosphaera bukryi*	*Prediscosphaera cretacea*	*Prediscosphaera grandis*	*Prediscosphaera honjoi*	*Prediscosphaera intercisa*	*Prediscosphaera spinosa*	*Prediscosphaera stoveri*	*Reinhardtites levis*	*Rhagodiscus angustus*	*Stradneria crenulata*	*Thoracosphaera operculata*	*Thoracosphaera* sp.	*Vekshinella? parma*	*Watznaueria barnesae*	*Zygodiscus xenotus*
Maestrichtian	late	CC26 — CC25	*N. frequens* — *A. cymbiformis*	*N. frequens*	11R-3, 73–74	R	M	R	F	.	.	.	.	F	.	C	.	.	.	R	.	.	.	.	F	.	.	.	R	.	.	R	F
					11R-4, 46–47	A	M	F	A	.	.	.	.	C	.	.	F	.	.	F	.	F	.	.	F	.	.	.	.	.	.	F	F
					11R-CC	A	M	F	C	.	.	.	.	C	.	.	F	.	.	F	?	.	.	.	F	.	.	.	.	.	.	C	F
					12R-1, 41–42	C	M	F	C	.	.	.	.	C	.	.	.	.	.	.	?	.	.	.	.	.	.	C	.	.	.	F	R
					12R-2, 41–42	A	M/P	.	A	.	.	.	.	C	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	F
					12R-3, 42–43	C	M	.	C	.	.	R	.	C	.	.	.	.	.	R	?	R	.	.	F	.	.	R	.	.	.	R	R
					12R-5, 42–43	C	M/P	.	C	.	.	R	.	C	.	.	.	.	.	R	?	F	.	.	R	.	.	F	.	.	.	.	R
					12R-CC	A	M/G	R	R	.	.	F	.	A	.	.	A	.	C	C	.	F	F	.	A	.	F	F	.	.	.	.	C
					13R-1, 48–49	A	M/G	.	A	.	.	.	.	A	R	.	A	.	.	C	F	C	F	C	C	.	.	F	F	.	.	.	F
					13R-3, 46–47	A	M/G	.	A	.	.	.	.	F	.	.	.	.	C	.	C	.	F	R	A	.	.	.	F	.	.	.	F
					13R-5, 45–46	C	M/P	.	A	.	.	.	.	F	.	.	.	.	.	F	R	.	F	.	.	.	.	.	.	.	.	.	.
					13R-6, 42–43	A	M	.	A	.	.	.	F	C	.	.	.	.	.	.	.	.	.	.	C	.	.	.	.	.	.	.	R
					13R-CC	A	M/P	.	A	.	.	R	R	A	.	.	C	.	C	F	R	C	F	?	C	.	R	R	F	R	.	F	F
					14R-1, 32–33	A	M/P	.	A	.	.	R	R	A	.	.	F	.	C	C	.	C	.	.	.	.	.	.	R	R	.	R	R
					14R-3, 43–44	C	P	.	A	.	.	.	.	R	.	F	.	.	.	R	.	.	.	.	.	.	.	F	.	.	.	R	F
					14R-5, 28–29	A	M/P	F	A	R	.	R	R	F	.	F	.	.	F	C	R	F	.	R	.	.	.	R	.	.	.	.	F
					14R-7, 22–23	A	M/P	F	A	R	.	.	R	F	.	F	.	.	.	C	.	.	.	.	.	.	?	.	.	?	.	F	F
					14R-CC	A	M/P	F	A	R	.	R	.	C	.	.	.	R	.	C	.	.	.	R	.	.	.	F	.	.	R	F	F
					15R-1, 27–28	C	M/P	F	A	R	R	R	.	A	R	C	.	.	R	F	.	.	F	R	.	.	.	R	R	.	.	.	F
					15R-3, 21–22	C	M/P	R	A	.	.	.	.	R	.	F	.	.	.	.	R	.	.	.	.	.	.	R	.	.	.	.	R
					15R-5, 92–93	C	M/P	F	A	.	.	.	.	F	.	F	.	.	.	R	.	R	.	.	.	.	R	.	.	.	.	.	.
					15R-CC	C	M/P	.	A	R	R	R	R	C	R	C	.	.	.	C	.	.	.	.	.	.	.	F	.	R	R	F	.
					16R-2, 66–67	C	M/P	F	A	.	.	R	.	F	.	F	.	.	.	R	.	.	.	R	.	.	.	.	.	.	.	F	.
					16R-3, 103–104	C	M	A	A	.	.	.	.	C	.	R	.	.	.	.	.	.	.	.	.	.	.	R	F	.	.	.	.
				B. magnum	16R-CC	C	M/P	C	A	.	.	C	C	C	.	C	F	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	F
					17R-1, 2–3	F	M/P	F	C	R	.	R	R	F	.	.	.	.	.	.	F	.	.	C	.	.	R	R	.	.	.	.	.
	early	CC24	*R. levis*		17R-3, 105–106	C	M/P	F	A	.	R	F	R	C	.	.	.	.	.	R	.	?	.	C	.	R	F	F	R	.	.	.	F
					17R-4, 6–7	C	M/P	F	A	.	.	F	C	C	.	.	.	.	.	F	.	.	.	.	.	R	.	R	.	.	.	.	F
					17R-5, 21–22	F	M/P	C	A	.	.	R	.	R	.	F	.	.	R	R	.	F	.	.	.	F	F	F	.	.	.	.	.
					17R-CC	A	M/P	F	C	R	R	F	R	C	F	.	.	.	.	R	.	.	.	C	.	F	.	.	.	.	.	.	C
					19R-1, 27–28	C	M	.	A	R	.	F	.	F	C	.	R	.	.	F	.	.	.	R	R	C	.	?	.	.	.	R	.
					19R-3, 44–45	A	M	F	A	.	.	F	.	.	A	.	.	.	.	F	.	.	.	.	.	C	.	?	.	.	.	C	.
					19R-CC	A	M/P	.	A	C	R	R	.	F	C	.	R	C	.	?	.	R	.	?	R	C	R	R	R	.	.	C	R

Table 2. Maestrichtian calcareous nannofossils, Hole 754A.

Age	Nannofossil zone			Core, section, interval (cm)	Abundance	Preservation	*Ahmuellerella octoradiata*	*Arkhangelskiella cymbiformis*	*Arkhangelskiella specillata*	*Biscutum constans*	*Biscutum dissimilis*	*Biscutum magnum*	*Broinsonia enormis*	*Broinsonia furtiva*	*Chiastozygus garrisonii*	*Chiastozygus* sp.	*Cretarhabdus conicus*	*Cribrosphaerella daniae*	*Cribrosphaerella ehrenbergii*	*Eiffellithus gorkae*	*Eiffellithus turriseiffelii*	*Gartnerago obliquum*	*Glaukolithus compactus*	*Kamptnerius magnificus*	*Lithraphidites carniolensis*	*Lucianorhabdus arcuatus*	*Lucianorhabdus cayeuxii*	*Manivitella pemmatoidea*	*Microrhabdulus decoratus*	*Micula decussata*	*Misceomarginatus pleniporus*
early Maestrichtian	CC24	*R. levis*	*B. magnum*	17N-CC	C	M/P	C	.	R	R	.	R	C	.	R	.	.	.	R	R	R	.	C	C	.	.	C	.	R	A	F
				18N-CC	C	M/P	.	.	R	.	.	.	.	.	.	.	.	.	C	.	.	.	C	C	.	.	C	.	.	A	R
				19N-1, 47-48	C	M	C	.	F	.	R	R	.	.	F	R	F	.	C	R	F	F	A	C	.	.	C	.	R	A	F
				19N-CC	C	P	R	R	R	.	.	.	C	.	.	.	.	.	R	.	.	.	C	C	.	.	C	.	.	A	R
				20N-1, 47-48	C	M	C	.	F	R	F	C	C	F	.	.	F	.	C	.	C	F	C	C	R	.	C	.	R	A	C
				20N-CC	C	M/P	R	.	F	.	.	F	C	.	.	F	R	R	C	.	R	R	C	C	F	.	A	.	R	A	F
				21N-1, 47-48	F	M	R	.	R	R	R	C	C	.	.	F	F	.	R	.	R	R	C	C	F	.	A	.	.	C	R
				21N-1, 135-136	F	M	F	.	R	R	R	C	C	.	.	R	F	.	.	.	.	F	C	C	F	.	C	.	R	.	R
				21N-CC	C	M/P	R	F	R	R	R	C	C	.	.	F	F	F	F	.	R	R	C	C	F	.	A	.	R	C	F
				22N-CC	F	P	.	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	R	.	.	C	.	.	A	.
				23N-1, 7-8	A	M	C	.	F	F	C	C	.	C	R	F	F	.	F	F	C	F	C	C	.	C	A	R	F	A	F
				23N-CC	A	M	F	.	F	R	F	C	C	F	F	.	C	.	C	.	C	F	C	C	F	.	A	.	F	C	F

Note: Preservation: G = good, M = moderate, P = poor. Abundance: A = abundant, C = common, F = few, R = rare, ? = questionably present, B = barren, . = not present.

Age	Nannofossil zone			Core, section, interval (cm)	Abundance	Preservation	*Nephrolithus corystus*	*Nephrolithus frequens*	*Phanulithus obscurus*	*Placozygus fibuliformis*	*Placozygus sigmoides*	*Prediscosphaera arkhangelskyi*	*Prediscosphaera bukryi*	*Prediscosphaera cretacea*	*Prediscosphaera spinosa*	*Prediscosphaera stoveri*	*Reinhardtites levis*	*Repagalum parvidentatum*	*Rhagodiscus angustus*	*Staurolithites* sp.	*Stradneria crenulata*	*Thoracosphaera operculata*	*Thoracosphaera* sp.	*Watznaueria barnesae*	*Zygodiscus xenotus*
early Maestrichtian	CC24	*R. levis*	*B. magnum*	17N-CC	C	M/P	C	.	C	R	.	.	.	R	.	.	C	.	.	.	.	.	R	.	.
				18N-CC	C	M/P	.	.	R	.	.	.	.	.	.	.	C	C	.	.	.	.	.	.	.
				19N-1, 47-48	C	M	F	F	C	.	R	.	R	F	.	R	C	F	.	.	R	.	.	.	.
				19N-CC	C	P	.	.	C	.	.	.	.	.	.	.	C	.	.	.	.	.	.	R	.
				20N-1, 47-48	C	M	R	R	C	F	.	.	.	C	R	.	C	.	.	R	.	.	R	.	C
				20N-CC	C	M/P	F	.	C	R	R	.	.	R	R	.	C	.	?	.	.	.	.	R	F
				21N-1, 47-48	F	M	.	R	C	R	.	R	.	.	.	R	C	R	.	.	F	.	.	.	.
				21N-1, 135-136	F	M	.	.	C	R	.	R	.	R	.	.	C	R	.	.	.	.	.	.	.
				21N-CC	C	M/P	F	R	C	R	.	.	.	R	.	R	C	R	.	.	F	.	.	.	.
				22N-CC	F	P	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				23N-1, 7-8	A	M	R	R	C	R	.	F	.	F	.	?	R	.	.	.	.	R	R	.	C
				23N-CC	A	M	C	F	C	F	.	F	.	F	.	.	R	.	.	.	F	.	R	.	C

agalum parvidentatum, occur with low-latitude forms such as *Arkhangelskiella specillata, Arkhangelskiella cymbiformis, Aspidolithus parcus constrictus, Gartnerago obliquum, Quadrum trifidum, Quadrum sissinghii*, and *Micula murus. Reinhardtites levis, Reinhardtites* sp. aff. *R. anthophorus, Reinhardtites anthophorus*, and diverse species of *Prediscosphaera* are also present (Table 5).

Uppermost lithologic Subunit IIB was recovered from Cores 121-758A-32X to 121-758A-38X. This subunit consists of mottled and burrowed calcareous and foraminiferal chalk that contains fragments of inoceramids and other mollusks. Calcareous nannofossils in Subunit IIB are abundant and exhibit good to moderate preservation.

The upper Maestrichtian *Nephrolithus frequens* Zone of Sissingh (1977) occurs in Section 121-758A-32X-1 and is characterized by the occurrence of the low-latitude form *M. murus*. No specimens of the high-latitude species *N. frequens* were found in this interval, suggesting that this site was tropical during the latest Maestrichtian.

The interval from Samples 121-758A-32X-3, 47–48 cm, to 121-758A-35X-5, 47–48 cm, contains mixed assemblages, making zonal assignment difficult. Reworked specimens of *A. parcus constrictus* were found with *R. levis, Lithraphidites quadratus*, and *Nephrolithus corystus. Tranolithus phacelosus* is very rare and inconsistent in its occurrence; it is believed to be reworked. This interval is assigned as the *R. levis* Zone (CC24) of the lower Maestrichtian based on the consistent presence of *R. levis*. Specimens of the genus *Nephrolithus* are generally poorly preserved.

The interval from Samples 121-758A-33X-5, 47–48 cm, to 121-758A-40X-2, 47–48 cm, contains the assemblage of *R. levis, T. phacelosus, Q. sissinghii*, and *A. parcus constrictus* and lacks *R. anthophorus*. This assemblage is characteristic of the *T. phacelosus* Zone (CC23a) of late Campanian age. The upper boundary of this zone at this site was delineated by the last common occurrence of *T. phacelosus*. This stratigraphic level also corresponds to the LAD of *Q. sissinghii*, an event that Perch-Nielsen (1985) suggested is coeval with the LAD of *T. phacelosus*.

Unit III extends from the base of Subunit IIB down to Sample 121-758A-47R-CC. This unit consists of bioturbated greenish gray tuffs that contain basalt pebbles with minor beds of calcareous chalk and shell fragments. Calcareous nannofossils in Unit III are common to rare, exhibiting moderate to poor preservation. Unit IV, the lowermost Cretaceous sediment at Site 758, is dominated by gray tuffs with minor interbeds of ashy, calcareous chalk and partially indurated ash beds. It also contains some pyrite in burrows, rounded basalt pebbles, and shell fragments. The sedimentary structures include some sharp scoured contacts, microfractures, and soft-sediment deformation structures. The calcareous nannofossils in this unit also exhibit moderate to poor preservation but are very rare or absent in some samples in the lower part of the section.

The calcareous nannofossil assemblages in the interval from Sample 121-758A-40X-CC through Core 121-758A-57R (total depth) are uniform in nature and composition. The assemblage is characterized by the occurrence of *R. anthophorus, R. levis, Q. trifidum, Q. sissinghii*, and *Eiffellithus eximius*. This indicates the upper *Q. trifidum* Zone (CC22c) of the upper Campanian. The Maestrichtian/Campanian boundary is placed in Sample 121-758A-41X-5, 46–47 cm, at the LAD of *E. eximius*. The presence of the *Quadrum* spp. and the absence of austral forms indicate that conditions at this site were temperate to tropical during the late Campanian to early Maestrichtian.

SUMMARY AND CONCLUSIONS

The Cretaceous calcareous nannofossils recovered from the sites drilled during Leg 121 range from Turonian to late Maestrichtian, as summarized in Figure 4. Micrographs of diagnostic species are presented in Plates 1–8.

Maestrichtian calcareous nannofossil assemblages were recovered from Sites 752 and 754 on Broken Ridge and Site 758 on Ninetyeast Ridge. The quality of the upper Maestrichtian calcareous nannofossil assemblages from the Broken Ridge sites is generally moderate to poor. The assemblages are characterized by high-latitude species. The upper Campanian through Maestrichtian calcareous nannofossil assemblages recovered from Sites 752 and 754 (Broken Ridge) are strongly austral in character. They are quite similar to the assemblages recovered from the Falkland Plateau (Legs 36 and 71), the Weddell sea (Leg 113), and the central Kerguelen Plateau (Leg 120). The *Nephrolithus frequens* Zone of Sissingh (1977) can not be applied at the uppermost Maestrichtian section at Broken Ridge because of the overlapping ranges of *N. frequens* and *Reinhardtites levis*. At Site 758 (Ninetyeast Ridge) the upper Maestrichtian assemblages are moderately to well preserved. The assemblage contains some high-latitude forms, but the distinctive lower latitude taxon *Micula murus* is also present.

The early Maestrichtian assemblages are mostly very poor at the Broken Ridge sites. At Site 754, barren samples were found alternating with intervals containing very few, scattered species in the very thick limestone-chert section. SEM work suggests that the lowermost sediment at this site is also Maestrichtian in age. At Ninetyeast Ridge (Site 758), many reworked specimens were found, making the biostratigraphic assignment difficult.

An upper Campanian section was recovered from Site 758. The low-latitude taxa *Quadrum sissinghii* and *Quadrum trifidum* are well preserved. In addition, several high-latitude species were found in these assemblages, indicating a mixing of southern and temperate water masses.

The Turonian to lowermost Campanian were recovered only from Site 755 on Broken Ridge. For the most part, the preservation is very poor. Barren samples were found in the lower part of the section. The rapid ash-rich sedimentation at this time was not favorable for the preservation of calcareous nannofossils.

TAXONOMIC NOTES

Genus *Eprolithus* Stover (1966)
Eprolithus sp. 1
(Pl. 8, Figs. 4, 5)

Remarks. Perch-Nielsen (1985, figs. 56.17 and 56.18) considered this form intermediate between *Eprolithus floralis* (Stradner, 1962) Stover (1966) and the first representative of the genus *Quadrum* (i.e., her *Quadrum* sp.). The forms illustrated here appear to be identical with those of Perch-Nielsen (1985). This taxon differs from *E. floralis* (s.s.) in having an irregular shape with eight to nine wall elements.

Eprolithus sp. 2
(Pl. 8, Figs. 7, 8)

Remarks. This form is identical to *Eprolithus* sp. 2 of Perch-Nielsen (1979, 1985); I have followed her nomenclature designation. This form differs from *E. floralis* (s.s.) in having eight acute wall elements with a moderately open central area. Perch-Nielsen (1979) suggested that this form could represent the ancestor of the Late Cretaceous genus *Lithastrinus*.

Genus *Reinhardtites* Perch-Nielsen (1968)
Reinhardtites sp. aff. *R. anthophorus* (Deflandre, 1959)
Perch-Nielsen (1968)
(Pl. 4, Fig. 4)

Remarks. Sissingh (1977) considered this form to be transitional between *R. anthophorus* and *R. levis* Prins and Sissingh (1977 *in* Sissingh, 1977). It is characterized by a moderately large central opening surrounded by a wide plate-lining at both sides of the central bridge structure. It differs from *R. anthophorus* in having narrower central openings and in the absence of the widened inverted cone structure in its stem. It differs from *R. levis* in having wider central openings.

Table 3. Maestrichtian calcareous nannofossils, Hole 754B.

Age	Nannofossil zone			Core, section, interval (cm)	Abundance	Preservation	*Ahmuellerella octoradiata*	*Arkhangelskiella cymbiformis*	*Arkhangelskiella specillata*	*Aspidolithus parcus constrictus*	*Biscutum castrorum*	*Biscutum constans*	*Biscutum coronum*	*Biscutum dissimilis*	*Biscutum magnum*	*Biscutum notaculum*	*Broinsonia enormis*	*Broinsonia furtiva*	*Chiastozygus amphipons*	*Chiastozygus garrisonii*	*Chiastozygus* sp.
				5R-1, 0–1	C	M	C	C	R	.	.	.	.	.	F	.	.	.	.	.	.
				5R-1, 47–48	C	M	F	R	R	.	.	.	.	R	R	.	C	.	.	.	.
				5R-3, 47–48	C	M	.	.	R	.	.	R	.	.	R	.	C	.	.	.	.
				5R-CC	C	M	F	R	R	.	.	.	.	.	R	.	C	.	.	R	.
				6R-1, 47–48	C	M	F	.	.	.	.	C	.	R	F	.	C	.	.	R	.
				6R-3, 47–48	C	M	F	R	F	.	.	C	.	F	F	.	R	R	.	R	.
				6R-CC	A	M/P	.	C	F	.	.	.	.	R	C	.	C	C	.	.	.
			B. magnum	7R-1, 46–47	C	M	F	R	R	.	.	.	.	C	C	.	C	R	.	F	.
				7R-3, 46–47	C	M	C	R	R	.	.	.	.	F	C	.	C	.	.	R	.
				7R-5, 46–47	C	M/P	C	R	R	.	.	C	.	R	R	.	R	.	.	R	.
	CC24	*R. levis*		7R-CC	C	M/P	C	F	R	.	.	C	.	.	F	?	R	.	.	R	.
				8R-1, 113–114	C	M	C	.	C	.	.	F	.	.	F	R	R	.	.	R	.
				8R-CC	C	M	F	.	R	.	.	R	.	.	R	R	F	R	.	.	.
				9R-1, 133–135	F	M/P	F	.	R	.	.	C	.	.	R	.	R	.	.	.	.
				9R-3, 94–96	F	M	F	.	.	.	.	.	.	.	R	.	R	.	.	.	.
				9R-5, 118–120	C	M	C	R	R	.	.	.	.	.	R	.	F	.	.	R	.
				9R-CC	C	M/P	C	R	R	.	.	F	R	.	.	.	F	R	.	R	.
				10R-1, 102–103	F	M	.	.	.	.	.	R	.	.	.	.	R	.	.	.	.
				10R-3, 102–103	F	M	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				10R-CC	F	M/P	.	.	.	.	.	.	.	R	R	.	.	.	.	.	R
				11R-1, 47–48	C	M	R	.	.	.	.	C	.	.	.	.	.	.	.	R	.
				11R-CC	C	M/P	C	.	F	.	.	R	F	.	F	.	F	.	.	F	.
				12R-1, 42–43	C	M	C	.	R	.	.	.	.	.	F	.	C	.	.	.	.
				12R-CC	C	M/P	R	.	R	.	.	F	.	.	.	.	R	.	.	.	.
				13R-1, 37–38	C	M	F	F	.	.	.	F	F	.	C	.	F	.	.	.	R
				13R-3, 47–48	C	M	C	.	F	.	.	R	R	.	R	.	R	.	.	F	R
				13R-5, 47–48	F	M/P	R	F	.	.	.	.	R	R	R	.	F	.	.	F	.
				13R-CC	C	M/P	C	R	R	.	.	F	F	R	C	.	.	.	.	R	R
				14R-1, 53–54	F	M/P	R	.	.	.	.	R	R	.	F	.	.	R	.	.	.
				14R-3, 53–54	C	M/P	R	.	?	.	.	R	F	.	.	.	C	.	.	.	.
early Maestrichtian				14R-5, 16–17	R	M/P	.	.	.	.	.	F	.	.	F	.	.	.	.	R	.
				14R-7, 21–22	F	M/P	.	.	.	.	.	R	R	.	R	.	F	.	.	.	.
				14R-CC	C	M/P	R	R	.	.	.	F	F	.	.	.	?	.	.	R	.
				15R-1, 117–118	F	M/P	F	.	.	.	.	C	.	.	.	.	R	.	.	.	.
				15R-2, 64–65	R	M/P	C	.	.	.	.	R	.	.	.	.	.	.	.	.	.
				15R-3, 53–54	F	M/P	.	.	?	.	.	R	.	.	.	.	R	.	.	R	.
				15R-5, 48–49	F	M/P	.	.	.	.	.	.	R	.	R	.	.	.	.	.	.
			B. coronum	15R-CC	F	M/P	R	R	?	.	.	.	.	.	.	.	.	R	.	.	.
				16R-1, 29–30	C	M/P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				16R-2, 122–123	C	M/P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	CC23b	*T. phacelosus*		16R-3, 9–10	F	M/P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				16R-CC	A	M/P	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.
				17R-1, 84–85	F	M/P	F	.	F	.	.	.	R	.	C	.	R	.	.	F	.
				17R-2, 84–85	F	M/P	R	.	R	.	.	R	.	.	.	.	.	.	.	.	.
				17R-CC	R	M/P	.	F	.	.	.	.	.	.	R	.	.	.	.	.	.
				18R-CC	R	P	.	R	.	.	.	.	.	R	.	.	.	.	.	.	.
				19R-1, 81–82	R	P	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.
				19R-CC	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				20R-1, 74–75	R	M/P	R	.	.	.	.	R	.	.	.	.	.	.	.	.	.
				20R-2, 52–53	R	M/P	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				20R-CC	F	M/P	R	?	.	.	.	.	R	.	R	.	R	.	.	.	.
				21R-1, 29–30	R	M/P	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.
				21R-1, 135–136	R	M/P	.	.	F	.	F	F	.	.	.	.	C	F	F	.	F
				22R-1, 106–108	R	M/P	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.
				22R-CC	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				23R-1, 12–13	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				23R-CC	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				24R-2, 20–21	F	M/P	R	.	R	?	.	R	.	F	R	.	C	.	.	R	?
				24R-CC	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				25R-1, 27–28	C	M/P	.	.	R	.	.	F	.	R	.	.	C	.	.	?	.
				25R-CC	C	P	R	F	F	?	.	F	.	?	R	.	.	.	.	.	.

Note: Preservation: G = good, M = moderate, P = poor. Abundance: A = abundant, C = common, F = few, R = rare, ? = questionably present, B = barren.

Table 3 (continued).

Age	Nannofossil zone			Core, section, interval (cm)	Abundance	Preservation	*Corollithion signum*	*Cretarhabdus conicus*	*Cribrosphaerella daniae*	*Cribrosphaerella ehrenbergii*	*Eiffellithus gorkae*	*Eiffellithus turriseiffelii*	*Gartnerago obliquum*	*Glaukolithus compactus*	*Kamptnerius magnificus*	*Lithraphidites carniolensis*	*Lucianorhabdus arcuatus*	*Lucianorhabdus cayeuxii*	*Manivitella pemmatoidea*	*Markalius inversus*	*Microrhabdulus decoratus*
early Maestrichtian	CC24	*R. levis*	*B. magnum*	5R-1, 0-1	C	M	.	.	R	R	R	R	F	A	C	.	.	R	.	.	.
early Maestrichtian	CC24	*R. levis*	*B. magnum*	5R-1, 47-48	C	M	.	F	.	F	R	F	R	F	C	.	.	C	.	.	.
early Maestrichtian	CC24	*R. levis*	*B. magnum*	5R-3, 47-48	C	M	.	.	.	R	R	?	.	C	?	.	.	C	.	.	R
early Maestrichtian	CC24	*R. levis*	*B. magnum*	5R-CC	C	M	.	F	R	F	.	F	F	C	C	.	.	C	.	.	.
early Maestrichtian	CC24	*R. levis*	*B. magnum*	6R-1, 47-48	C	M	.	R	.	R	.	R	.	C	C	R	.	C	.	.	F
early Maestrichtian	CC24	*R. levis*	*B. magnum*	6R-3, 47-48	C	M	.	R	.	C	.	F	R	C	F	R	.	C	.	.	C
early Maestrichtian	CC24	*R. levis*	*B. magnum*	6R-CC	A	M/P	.	F	.	F	.	F	.	C	F	F	.	A	.	.	.
early Maestrichtian	CC24	*R. levis*	*B. magnum*	7R-1, 46-47	C	M	.	R	.	R	R	F	R	C	C	R	.	C	.	R	.
early Maestrichtian	CC24	*R. levis*	*B. magnum*	7R-3, 46-47	C	M	.	R	.	.	.	R	C	.	F	.	.	C	.	.	.
early Maestrichtian	CC24	*R. levis*	*B. magnum*	7R-5, 46-47	C	M/P	.	R	.	C	.	R	.	.	C	.	.	C	.	R	R
early Maestrichtian	CC24	*R. levis*	*B. magnum*	7R-CC	C	M/P	.	R	.	C	.	R	C	.	F	R	.	A	.	.	.
early Maestrichtian	CC24	*R. levis*	*B. magnum*	8R-1, 113-114	C	M	.	.	.	R	.	.	R	.	?	.	.	A	.	.	.
early Maestrichtian	CC24	*R. levis*	*B. magnum*	8R-CC	C	M	.	R	.	R	.	R	F	.	.	R	.	C	.	.	.
early Maestrichtian	CC24	*R. levis*	*B. magnum*	9R-1, 133-135	F	M/P	.	.	.	R	.	R	R	.	.	.	.	A	.	.	C
early Maestrichtian	CC24	*R. levis*	*B. magnum*	9R-3, 94-96	F	M	.	.	.	.	.	R	F	R	.	.	.	A	.	.	.
early Maestrichtian	CC24	*R. levis*	*B. magnum*	9R-5, 118-120	C	M	.	.	.	F	.	R	F	A	R	.	.	A	.	.	F
early Maestrichtian	CC24	*R. levis*	*B. coronum*	9R-CC	C	M/P	.	R	.	.	R	F	R	F	?	R	.	A	.	R	.
early Maestrichtian	CC24	*R. levis*	*B. coronum*	10R-1, 102-103	F	M	.	.	.	.	.	R	R	.	.	.	.	C	.	.	R
early Maestrichtian	CC24	*R. levis*	*B. coronum*	10R-3, 102-103	F	M	.	?	.	.	.	.	.	.	.	F	.	A	.	.	R
early Maestrichtian	CC24	*R. levis*	*B. coronum*	10R-CC	F	M/P	.	R	.	.	.	C	.	.	.	F	.	C	.	.	F
early Maestrichtian	CC24	*R. levis*	*B. coronum*	11R-1, 47-48	C	M	.	?	.	.	.	.	.	.	.	?	.	C	.	.	R
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	11R-CC	C	M/P	.	R	.	F	.	C	.	C	F	R	.	A	.	.	.
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	12R-1, 42-43	C	M	.	.	.	R	.	C	R	.	.	.	.	C	.	.	C
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	12R-CC	C	M/P	.	.	.	R	.	C	.	.	C	R	.	C	.	.	.
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	13R-1, 37-38	C	M	.	R	.	C	.	C	F	.	F	R	.	C	.	.	.
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	13R-3, 47-48	C	M	.	F	.	C	F	F	F	.	F	R	.	C	.	.	C
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	13R-5, 47-48	F	M/P	.	R	.	R	F	F	F	C	.	F	.	C	R	.	F
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	13R-CC	C	M/P	.	R	.	?	F	C	C	C	C	C	.	C	.	.	C
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	14R-1, 53-54	F	M/P	.	.	.	R	.	F	.	C	F	F	.	C	.	.	C
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	14R-3, 53-54	C	M/P	.	.	.	F	.	.	.	.	F	R	.	C	.	.	F
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	14R-5, 16-17	R	M/P	.	.	.	.	.	F	R	F	.	.	.	C	.	.	R
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	14R-7, 21-22	F	M/P	.	.	.	R	.	R	R	F	F	R	.	F	.	R	R
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	14R-CC	C	M/P	.	.	.	.	R	F	R	C	.	.	.	F	.	.	.
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	15R-1, 117-118	F	M/P	.	.	.	.	R	.	R	.	C	.	.	C	.	.	F
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	15R-2, 64-65	R	M/P	.	.	.	.	.	.	R	.	R	.	.	C	.	.	R
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	15R-3, 53-54	F	M/P	.	.	.	.	.	.	.	.	R	.	.	C	.	.	.
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	15R-5, 48-49	F	M/P	.	.	.	.	.	.	.	.	?	.	.	R	.	.	.
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	15R-CC	F	M/P	.	.	.	R	.	R	.	.	R	F	.	F	.	.	R
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	16R-1, 29-30	C	M/P	.	.	.	.	.	.	.	.	.	.	.	F	.	.	R
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	16R-2, 122-123	C	M/P	.	.	.	.	.	.	.	.	F	.	.	R	.	.	.
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	16R-3, 9-10	F	M/P	.	.	.	.	.	R	.	.	F	.	.	.	.	.	.
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	16R-CC	A	M/P	.	.	.	.	.	F	C	.	C	.	.	F	.	.	R
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	17R-1, 84-85	F	M/P	.	F	.	R	R	F	F	R	F	.	.	C	.	.	C
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	17R-2, 84-85	F	M/P	.	R	.	.	.	R	.	.	R	.	.	.	.	.	.
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	17R-CC	R	M/P	.	.	.	.	.	.	R	.	R	.	.	F	.	.	.
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	18R-CC	R	P	.	.	.	.	.	.	.	.	.	.	.	F	.	.	.
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	19R-1, 81-82	R	P	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	19R-CC	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	20R-1, 74-75	R	M/P	.	R	.	.	.	.	R	.	F	.	.	R	A	.	.
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	20R-2, 52-53	R	M/P	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	20R-CC	F	M/P	.	.	.	.	.	.	F	.	F	.	.	.	.	.	.
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	21R-1, 29-30	R	M/P	?	.	.	.	.	R	.	.	F	.	.	.	.	.	.
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	21R-1, 135-136	R	M/P	.	R	.	R	.	F	F	.	R	.	.	R	.	.	R
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	22R-1, 106-108	R	M/P	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	22R-CC	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	23R-1, 12-13	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	23R-CC	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	24R-2, 20-21	F	M/P	.	.	.	.	.	.	.	.	R	.	C	.	.	.	F
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	24R-CC	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	25R-1, 27-28	C	P	.	.	.	.	.	.	R	.	F	.	.	A	.	.	.
early Maestrichtian	CC23b	*T. phacelosus*	*B. coronum*	25R-CC	C	P/P	.	.	.	R	R	R	F	.	C	.	.	F	.	.	F

Table 3 (continued).

Age	Nannofossil zone			Core, section, interval (cm)	Abundance	Preservation	*Micula decussata*	*Misceomarginatus pleniporus*	*Monomarginatus pectinatus*	*Monomarginatus quaternarius*	*Nephrolithus corystus*	*Nephrolithus frequens*	*Phanulitus obscurus*	*Placozygus fibuliformis*	*Placozygus sigmoides*	*Prediscosphaera arkhangelskyi*	*Prediscosphaera bukryi*	*Prediscosphaera cretacea*	*Prediscosphaera grandis*	*Prediscosphaera honjoi*	*Prediscosphaera spinosa*
early Maestrichtian	CC24	*R. levis*	*B. magnum*	5R-1, 0–1	C	M	C	.	.	.	R	F	R	.	R	.	.	.	.	F	R
				5R-1, 47–48	C	M	A	R	.	.	R	R	C	R	.	R	.	F	.	R	R
				5R-3, 47–48	C	M	A	.	.	.	C	.	C	.	.	.	.	R	.	.	.
				5R-CC	C	M	C	R	.	.	.	R	C	R	R	R	.	R	.	R	.
				6R-1, 47–48	C	M	C	R	.	.	R	.	C	.	.	F	.	C	.	.	F
				6R-3, 47–48	C	M	A	C	.	R	C	R	C	.	.	R	.	C	R	.	F
				6R-CC	A	M/P	A	C	.	.	.	.	C	.	.	.	.	.	.	.	.
				7R-1, 46–47	C	M	C	.	R	.	R	R	C	R	.	.	.	R	.	.	R
				7R-3, 46–47	C	M	C	C	.	.	R	F	C	R	.	.	.	F	.	.	.
				7R-5, 46–47	C	M/P	A	C	R	.	.	C	C	R	.	.	.	R	.	.	R
				7R-CC	C	M/P	A	F	R	R	R	.	R	F	.	.	.	.	.	.	R
				8R-1, 113–114	C	M	A	F	R	.	R	.	C	.	.	.	?	.	.	.	.
				8R-CC	C	M	A	F	.	.	R	.	C	.	.	.	.	R	.	.	.
				9R-1, 133–135	F	M/P	A	R	.	.	.	.	R	.	.	.	.	.	.	.	F
				9R-3, 94–96	F	M	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				9R-5, 118–120	C	M	A	.	.	.	.	.	R	R	.	.	.	R	.	.	R
			B. coronum	9R-CC	C	M/P	A	R	.	R	R	.	C	F	.	.	.	.	C	?	F
				10R-1, 102–103	F	M	A	.	.	.	.	.	.	.	.	.	.	.	.	.	?
				10R-3, 102–103	F	M	A	R	.	.	.	.	.	.	R	.	.	.	.	.	.
				10R-CC	F	M/P	.	.	.	R	.	.	C	R	.	.	.	.	.	.	.
				11R-1, 47–48	C	M	A	.	.	.	.	.	F	.	.	.	.	.	.	.	.
	CC23b	*T. phacelosus*		11R-CC	C	M/P	A	F	R	R	.	.	R	.	.	R	.	R	?	.	.
				12R-1, 42–43	C	M	R	.	.	.	.	.	.	.	.	.	.	F	.	.	.
				12R-CC	C	M/P	C	R	.	.	.	.	C	.	.	.	.	R	.	.	.
				13R-1, 37–38	C	M	C	R	.	.	R	.	C	.	.	R	.	.	.	.	F
				13R-3, 47–48	C	M	C	R	.	.	.	.	R	C	.	.	R	F	?	.	R
				13R-5, 47–48	F	M/P	C	R	.	.	.	.	F	.	.	R	.	.	A	.	R
				13R-CC	C	M/P	A	R	.	.	.	.	F	C	.	.	R	F	.	.	F
				14R-1, 53–54	F	M/P	C	.	.	.	.	.	.	R	.	.	.	R	.	.	R
				14R-3, 53–54	C	M/P	A	.	.	.	.	.	.	.	.	.	F	F	?	.	.
				14R-5, 16–17	R	M/P	C	.	.	.	.	.	.	R	.	.	.	R	.	.	F
				14R-7, 21–22	F	M/P	A	R	R	.	.	.	.	R	.	.	F	.	.	.	.
				14R-CC	C	M/P	F	.	.	.	.	.	R	.	.	.	F	C	.	.	.
				15R-1, 117–118	F	M/P	C	F	.	.	.	.	.	R	.	.	.	R	.	.	R
				15R-2, 64–65	R	M/P	A	.	.	.	.	.	.	.	.	.	.	R	.	.	.
				15R-3, 53–54	F	M/P	C	.	.	.	.	.	.	.	.	.	.	R	.	.	R
				15R-5, 48–49	F	M/P	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				15R-CC	F	M/P	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				16R-1, 29–30	C	M/P	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				16R-2, 122–123	C	M/P	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				16R-3, 9–10	F	M/P	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				16R-CC	A	M/P	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				17R-1, 84–85	F	M/P	.	.	.	.	.	.	.	.	.	.	.	C	.	.	C
				17R-2, 84–85	F	M/P	C	.	.	.	.	.	.	.	.	.	.	R	R	.	R
				17R-CC	R	M/P	F	.	.	.	.	.	.	.	.	.	.	R	.	.	.
				18R-CC	R	P	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				19R-1, 81–82	R	P	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				19R-CC	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				20R-1, 74–75	R	M/P	.	R	.	.	.	.	.	.	.	.	.	.	.	.	R
				20R-2, 52–53	R	M/P	.	.	.	.	.	.	.	R	.	.	.	R	.	.	.
				20R-CC	F	M/P	C	.	.	.	.	.	.	.	.	.	.	F	.	.	.
				21R-1, 29–30	R	M/P	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				21R-1, 135–136	R	M/P	C	R	.	.	.	.	.	R	.	.	.	R	.	.	F
				22R-1, 106–108	R	M/P	R	.	.	.	.	.	.	.	.	.	.	R	.	.	.
				22R-CC	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				23R-1, 12–13	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				23R-CC	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				24R-2, 20–21	F	M/P	C	?	.	.	.	.	.	R	.	.	.	F	?	.	.
				24R-CC	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				25R-1, 27–28	C	P	A	?	.	.	.	.	.	.	.	.	.	R	.	.	R
				25R-CC	C	P/P	C	.	.	.	.	.	F	.	.	.	.	F	R	.	R

Table 3 (continued).

Age	Nannofossil zone			Core, section, interval (cm)	Abundance	Preservation	*Prediscosphaera stoveri*	*Quadrum sissinghii*	*Quadrum trifidum*	*Reinhardtites anthophorus*	*Reinhardtites levis*	*Repagalum parvidentatum*	*Rhagodiscus angustus*	*Staurolithites* sp.	*Stradneria crenulata*	*Thoracosphaera operculata*	*Thoracosphaera* sp.	*Tranolithus phacelosus*	*Vekshinella? parma*	*Watznaueria barnesae*	*Zygodiscus xenotus*
				5R-1, 0–1	C	M	F	.	.	.	C	.	.	.	.	.	.	.	.	.	R
				5R-1, 47–48	C	M	R	.	.	.	C	.	.	.	R	R	R	.	.	.	.
				5R-3, 47–48	C	M	.	.	.	.	C	.	.	.	.	.	R	.	.	.	.
				5R-CC	C	M	R	.	.	.	C	R	.	.	.	.	.	.	.	.	F
				6R-1, 47–48	C	M	.	.	.	.	C	R	.	.	F	.	.	.	.	.	F
				6R-3, 47–48	C	M	.	.	.	.	F	.	.	.	.	.	.	.	.	C	F
				6R-CC	A	M/P	.	.	.	.	C	.	.	.	R	.	.	.	.	F	R
			B. magnum	7R-1, 46–47	C	M	R	.	.	.	C	.	.	.	R	.	.	.	.	.	F
				7R-3, 46–47	C	M	.	.	.	.	C	R	.	.	R	.	R	.	.	.	.
				7R-5, 46–47	C	M/P	F	.	.	.	C	R	R	.	.	.	.	.	.	A	F
	CC24	*R. levis*		7R-CC	C	M/P	F	.	.	R	C	.	.	.	R	.	.	.	.	C	.
				8R-1, 113–114	C	M	.	.	.	.	A	.	.	.	R	.	F	.	.	F	.
				8R-CC	C	M	.	.	?	R	C	.	.	.	.	.	R	.	.	.	.
				9R-1, 133–135	F	M/P	.	.	.	.	C	.	.	.	.	.	R	.	.	R	.
				9R-3, 94–96	F	M	.	.	.	.	C	.	.	.	.	.	.	.	R	.	.
				9R-5, 118–120	C	M	.	.	.	R	C	R	.	.	.	.	R	.	.	C	R
				9R-CC	C	M/P	?	.	.	R	A	?	.	.	F	.	R	.	.	.	R
				10R-1, 102–103	F	M	.	.	.	.	C	R	.	.	F	.	.	.	.	R	R
				10R-3, 102–103	F	M	.	.	.	.	A	R	.	.	R	.	.	.	.	.	.
				10R-CC	F	M/P	.	.	.	.	F	C	.	.	R	.	.	.	.	.	.
				11R-1, 47–48	C	M	.	.	.	.	R	R	.	.	R	R	.	.	.	C	.
				11R-CC	C	M/P	.	R	.	.	R	.	.	.	C	R	R	R	F	A	.
				12R-1, 42–43	C	M	.	.	.	.	C	.	.	.	C	.	R	F	.	.	.
				12R-CC	C	M/P	.	.	.	R	C	.	.	.	.	.	R	R	.	.	.
				13R-1, 37–38	C	M	R	.	.	.	C	R	.	C	F	.	.	.	.	C	R
				13R-3, 47–48	C	M	F	.	.	R	C	C	.	R	R	.	.	R	.	C	F
				13R-5, 47–48	F	M/P	.	.	.	.	C	.	.	.	.	.	.	.	.	.	R
				13R-CC	C	M/P	F	.	.	.	C	R	.	R	F	.	.	?	R	A	F
				14R-1, 53–54	F	M/P	.	.	.	F	C	.	.	R	R	.	.	.	.	.	.
				14R-3, 53–54	C	M/P	F	.	.	F	F	.	.	.	?	.	.	.	F	C	.
early Maestrichtian				14R-5, 16–17	R	M/P	.	.	.	R	F	F	.	C	.	.	R	R	F	C	.
				14R-7, 21–22	F	M/P	R	.	.	F	F	C	.	F	.	.	.	.	C	C	.
				14R-CC	C	M/P	?	.	.	R	R	C	.	.	R	.	.	F	.	C	.
				15R-1, 117–118	F	M/P	R	.	.	R	R	C	.	R	.	.	.	.	F	C	R
				15R-2, 64–65	R	M/P	.	.	.	R	F	C	.	.	.	.	.	.	R	C	.
				15R-3, 53–54	F	M/P	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.
				15R-5, 48–49	F	M/P	.	.	.	F	.	.	.	.	.	.	R	.	.	C	.
			B. coronum	15R-CC	F	M/P	.	.	.	F	F	.	.	.	.	.	R	R	R	C	.
				16R-1, 29–30	C	M/P	.	.	.	.	?	.	.	.	.	.	.	.	R	.	.
				16R-2, 122–123	C	M/P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	CC23b	*T. phacelosus*		16R-3, 9–10	F	M/P	.	.	.	R	C	.	.	.	.	.	R	.	R	F	.
				16R-CC	A	M/P	.	.	.	.	A	.	.	.	.	.	.	.	.	F	.
				17R-1, 84–85	F	M/P	.	.	.	C	C	C	C	C	R	.	R	R	.	C	.
				17R-2, 84–85	F	M/P	.	.	.	R	R	.	.	.	R	.	.	.	.	R	.
				17R-CC	R	M/P	.	.	.	.	R	.	.	.	.	.	R	.	.	F	.
				18R-CC	R	P	.	.	.	R	R	.	.	.	.	.	.	.	.	.	.
				19R-1, 81–82	R	P	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.
				19R-CC	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				20R-1, 74–75	R	M/P	.	.	.	R	F	.	.	.	.	.	.	R	R	C	.
				20R-2, 52–53	R	M/P	.	.	.	R	.	.	R	R	.	.	.	F	.	F	.
				20R-CC	F	M/P	.	.	.	F	F	.	.	R	.	.	R	F	.	C	.
				21R-1, 29–30	R	M/P	.	.	.	R	.	.	.	.	.	.	R	R	.	F	.
				21R-1, 135–136	R	M/P	.	.	.	F	.	.	.	R	R	.	.	F	.	C	.
				22R-1, 106–108	R	M/P	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.
				22R-CC	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				23R-1, 12–13	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				23R-CC	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				24R-2, 20–21	F	M/P	.	.	.	F	F	.	.	F	.	.	.	R	.	C	.
				24R-CC	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				25R-1, 27–28	C	P	F	.	.	R	F	.	?	.	F	.	?	F	?	C	?
				25R-CC	C	P/P	.	.	.	.	C	.	.	R	.	.	.	R	.	A	R

Table 4. Turonian–lower Campanian calcareous nannofossils, Hole 755A.

Age	Nannofossil zone		Core, section, interval (cm)	Abundance	Preservation	*Ahmuerelella octoradiata*	*Biscutum constans*	*Broinsonia enormis*	*Broinsonia furtiva*	*Broinsonia parca*	*Chiastozygus garrisonii*	*Chiastozygus litterarius*	*Chiastozygus* sp.	*Corollithion signum*	*Cretarhabdus angustiforatus*	*Cretarhabdus conicus*	*Cribrosphaerella ehrenbergii*	*Eiffellithus eximius*	*Eiffellithus gorkae*	*Eiffellithus turriseiffelii*	*Eprolithus floralis*	*Eprolithus* sp. 1	*Eprolithus* sp. 2	*Gartnerago obliquum*	*Glaukolithus compactus*
e. Camp.	CC17	*C. obscurus*	5R-1, 36–38	R	P	R	R	R	R	F	R	.	.	.	.	.	.	R	.	.	.	.	.	R	.
			5R-1, 89–90	R	P	R	.	.	F	.	.	.	.	.	.	.	.	.	R	R	.	.	.	F	F
			5R-2, 40–41	R	P	.	F	?	.	.	.	.	.	.	.	.	.	?	.	?	.	.	.	C	F
			5R-2, 90–91	R	P	.	.	.	.	R	.	.	R	.	.	.	.	R	.	.	.	.	.	R	R
			5R-CC	C	M	F	.	.	.	C	.	.	C	.	.	.	.	C	.	.	.	.	.	F	.
			6R-1, 14–15	R	P	R	R	.	.	R	.	.	.	.	.	.	.	R	.	R	.	.	.	F	.
	CC16	*L. cayeuxi*	6R-2, 129–130	F	M	.	.	F	.	.	.	?	.	.	.	.	R	R	.	F	.	.	.	F	.
			6R-3, 46–47	R	P	.	.	.	.	.	.	.	.	.	.	.	.	R	.	F	.	.	.	.	F
			6R-4, 15–16	R	P	F	F	R	.	.	.	F	.	.	.	.	R	F	.	.	.	.	.	C	R
Santonian			6R-CC	R	P	R	R	R	.	F	.	.	.	.	.	.	.	F	.	.	.	.	.	R	R
			7R-1, 76–77	R	P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			7R-2, 37–38	R	P	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			7R-CC	R	P	.	.	C	R	F	F	F	.	.	.	.	R	?	.	F	.	.	.	F	F
			8R-1, 24–25	R	P	F	C	R	C	C	C	.	.	.	.	.	.	R	.	F	.	.	.	C	R
			8R-3, 26–27	R	P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			8R-CC	R	P	R	R	R	R	?	R	.	.	.	.	.	.	R	.	R	.	.	.	R	.
	CC15	*R. anthophorus*	9R-1, 22–23	R	P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	?	.	.	.	R	.
			9R-2, 21–22	R	P	R	R	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.	.	R	.
			9R-CC	F	M	C	.	C	.	.	R	.	.	.	.	.	.	C	.	C	.	.	.	F	.
			10R-1, 38–39	R	P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.
			10R-2, 43–44	R	M	R	.	R	R	.	R	.	.	.	.	.	.	.	.	F	.	R	.	F	R
			10R-CC	R	P	.	.	.	F	.	.	.	.	.	.	.	.	?	.	.	.	.	.	F	.
	CC14	*M. decussata*	11R-1, 31–32	R	P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R
			11R-CC	R	P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	C	F
Coniacian			12R-1, 62–63	R		.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			12R-CC	R	P	R	.	.	.	.	.	.	.	.	.	.	.	R	.	R	.	F	F	R	.
			13R-1, 52–53	R	P	R	.	.	.	.	.	.	.	.	.	.	.	?	.	.	.	.	.	.	R
			13R-2, 52–53	F	P	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.	.	F	.
			13R-4, 49–50	R	P	.	.	.	.	.	R	.	.	.	.	.	.	F	.	R	.	R	R	.	R
			13R-CC	R	P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	F	?	.
			14R-1, 38–39	R	P	.	R	.	.	.	.	.	.	.	.	.	.	R	.	.	.	F	F	F	R
			14R-2, 38–39	R	P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			14R-3, 38–39	R	P	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	?	F	.	R	.
			14R-4, 38–39	R	P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			14R-CC	R	P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	?	F	.	F	.	.
			15R-1, 57–58	F	P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	?	R	.
			15R-2, 57–58	R	P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	F	.	.	R	R
			15R-3, 82–83	R	P	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			15R-4, 59–60	R	P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	R	.	.
			15R-5, 22–23	R		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			15R-6, 9–10	R	P	.	.	.	.	.	.	.	.	.	.	.	.	?	.	R	.	.	.	.	.
			15R-CC	C	P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	F	R	.	.	.
			16R-1, 50–51	R		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	?	.	.	.	.
			16R-2, 64–65	R	P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.
			16R-3, 54–55	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			16R-4, 55–56	R	P	.	.	.	.	.	.	?	?	.	.	.	.	.	.	?	R	.	R	.	?
Turonian		Not zoned	16R-5, 76–77	R	P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	?
			16R-6, 111–112	R	P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	?	.	.	.
			16R-CC	F	P	?	R	.	.	.	.	.	.	.	.	.	.	.	.	R	F	.	.	R	R
			17R-1, 70–71	F	P	R	F	.	.	.	R	.	.	R	.	.	.	R	.	.	R	.	.	R	.
			17R-2, 70–71	R	P	R	R	.	.	.	R	.	.	R	.	.	.	R	.	R	F	R	.	R	R
			17R-3, 70–71	R	P	.	R	.	.	.	.	.	.	.	.	.	.	.	.	R	F	R	?	R	.
			17R-4, 17–18	C	P	R	?	.	.	.	F	.	.	.	.	.	.	.	.	R	F	.	.	F	F
			17R-CC	C	P	R	R	.	.	.	R	R	.	R	.	.	.	.	F	F	C	.	.	R	R
			18R-1, 20–21	R	P	R	R	.	.	.	.	.	.	.	.	.	.	.	.	R	R	.	.	R	F
			18R-2, 123–124	F	P	F	R	.	.	.	R	.	.	.	.	R	.	R	.	R	F	.	R	F	F
			18R-3, 35–36	F	M	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.
			18R-6, 18–19	F	M	F	.	.	.	.	F	.	.	.	.	.	.	.	.	F	C	R	.	R	.
			18R-7, 116–117	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			18R-CC	B	P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.
			19R-1, 26–27	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			19R-2, 35–36	B		R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			19R-3, 28–29	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			19R-4, 21–22	R	M	.	R	R	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	R
			19R-4, 35–36	R	M	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			19R-5, 13–14	R	P	R	R	.	.	.	?	.	.	.	.	.	.	.	.	R	F	.	R	R	R
			19R-6, 18–19	F	M	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	F	.	.	.	.
			19R-7, 36–37	R	M	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	R	.	.	R	.
			19R-CC	R	M	.	R	.	.	.	R	.	.	.	R	.	.	.	.	R	F	.	.	.	R

Note: Preservation: G = good, M = moderate, P = poor. Abundance: A = abundant, C = common, F = few, R = rare, ? = questionably present, B = barren, . = not present.

Table 4 (continued).

Age	Nannofossil zone		Core, section, interval (cm)	Abundance	Preservation	*Glaukolithus diplogrammus*	*Helicolithus trabeculatus*	*Kamptnerius magnificus*	*Lithastrinus grillii*	*Lithastrinus moratus*	*Lithastrinus septenarius*	*Lithraphidites carniolensis*	*Lucianorhabdus cayeuxii*	*Lucianorhabdus maleformis*	*Marthasterites furcatus*	*Microrhabdolus decoratus*	*Micula decussata*	*Phanulithus obscurus*	*Placozygus fibuliformis*	*Prediscosphaera cantabrigensis*	*Prediscosphaera cretacea*	*Prediscosphaera intercisa*	*Prediscosphaera ponticula*	*Prediscosphaera* sp.	*Prediscosphaera spinosa*
e. Camp.	CC17	*C. obscurus*	5R-1, 36–38	R	P	.	C	.	.	.	.	.	F	R	.	R	F	R	.	.	.	.	.	.	.
			5R-1, 89–90	R	P	.	.	R	.	.	.	.	C	?	.	.	C	C	.	.	.	.	.	.	.
			5R-2, 40–41	R	P	.	F	.	.	.	.	.	?	C	.	R	C	.	.	.	.	.	.	?	.
			5R-2, 90–91	R	P	R	F	R	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.
			5R-CC	C	M	R	.	F	.	.	.	.	.	.	R	.	C	.	.	.	.	.	.	.	.
			6R-1, 14–15	R	P	.	C	R	.	.	.	.	R	.	.	R	.	.	.	.	.	.	.	.	.
	CC16	*L. cayeuxi*	6R-2, 129–130	F	M	R	C	?	.	.	.	.	.	R	?	R	C	.	.	.	.	R	.	R	.
			6R-3, 46–47	R	P	.	R	R	.	.	.	.	.	.	.	.	C	.	.	.	.	R	.	.	.
			6R-4, 15–16	R	P	.	C	R	.	.	.	.	.	R	.	.	F	.	.	.	.	F	.	R	.
Santonian			6R-CC	R	P	.	C	R	.	.	.	.	.	R	.	.	C	.	.	.	.	.	.	.	.
			7R-1, 76–77	R	P	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.
			7R-2, 37–38	R	P	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.
			7R-CC	R	P	.	F	C	.	.	.	.	.	R	.	.	C	.	.	.	.	.	.	.	.
			8R-1, 24–25	R	P	.	C	C	.	.	.	R	.	C	.	.	C	.	.	.	.	R	.	.	.
			8R-3, 26–27	R	P	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			8R-CC	R	P	R	F	.	.	.	.	R	.	.	.	R	R	.	.	.	.	.	.	.	.
	CC15	*R. anthophorus*	9R-1, 22–23	R	P	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			9R-2, 21–22	R	P	R	R	?	R	R	.	.	.	.	.	R	F	.	.	.	.	.	.	.	.
			9R-CC	F	M	.	.	R	.	.	.	.	.	.	.	.	C	.	.	.	.	.	.	.	R
			10R-1, 38–39	R	P	R	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.
			10R-2, 43–44	R	M	R	C	F	.	.	.	.	.	.	.	.	F	.	F	.	.	.	.	.	R
			10R-CC	R	P	.	.	.	.	.	.	.	.	.	.	.	F	.	R	.	.	.	.	.	.
	CC14	*M. decussata*	11R-1, 31–32	R	P	.	.	.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.
			11R-CC	R	P	.	.	?	.	.	.	.	.	.	.	.	C	.	.	.	.	.	.	.	.
Coniacian			12R-1, 62–63	R		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			12R-CC	R	P	.	.	?	.	R	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.
			13R-1, 52–53	R	P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			13R-2, 52–53	F	P	C	.	R	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	R
			13R-4, 49–50	R	P	R	F	R	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.
			13R-CC	R	P	.	.	F	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			14R-1, 38–39	R	P	.	.	R	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.
			14R-2, 38–39	R	P	R	.	?	.	F	.	.	.	.	.	.	?	.	R	.	.	.	.	.	.
			14R-3, 38–39	R	P	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			14R-4, 38–39	R	P	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			14R-CC	R	P	.	.	.	.	F	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.
			15R-1, 57–58	F	P	F	.	.	.	R	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.
			15R-2, 57–58	R	P	R	.	.	.	F	.	.	.	.	.	.	.	.	F	.	.	.	.	R	.
			15R-3, 82–83	R	P	R	.	.	.	?	?	.	.	.	.	.	.	.	R	.	.	.	.	.	.
			15R-4, 59–60	R	P	R	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.
			15R-5, 22–23	R		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			15R-6, 9–10	R	P	R	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.
			15R-CC	C	P	F	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.
			16R-1, 50–51	R		.	.	.	.	.	.	.	.	.	.	.	.	.	?	.	.	.	.	.	.
			16R-2, 64–65	R	P	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.
			16R-3, 54–55	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			16R-4, 55–56	R	P	C	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.	R	.	.	.
Turonian	Not zoned		16R-5, 76–77	R	P	.	.	.	.	R	.	.	.	.	.	.	.	.	?	.	.	.	.	.	.
			16R-6, 111–112	R	P	?	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			16R-CC	F	P	F	.	.	.	?	.	.	.	.	.	.	.	.	R	.	.	.	F	.	.
			17R-1, 70–71	F	P	F	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.
			17R-2, 70–71	R	P	F	.	.	.	R	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.
			17R-3, 70–71	R	P	R	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.
			17R-4, 17–18	C	P	R	.	.	.	.	.	.	.	.	.	.	.	.	R	R	.	.	.	R	.
			17R-CC	C	P	?	.	R	.	F	.	.	.	.	.	.	.	.	.	.	.	.	F	?	R
			18R-1, 20–21	R	P	F	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	R
			18R-2, 123–124	F	P	F	C	.	.	R	.	.	F	R	.	?	.	.	F	.	.	.	F	.	.
			18R-3, 35–36	F	M	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			18R-6, 18–19	F	M	R	.	.	.	.	.	.	.	.	.	.	.	.	C	.	.	?	.	.	.
			18R-7, 116–117	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			18R-CC	B	P	F	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.
			19R-1, 26–27	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			19R-2, 35–36	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			19R-3, 28–29	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			19R-4, 21–22	R	M	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			19R-4, 35–36	R	M	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			19R-5, 13–14	R	P	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	?	.	.	.	.
			19R-6, 18–19	F	M	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			19R-7, 36–37	R	M	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			19R-CC	R	M	C	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	F	?	.	.

Table 4 (continued).

Age	Nannofossil zone		Core, section, interval (cm)	Abundance	Preservation	*Quadrum gartneri*	*Reinhardtites anthophorus*	*Repagalum parvidentatum*	*Rhagodiscus angustus*	*Rhagodisdus* sp.	*Staurolithites crux*	*Staurolithus* sp.	*Stradneria crenulata*	*Tegumentum octiformis*	*Tegumentum stradneri*	*Tranolithus manifestus*	*Tranolithus phacelosus*	*Vagalapilla matalosa*	*Watznaueria barnesae*	*Zeugrhabdotus sisyphus?*
e. Camp.	CC17	*C. obscurus*	5R-1, 36-38	R	P	R	.	.	.	R	.	F	R	.	.	.	R	.	C	R
			5R-1, 89-90	R	P	.	R	.	.	.	.	R	R	.	.	.	.	.	C	.
			5R-2, 40-41	R	P	.	.	.	.	?	.	R	F	.	.	.	F	.	C	?
			5R-2, 90-91	R	P	.	?	.	.	.	.	F	.	.	.	.	R	.	C	.
			5R-CC	C	M	.	F	.	.	.	.	.	.	.	.	.	.	.	C	.
			6R-1, 14-15	R	P	.	.	.	.	.	.	R	R	.	.	.	F	.	C	F
	CC16	*L. cayeuxi*	6R-2, 129-130	F	M	.	F	.	.	.	.	.	.	.	?	.	C	.	C	.
			6R-3, 46-47	R	P	F	?	.	.	.	.	.	.	.	.	F	.	R	C	.
			6R-4, 15-16	R	P	.	R	.	.	.	.	.	F	.	.	.	F	F	F	.
Santonian			6R-CC	R	P	.	R	.	.	.	.	R	.	.	.	.	F	.	C	.
			7R-1, 76-77	R	P	R	.	.	.	.	.	.	.	.	.	.	R	.	R	.
			7R-2, 37-38	R	P	.	.	.	.	.	.	.	.	.	.	.	R	.	R	.
			7R-CC	R	P	C	R	.	.	.	.	?	R	.	.	.	C	.	C	F
			8R-1, 24-25	R	P	F	.	.	.	.	.	.	R	.	.	.	C	F	C	.
			8R-3, 26-27	R	P	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.
			8R-CC	R	P	R	.	.	.	.	.	.	R	.	.	.	F	.	C	.
	CC15	*R. anthophorus*	9R-1, 22-23	R	P	.	.	.	.	.	.	.	.	.	.	.	F	.	C	.
			9R-2, 21-22	R	P	.	.	.	.	.	.	.	.	.	.	.	F	.	F	R
			9R-CC	F	M	.	R	.	.	.	.	R	R	.	.	.	F	.	C	.
			10R-1, 38-39	R	P	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.
			10R-2, 43-44	R	M	.	R	.	.	.	.	.	R	.	.	.	C	.	C	.
			10R-CC	R	P	F	.	.	.	.	.	.	.	.	.	.	F	.	C	.
	CC14	*M. decussata*	11R-1, 31-32	R	P	.	.	.	.	.	.	.	.	.	.	.	R	.	F	.
			11R-CC	R	P	.	.	.	.	.	.	.	.	.	.	.	F	.	C	.
Coniacian			12R-1, 62-63	R		.	.	.	.	.	.	.	.	.	.	.	.	.	R	.
			12R-CC	R	P	C	.	.	.	.	.	.	.	.	.	.	R	.	F	.
			13R-1, 52-53	R	P	C	.	.	.	.	.	.	.	.	.	.	F	.	F	.
			13R-2, 52-53	F	P	C	.	.	.	.	.	.	.	.	.	.	?	.	C	.
			13R-4, 49-50	R	P	?	.	.	.	.	.	R	R	.	.	.	F	.	R	.
			13R-CC	R	P	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.
			14R-1, 38-39	R	P	.	.	.	.	.	.	.	.	.	.	.	C	.	C	.
			14R-2, 38-39	R	P	.	.	.	.	.	.	.	.	.	.	.	F	.	F	.
			14R-3, 38-39	R	P	.	.	.	.	.	.	.	.	.	.	.	R	.	F	.
			14R-4, 38-39	R	P	.	.	.	.	.	.	.	.	.	.	.	R	.	F	.
			14R-CC	R	P	R	.	.	.	.	.	.	.	.	.	.	F	.	F	.
			15R-1, 57-58	F	P	R	.	.	.	.	.	.	.	.	.	.	.	.	C	.
			15R-2, 57-58	R	P	R	.	.	.	.	.	.	.	.	.	.	R	.	F	.
			15R-3, 82-83	R	P	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.
			15R-4, 59-60	R	P	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.
			15R-5, 22-23	R		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			15R-6, 9-10	R	P	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.
			15R-CC	C	P	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.
			16R-1, 50-51	R		.	.	.	.	.	.	.	.	.	.	.	.	.	R	.
			16R-2, 64-65	R	P	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.
			16R-3, 54-55	B		.	.	.	.	.	.	.	.	.	.	.	.	.	C	.
			16R-4, 55-56	R	P	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.
Turonian		Not zoned	16R-5, 76-77	R	P	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.
			16R-6, 111-112	R	P	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.
			16R-CC	F	P	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.
			17R-1, 70-71	F	P	.	.	.	.	.	.	?	R	.	.	.	.	R	C	.
			17R-2, 70-71	R	P	.	.	.	.	R	.	?	R	.	.	.	.	F	C	.
			17R-3, 70-71	R	P	.	.	.	R	.	.	.	R	R	.	.	.	.	F	.
			17R-4, 17-18	C	P	.	.	.	.	.	.	R	R	.	.	.	.	.	C	.
			17R-CC	C	P	.	.	.	R	.	.	.	R	R	.	.	F	R	C	R
			18R-1, 20-21	R	P	.	.	.	.	.	.	.	.	.	.	.	.	R	C	.
			18R-2, 123-124	F	P	.	.	.	R	.	.	F	R	R	.	R	F	.	C	R
			18R-3, 35-36	F	M	.	.	.	.	.	.	.	.	R	.	.	R	.	C	.
			18R-6, 18-19	F	M	.	.	.	F	.	R	.	F	R	.	.	.	.	C	.
			18R-7, 116-117	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			18R-CC	B	P	.	.	.	.	.	.	.	.	.	.	R	.	.	F	.
			19R-1, 26-27	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			19R-2, 35-36	B		.	.	.	.	.	.	.	.	.	.	.	.	.	R	.
			19R-3, 28-29	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			19R-4, 21-22	R	M	.	.	.	.	.	.	.	R	.	.	R	.	.	C	R
			19R-4, 35-36	R	M	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
			19R-5, 13-14	R	P	.	.	.	.	.	.	.	R	R	.	.	.	.	F	R
			19R-6, 18-19	F	M	.	.	.	.	.	.	.	.	.	.	F	F	.	C	.
			19R-7, 36-37	R	M	.	.	.	R	.	.	.	.	F	.	.	.	.	C	.
			19R-CC	R	M	.	.	.	R	.	.	.	.	C	.	.	.	R	F	C

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APPENDIX

Species Considered in this Report in Alphabetical Order of Generic Epithets

Bibliographic references for these taxa are found in Loeblich and Tappan (1966, 1968, 1969, 1970a, 1970b, 1971, 1973), van Heck (1979a, 1979b, 1980a, 1980b, 1981a, 1981b, 1982a, 1982b, 1983), and Steinmetz (1984a, 1984b, 1985a, 1985b, 1986, 1987a, 1987b, 1988a, 1988b, 1989). Any taxa not cited therein are cited in the references of this paper.

Ahmuellerella octoradiata (Gorka) Reinhardt (1964)
Arkhangelskiella cymbiformis Vekshina, 1959
Arkhangelskiella specillata Vekshina, 1959
Aspidolithus parcus constrictus (Hattner et al., 1980)
Aspidolithus parcus expansus (Wise and Watkins, 1983) Perch-Nielsen 1984
Aspidolithus parcus parcus (Stradner, 1963) Noel (1969)
Biscutum castrorum Black, 1959
Biscutum constans (Gorka, 1957)
Biscutum coronum Wind and Wise *in* Wise and Wind, 1977
Biscutum dissimilis Wind and Wise *in* Wise and Wind, 1977
Biscutum magnum Wind and Wise *in* Wise and Wind, 1977
Biscutum notaculum Wind and Wise *in* Wise and Wind, 1977
Braarudosphaera bigelowii (Grun and Braarud, 1935) Deflandre (1947)
Broinsonia enormis (Shumenko, 1968) Manivit, 1971
Broinsonia furtiva Bukry (1969)
Calculites obscurus (Deflandre, 1959) Prins and Sissingh *in* Sissingh, 1977
Calculites ovalis (Stradner, 1963) Prins and Sissingh *in* Sissingh, 1977
Ceratolithoides aculeus (Stradner, 1961) Prins and Sissingh *in* Sissingh, 1977
Chiastozygus amphipons (Bramlette and Martini, 1964) Gartner, 1968
Chiastozygus garrisonii Bukry, 1969 *in* Wise and Wind, 1977
Chiastozygus litterarius (Gorka, 1957) Manivit, 1971
Corollithion signum Stradner, 1968
Cretarhabdus angustiforatus (Black, 1971) Bukry, 1973
Cretarhabdus conicus Bramlette and Martini, 1964
Cretarhabdus loriei Gartner, 1968
Cribrosphaerella daniae Perch-Nielsen, 1973
Cribrosphaerella ehrenbergii (Arkhangelsky, 1912) Deflandre, 1952
Eiffellithus eximius (Stover, 1966) Perch-Nielsen, 1968
Eiffellithus gorkae Reinhardt, 1965
Eiffellithus turriseiffelii (Deflandre and Fert) Reinhardt, 1965
Eprolithus floralis (Stradner, 1962) Stover, 1966
Gartnerago obliquum (Stradner) Reinhardt, 1970
Glaukolithus compactus (Bukry, 1969) Perch-Nielsen (1984a)
Glaukolithus diplogrammus (Deflandre *in* Deflandre and Fert, 1954) Reinhardt (1964)
Helicolithus trabeculatus (Gorka, 1957) Verbeek, 1977
Kamptnerius magnificus Deflandre, 1959
Lapideacassis mariae Black, emend. Wind and Wise *in* Wise and Wind, 1977
Lithastrinus grillii Stradner, 1962
Lithastrinus moratus Stover (1966)
Lithastrinus septenarius Forchheimer (1972)
Lithraphidites carniolensis Deflandre, 1963
Lithraphidites quadratus Roth, 1978
Lithraphidites prequadratus, Bramlette and Martini, 1964
Lucianorhabdus cayeuxii Deflandre, 1959
Lucianorhabdus maleformis Reinhardt, 1966
Manivitella pemmatoidea (Deflandre *in* Manivit, 1965) Thierstein (1971)
Markalius inversus (Deflandre *in* Deflandre and Fert, 1954) Bramlette and Martini, 1964
Marthasterites furcatus (Deflandre) Deflandre, 1959
Microrhabdulus decoratus Deflandre, 1959
Micula decussata Vekshina, 1959
Micula murus (Martini, 1961) Bukry (1973)
Misceomarginatus pleniporus Wind and Wise *in* Wise and Wind, 1977
Monomarginatus pectinatus Wind and Wise *in* Wise and Wind, 1977
Monomarginatus quaternarius Wind and Wise *in* Wise and Wind, 1977
Nephrolithus corystus Wind, 1983
Nephrolithus frequens Gorka, 1959
Placozygus fibuliformis (Reinhardt, 1964) Hoffmann (1970b)
Placozygus sigmoides (Bramlette and Sullivan, 1961) Romein (1979)
Prediscosphaera arkhangelskyi (Reinhardt, 1965) Perch-Nielsen (1984a)
Prediscosphaera bukryi Perch-Nielsen (1973)
Prediscosphaera cretacea (Arkhangelsky, 1912) Gartner, 1968
Prediscosphaera grandis Perch-Nielsen, 1979
Prediscosphaera honjoi Bukry, 1969
Prediscosphaera intercisa (Deflandre *in* Deflandre and Fert, 1954) Shumenko, 1976
Prediscosphaera spinosa (Bramlette and Martini) Gartner, 1968
Prediscosphaera stoveri (Perch-Nielsen) Shafik and Stradner, 1971
Quadrum gartneri Prins and Perch-Nielsen *in* Manivit et al., (1977)
Quadrum sissinghii Perch-Nielsen, 1984
Quadrum trifidum (Stradner *in* Stradner and Papp, 1961) Prins and Perch-Nielsen, 1984
Reinhardtites anthophorus (Deflandre, 1959) Perch-Nielsen (1968)
Reinhardtites sp. aff. *R. anthophorus* (Deflandre) Perch-Nielsen, 1968
Reinhardtites levis Prins and Sissingh, 1977
Repagalum parvidentatum (Deflandre and Fert, 1954) Forchheimer (1972)
Rhagodiscus angustus (Stradner, 1963) Reinhardt (1971)
Scampanella cornuta Forchheimer and Stradner, 1964
Staurolithus sp., Crux, 1989
Stradneria crenulata (Bramlette and Martini) Noel, 1970a
Tegumentum stradneri Thierstein *in* Roth and Thierstein (1972)
Tegumentum octiformis (Kothe, 1981)
Thoracosphaera operculata Bramlette and Martini, 1974
Tranolithus exiguus Stover, 1977
Tranolithus gabalus Stover, 1976
Tranolithus manifestus Stover (1966)
Tranolithus phacelosus Stover, 1966
Vagalapilla matalosa (Stover, 1966) Thierstein, 1973
Vekshinella? parma Wind and Wise, 1977
Watznaueria barnesae (Black) Perch-Nielsen, 1968
Zeugrhabdotus embergeri (Noel, 1959) Perch-Nielsen (1984a)
Zeugrhabdotus sysiphus (Gartner, 1968)
Zygodiscus xenotus (Stover) Rissatti, 1973

Table 5. Maestrichtian–upper Campanian calcareous nannofossils, Hole 758A.

Age		Nannofossil zone		Core, section, interval (cm)	Abundance	Preservation	*Ahmuellerella octoradiata*	*Arkhangelskiella cymbiformis*	*Arkhangelskiella specillata*	*Aspidolithus parcus constrictus*	*Biscutum castrorum*	*Biscutum constans*	*Biscutum coronum*	*Biscutum dissimilis*	*Biscutum magnum*	*Biscutum notaculum*	*Braarudosphaera bigelowii*	*Broinsonia enormis*	*Broinsonia furtiva*	*Ceratolithoides aculeus*	*Chiastozygus amphipons*	*Chiastozygus garrisonii*	*Chiastozygus litterarius*	*Chiastozygus* sp.	*Corollithion signum*	*Cretarhabdus angustiforatus*	*Cretarhabdus conicus*	*Cretarhabdus loriei*	*Cribrosphaerella daniae*	*Cribrosphaerella ehrenbergii*	*Eiffellithus eximius*
Maestrichtian	late	CC26 — CC25	*N. frequens* — *A. cymbiformis*	32X-1, 23.5	A	G/M	F	A	C	.	.	C	.	.	.	.	.	.	C	A	.	.	.	.	.	F	F	R	.	C	.
				32X-1, 84	A	G/M	R	A	C	.	.	F	.	.	.	.	.	.	C	A	.	.	.	.	.	C	.	R	.	C	.
				32X-1, 144	A	G/M	F	A	C	.	.	F	.	.	.	.	.	.	C	A	.	.	.	F	.	F	R	.	.	C	.
				32X-3, 47–48	A	G/M	A	A	A	.	.	C	.	C	C	.	.	.	.	F	.	.	.	C	.	F	C	F	F	A	.
				32X-6, 10–11	A	G	F	A	F	.	.	F	.	.	.	.	.	.	C	C	.	.	.	C	.	C	C	.	R	A	.
	early	CC24	*R. levis*	32X-CC	A	G	F	A	A	F	.	.	.	R	R	.	.	F	C	F	.	.	.	R	.	F	A	R	F	A	.
				33X-1, 47–48	A	G	A	A	A	R	.	.	.	R	R	.	.	R	C	F	.	.	.	F	.	F	C	.	.	A	.
				33X-2, 47–48	A	G	C	R	A	R	.	F	.	R	.	.	.	.	C	F	.	.	.	F	.	F	C	F	.	C	.
				33X-3, 47–48	A	M	A	.	A	.	.	F	.	.	C	R	R	R	F	F	.	.	C	.	.	.	C	R	R	A	.
				33X-5, 47–48	A	M/P	A	.	A	F	.	R	F	F	C	.	.	F	C	F	.	.	.	C	.	F	C	C	R	C	.
		CC23	*T. phacelosus*	33X-6, 47–48	A	M	C	.	C	F	.	C	.	R	C	.	R	C	C	.	.	C	.	C	.	C	F	R	.	A	.
				33X-CC, 42–43	A	M	C	C	A	R	.	.	.	F	C	.	.	.	C	.	.	.	C	.	.	F	.	C	.	C	.
				33X-CC			.	.	A	.	.	.	.	R	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				34X-1, 37–38	A	G	C	C	C	F	C	.	.	F	F	.	.	.	C	.	.	.	C	C	.	F	C	C	.	R	.
				34X-2, 36–37	A	G	C	.	C	F	C	.	.	.	C	.	.	.	.	.	.	.	C	.	.	.	C	?	.	C	.
				34X-3, 33–34	A	G	C	.	A	R	F	F	F	R	F	.	.	.	.	.	.	.	C	.	.	.	C	.	.	A	.
				34X-4, 29–30	A	G	.	.	A	C	.	C	C	F	A	.	.	.	.	.	.	.	.	F	.	.	C	.	.	C	.
				34X-5, 27–28	A	G	C	.	A	F	.	C	.	F	C	.	.	.	.	.	.	.	F	.	.	.	C	.	.	A	.
				34X-CC	A	G	C	.	A	F	.	C	.	F	F	R	.	.	R	.	.	.	.	C	.	.	F	R	R	C	.
				35X-1, 46–47	A	G.	C	C	F	C	.	.	?	.	C	.	.	.	R	C	.	.	.	.	.	C	C	F	.	A	.
				35X-3, 46–47	A	G	C	.	F	R	.	C	R	R	C	.	.	.	.	.	.	F	.	F	.	C	C	C	.	A	.
				35X-CC	A	G	C	F	C	F	.	C	C	.	F	.	.	.	F	.	.	C	.	.	.	?	C	F	.	C	.
				36X-1, 46–47	A	G	A	R	C	R	.	C	?	R	C	.	.	.	.	.	.	C	.	.	.	C	R	.	.	A	.
				36X-2, 46–47	A	G	C	A	C	C	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	A	.
				36X-3, 46–47	A	G	A	F	R	C	.	F	.	.	.	.	.	.	.	.	.	R	.	C	.	.	C	.	.	C	.
				36X-CC	A	G/M	F	R	F	F	.	C	.	R	C	.	.	.	F	.	.	R	.	R	.	.	.	.	.	C	.
				37X-1, 14–15	A	M	R	.	.	F	.	C	F	.	.	.	.	R	.	.	.	R	.	.	.	.	C	.	.	F	.
				37X-CC	A	M	F	.	.	F	.	F	.	.	F	.	.	C	.	.	.	.	.	F	.	.	C	.	.	A	.
				38X-1, 46–47	A	M	C	R	.	.	.	C	.	R	F	.	.	.	.	.	.	F	R	.	.	.	F	.	.	C	.
				38X-CC	A	M	C	.	?	.	.	.	.	.	.	.	.	F	.	.	.	.	F	.	.	.	F	.	.	C	.
				39X-1, 47–48	A	M	C	.	.	F	.	C	F	.	F	.	.	F	.	.	.	.	.	.	.	.	C	.	.	R	.
				39X-CC	A	M	C	?	?	.	C	R	F	.	C	.	.	F	.	.	R	.	R	.	.	.	C	F	.	C	.
				40X-1, 47–48	A	M	C	.	.	C	.	.	F	.	C	.	.	C	.	.	.	R	C	.	.	.	C	.	.	C	.
				40X-2, 47–48	A	M	C	R	.	R	.	C	R	.	R	.	.	C	.	.	.	.	C	.	.	.	C	.	.	C	.
		CC22	*Q. trifidum*	40X-CC	A	M	C	?	.	R	.	C	F	R	C	.	R	C	.	.	R	F	F	.	.	.	C	R	.	C	.
				41X-1, 46–47	C	M/P	C	.	F	.	.	C	R	R	C	R	R	C	F	.	.	F	F	R	.	.	C	.	.	C	.
				41X-3, 46–47	C	M	R	.	.	.	.	C	F	.	C	.	R	C	.	.	R	.	R	.	.	.	C	.	.	C	.
				41X-5, 46–47	C	M	C	.	.	F	.	C	F	F	.	.	.	C	.	.	R	R	C	.	.	.	F	R	.	C	R
Campanian	late			41X-CC	F	M/P	F	F	F	F	.	R	F	R	.	.	.	F	.	.	.	R	.	.	.	R	F	.	.	R	R
				42X-1, 21–22	C	M/P	C	F	R	F	.	F	F	R	.	.	.	.	F	.	.	F	F	.	.	.	F	R	.	F	R
				42X-3, 47–48	C	M	R	A	R	.	F	.	R	.	F	.	.	F	.	.	.	F	R	.	.	.	C	R	.	F	R
				42X-CC	R	P	.	.	.	?	R	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.	.	.
				43X-1, 19–20	F	M/P	C	.	.	R	.	C	R	R	R	.	.	.	.	.	.	F	.	?	.	.	C	.	.	F	R
				43X-CC	R	P	.	?	.	.	R	?	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				44X-CC	F	M/P	C	R	.	.	.	R	.	.	R	.	.	F	.	.	.	.	.	R	.	.	.	.	.	.	R
				45X-CC	F	P	F	.	R	R	?	.	R	R	R	.	.	R	.	.	.	R	.	.	.	.	.	.	.	F	.
				46X-CC, 19–20	C	M/P	A	R	F	.	.	F	.	.	.	.	.	C	.	.	.	F	C	.	.	.	F	.	.	.	.
				46X-CC	C	M	.	C	.	F	.	.	?	.	R	.	.	F	.	.	.	F	.	.	.	.	R	.	.	C	.
				47R-2, 80–81	F	M/P	R	R	R	.	.	.	.	.	.	.	.	F	.	.	.	R	.	R	.	.	R	.	.	F	R
				47R-CC	R	M/P	F	.	R	.	.	.	.	?	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.
				48R-1, 19–20	F	M/P	F	R	F	?	F	.	F	R	F	.	.	.	.	.	.	R	.	.	.	.	F	.	.	C	R
				48R-3, 38–39	R	P	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.
				48R-CC	R	M/P	C	R	F	F	.	?	R	.	R	.	R	R	R	.	?	F	.	?	.	.	.	.	.	F	R
				49R-1, 28–29	R	P	F	R	.	R	.	.	R	R	R	.	.	R	.	.	.	R	.	.	.	.	.	.	.	F	.
				49R-CC	R	P	F	R	R	F	.	C	.	.	F	.	.	R	.	.	.	.	.	.	.	.	R	.	.	C	F
				50R-2, 47–48	R	M	C	R	.	F	F	.	R	R	.	.	R	.	.	.	.	F	.	.	.	.	.	.	.	R	.
				50R-3, 47–48	F	M/P	C	.	.	R	F	.	.	R	.	.	.	.	.	.	.	R	.	.	.	.	C	.	.	R	.
				50R-CC	R	P	C	.	.	F	F	.	.	R	F	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.
				51R-1, 26–27	F	M/P	C	.	.	R	C	.	.	R	C	.	.	F	.	.	.	.	.	.	.	.	.	.	.	F	.
				51R-2, 53–54	F	M	C	.	.	.	R	.	.	?	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.
				51R-3, 71–72	R	M	C	.	.	.	F	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				51R-4, 42–43	F	M	F	.	.	.	R	.	.	.	R	.	R	R	.	.	R	.	.	.	.	.	F	.	.	.	.
				51R-CC	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				52R-1, 47–48	R	P	F	.	.	.	R	.	.	.	R	.	.	.	.	.	.	R	.	.	.	.	R	.	.	F	.
				52R-3, 47–48	R	M/P	C	.	.	.	F	.	R	.	.	.	R	R	.	.	.	C	.	.	.	.	F	.	.	R	.
				52R-CC	R	P	F	.	.	.	.	.	F	.	F	.	.	.	.	.	.	R	.	.	.	.	R	.	.	.	.
				53R-1, 19–20	R	M	F	F	.	.	F	.	F	.	.	.	.	.	.	.	.	F	.	.	.	.	F	.	.	R	.
				53R-CC	C	M	C	F	.	.	F	.	.	R	.	.	.	.	.	.	C	F	.	R	.	.	C	.	.	R	.
				54R-1, 51–52	F	P	.	.	.	.	F	.	.	.	F	.	.	F	.	.	.	.	.	.	.	.	R	.	.	.	.
				54R-2, 32–33	R	M	.	.	.	.	R	.	R	.	F	.	.	R	.	.	.	.	.	.	.	.	R	.	.	.	.
				54R-CC	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				56R-3, 48–49	R	P	.	.	.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.
				56R-CC	R	P	.	.	R	.	.	.	.	.	.	.	.	C	.	.	.	.	.	.	.	.	.	.	.	R	.
				57R-1, 56–57	R	P	.	.	.	.	R	.	.	.	R	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.
				57R-1, 139–140	R	P	R	.	F	.	.	R	R	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.
				57R-2, 56–57		M	R	F	F	.	C	?	.	F	?	.	.	.	.	.	F	.	.	F	R	.	.	.	.	.	.

Note: Preservation: G = good, M = moderate, P = poor. Abundance: A = abundant, C = common, F = few, R = rare, ? = questionably present, B = barren . = not present.

Table 5 (continued).

Age		Nannofossil zone		Core, section, interval (cm)	Abundance	Preservation	*Eiffellithus gorkae*	*Eiffellithus turriseiffelii*	*Gartnerago obliquum*	*Glaukolithus compactus*	*Glaukolithus diplogrammus*	*Kamptnerius magnificus*	*Lapideacassis mariae*	*Lithraphidites quadratus*	*Lithraphidites carniolensis*	*Lucianorhabdus arcuatus*	*Lucianorhabdus cayeuxii*	*Manivitella pemmatoidea*	*Markalius inversus*	*Microrhabdulus decoratus*	*Micula decussata*	*Micula murus*	*Misceomarginatus pleniporus*	*Monomarginatus pectinatus*	*Monomarginatus quaternarius*	*Nephrolithus corystus*	*Phanulithus obscurus*	*Phanulithus ovalis*	*Placozygus fibuliformis*	*Placozygus sigmoides*	*Prediscosphaera arkhangelskyi*
Maestrichtian	late	CC26 — CC25	*N. frequens* — *A. cymbiformis*	32X-1, 23.5	A	G/M	.	C	.	.	.	C	.	F	C	R	.	.	R	C	A	F	.	.	.	.	.	.	C	.	.
				32X-1, 84	A	G/M	.	C	.	.	.	F	C	F	A	.	.	R	R	A	A	F	.	.	.	?	.	.	F	.	.
				32X-1, 144	A	G/M	.	C	.	.	.	F	.	.	C	.	.	R	R	C	A	?	.	.	R	.	.	.	F	.	.
				32X-3, 47–48	A	G/M	R	C	F	F	R	A	.	.	.	.	.	.	R	A	A	.	R	R	.	R	.	.	.	C	.
				32X-6, 10–11	A	G	.	C	F	R	.	F	.	.	C	.	.	.	R	A	A	.	.	.	.	?	.	.	.	.	.
	early	CC24	*R. levis*	32X-CC	A	G	.	R	F	A	.	A	R	R	A	.	R	R	F	C	A	.	.	R	.	R	.	.	.	F	R
				33X-1, 47–48	A	G	.	C	.	R	.	C	.	.	C	.	.	F	R	A	A	.	.	R	.	R	.	.	.	C	C
				33X-2, 47–48	A	G	R	C	R	F	.	A	.	.	C	.	R	.	R	C	A	.	.	F	.	C	.	.	.	R	F
				33X-3, 47–48	A	M	.	C	F	.	.	C	R	.	C	.	.	R	.	A	A	.	R	R	.	R	F	.	.	R	F
				33X-5, 47–48	A	M/P	C	A	R	R	.	A	.	.	F	.	A	R	R	C	A	.	.	R	.	C	F	F	.	R	.
		CC23	*T. phacelosus*	33X-6, 47–48	A	M	R	C	F	F	.	C	.	.	C	.	C	R	.	A	A	.	.	R	.	R	C	.	.	F	F
				33X-CC, 42–43	A	M	F	F	F	C	.	C	.	.	C	.	C	R	R	C	.	.	.	F	.	.	.	.	.	.	.
				33X-CC			.	F	.	.	.	.	.	.	.	.	.	.	.	F	A	.	.	.	.	.	.	.	.	.	.
				34X-1, 37–38	A	G	.	C	F	F	.	C	.	.	F	.	F	.	.	C	A	.	.	F	.	R	.	.	.	.	?
				34X-2, 36–37	A	G	.	F	.	.	.	C	R	.	F	.	A	R	R	C	A	.	.	F	.	R	F	.	.	.	.
				34X-3, 33–34	A	G	.	C	.	F	.	C	.	.	.	.	A	.	.	.	A	.	.	F	.	F	F	.	.	.	.
				34X-4, 29–30	A	G	.	C	.	F	.	R	F	.	R	.	C	R	.	R	A	.	.	R	.	.	F	.	.	.	.
				34X-5, 27–28	A	G	.	C	.	F	.	C	.	.	.	.	R	.	.	C	A	.	.	F	.	R	C	.	.	.	.
				34X-CC	A	G	.	F	C	.	.	F	.	.	F	.	A	.	.	C	A	.	.	F	.	F	A	.	.	F	F
				35X-1, 46–47	A	G	.	C	.	.	.	.	.	.	.	.	A	.	.	C	A	.	.	C	.	.	F	.	.	R	F
				35X-3, 46–47	A	G	C	C	F	C	.	.	.	.	C	.	C	.	.	C	A	.	.	.	.	.	C	.	.	F	F
				35X-CC	A	G	F	C	F	.	.	.	.	.	C	.	C	R	R	F	A	.	.	C	.	R	F	.	F	.	F
				36X-1, 46–47	A	G	C	A	.	.	.	C	.	.	C	.	A	.	.	F	A	.	.	C	.	R	F	C	F	.	.
				36X-2, 46–47	A	G	.	C	R	A	.	C	.	.	.	.	A	.	F	F	A	.	.	F	.	.	C	.	.	.	.
				36X-3, 46–47	A	G	C	C	C	R	.	R	.	.	F	.	C	.	R	C	A	.	.	C	.	.	F	.	R	.	C
				36X-CC	A	G/M	.	C	F	R	R	C	R	.	C	.	C	R	.	F	A	.	R	.	.	F	F	.	.	R	C
				37X-1, 14–15	A	M	R	C	F	C	.	C	.	.	F	.	A	.	.	C	A	.	.	R	.	.	C	.	R	C	.
				37X-CC	A	M	F	A	C	R	.	F	.	.	C	.	A	.	.	C	A	.	F	F	.	.	C	.	C	.	.
				38X-1, 46–47	A	M	A	A	C	C	R	C	.	.	F	.	C	R	R	F	A	.	.	C	.	.	C	.	.	F	.
				38X-CC	A	M	F	C	C	.	R	C	.	.	C	.	C	.	.	C	A	.	.	C	.	.	C	.	F	.	.
				39X-1, 47–48	A	M	F	A	R	C	R	C	.	.	C	.	C	.	.	C	A	.	.	C	.	.	C	.	.	F	.
				39X-CC	A	M	R	A	F	C	C	F	.	.	R	.	C	.	.	C	A	F	R	.	.	.	C	?	F	C	F
				40X-1, 47–48	A	M	F	C	C	C	C	C	.	.	A	.	C	.	.	A	A	.	R	C	.	.	C	.	C	C	.
				40X-2, 47–48	A	M	R	C	C	C	R	C	.	.	F	.	C	.	.	C	C	.	.	F	.	.	R	.	R	C	.
		CC22	*Q. trifidum*	40X-CC	A	M	.	C	F	F	.	C	.	.	A	.	.	.	.	C	A	.	F	C	.	.	F	.	F	A	.
				41X-1, 46–47	C	M/P	.	C	F	C	.	C	.	.	C	.	C	.	.	C	A	.	R	C	.	.	F	.	F	F	F
				41X-3, 46–47	C	M	R	C	C	R	R	C	.	.	F	.	C	.	.	C	C	.	.	F	.	.	C	.	C	C	F
				41X-5, 46–47	C	M	.	C	C	F	.	F	.	.	F	.	C	.	.	C	C	.	R	C	.	.	.	.	F	C	F
Campanian	late			41X-CC	F	M/P	R	F	C	.	F	F	.	.	.	.	C	.	.	F	C	.	.	.	.	.	F	.	F	F	F
				42X-1, 21–22	C	M/P	C	C	C	R	F	F	.	.	C	.	C	.	.	C	A	.	R	C	.	.	F	.	C	C	F
				42X-3, 47–48	C	M	F	C	C	R	.	C	.	.	C	.	C	.	.	C	C	.	F	C	.	.	F	.	C	C	F
				42X-CC	R	P	.	.	.	.	.	F	.	.	.	.	.	.	?	F	.	.	.	F	.	.	.	.	F	.	.
				43X-1, 19–20	F	M/P	R	C	C	.	.	R	.	.	.	.	C	.	.	.	C	.	.	C	.	.	.	.	.	R	F
				43X-CC	R	P	.	.	R	.	.	?	.	.	.	.	C	.	.	.	C	.	.	.	.	.	.	.	.	.	.
				44X-CC	F	M/P	.	C	C	.	.	R	.	.	.	.	C	.	.	C	F	.	.	C	.	.	.	.	.	R	R
				45X-CC	F	P	.	F	.	.	.	F	.	.	.	.	C	.	.	F	A	.	F	.	.	.	.	.	.	.	.
				46X-CC, 19–20	C	M/P	.	C	F	.	.	F	.	.	.	.	C	.	.	C	A	.	R	C	.	.	.	.	.	C	.
				46X-CC	C	M	F	F	F	.	F	C	.	.	.	.	C	.	.	C	A	.	?	C	.	.	.	.	.	F	.
				47R-2, 80–81	F	M/P	F	R	C	.	.	F	.	.	R	.	C	.	.	.	C	.	R	F	.	.	.	.	?	?	R
				47R-CC	R	M/P	R	F	.	.	.	F	.	.	.	.	F	.	.	F	C	.	R	F	.	.	.	.	.	.	.
				48R-1, 19–20	F	M/P	R	F	C	C	R	F	.	.	.	.	C	.	.	F	C	.	R	C	.	.	.	.	R	.	R
				48R-3, 38–39	R	P	.	F	.	.	.	.	.	.	.	.	F	.	.	.	C	.	.	.	.	.	.	.	.	.	.
				48R-CC	R	M/P	C	C	C	R	F	F	.	.	.	.	F	.	.	F	.	.	R	C	.	.	.	.	.	R	.
				49R-1, 28–29	R	P	F	C	F	.	R	C	.	.	.	.	F	.	.	R	C	.	R	C	.	.	.	.	.	.	.
				49R-CC	R	P	F	F	C	.	.	F	.	.	.	.	C	.	.	F	C	.	.	R	.	.	.	.	F	R	.
				50R-2, 47–48	R	M	F	F	F	.	.	F	.	.	.	.	F	.	.	.	C	.	.	C	.	.	R	.	R	.	R
				50R-3, 47–48	F	M/P	R	C	C	.	F	F	.	.	F	.	.	.	.	F	C	.	R	C	.	.	R	.	.	C	R
				50R-CC	R	P	.	R	C	R	F	F	.	.	.	.	C	.	.	C	C	.	.	F	.	.	.	.	.	F	.
				51R-1, 26–27	F	M/P	C	C	C	.	F	C	.	.	.	.	C	.	.	C	C	.	.	F	.	.	.	.	R	R	.
				51R-2, 53–54	F	M	.	C	C	.	R	C	.	.	.	.	C	.	.	C	.	.	.	C	.	.	.	.	.	R	.
				51R-3, 71–72	R	M	.	F	F	.	.	F	.	.	.	.	F	.	.	C	C	.	.	C	.	.	.	.	.	R	.
				51R-4, 42–43	F	M	.	R	C	.	F	R	.	.	.	.	C	.	.	F	C	.	.	R	.	.	.	.	.	.	.
				51R-CC	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				52R-1, 47–48	R	P	.	F	C	.	.	C	.	.	.	.	F	.	.	C	C	.	.	?	.	.	.	.	.	.	.
				52R-3, 47–48	R	M/P	.	F	C	.	C	R	.	.	F	.	C	.	.	C	C	.	R	C	.	.	.	.	.	.	R
				52R-CC	R	P	.	C	C	.	F	F	.	.	.	.	C	.	.	C	C	.	.	F	.	.	R	.	.	F	R
				53R-1, 19–20	R	M	.	F	F	F	C	F	.	.	.	.	F	.	.	F	A	.	.	F	.	.	.	.	.	.	.
				53R-CC	C	M	.	C	R	C	.	.	.	.	.	.	C	.	.	F	C	.	.	C	.	.	.	.	R	.	.
				54R-1, 51–52	F	P	.	.	C	.	.	F	.	.	.	.	F	.	.	F	C	.	.	.	.	.	.	.	.	.	.
				54R-2, 32–33	R	M	.	R	F	.	.	F	.	.	.	.	F	.	.	R	C	.	.	.	.	.	R	.	.	.	.
				54R-CC	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				56R-3, 48–49	R	P	.	F	C	.	.	C	.	.	.	.	.	.	.	R	C	.	.	.	.	.	.	.	R	.	.
				56R-CC	R	P	.	.	F	.	.	C	.	.	.	.	.	.	.	.	C	.	.	.	.	.	.	.	.	.	.
				57R-1, 56–57	R	P	.	R	R	.	.	F	.	.	.	.	.	.	.	.	C	.	.	.	.	.	.	.	R	.	.
				57R-1, 139–140	R	P	.	R	R	.	.	R	.	.	.	.	.	.	.	R	F	.	.	R	.	.	.	.	.	.	.
				57R-2, 56–57		M	F	R	C	.	.	C	.	.	.	.	.	.	.	F	C	.	.	R	.	.	.	.	R	.	.

Table 5 (continued).

Age		Nannofossil zone		Core, section, interval (cm)	Abundance	Preservation	*Prediscosphaera bukryi*	*Prediscosphaera cretacea*	*Prediscosphaera grandis*	*Prediscosphaera honjoi*	*Prediscosphaera intercisa*	*Prediscosphaera spinosa*	*Prediscosphaera stoveri*	*Quadrum sissinghii*	*Quadrum trifidum*	*Reinhardtites anthophorus*	*Reinhardtites levis*	*Reinhardtites* sp. aff. *R. anthophorus*	*Repagalum parvidentatum*	*Rhagodiscus angustus*	*Rhagodiscus* sp.	*Rhagodiscus splendens*	*Scampanella cornuta*	*Staurolithites* sp.	*Stradneria crenulata*	*Thoracosphaera operculata*	*Thoracosphaera* sp.	*Tranolithus exiguus*	*Tranolithusu gabalus*	*Tranolithus phacelosus*	*Vekshinella? parma*	*Watznaueria barnesae*	*Zeugrhabdotus embergeri*	*Zygodiscus xenotus*
Maestrichtian	late	CC26 — CC25	*N. frequens* — *A. cymbiformis*	32X-1, 23.5	A	G/M	.	C	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.	.	F	.	.	.	.	.	.	A	.	.
				32X-1, 84	A	G/M	.	.	C	.	.	.	R	.	.	.	.	.	.	.	.	C	.	.	.	.	.	.	.	.	.	A	.	.
				32X-1, 144	A	G/M	.	C	F	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	F	.	.	.	.	.	.	A	.	.
				32X-3, 47–48	A	G/M	.	C	C	.	.	F	R	.	.	.	C	.	R	R	R	.	.	.	A	.	.	.	.	.	.	C	.	C
				32X-6, 10–11	A	G	.	C	F	.	.	F	R	.	.	.	.	.	.	R	R	R	.	.	F	.	.	.	.	.	.	C	.	C
	early	CC24	*R. levis*	32X-CC	A	G	.	A	C	.	.	F	.	.	.	.	C	F	F	.	C	.	.	.	.	F	R	.	.	.	.	A	.	.
				33X-1, 47–48	A	G	.	A	C	.	F	C	R	.	.	.	C	F	F	.	C	.	.	.	A	.	R	.	.	.	.	A	R	.
				33X-2, 47–48	A	G	.	C	.	.	.	.	.	.	.	.	C	C	R	R	R	.	.	.	A	.	.	.	.	R	.	C	F	C
				33X-3, 47–48	A	M	.	C	C	.	.	.	.	.	.	.	.	F	.	R	.	.	.	.	A	.	.	.	.	R	.	C	.	.
				33X-5, 47–48	A	M/P	R	C	C	.	.	R	R	R	.	.	R	C	R	R	.	.	.	.	A	.	.	.	.	R	.	C	.	F
		CC23	*T. phacelosus*	33X-6, 47–48	A	M	.	C	C	.	.	F	F	R	.	.	C	F	R	.	C	.	.	.	C	.	.	.	.	.	.	C	R	C
				33X-CC, 42–43	A	M	.	C	C	.	.	F	.	F	F	.	F	C	.	R	R	.	.	.	C	.	.	.	.	C	.	C	.	F
				33X-CC			.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	A	.	.
				34X-1, 37–38	A	G	.	R	C	.	.	A	.	F	R	.	C	F	R	.	.	R	.	.	C	.	.	.	.	.	.	C	C	.
				34X-2, 36–37	A	G	.	C	F	.	.	F	.	F	.	.	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.	.
				34X-3, 33–34	A	G	.	.	C	.	.	.	.	.	.	.	C	.	.	?	.	.	.	.	C	.	.	.	.	.	.	A	.	.
				34X-4, 29–30	A	G	.	C	F	.	.	R	.	F	R	.	C	.	.	.	.	.	.	.	C	.	.	.	.	.	.	C	.	.
				34X-5, 27–28	A	G	.	.	F	.	.	F	.	F	.	.	C	F	R	R	.	F	.	.	C	.	.	.	.	R	.	A	.	.
				34X-CC	A	G	.	F	F	.	.	F	.	F	R	.	A	F	.	.	.	.	.	.	R	.	.	.	.	R	.	C	F	.
				35X-1, 46–47	A	G	.	C	.	.	C	.	R	C	R	.	C	C	R	.	R	.	.	.	.	.	.	.	.	R	.	A	.	F
				35X-3, 46–47	A	G	.	C	F	.	F	.	F	R	.	.	C	C	.	R	.	.	.	.	C	.	.	.	.	R	.	A	.	C
				35X-CC	A	G	F	F	F	.	.	F	.	R	.	.	C	C	.	.	R	.	.	.	F	.	R	.	.	R	.	C	.	C
				36X-1, 46–47	A	G	.	C	.	.	.	C	C	.	.	.	C	C	R	.	?	.	.	.	A	R	.	.	.	.	.	A	.	C
				36X-2, 46–47	A	G	.	C	.	.	.	R	.	.	.	.	A	.	.	.	.	.	.	.	C	.	.	.	.	.	.	C	.	.
				36X-3, 46–47	A	G	C	C	F	.	.	C	C	R	.	.	C	C	.	.	.	.	.	.	C	.	R	.	.	.	.	C	.	C
				36X-CC	A	G/M	.	C	R	R	.	C	F	R	F	.	A	F	R	R	.	.	.	.	F	.	R	.	.	R	.	C	.	R
				37X-1, 14–15	A	M	.	C	R	.	.	.	R	R	R	.	C	.	.	.	.	.	.	.	C	.	.	.	.	R	F	C	.	.
				37X-CC	A	M	.	C	R	.	.	F	C	.	.	.	C	.	.	.	.	.	.	.	A	.	.	.	.	R	F	A	.	.
				38X-1, 46–47	A	M	.	C	F	F	.	C	C	F	.	.	A	F	.	C	.	.	.	.	C	.	.	.	.	.	F	C	.	.
				38X-CC	A	M	?	C	.	F	.	F	C	.	.	.	C	C	.	.	.	?	.	?	C	.	C	.	.	.	F	A	.	.
				39X-1, 47–48	A	M	F	C	R	.	.	R	F	.	.	.	C	A	.	.	.	.	.	.	.	.	.	.	.	R	F	A	.	.
				39X-CC	A	M	F	C	R	C	.	.	C	R	?	.	C	A	.	.	.	R	.	R	C	.	F	.	.	R	F	A	.	.
				40X-1, 47–48	A	M	.	C	.	.	.	F	R	.	.	.	C	A	A	R	.	.	.	C	.	.	F	.	.	R	C	A	.	.
				40X-2, 47–48	A	M	.	.	.	.	.	.	C	.	R	.	C	A	C	.	.	.	.	.	.	.	.	.	.	R	F	A	.	.
		CC22	*Q. trifidum*	40X-CC	A	M	.	C	.	.	.	F	F	.	R	A	C	A	C	.	C	.	.	C	F	.	.	.	.	R	R	A	.	.
				41X-1, 46–47	C	M/P	.	C	F	.	.	C	.	R	R	C	R	F	C	.	.	.	.	C	C	.	R	.	.	R	F	A	.	.
				41X-3, 46–47	C	M	F	C	.	.	.	C	F	R	R	C	R	F	C	.	.	R	.	C	F	.	F	.	.	R	F	A	.	.
				41X-5, 46–47	C	M	C	C	R	F	.	C	C	R	.	C	R	F	C	.	.	R	.	F	C	.	.	.	.	F	.	A	.	.
Campanian	late			41X-CC	F	M/P	.	C	F	F	.	F	C	R	R	C	F	C	C	?	.	R	.	C	F	.	F	.	.	.	F	F	.	.
				42X-1, 21–22	C	M/P	F	C	.	F	.	F	C	?	R	C	F	F	C	R	R	?	R	C	F	.	F	.	.	.	F	F	.	.
				42X-3, 47–48	C	M	?	C	C	.	.	F	C	?	?	C	F	F	C	.	.	.	.	C	A	.	F	.	.	R	F	C	.	.
				42X-CC	R	P	.	F	.	.	.	.	.	F	?	F	F	R	.	.	.	.	.	.	.	.	.	.	.	R	.	F	.	.
				43X-1, 19–20	F	M/P	.	.	R	F	.	C	C	F	?	C	F	R	A	R	.	.	.	.	R	.	.	.	.	R	F	C	.	.
				43X-CC	R	P	.	F	?	R	.	R	F	?	.	R	R	R	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.
				44X-CC	F	M/P	.	.	.	.	.	F	F	.	.	C	R	R	C	.	.	.	.	.	R	.	.	.	.	R	F	C	.	.
				45X-CC	F	P	?	F	.	.	.	R	?	.	.	R	R	R	F	.	.	.	.	.	.	.	.	.	.	.	.	F	.	F
				46X-CC, 19–20	C	M/P	C	C	.	.	.	C	C	R	.	C	R	R	A	.	.	.	.	.	F	.	.	.	.	?	C	C	.	.
				46X-CC	C	M	C	F	.	F	.	F	.	R	.	C	R	C	A	.	.	.	.	C	F	.	F	.	R	.	C	C	.	.
				47R-2, 80–81	F	M/P	.	C	.	.	.	C	F	.	.	?	R	.	A	R	.	.	.	C	F	.	F	R	.	R	F	C	.	.
				47R-CC	R	M/P	.	F	.	.	.	.	.	.	R	C	R	R	C	.	.	.	.	.	.	.	F	.	.	.	F	C	.	.
				48R-1, 19–20	F	M/P	C	C	R	?	.	C	C	.	.	F	R	R	C	R	.	.	.	R	F	.	R	.	.	.	F	C	.	.
				48R-3, 38–39	R	P	R	F	.	.	.	F	.	.	.	.	.	.	C	.	.	.	.	F	.	.	.	.	.	.	F	C	.	.
				48R-CC	R	M/P	F	F	.	?	.	F	F	?	R	C	.	.	A	R	.	.	.	R	R	.	F	.	.	.	F	C	.	F
				49R-1, 28–29	R	P	C	F	.	.	.	F	F	.	.	C	R	.	A	R	.	.	.	R	R	.	F	.	.	.	R	C	.	.
				49R-CC	R	P	.	F	.	.	.	F	C	?	.	F	.	C	C	.	.	.	.	F	.	.	.	.	.	.	.	F	.	F
				50R-2, 47–48	R	M	.	.	.	.	.	.	R	.	.	F	.	R	C	.	.	.	.	F	R	.	.	.	.	.	C	C	.	.
				50R-3, 47–48	F	M/P	.	F	.	.	.	C	.	.	.	F	.	R	A	.	.	.	.	C	C	R	.	R	.	.	.	F	.	.
				50R-CC	R	P	.	.	.	.	.	.	.	.	.	C	.	?	C	.	.	.	.	C	.	.	R	.	.	.	.	C	.	?
				51R-1, 26–27	F	M/P	C	.	.	.	.	C	C	.	.	C	.	.	C	F	.	.	.	C	R	.	C	.	.	F	F	C	.	.
				51R-2, 53–54	F	M	F	C	.	?	.	C	C	.	.	C	.	.	C	.	.	.	.	C	.	.	F	.	.	R	.	C	.	.
				51R-3, 71–72	R	M	.	R	.	.	.	F	R	.	.	C	.	.	C	R	.	.	.	C	R	.	F	.	.	R	.	C	.	.
				51R-4, 42–43	F	M	.	R	.	.	.	.	.	.	.	R	.	.	C	.	.	.	.	.	.	.	.	.	.	F	.	F	.	.
				51R-CC	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				52R-1, 47–48	R	P	R	.	.	.	.	.	.	.	.	F	.	.	C	.	.	.	.	R	.	.	.	.	.	.	.	C	.	.
				52R-3, 47–48	R	M/P	F	C	.	.	.	C	F	.	R	R	.	.	A	R	.	.	R	C	R	R	.	?	.	.	R	C	.	.
				52R-CC	R	P	R	C	.	.	.	F	F	.	.	?	.	F	C	.	.	.	.	C	.	R	.	.	.	.	.	C	.	.
				53R-1, 19–20	R	M	F	.	.	F	.	F	F	.	.	.	F	.	A	.	.	.	.	R	.	.	F	.	.	.	.	C	.	.
				53R-CC	C	M	.	F	.	R	.	C	R	R	.	C	R	R	.	.	.	.	.	.	.	R	.	.	R	R	.	A	.	.
				54R-1, 51–52	F	P	.	.	.	.	.	.	F	.	.	C	R	.	F	.	.	.	.	R	.	.	.	.	.	?	.	C	.	.
				54R-2, 32–33	R	M	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	R	.	F	.	.	.	.	F	.	.
				54R-CC	B		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
				56R-3, 48–49	R	P	.	.	.	.	.	R	.	.	.	.	?	.	.	.	.	.	.	.	R	.	.	.	.	.	F	C	C	.
				56R-CC	R	P	.	.	.	.	.	R	.	.	.	R	.	.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	C
				57R-1, 56–57	R	P	.	.	.	.	.	.	.	.	.	F	?	.	.	.	.	.	.	.	R	.	.	R	.	.	.	F	R	.
				57R-1, 139–140	R	P	.	R	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	R	.	F	.	.
				57R-2, 56–57		M	.	R	.	F	.	.	F	.	.	F	?	.	.	.	.	.	.	.	R	.	R	.	R	R	.	C	F	.

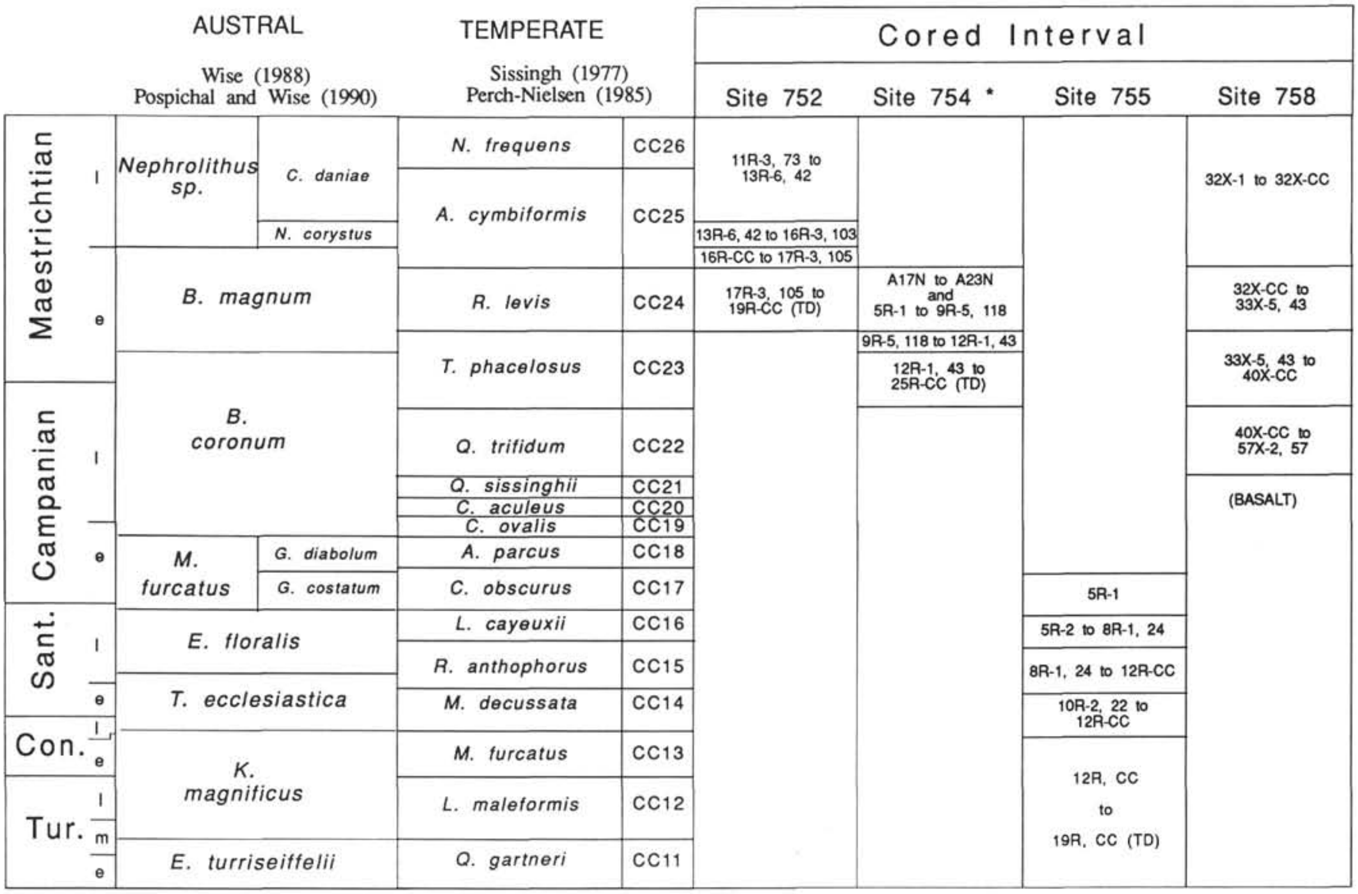

Figure 4. Summary of the nannofossil biostratigraphy for the Cretaceous sediments from Leg 121. For Site 754, cores from Hole 754A are identified with the prefix *A*; cores from Hole 754B have no prefix.

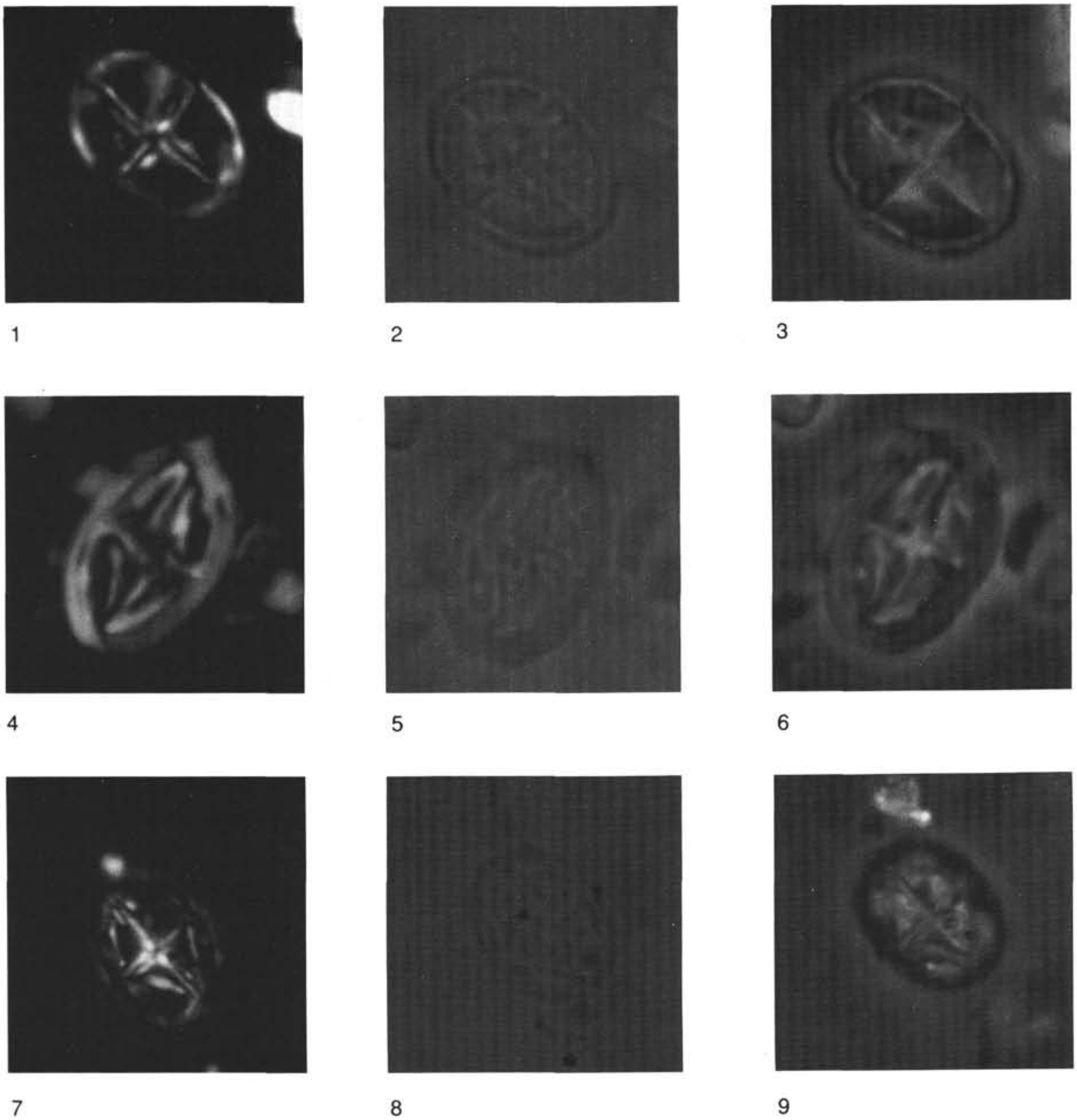

Plate 1. **1–3.** *Misceomarginatus pleniporus*, ×3000, Sample 121-758A-36X-CC. **4–6.** *Monomarginatus quaternarius*, ×3375, Sample 121-758A-35X-CC. **7–9.** *Monomarginatus pectinatus*, ×3000, Sample 121-754B-10R-3, 102–103 cm. Figs. 1, 4, 7: polarized light; Figs. 2, 5, 8: transmitted light; Figs. 3, 6, 9: phase-contrast.

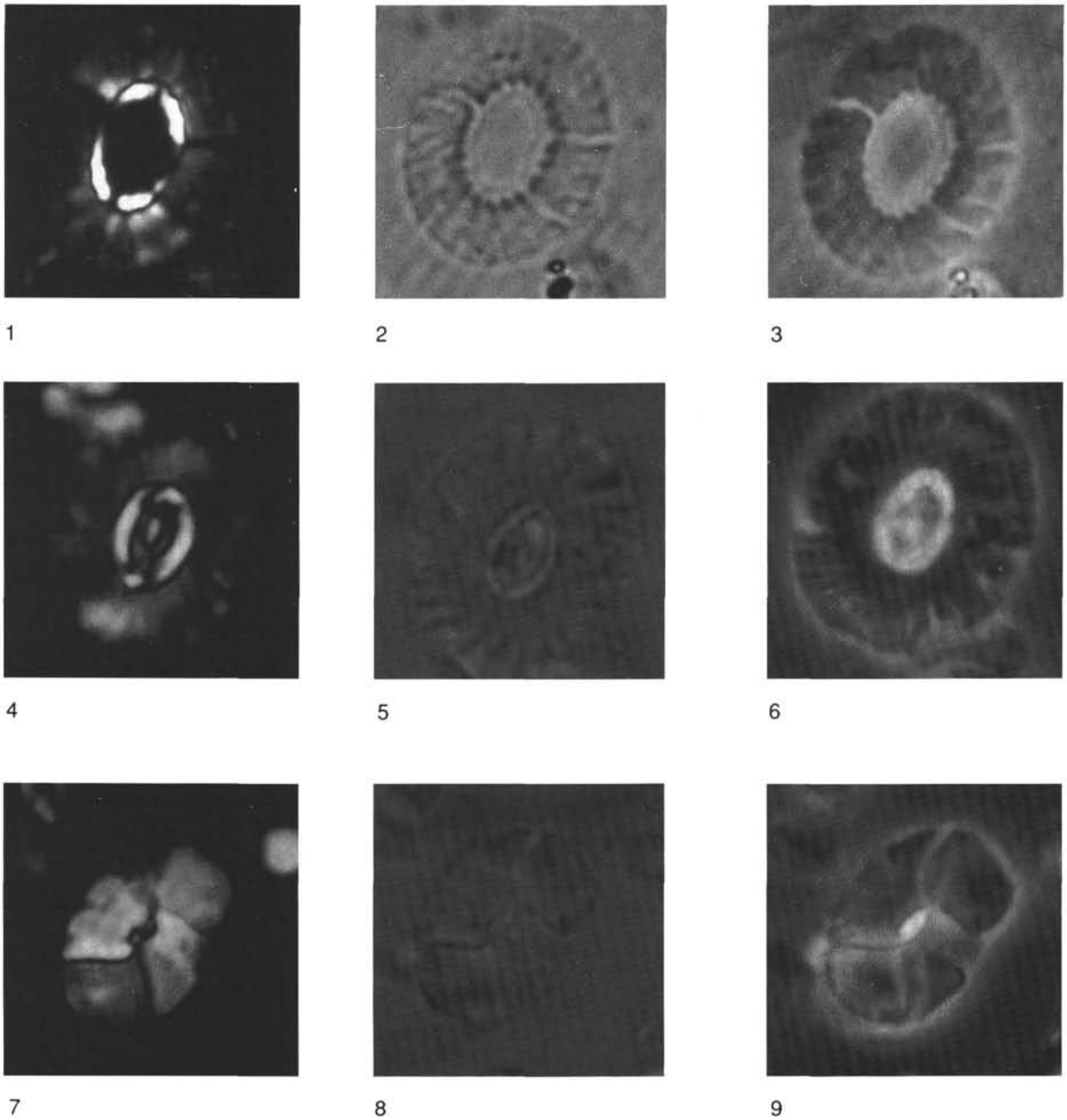

Plate 2. All specimens are ×3000. **1–3.** *Biscutum magnum*, Sample 121-758A-52R-1, 47–48 cm. **4–6.** *Biscutum coronum*, Sample 121-758A-43X-1, 19–20 cm. **7–9.** *Biscutum dissimilis*, Sample 121-758A-42X-3, 47–48 cm. Figs. 1, 4, 7: polarized light; Figs. 2, 5, 8: transmitted light; Figs. 3, 6, 9: phase-contrast.

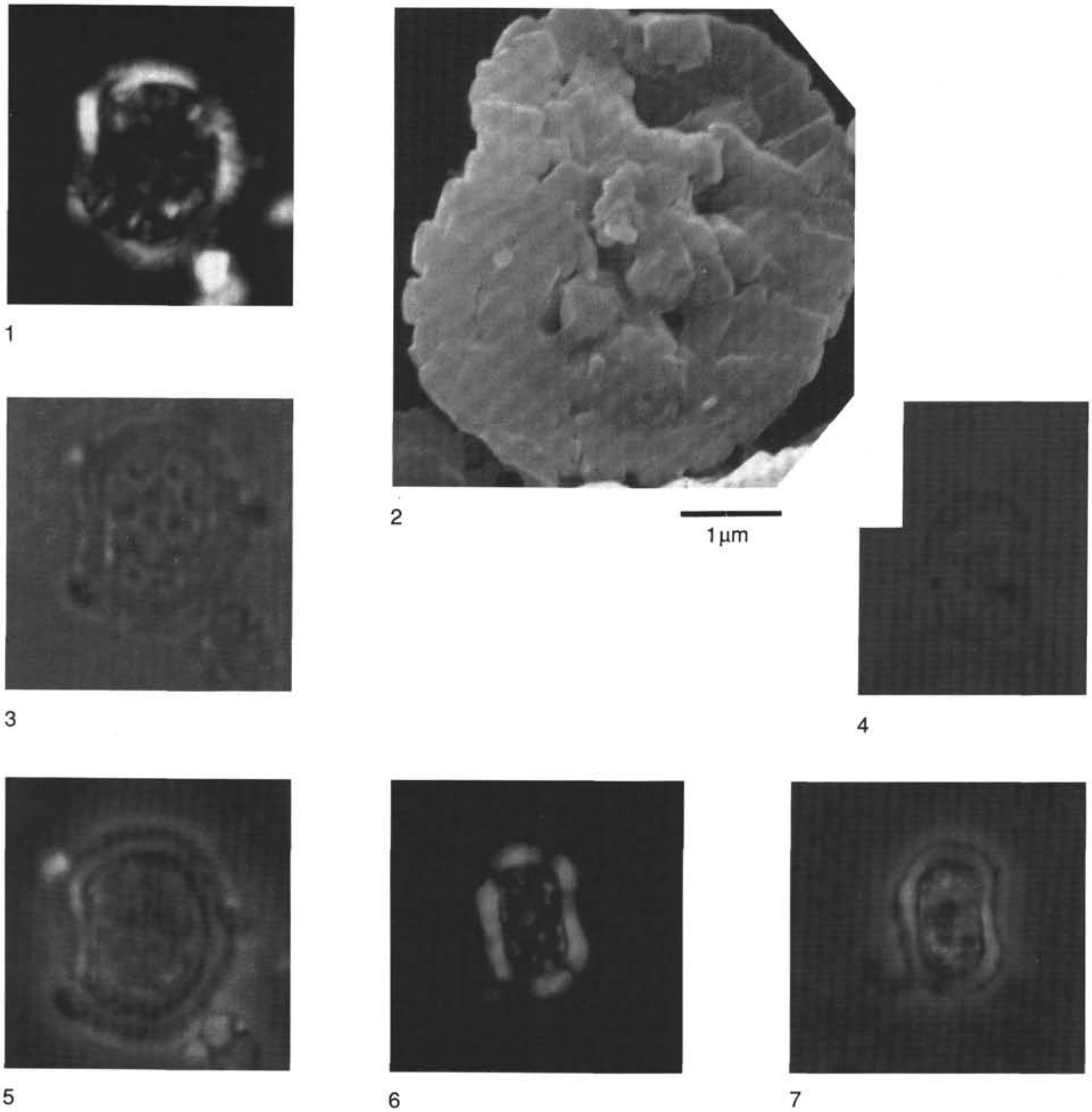

Plate 3. **1–4.** *Nephrolithus frequens*, Sample 121-752B-13H-CC. Figs. 1–3: ×4125. **5–7.** *Nephrolithus corystus*, ×3000, Sample 121-752B-17R-3, 105–106 cm. Figs. 1, 6: polarized light; Figs. 2, 5: transmitted light; Figs. 3, 7: phase-contrast; Fig. 4: SEM.

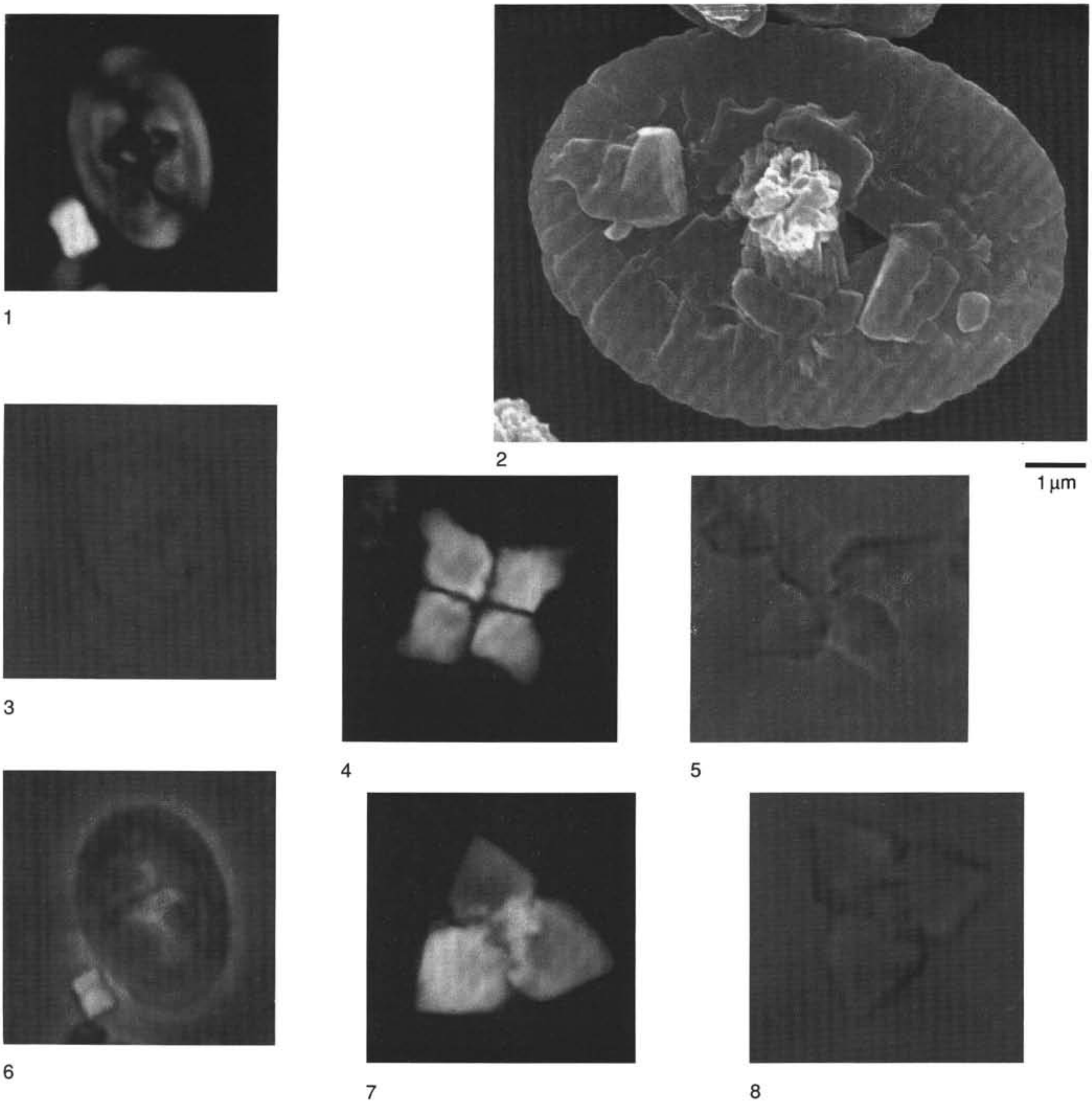

Plate 4. All specimens are ×3000, Sample 121-758A-36X-CC, except as noted. **1–3.** *Reinhardtites levis.* **4.** *R.* sp. aff. *R. anthophorus*, Sample 121-754B-25R-CC. **5, 6.** *Quadrum sissinghii.* **7, 8.** *Quadrum trifidum.* Figs. 1, 5, 7: polarized light; Figs. 2, 6, 8: transmitted light; Fig. 3: phase-contrast; Fig. 4: SEM.

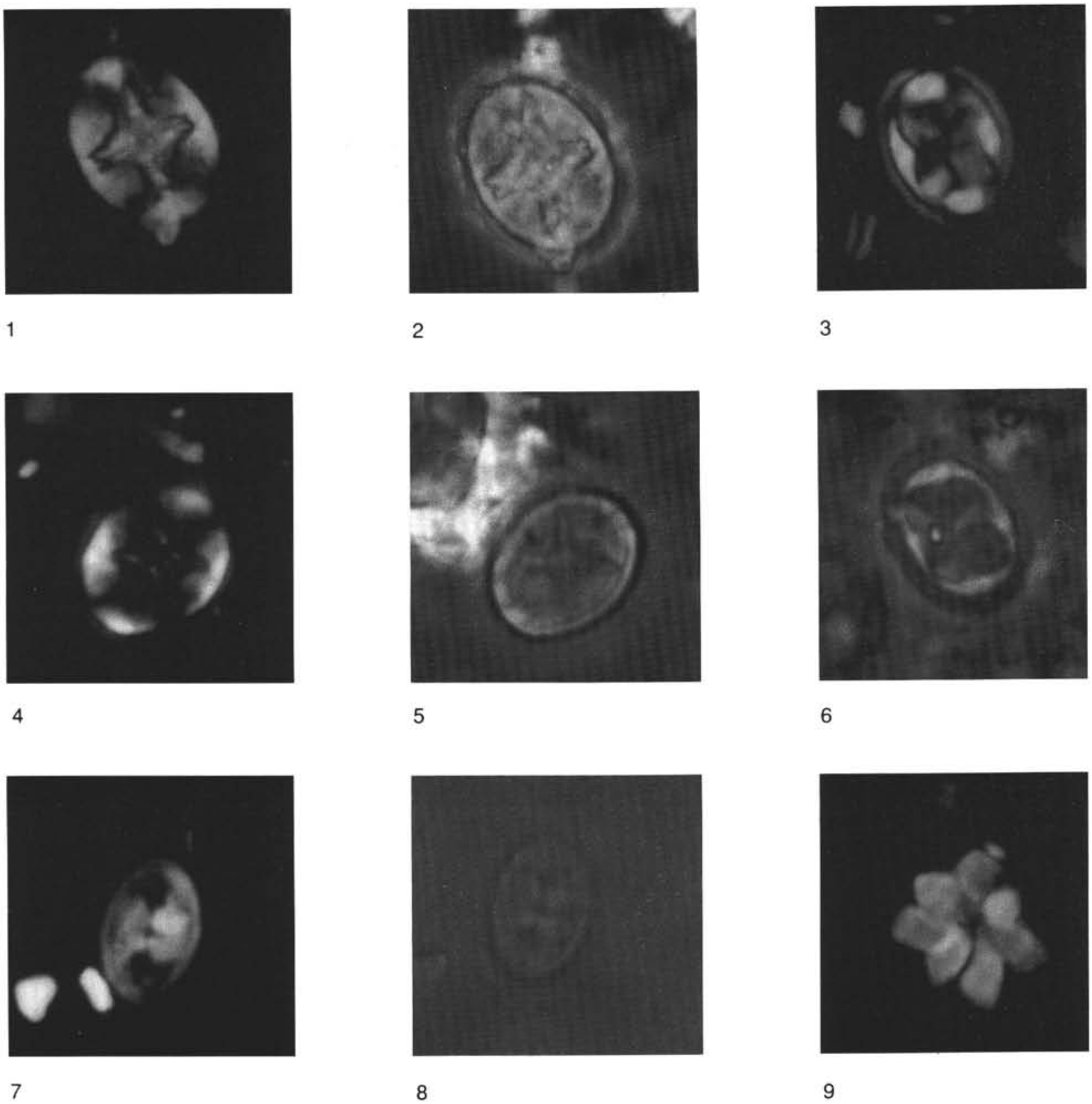

Plate 5. **1, 2.** *Eiffellithus eximius*, ×2500, Sample 121-758A-47X-2, 81–82 cm. **4, 5.** *Eiffellithus turriseiffelii*, ×3000, Sample 121-758A-41X-3, 46–47 cm. **3, 6.** *Helicolithus trabeculatus*, ×4000, Sample 121-755A-8R-CC. **7, 8.** *Tranolithus phacelosus*, ×3000, Sample 121-758A-41X-3, 46–47 cm. **9.** *Lithastrinus moratus*, ×3000, Sample 121-755A-8H-1, 24–25 cm. Figs. 1, 3, 4, 7, 9: polarized light; Figs. 2, 5, 6: phase-contrast; Fig. 8: transmitted light.

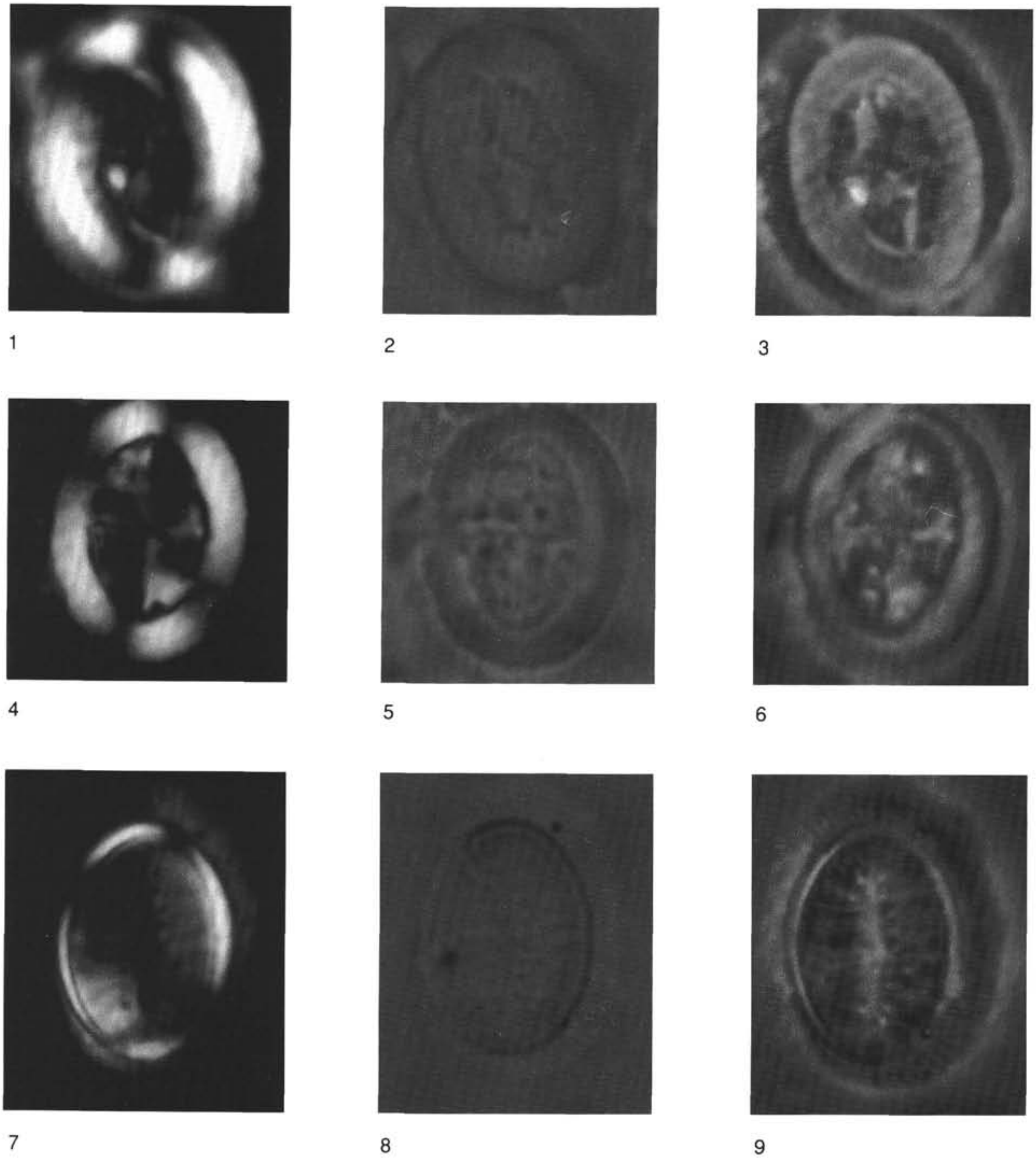

Plate 6. **1–3.** *Aspidolithus parcus constrictus*, ×3750, Sample 121-758A-1, 46–47 cm. **4–6.** *Arkhangelskiella cymbiformis*, ×3750, Sample 121-758A-33X-6, 42–43 cm. **7–9.** *Kamptnerius magnificus*, ×3000, Sample 121-758A-49R-1, 28–29 cm. Figs. 1, 4, 7: polarized light; Figs. 2, 5, 8 : transmitted light; Figs. 3, 6, 9: phase-contrast.

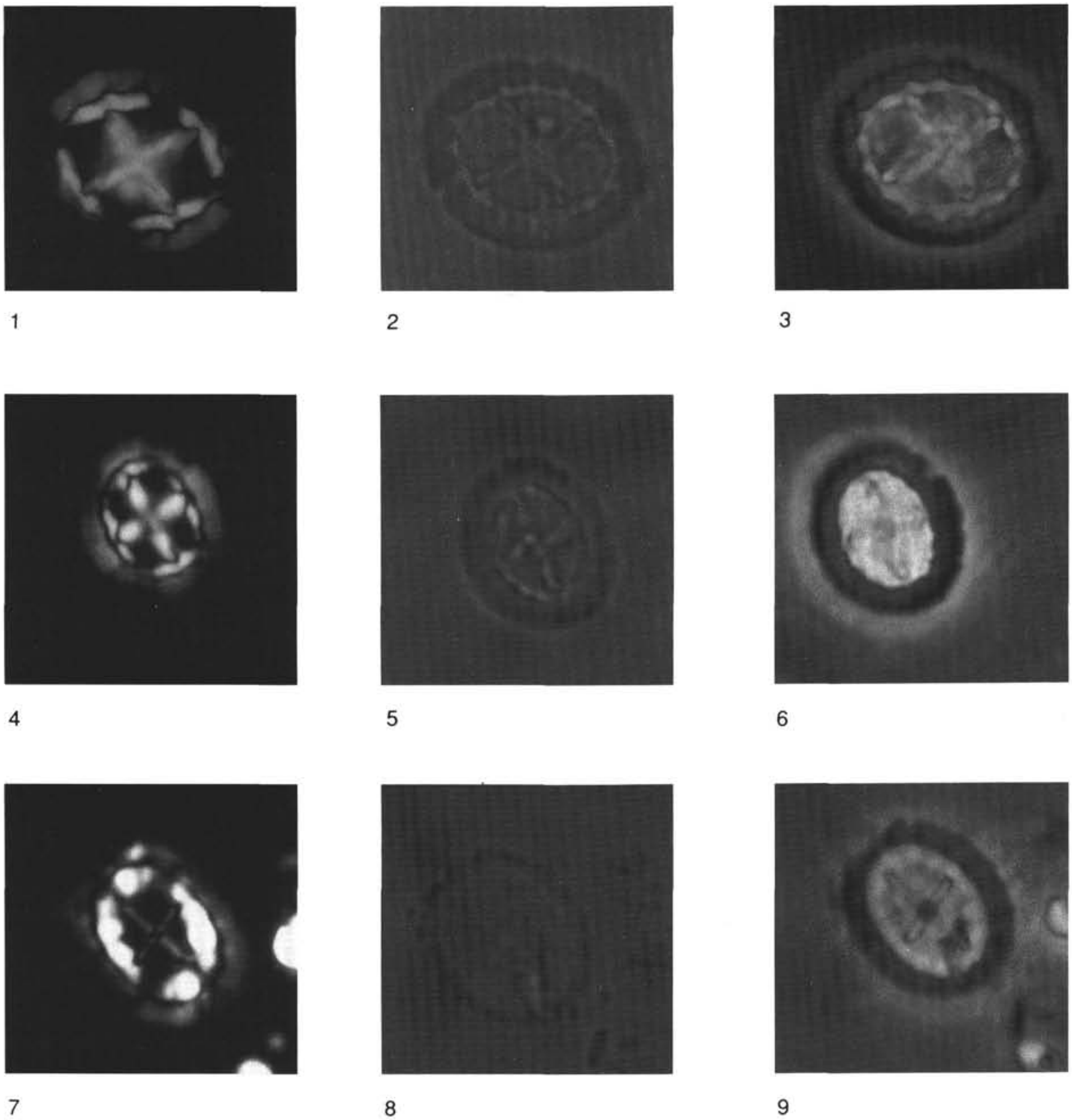

Plate 7. **1–3.** *Prediscosphaera grandis*, ×2375, Sample 121-758A-32X-CC. **4–6.** *Prediscosphaera spinosa*, ×3000, Sample 121-758A-36X-CC. **7–9.** *Prediscosphaera arkhangelskyi*, ×3000, Sample 121-758A-32X-CC. Figs. 1, 4, 7: polarized light; Figs. 2, 5, 8: transmitted light; Figs. 3, 6, 9: phase-contrast.

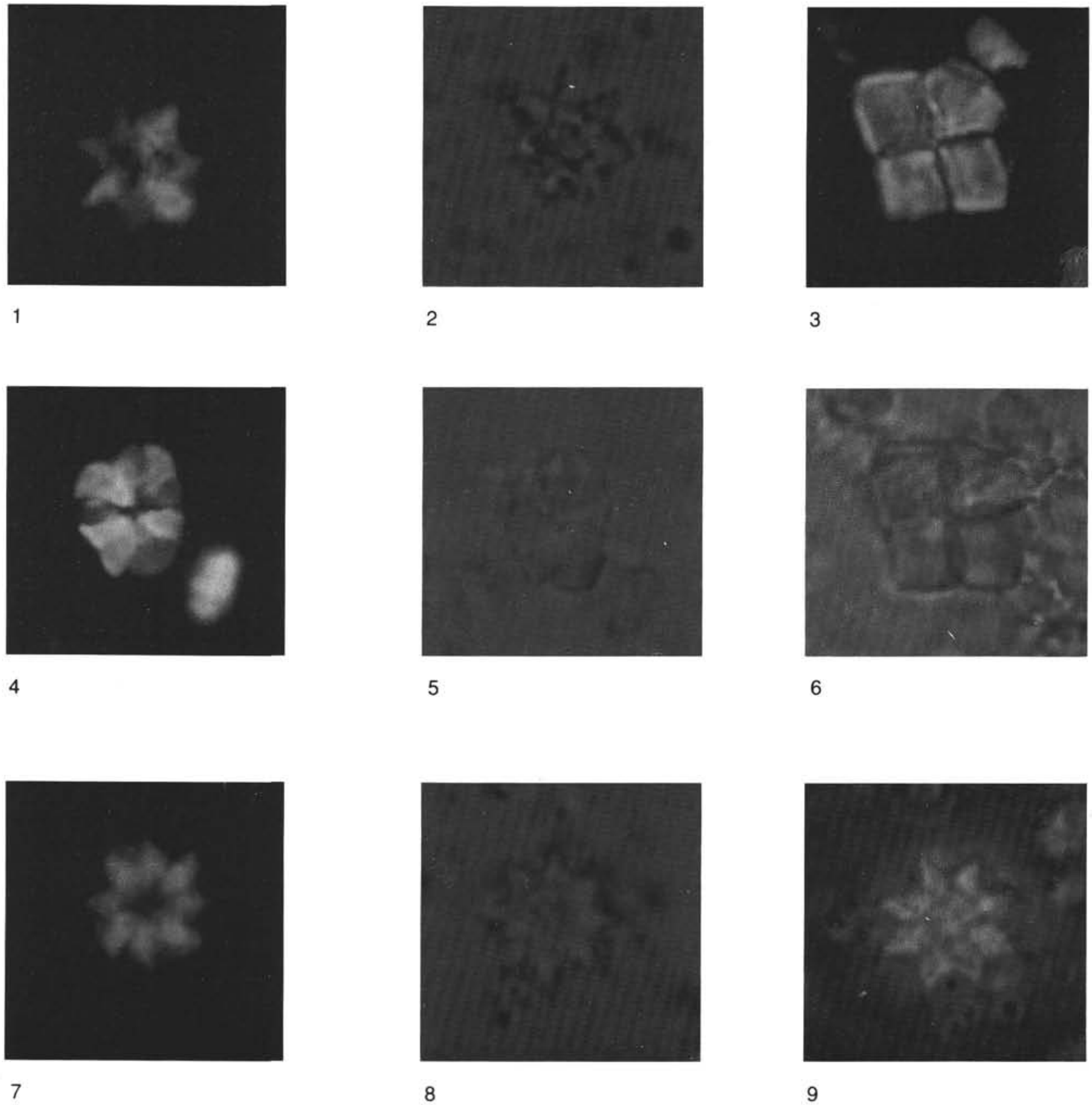

Plate 8. **1, 2.** *Lithastrinus septenarius*, ×3500, Sample 121-755A-15R-3, 82–83 cm. **4, 5.** *Eprolithus* sp. 1, ×3500, Sample 121-755A-13R-4, 49–50 cm. **3, 6.** *Quadrum gartneri*, ×3750, Sample 121-755A-12R-CC. **7–9.** *Eprolithus* sp. 2, ×3500, Sample 121-755A-13R-4, 49–50 cm. Figs. 1, 3, 4, 7: polarized light; Figs. 2, 5, 6, 8: transmitted light; Fig. 9: phase-contrast.