Gradstein F. M., Ludden, J. N., et al., 1992
Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 123

18. BIOSTRATIGRAPHY OF UPPER CRETACEOUS AND PALEOGENE CALCAREOUS NANNOFOSSILS FROM LEG 123, NORTHEASTERN INDIAN OCEAN[1]

Michael J. Moran[2]

ABSTRACT

Two of five holes drilled at two separate sites during Leg 123 of the Ocean Drilling Program intersected thick and relatively complete sections of Upper Cretaceous–Paleogene nannofossiliferous sediments. Although dominated by turbidite deposition in the upper part, Hole 765C contains a thick and relatively complete Albian–Oligocene section, including a particularly thick Aptian interval, with abundant and fairly well-preserved nannofossils. Several unconformities are confidently interpreted in this section that span much of the Santonian, late Campanian, Maestrichtian, late Eocene, and early Oligocene. Hole 766A contains a thick and relatively complete Albian–lower Eocene section having generally abundant and well-preserved nannofossils. Several unconformities also have been identified in this section that span much of the Coniacian, early Campanian, Maestrichtian, and late Eocene through early Pliocene. The chronostratigraphic position and length of all these unconformities may have considerable significance for reconstructing the sedimentary history and for interpreting the paleoceanography of this region.

A particularly thick section of upper Paleocene–lower Eocene sediments, including a complete record across the Paleocene/Eocene boundary, also was cored in Hole 766A that contains abundant and diverse nannofossil assemblages. Although assemblages from this section were correlated successfully using a standard low-latitude zonation, difficulties were encountered that reduced biostratigraphic resolution. Several lines of evidence suggest a mid-latitude position for Site 766 during this time, including (1) high assemblage diversity characteristic of mid-latitude zones of upwelling and (2) absence of certain ecologically controlled markers found only in low latitudes.

INTRODUCTION

During Leg 123 of the Ocean Drilling Program, scientists drilled five holes at two separate sites in the northeastern Indian Ocean, adjacent to the northwestern shelf region of Australia, from September through October 1988 (Fig. 1). This cruise, which represented a combined effort with Leg 122 scientists, attempted to explore and better understand the paleoceanographic history of the northwestern margin of Australia from Exmouth to Scott plateaus. This margin is thought to represent one of the oldest continent/ocean boundaries on Earth (Ludden, Gradstein, et al., 1990). The primary objectives of Leg 123 involved determining events in the final stages of rifting of the Exmouth Plateau and determining when volcanic basement and early oceanic sediments in the Argo Abyssal Plain were formed. The presence of generally abundant and well-preserved calcareous nannofossil assemblages in much of the Upper Cretaceous through Paleogene sediments from these holes provided the impetus for this study, which has yielded an accurate and detailed temporal framework for ascertaining the nature and timing of post-rifting events and for reconstructing the paleoceanography of this area, as well as identifying unconformities for interpreting regional sedimentary history.

Site 765 is located in the southern Argo Abyssal Plain at 15°58.41′S and 117°34.495′E in a water depth of 5728.2 m (Fig. 1). This site is located over what was thought to be the oldest oceanic crust in the Indian Ocean. Four holes were drilled; in the first three, sedimentary sections were cored. Hole 765A was presumed to have missed the mud line during initial entry and was abandoned after the first core. Hole 765B was drilled to a total depth of 386.3 m using both the advanced hydraulic piston corer (APC) and extended-core barrel (XCB) methods for maximum recovery. A Quaternary to middle Miocene section was recovered. Problems with recovery and penetration forced the scientists to drill a new hole (Hole 765C), which was begun at 350.2 mbsf using the rotary-core barrel (RCB) method. This hole was penetrated to a total depth of 964 mbsf, which included approximately 30 m of basaltic basement. Preliminary shipboard biostratigraphy indicated that this hole intersected a middle Miocene to Berriasian section (Ludden, Gradstein, et al., 1990). The Aptian-Oligocene portion of this sequence, which spanned Cores 123-765C-34R through -14R, is examined here.

Site 766 is located on the western limit of the Exmouth Plateau at 19°55.985′S and 110°27.130′E in a water depth of 3997.5 m (Fig. 1). This site is positioned over the foot of the continental slope above the Gascoyne Abyssal Plain. Hole 766A was drilled at this site using only the RCB method and was penetrated a total of 527 mbsf, 60.3 m of which consists of igneous material interpreted as basement. Shipboard biostratigraphy indicated the presence of a condensed Cenozoic section overlying a more complete Mesozoic section (Ludden, Gradstein, et al., 1990). The Albian–lower Eocene portion, which spanned Cores 123-766A-21R through -3R, is examined here.

METHODS AND PROCEDURES

Upper Cretaceous–Paleogene sediments from holes drilled at Sites 765 and 766 were examined for calcareous-nannofossil biostratigraphic information. Standard smear slides made from raw sediment samples were analyzed using the light microscope. The results are presented in Tables 1 through 4. These tables graphically display information such as the abundance of nannofossils as a sedimentary component, relative abundance of individual nannofossil species, estimates of preservation of all nannofossil taxa, as well as stratigraphic distribution of nannofossil species and zonal assignment of samples.

[1] Gradstein, F. M., Ludden, J. N., et al., 1992. *Proc. ODP, Sci. Results*, 123: College Station, TX (Ocean Drilling Program).

[2] Department of Geology, University of Papua New Guinea, Port Moresby, Papua New Guinea.

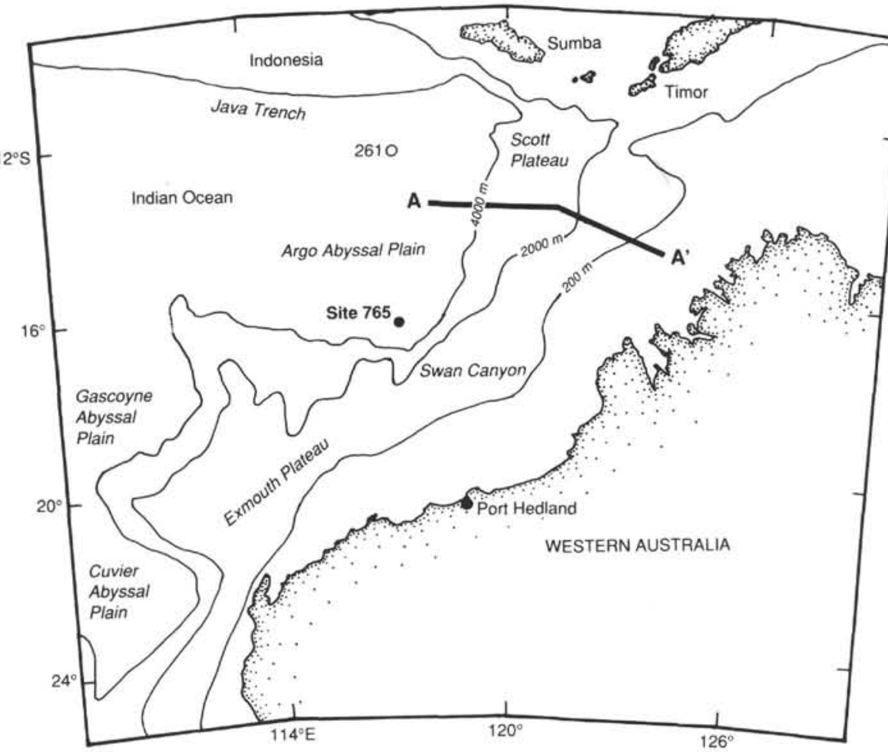

Figure 1. Location of sites drilled during Leg 123.

Letter designations in Tables 1 through 4 indicate the abundance of nannofossils as a sedimentary component and follow a method outlined by Watkins and Bowdler (1984). The criteria for letter designations are as follows:

A = abundant (nannofossils >15% of sediment)
C = common (nannofossils 5%–15% of sediment)
F = few (nannofossils 1%–5% of sediment)
R = rare (nannofossils <1% of sediment)
B = barren (no nannofossils in 100 fields of view at 1500×X)

Letter designations in Tables 1 through 4 that indicate the relative abundance of individual nannofossil species follow a method proposed by Hay (1970) and modified by Watkins and Bowdler (1984). The criteria for these letter designations are as follows:

A = abundant (1–10 specimens 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 this taxa

Letter designations in Tables 1 through 4 that indicate estimates of average preservational state of all nannofossil taxa follow a method used by Moran and Watkins (1988). An estimate of the average preservational state of all nannofossils encountered is necessary because preservation can vary widely, not only between specimens from different taxonomic units, but also between individual specimens within a particular taxonomic unit. The criteria for letter designations are as follows:

G = good (most specimens exhibit little or no secondary alteration)
M = moderate (specimens exhibit significant secondary alteration in the form of overgrowth or dissolution but identification of species not impaired),
P = poor (specimens exhibit profound secondary alteration and identification of species is impaired but still possible).

A designation of "M-P" indicates an estimated preservational state intermediate between the two end components.

The biostratigraphic zonation scheme and zonal code numbers used for correlation of Cretaceous material follows that of Sissingh (1977), with the modifications of additional subdivision by alternate biohorizons, as suggested by Perch-Nielsen (1979; 1985), for greater biostratigraphic resolution. Here, the zonal code numbers of Sissingh (1977) are preceded by the abbreviation CC. This zonation scheme has proven most accurate and effective for worldwide low-latitude correlation of Cretaceous sediments. The Cenozoic section is correlated using the zonation scheme and zonal code numbers of Okada and Bukry (1980) because this method yields the highest resolution and greatest accuracy for worldwide, low-latitude correlation.

RESULTS

Site 765

Shipboard sedimentologic evidence from the section drilled at Hole 765C indicated that the Aptian–Paleogene portion (part of lithologic Units III and IV; Cores 123-765C-34R through -14R) consists lithologically of dominant hemipelagic clays and claystones and minor calcareous turbidites as well as other redeposited calcareous sediment (Ludden, Gradstein, et al., 1990). As a result of the minor effect of turbidity currents in the deposition of sediments in this interval, nannofossils exhibit little evidence of reworking, as opposed to those found in the Neogene section, where turbidity currents are thought to dominate the depositional environment (Ludden, Gradstein, et al., 1990). In addition, nannofossil assemblages in the Upper Cretaceous–Paleogene interval of Hole 765C are fairly well preserved, high in diversity, and nannofossils are common to abundant as a sedimentary component (Tables 1 and 2). These factors, along with good recovery for this interval (55.9%) and a reasonably complete stratigraphic record, allowed for an accurate and high-resolution biostratigraphic correlation and for establishment of a useful temporal framework for this hole.

At the bottom of the studied interval, Sample 123-765C-34R-CC has been placed in Subzone CC7a (*Chiastozygus litterarius* Zone) based on the presence of *C. litterarius* and *Rhagodiscus angustus* and is Aptian in age (Fig. 2). Reworking of Jurassic material is evident with the presence of *Parhabdolithus liasicus.* Sample 123-765C-33R-CC is barren of nannofossils. Sediments between Sample 123-765C-33R-1, 62–63 cm, and -32R-3, 63–64 cm, have been placed in Subzone CC7b based on the presence of the previously mentioned species and are also of Albian–Aptian age. The Aptian/Albian boundary falls within Subzone CC7b (*Chiastozygus litterarius* Zone) and thus occurs within this interval. The subzonal designation CC7b was given based on the presence of *Hayesites albiensis* and *Eprolithus floralis* in the absence of *Micrantholithus obtusus.* Samples 123-765C-32R-2, 67–69 cm, and -32R-1, 64–65 cm, are barren of nannofossils. Sediments of Albian age continue in Samples 123-765C-31R-CC through -26R-3, 118–119 cm, and were placed in Zone CC8 (*Prediscosphaera columnata* Zone) based on the presence of *P. columnata* and are of Albian age. A subdivision of Subzone CC8b occurs in Sample 123-765C-28R-CC based on the first appearance of *Tranolithus phacelosus.*

The first appearance of *Eiffellithus turriseiffeli* in Sample 123-765C-26R-3, 32–33 cm, marks the base of Zone CC9 (*Eiffellithus turriseiffeli* Zone), which continues through Sample 123-765C-26R-3, 25–26 cm, and indicates an age of late Albian. The next productive samples (Sample 123-765C-25R-CC as well as 123-765C-25R-5, 35–36 cm) were placed in Zone CC11 (*Quadrum gartneri* Zone) based on the presence of *Q. gartneri, E. turriseiffeli,* and *E. floralis* and is early to middle Turonian in age. Because of sampling restrictions, the completeness of the Cenomanian section and the Cenomanian/Turonian boundary is uncertain; Zone CC10 may be present. However, the small amount of material between Samples 123-765C-26R-3, 25–26 cm, and -25R-CC (3.25 m) suggests a condensed or partially missing Cenomanian section.

The next available sample (Sample 123-765C-25R-3, 15–19 cm) contains *Eiffellithus eximius,* placing it within Zone CC12 (*Lucianorhabdus maleformis* Zone), and yielded an age of late Turonian–early Coniacian. Sediments of Coniacian age were also found in Sample 123-765C-25R-2, 48–49 cm, and were assigned to Zone CC13 (*Marthasterites furcatus* Zone) based on the presence of *M. furcatus.* Sediments in Samples 123-765C-25R-1, 33–35 cm, through -4R-4, 41–43 cm, were placed in Zone CC17

			Argo Abyssal Hole 765C	Exmouth Plateau Hole 766A
Maastrichtian	*N. frequens*	CC26		10R-2, 114 → 10R-3, 13
	A. cymbiformis	CC25		
	R. levis	CC24		
Campanian	*T. phacelosus*	CC23	23R-3, 93 → 23R-4	10R, CC
	Q. trifidum	CC22		11R 12R-1, 114 → 12-2, 27
	Q. sissinghi	CC21		12R, CC
	C. aculeus	CC20	23R, CC	
	C. ovalis	CC19	24R-1, 36 → 24R-3, 95	13R-1, 38 → 13-2, 30
	A. parcus	CC18		
	C. obscurus	CC17	24R-4, 41 → 25R-1, 34	
Santonian	*L. cayeuxii*	CC16		13R-3, 69 → 14R-1, 46
	R. anthophorus	CC15		
Coniacian	*M. decussata*	CC14		
	M. furcatus	CC13	25R-2, 48	14R-2, 23
	L. maleformis	CC12	25R-3, 17	14R-3, 23
Turonian	*Q. gartneri*	CC11	25R, CC	14R-4 → 14, CC
Cenomanian	*M. decoratus*	CC10		
Albian	*E. turriseifelii*	CC9	26R-3, 25 → 26R-3, 33	15R, CC → 17R-4, 82
	P. columnata	CC8	26-3, 118 → 28R 29R → 31R	17R, CC → 21R
Aptian	*C. litterarius*	CC7	32R-3, 63 → 33R-1, 63 34R	

Figure 2. Distribution of Cretaceous sediments from Leg 123 based on calcareous nannofossil biostratigraphy.

Table 1. Cretaceous calcareous nannofossils from Site 765.

Core, section, interval (cm)	Biostratigraphic horizon/ zone	Preservation	Sedimentary abundance	*Ahmuellerella octoradiata*	*Arkhangelskiella cymbiformis*	*Arkhangelskiella specillata*	*Aspidolithus bevieri*	*Aspidolithus constrictus*	*Aspidolithus parcus*	*Axopodorhabdus albianus*	*Biscutum castrorum*	*Biscutum constans*	*Biscutum magnum*	*Biscutum salebrosum*	*Calcicalathina oblongata*	*Calculites obscurus*	*Calolithus martelae*	*Ceratolithoides aculeus*	*Chiastozygus amphipons*	*Chiastozygus litterarius*	*Chiastozygus striatus*	*Chiastozygus tenuis*	*Coccolithus pelagicus*	*Corollithion achylosus*	*Corollithion kennedyi*	*Crepidolithus crassus*	*Crepidolithus impontus*	*Cretarhabdus conicus*
123-765C-22R-4, 108–109	CP1–CP2	M–P	R	.	.	.	.	.	R	.	.	.	.	.	.	.	.	R	.	.	.	.	F	.	.	.	.	.
22R-5				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23R-3, 94–95	CC22b	M–P	A	F	.	F	.	C	F	.	.	.	.	R	.	.	.	F	.	.	F	.	.	.	.	.	.	F
23R-4, 93–95	CC22b	M–P	C	F	.	R	.	R	F	.	.	F	.	.	.	F	.	F	.	R	F	.	.	.	.	.	.	R
23R-CC	CC20	M	C	F	R	F	.	R	F	.	.	F	.	F	.	.	.	F	.	R	.	.	.	.	.	.	.	.
24R-1, 36–37	CC19	M	A	.	.	.	.	R	C	.	.	F	.	.	.	F	.	.	.	.	F	.	.	.	.	.	.	.
24R-2, 118–119	CC19	P	C	R	.	F	.	.	F	.	R	.	.	.	.	F	.	.	.	F	.	.	.	.	.	.	.	.
24R-3, 55–58	CC19	P	C	.	.	.	R	.	F	.	.	R	.	.	.	F	.	.	.	F	R	.	.	.	.	.	.	.
24R-4, 41–43	CC17	M–P	A	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.	.	F	.	.	.	.	.	.	.	.
24R-CC	CC17	M	A	.	.	.	.	.	.	.	R	.	.	.	.	F	.	.	.	F	.	.	.	.	.	.	.	.
25R-1, 33–35	CC17	M	A	.	.	.	.	.	R	.	R	.	.	.	.	F	.	.	.	.	.	R	.	.	.	.	.	.
25R-2, 48–49	CC13	P	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.
25R-3, 15–19	CC12	M–P	A	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
25R-4				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
25R-5, 35–36	CC11	M–P	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
25R-CC	CC11	M	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.
26R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
26R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
26R-3, 25–26	CC9	M	A	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	R	.	R	.	.	R	.	.	.
26R-3, 32–33	CC9	M	A	.	.	.	.	.	.	R	F	.	.	.	.	.	.	.	.	F	.	F	.	.	.	.	.	.
26R-3, 118–119	CC8b	M	A	.	.	.	.	.	.	R	F	.	.	.	.	.	.	.	.	F	.	.	.	.	R	.	.	.
26R-4, 71–73	CC8b	M	A	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.
26R-5, 44–46	CC8b	M–P	C	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.
26R-CC	?	P	Essentially barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
27R-1, 97–98			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
27R-2, 56–57			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
27R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
28R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
28R-2, 109–110	CC8b	M–P	F	.	.	.	.	.	.	.	F	.	.	R	.	.	.	.	.	.	.	R	.	.	.	.	.	.
28R-3				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
28R-CC	CC8b	M–P	F	.	.	.	.	.	.	.	F	.	.	.	R	.	.	.	.	R	.	.	.	.	.	.	.	.
29R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29R-3				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29R-4				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29R-5				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30R-3				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30R-4				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30R-5				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30R-6				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30R-CC	CC7b	M–P	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.
31R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
31R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
31R-3				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
31R-4				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
31R-CC	CC8	M	C	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	R	R	.	.	.	R	.	.	R	.
32R-1, 64–65			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
32R-2, 67–69			Essentially barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
32R-3, 63–64	CC7b	M–P	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.
32R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
33R-1, 62–63	CC7b(?)	P	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
33R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
34R-CC	CC7a	G	F	.	.	.	.	.	.	R	R	.	.	.	.	.	.	.	.	F	R	.	.	R	.	.	.	.

Key to symbols: ? = implied presence; RE = Reworked; VR = Very rare; R = Rare; F = Few; C = Common; A = Abundant; VA = Very abundant; ? = Questionably present; . = Not present.

Table 1 (continued).

Core, section, interval (cm)	Biostratigraphic horizon/ zone	Preservation	Sedimentary abundance	*Cretarhabdus crenulata*	*Cretarhabdus loriei*	*Cribrosphaerella ehrenbergi*	*Crucicribrum striatum*	*Cruciplacolithus tenuis*	*Cyclagelosphaera deflandrei*	*Cyclagelosphaera margereli*	*Cyclagelosphaera rotaclypeata*	*Cylindralithus serratus*	*Eiffellithus eximius*	*Eiffellithus gorkae*	*Eiffellithus turriseiffeli*	*Ellipsagelosphaera britannica*	*Ellipsagelosphaera fossacincta*	*Eprolithus antiquus*	*Eprolithus floralis*	*Ericsonia robusta*	*Flabellites biforaminis*	*Gartnerago nanum*	*Gartnerago obliquum*	*Gephyrorhabdus coronadventis*	*Glaukolithus diplogrammus*	*Haqius circumradiatus*	*Hayesites albiensis*	*Helenea staurolithina*
123-765C-22R-4, 108–109	CP1–CP2	M–P	R	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	R	R	.	.	.	.	.	.	.	.
22R-5				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23R-3, 94–95	CC22b	M–P	A	.	.	A	.	.	.	.	.	F	C	R	F	.	.	.	.	.	.	.	.	.	.	R	.	.
23R-4, 93–95	CC22b	M–P	C	.	.	C	.	.	.	.	.	F	C	.	.	.	.	.	R	.	.	.	R	R	F	.	.	.
23R-CC	CC20	M	C	.	.	C	.	.	.	.	.	F	F	R	F	.	.	.	.	.	.	R	.	R	F	R	.	.
24R-1, 36–37	CC19	M	A	.	.	F	.	.	.	.	R	.	F	.	.	.	.	.	.	.	.	R	F	R	C	.	.	.
24R-2, 118–119	CC19	P	C	C	.	F	.	.	.	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.
24R-3, 55–58	CC19	P	C	.	.	R	.	.	.	.	.	R	F	.	.	.	.	.	R	.	.	.	F	.	R	.	.	.
24R-4, 41–43	CC17	M–P	A	.	.	.	.	.	.	.	.	.	F	R	.	.	.	.	R	.	R	.	.	.	.	R	.	.
24R-CC	CC17	M	A	.	.	F	.	.	.	.	.	.	F	.	F	.	.	.	F	.	.	.	F	.	.	.	.	.
25R-1, 33–35	CC17	M	A	.	.	.	.	.	.	.	.	.	F	R	.	.	.	.	F	.	.	.	.	.	.	R	.	.
25R-2, 48–49	CC13	P	C	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.	.	.	R	.	.	.	.	.
25R-3, 15–19	CC12	M–P	A	F	.	.	.	.	.	.	.	.	F	.	.	.	.	.	C	.	.	.	R	.	.	R	.	.
25R-4				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
25R-5, 35–36	CC11	M–P	A	C	.	.	.	.	.	.	.	.	.	.	F	.	.	.	C	.	.	.	.	.	F	F	.	.
25R-CC	CC11	M	A	R	.	.	.	.	.	.	.	.	.	.	F	.	.	.	C	.	.	.	.	.	.	R	.	.
26R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
26R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
26R-3, 25–26	CC9	M	A	C	R	.	.	.	.	.	.	.	.	.	F	.	F	.	C	.	.	.	.	.	F	R	.	R
26R-3, 32–33	CC9	M	A	F	.	.	.	.	.	.	.	.	.	.	R	.	F	.	C	.	.	.	.	.	F	R	.	.
26R-3, 118–119	CC8b	M	A	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	R	.	R
26R-4, 71–73	CC8b	M	A	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.	.	.	.	.	.	R	.	.
26R-5, 44–46	CC8b	M–P	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.	.	.	.	.	.	R	.	.
26R-CC	?	P	Essentially barren	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.
27R-1, 97–98			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
27R-2, 56–57			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
27R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
28R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
28R-2, 109–110	CC8b	M–P	F	F	F	.	.	.	.	.	.	.	.	.	.	F	.	R	F	.	.	.	.	.	.	.	.	.
28R-3				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
28R-CC	CC8b	M–P	F	R	F	.	F	.	.	.	.	.	.	.	.	R	F	R	R	.	.	.	.	.	.	.	.	.
29R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29R-3				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29R-4				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29R-5				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30R-3				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30R-4				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30R-5				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30R-6				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30R-CC	CC7b	M–P	C	.	F	.	.	.	.	.	.	.	.	.	.	F	F	F	F	.	.	.	.	.	.	.	.	.
31R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
31R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
31R-3				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
31R-4				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
31R-CC	CC8	M	C	.	.	.	.	.	.	.	.	.	.	.	.	F	F	F	R	.	.	.	.	R	F	.	.	.
32R-1, 64–65			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
32R-2, 67–69			Essentially barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
32R-3, 63–64	CC7b	M–P	F	.	R	.	.	.	.	.	.	.	.	.	.	F	F	F	R	.	F	.	.	R	R	.	R	.
32R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
33R-1, 62–63	CC7b(?)	P	F	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	R	R
33R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
34R-CC	CC7a	G	F	.	F	.	.	.	.	.	.	.	.	.	.	.	R	R	.	.	.	.	.	.	.	R	.	.

Table 1 (continued).

Core, section, interval (cm)	Biostratigraphic horizon/zone	Preservation	Sedimentary abundance	*Helicolithus trabeculatus*	*Lithastrinus grillii*	*Lithastrinus moratus*	*Lithastrinus septenarius*	*Lithraphidites carniolensis*	*Lucianorhabdus cayeuxii*	*Lucianorhabdus maleformis*	*Manivitella pemmatoidea*	*Markalius inversus*	*Marthasterites furcatus*	*Microrhabdulus decoratus*	*Microstaurus chiastius*	*Micula decussata*	*Micula praemurus*	*Micula quadrata*	*Micula swastica*	*Parhabdolithus embergeri*	*Placozygus fibuliformis*	*Placozygus sigmoides*	*Prediscosphaera columnata*	*Prediscosphaera cretacea*	*Prediscosphaera grandis*	*Prediscosphaera honjoi*	*Quadrum gartneri*	*Quadrum gothicum*
123-765C-22R-4, 108–109	CP1–CP2	M–P	R	.	.	.	.	.	.	.	.	F	.	R	.	R	.	.	.	.	.	R	.	R	.	.	.	.
22R-5				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23R-3, 94–95	CC22b	M–P	A	.	R	.	.	F	R	.	R	.	.	C	.	C	R	R	R	R	.	.	.	F	R	R	.	F
23R-4, 93–95	CC22b	M–P	C	F	R	.	.	.	R	R	R	.	.	F	.	C	R	.	R	.	.	.	.	F	.	R	F	F
23R-CC	CC20	M	C	.	.	.	.	F	.	.	F	.	.	F	.	C	.	.	.	.	.	R	.	F	.	.	F	R
24R-1, 36–37	CC19	M	A	.	F	.	.	.	.	.	R	.	.	F	.	C	.	.	.	.	.	F	.	F	.	.	.	.
24R-2, 118–119	CC19	P	C	R	F	.	.	R	R	.	F	.	.	F	.	C	.	.	.	.	.	.	.	F	R	.	.	.
24R-3, 55–58	CC19	P	C	R	F	.	.	.	F	R	R	.	.	F	.	F	.	.	.	.	.	R	.	F	.	.	R	.
24R-4, 41–43	CC17	M–P	A	R	F	.	F	R	.	.	R	.	C	F	.	C	.	.	.	F	.	.	C	F	.	.	.	.
24R-CC	CC17	M	A	.	.	.	F	.	?	.	F	.	C	F	.	C	.	.	.	R	.	.	F	F	.	.	F	.
25R-1, 33–35	CC17	M	A	R	.	.	C	.	F	.	F	.	.	F	.	C	.	.	.	.	.	.	F	F	.	.	F	.
25R-2, 48–49	CC13	P	C	.	.	.	F	.	.	.	.	.	C	.	.	.	.	.	.	.	.	R	F	.	.	.	C	.
25R-3, 15–19	CC12	M–P	A	.	.	.	R	.	.	.	F	.	.	.	.	.	.	.	.	F	F	R	F	.	.	.	F	.
25R-4				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
25R-5, 35–36	CC11	M–P	A	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.	F	.	.	.	F	.
25R-CC	CC11	M	A	R	.	.	.	.	.	.	C	.	.	.	.	.	.	.	.	F	.	C	F	F	.	.	F	.
26R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
26R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
26R-3, 25–26	CC9	M	A	.	.	.	.	.	.	.	R	.	.	.	C	.	.	.	.	F	F	.	F	.	.	.	.	.
26R-3, 32–33	CC9	M	A	.	.	.	.	.	.	.	F	.	.	.	F	.	.	.	.	F	F	.	F	.	.	.	.	.
26R-3, 118–119	CC8b	M	A	.	.	.	.	.	.	.	F	.	.	.	R	.	.	.	.	C	.	.	C	.	.	.	.	.
26R-4, 71–73	CC8b	M	A	.	.	R	.	.	.	.	F	.	.	.	R	.	.	.	.	F	.	R	R	.	.	.	.	.
26R-5, 44–46	CC8b	M–P	C	.	.	.	.	.	.	.	F	.	.	.	R	.	.	.	.	R	.	.	F	.	.	.	.	.
26R-CC	?	P	Essentially barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
27R-1, 97–98			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
27R-2, 56–57			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
27R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
28R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
28R-2, 109–110	CC8b	M–P	F	.	.	.	.	.	.	.	F	.	.	.	R	.	.	.	.	F	.	.	R	.	.	.	.	.
28R-3				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
28R-CC	CC8b	M–P	F	.	.	.	.	F	.	.	R	.	.	.	F	.	.	.	.	.	.	.	F	.	.	.	.	.
29R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29R-3				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29R-4				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29R-5				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30R-3				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30R-4				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30R-5				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30R-6				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30R-CC	CC7b	M–P	C	.	.	.	.	F	.	.	R	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.
31R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
31R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
31R-3				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
31R-4				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
31R-CC	CC8	M	C	.	.	.	.	F	.	.	.	.	.	.	R	.	.	.	.	R	R	F	R	.	.	.	.	.
32R-1, 64–65			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
32R-2, 67–69			Essentially barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
32R-3, 63–64	CC7b	M–P	F	.	.	.	.	.	.	.	R	.	.	.	F	.	.	.	.	R	.	.	.	.	.	.	.	.
32R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
33R-1, 62–63	CC7b(?)	P	F	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.
33R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
34R-CC	CC7a	G	F	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.

Table 1 (continued).

Core, section, interval (cm)	Biostratigraphic horizon/ zone	Preservation	Sedimentary abundance	*Quadrum sissinghi*	*Quadrum trifidum*	*Reinhardtites anthophorus*	*Reinhardtites levis*	*Retecapsa angustiforata*	*Retecapsa neocomiana*	*Rhagodiscus angustus*	*Rhagodiscus asper*	*Rucinolithus irregularis*	*Rucinolithus wisei*	*Toweius eminens(?)*	*Tranolithus gabalus*	*Tranolithus minimus*	*Tranolithus phacelosus*	*Vagalapilla matalosa*	*Vekshinella stradneri*	*Watznaueria barnesae*	*Watznaueria biporta*	*Zeugrhabdotus erectus*	*Zeugrhabdotus pseudanthophorus*	*Zeugrhabdotus theta*
123-765C-22R-4, 108–109	CP1–CP2	M–P	R	.	.	.	R	.	.	.	.	.	.	R	.	.	.	.	.	R	.	.	R	.
22R-5				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23R-3, 94–95	CC22b	M–P	A	R	F	C	C	F	.	.	.	.	.	.	.	F	.	.	.	A	.	.	.	.
23R-4, 93–95	CC22b	M–P	C	.	F	F	F	C	.	.	.	.	.	.	.	R	R	.	R	C	.	.	.	.
23R-CC	CC20	M	C	.	.	C	.	F	.	.	.	.	.	.	.	R	F	.	F	C	R	.	.	.
24R-1, 36–37	CC19	M	A	.	.	C	.	F	.	.	.	.	.	.	.	.	F	.	.	A	R	.	.	.
24R-2, 118–119	CC19	P	C	.	.	F	.	.	.	.	R	.	.	.	.	.	F	R	.	C	.	.	.	.
24R-3, 55–58	CC19	P	C	.	.	F	.	F	.	.	.	.	.	.	.	.	R	.	.	C	.	.	.	.
24R-4, 41–43	CC17	M–P	A	.	.	F	.	C	.	.	.	.	.	.	.	.	F	.	.	A	F	R	.	.
24R-CC	CC17	M	A	.	.	F	.	C	.	.	.	.	.	.	.	.	F	.	.	A	.	F	.	R
25R-1, 33–35	CC17	M	A	.	.	F	.	F	.	.	.	.	.	.	.	.	.	.	.	C	.	.	.	F
25R-2, 48–49	CC13	P	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.	.	.	R
25R-3, 15–19	CC12	M–P	A	.	.	.	.	.	.	.	F	.	.	.	.	.	F	.	.	C	F	.	.	.
25R-4				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
25R-5, 35–36	CC11	M–P	A	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.	A	.	.	F	.
25R-CC	CC11	M	A	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.	A	F	.	.	R
26R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
26R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
26R-3, 25–26	CC9	M	A	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	A	R	.	F	R
26R-3, 32–33	CC9	M	A	.	.	.	.	.	.	.	.	.	.	.	F	.	C	.	.	A	.	.	.	C
26R-3, 118–119	CC8b	M	A	.	.	.	.	.	.	.	.	.	.	.	R	.	F	.	.	A	F	.	.	C
26R-4, 71–73	CC8b	M	A	.	.	.	.	.	.	R	.	.	.	.	.	.	R	.	.	A	F	.	.	F
26R-5, 44–46	CC8b	M–P	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	C	.	.	.
26R-CC	?	P	Essentially barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.	.	.
27R-1, 97–98			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
27R-2, 56–57			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
27R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
28R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
28R-2, 109–110	CC8b	M–P	F	.	.	.	.	.	.	F	.	.	R	.	.	.	.	R	.	A	F	R	.	R
28R-3				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
28R-CC	CC8b	M–P	F	.	.	.	.	.	.	.	R	.	.	.	R	.	F	.	.	C	.	.	.	F
29R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29R-3				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29R-4				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29R-5				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30R-3				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30R-4				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30R-5				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30R-6				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30R-CC	CC7b	M–P	C	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	C	F	.	.	.
31R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
31R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
31R-3				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
31R-4				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
31R-CC	CC8	M	C	.	.	.	.	R	.	R	F	.	.	.	.	.	.	F	F	C	.	.	.	.
32R-1, 64–65			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
32R-2, 67–69			Essentially barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.	.	.
32R-3, 63–64	CC7b	M–P	F	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	C	F	.	.	.
32R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
33R-1, 62–63	CC7b(?)	P	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.	.	.	.
33R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
34R-CC	CC7a	G	F	.	.	.	.	.	R	R	R	.	.	.	.	.	.	F	.	C	.	R	.	.

Table 2. Paleogene calcareous nannofossils from Site 765.

Core, section, interval (cm)	Biostrati-graphic horizon/ zone	Preservation	Sedimentary abundance	*Ahmuellerella octoradiata*	*Arkhangelskiella cymbiformis*	*Arkhangelskiella specillata*	*Aspidolithus constrictus*	*Aspidolithus parcus*	*Axopodorhabdus albianus*	*Biantholithus sparsus*	*Biscutum castrorum*	*Biscutum constans*	*Biscutum coronum*	*Biscutum magnum*	*Braarudosphaera hockwoldensis*	*Bukrylithus ambiguus*	*Calcicalathina oblongata*	*Calolithus martelae*	*Ceratolithoides aculeus*	*Chiastozygus amphipons*	*Chiastozygus litterarius*	*Chiastozygus platyrhethus*	*Chiastozygus striatus*	*Chiastozygus tenuis*	*Corollithion achylosus*	*Cretarhabdus angustiforata*	*Cretarhabdus conicus*	*Cretarhabdus crenulata*
123-766C-10R-2, 68–69		M	C	.	R	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.
10R-2, 141–142	1a	M–P	A	.	C	.	.	R	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
10R-CC		M–P	C	.	.	R	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	F
11R-1, 99–100		P	C	.	R	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C
11R-2, 99–100		M	A	.	F	F	.	F	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C
11R-3, 98–99		M	A	R	F	F	.	F	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C
11R-4, 98–99		M–P	C	.	R	F	.	F	.	.	.	F	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	C
11R-5, 99–100		M–P	A	.	.	F	F	F	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	C	R	.
11R-6, 99–100		M	A	.	.	R	F	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C
11R-CC		M	A	.	.	F	.	R	.	.	.	F	.	.	.	.	.	.	R	.	.	.	.	.	.	F	.	C
12R-1, 114–115		P	C	.	.	F	.	C	.	.	.	R	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	C
12R-2, 27–28		M	A	.	.	F	F	F	.	.	.	F	.	R	.	.	.	.	F	.	.	.	.	.	.	.	.	C
12R-CC		M–P	C	.	F	F	F	C	.	.	.	.	.	R	.	.	.	R	.	.	.	.	.	.	.	F	.	C
13R-1, 38–39		M	C	.	.	C	F	C	.	.	.	.	.	F	.	.	.	F	.	.	.	.	.	.	.	F	.	C
13R-2, 29–30		M	A	.	.	F	.	F	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	F	.	.	F	C
13R-3, 68–69	16	M–P	C	.	.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	.	F	.	.	.	C
13R-CC	-CC16	M–P	C	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C
14R-1, 46–47		M	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	C
14R-2, 22–23		M–P	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F
14R-3, 23–24		M–P	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C
14R-4, 27–28		M–P	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C
14R-CC		M–P	C	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	C
15R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15R-3				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15R-4				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15R-5				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15R-CC		M–P	A	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	R	.	.	.	.	.	.	C
16R-1, 129–131		M	A	.	.	.	.	.	F	.	.	R	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C
16R-2, 129–131		M	A	.	.	.	.	.	F	.	.	R	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C
16R-3, 129–131		M–G	A	.	.	.	.	.	.	.	.	R	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C
16R-4, 129–131		M–P	A	.	.	.	.	.	F	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C
16R-5, 129–131		M	A	.	.	.	.	.	.	.	.	F	C	.	.	R	.	.	.	.	.	.	.	.	.	.	.	C
16R-6, 129–131		M	A	.	.	.	.	.	.	.	.	R	C	.	.	.	.	.	.	.	.	.	.	F	.	.	.	C
16R-CC		M	A	.	.	.	.	.	.	.	.	C	C	.	.	F	.	.	.	.	.	.	.	F	.	.	.	C
17R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17R-3				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17R-4, 80–82		M	A	.	.	.	.	.	.	.	.	F	C	.	.	F	.	.	.	.	.	.	F	F	.	.	.	F
17R-5				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17R-6				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17R-CC		M	A	.	.	.	.	.	F	.	.	F	.	.	.	F	.	.	.	.	.	.	F	.	.	.	.	C
18R-1, 75–76		M	A	.	.	.	.	.	R	.	.	F	.	.	.	R	.	.	.	.	.	.	R	.	.	.	.	C
18R-2, 26–27		M	A	.	.	.	.	.	R	.	.	F	.	.	.	R	.	.	.	.	F	.	F	.	.	.	.	C
18R-3, 92–93		M	A	.	.	.	.	.	R	.	F	.	.	.	.	F	.	.	.	.	F	.	.	F	.	.	.	C
18R-4, 137–138		M	A	.	.	.	.	.	F	.	.	F	.	.	.	F	.	R	.	.	F	.	R	F	.	.	R	C
18R-5, 6–7		M–P	F	.	.	.	.	.	R	.	.	R	.	.	.	.	.	.	.	.	.	.	.	F	.	.	.	C
18R-CC		M–G	A	.	.	.	.	.	.	.	F	C	.	.	.	R	.	.	.	.	F	.	.	F	R	.	.	C
19R-1, 106–108		M	A	.	.	.	.	.	R	.	F	.	.	.	.	F	.	.	.	.	F	.	R	.	.	.	.	F
19R-2, 12–13		M	A	.	.	.	.	.	.	.	F	.	.	.	.	F	.	.	.	.	R	.	.	F	R	.	.	C
19R-3, 72–73				.	.	.	.	.	.	.	F	.	.	.	.	F	.	.	.	.	F	.	.	F	R	.	.	C
19R-4, 145–146		M	A	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	.	R	.	R	F	R	.	.	C
19R-5, 33–34		P	C	.	.	.	.	.	.	.	R	.	.	.	.	F	.	.	.	.	R	.	.	.	.	.	.	F
19R-CC		M–P	C	.	.	.	.	.	.	.	R	.	.	.	.	F	.	.	.	.	.	.	.	F	.	.	.	F
20R-1, 43–44		M	C	.	.	.	.	.	.	.	F	.	.	.	R	F	.	.	.	.	F	.	.	F	.	.	.	C
20R-2, 47–48		M	A	.	.	.	.	.	.	.	R	.	.	.	.	F	.	.	.	.	R	.	.	F	F	.	.	C
20R-3, 67–68		M	C	.	.	.	.	.	.	.	R	.	.	.	.	F	.	.	.	R	R	.	.	.	R	.	.	F
20R-4, 21–22		M	A	.	.	.	.	.	.	.	F	.	.	.	.	F	R	.	.	.	.	F	F	.	.	.	.	F
20R-CC		M	A	.	.	.	.	.	R	.	R	.	.	.	.	F	R	.	.	.	.	.	F	.	C	.	.	F
21R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
21R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
21R-CC				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
10R-3, 13–14		M–P	A	.	A	F	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	F	.	C

Key to symbols: RE = Reworked; R = Rare; F = Few; C = Common; A = Abundant; VA = Very abundant; ? = Questionable presence; . = Not present.

Table 2 (continued).

Core, section, interval (cm)	Biostratigraphic horizon/zone	Preservation	Sedimentary abundance	*Cretarhabdus loriei*	*Cribrosphaerella ehrenbergi*	*Crucicribrum striatum*	*Cruciellipsis cuvillieri*	*Cruciplacolithus edwardsii*	*Cyclagelosphaera alta*	*Cyclagelosphaera reinhardtii*	*Cyclagelosphaera rotaclypeata*	*Cylindralithus crassus*	*Cylindralithus serratus*	*Eiffellithus eximius*	*Eiffellithus eximius* (transitional)	*Eiffellithus gorkae*	*Eiffellithus turriseiffeli*	*Ellipsagelosphaera britannica*	*Ellipsagelosphaera fossacincta*	*Eprolithus floralis*	*Flabellites biforaminis*	*Gartnerago nanum*	*Gartnerago obliquum*	*Gephyrorhabdus coronadventis*	*Glaukolithus diplogrammus*	*Haqius circumradiatus*	*Helicolithus trabeculatus*	*Kamptnerius magnificus*
123-766C-10R-2, 68–69		M	C	.	.	.	.	F	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
10R-2, 141–142	1a	M–P	A	.	F	.	.	.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.
10R-CC		M–P	C	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.	.	R
11R-1, 99–100		P	C	.	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.
11R-2, 99–100		M	A	.	C	.	.	.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	R	.	.	.	.
11R-3, 98–99		M	A	.	C	.	.	.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.
11R-4, 98–99		M–P	C	.	C	.	.	.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	R	.	.	.
11R-5, 99–100		M–P	A	.	C	.	.	.	.	.	.	R	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.
11R-6, 99–100		M	A	.	C	.	.	.	.	.	.	R	.	.	.	.	.	.	R	.	.	.	.	R	.	.	.	.
11R-CC		M	A	.	A	.	.	.	.	.	.	F	.	.	.	.	F	.	.	.	.	.	.	R	.	.	.	.
12R-1, 114–115		P	C	.	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
12R-2, 27–28		M	A	.	C	.	.	.	.	.	.	R	.	R	.	R	.	.	.	.	.	.	.	.	.	R	.	R
12R-CC		M–P	C	.	F	.	.	.	.	.	.	R	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.
13R-1, 38–39		M	C	.	R	.	.	.	.	.	.	R	.	F	.	.	.	.	R	.	.	.	.	.	F	.	.	.
13R-2, 29–30		M	A	.	F	.	.	.	.	.	.	.	.	R	.	.	F	.	R	R	.	R	R	.	.	.	.	R
13R-3, 68–69	16	M–P	C	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.
13R-CC	-CC16	M–P	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.	F	.	.
14R-1, 46–47		M	C	.	.	.	.	.	.	.	R	F	.	R	.	.	R	.	.	C	.	.	R	.	.	F	.	.
14R-2, 22–23		M–P	F	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	F	.	.	.	.	.	R	.	.
14R-3, 23–24		M–P	F	.	.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	C	.	.	.	.	.	.	.	.
14R-4, 27–28		M–P	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	C	.	.	R	.	.	.	.	.
14R-CC		M–P	C	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.	R	C	R	.	.	.	F	F	.	.
15R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15R-3				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15R-4				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15R-5				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15R-CC		M–P	A	.	.	.	.	.	.	.	.	.	.	.	.	.	F	F	F	F	R	.	.	.	.	.	.	.
16R-1, 129–131		M	A	.	R	.	.	.	.	.	.	.	.	.	.	.	F	F	F	F	R	.	.	.	F	R	.	.
16R-2, 129–131		M	A	F	F	.	.	.	.	.	.	.	.	.	.	.	C	F	.	F	F	.	.	.	.	R	R	.
16R-3, 129–131		M–G	A	.	R	.	.	.	.	.	.	.	.	.	.	.	C	F	.	F	F	.	.	.	F	R	.	.
16R-4, 129–131		M–P	A	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	F	F	F	.	.	.	F	R	.	.
16R-5, 129–131		M	A	.	R	.	.	.	.	.	.	.	.	.	.	.	F	.	R	F	F	.	.	.	C	F	.	.
16R-6, 129–131		M	A	.	F	.	.	.	.	.	.	.	.	.	.	.	F	.	.	F	F	.	.	R	.	F	.	.
16R-CC		M	A	.	R	.	.	.	.	.	.	.	.	.	F	.	F	F	F	F	F	.	.	.	F	F	.	.
17R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17R-3				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17R-4, 80–82		M	A	C	R	F	.	.	.	.	.	.	.	.	F	.	F	.	R	F	F	.	.	R	C	F	.	.
17R-5				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17R-6				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17R-CC		M	A	F	R	.	.	.	.	.	.	F	.	.	.	.	.	F	F	R	F	.	.	.	F	R	.	.
18R-1, 75–76		M	A	.	R	.	.	.	.	.	.	F	.	.	.	.	.	F	F	F	F	.	.	R	F	F	.	.
18R-2, 26–27		M	A	F	R	.	.	.	.	.	.	F	.	.	.	.	.	F	F	F	R	.	.	.	F	R	.	.
18R-3, 92–93		M	A	F	F	R	.	.	.	.	.	R	.	.	.	.	.	F	F	F	F	.	.	R	C	R	.	.
18R-4, 137–138		M	A	F	R	.	.	.	.	.	.	R	.	.	.	.	.	F	F	F	F	.	.	.	.	R	.	.
18R-5, 6–7		M–P	F	.	.	.	.	.	.	.	.	R	.	.	.	.	.	F	.	F	F	.	.	.	R	R	.	.
18R-CC		M–G	A	F	.	R	.	.	.	.	.	.	.	.	.	.	.	F	R	F	C	.	.	R	C	R	.	.
19R-1, 106–108		M	A	F	F	.	.	.	.	.	.	.	.	.	.	.	.	F	F	F	F	.	.	.	F	F	.	.
19R-2, 12–13		M	A	F	F	.	.	.	.	.	.	.	.	.	.	.	.	F	F	F	C	.	.	R	R	F	.	.
19R-3, 72–73				F	F	.	.	.	.	.	.	.	F	.	.	.	.	F	F	F	F	.	.	.	R	F	.	.
19R-4, 145–146		M	A	R	R	.	.	.	.	.	.	.	.	.	.	.	.	F	F	F	C	.	.	.	.	R	.	.
19R-5, 33–34		P	C	R	F	.	.	.	.	.	.	.	.	.	.	.	.	F	F	F	.	.	.	.	F	.	.	.
19R-CC		M–P	C	R	F	.	.	.	.	.	.	.	F	.	.	.	.	F	F	F	F	.	.	R	F	.	.	.
20R-1, 43–44		M	C	F	R	.	.	.	.	.	.	.	R	.	.	.	.	F	F	F	F	F	.	.	.	F	.	.
20R-2, 47–48		M	A	F	R	.	.	.	.	.	.	.	R	.	.	.	.	F	R	F	F	.	.	R	F	.	.	.
20R-3, 67–68		M	C	R	R	.	.	.	.	.	.	F	.	.	.	.	.	F	F	F	C	.	.	.	F	F	.	.
20R-4, 21–22		M	A	.	F	.	R	.	.	.	.	C	.	.	.	.	.	F	F	F	R	.	.	.	F	F	.	.
20R-CC		M	A	R	F	.	R	.	.	.	.	F	.	.	.	.	.	F	F	F	R	.	.	F	.	C	.	.
21R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
21R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
21R-CC				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
10R-3, 13–14		M–P	A	.	F	.	.	.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.

Table 2 (continued).

Core, section, interval (cm)	Biostratigraphic horizon/ zone	Preservation	Sedimentary abundance	*Lithastrinus grillii*	*Lithastrinus septenarius*	*Lithraphidites carniolensis*	*Lithraphidites quadratus*	*Lucianorhabdus cayeuxii*	*Lucianorhabdus maleformis*	*Manivitella gronosa*	*Manivitella pemmatiodea*	*Markalius inversus*	*Marthasterites furcatus*	*Microrhabdulus decoratus*	*Microstaurus chiastius*	*Micula concava*	*Micula decussata*	*Micula murus*	*Micula praemurus*	*Micula* sp. cf. *murus*	*Micula swastica*	*Neocrepidolithus cohenii*	*Parhabdolithus embergeri*	*Placozygus fibuliformis*	*Placozygus sigmoides*	*Prediscosphaera columnata*	*Prediscosphaera cretacea*	*Prediscosphaera grandis*
123-766C-10R-2, 68–69		M	C	.	.	.	R	.	.	.	.	C	.	.	.	.	R	R	.	.	.	F	.	.	A	.	R	.
10R-2, 141–142	1a	M–P	A	.	.	F	.	.	.	.	R	F	.	.	.	.	A	F	.	.	R	.	.	.	.	.	C	F
10R-CC		M–P	C	.	.	F	.	.	.	.	F	.	.	F	.	.	C	.	.	.	.	.	.	.	F	.	F	.
11R-1, 99–100		P	C	.	.	F	.	.	.	.	.	.	.	.	.	.	C	.	.	.	.	.	.	.	F	.	F	F
11R-2, 99–100		M	A	.	.	C	.	.	.	.	R	.	.	F	.	.	A	.	.	R	F	.	.	.	F	F	F	F
11R-3, 98–99		M	A	.	.	C	.	.	.	.	F	.	.	F	.	.	C	.	.	.	R	.	.	.	F	F	C	F
11R-4, 98–99		M–P	C	.	.	C	.	.	.	.	F	.	.	F	.	F	C	.	.	.	R	.	.	.	.	F	.	F
11R-5, 99–100		M–P	A	.	.	F	.	.	.	.	R	.	.	F	.	F	C	.	F	.	R	.	.	.	.	F	.	F
11R-6, 99–100		M	A	.	.	.F	.	.	.	.	R	.	.	F	.	C	C	.	F	.	R	.	.	.	.	.	F	F
11R-CC		M	A	.	.	C	R	.	.	.	.	.	.	F	.	F	C	.	.	.	.	.	.	.	.	F	C	R
12R-1, 114–115		P	C	.	.	F	.	.	.	.	R	R	.	R	.	.	C	.	.	.	.	.	.	.	.	F	F	.
12R-2, 27–28		M	A	.	.	C	.	.	.	.	R	.	.	F	.	.	C	.	.	.	F	.	.	.	.	F	C	F
12R-CC		M–P	C	.	.	F	.	.	.	.	R	.	.	.	.	C	C	.	.	.	.	.	.	.	.	.	F	.
13R-1, 38–39		M	C	.	.	F	.	F	.	R	R	.	.	R	.	.	C	.	.	.	R	.	F	F	.	C	C	.
13R-2, 29–30		M	A	.	.	C	.	R	.	.	.	R	.	R	.	F	C	.	.	.	.	.	.	.	.	F	.	F
13R-3, 68–69	16	M–P	C	R	F	C	.	.	.	.	F	.	C	R	.	.	C	.	.	.	.	.	.	.	.	F	.	.
13R-CC	-CC16	M–P	C	.	.	C	.	.	.	R	F	.	A	.	.	F	C	.	.	.	.	.	.	.	.	F	.	.
14R-1, 46–47		M	C	R	F	F	.	.	?	R	F	R	A	.	.	F	F	.	.	.	.	.	.	.	.	C	.	.
14R-2, 22–23		M–P	F	.	R	F	.	.	?	R	F	.	F	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.
14R-3, 23–24		M–P	F	.	.	F	.	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	R	.	.	C	F	.
14R-4, 27–28		M–P	C	.	.	F	.	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	F	.	C	.	.
14R-CC		M–P	C	.	.	F	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	F	F	.	C	.	.
15R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15R-3				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15R-4				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15R-5				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15R-CC		M–P	A	.	.	.	.	.	.	F	C	.	.	.	F	.	.	.	.	.	.	.	F	.	.	C	.	.
16R-1, 129–131		M	A	.	.	R	.	.	.	F	F	.	.	.	F	.	.	.	.	.	.	.	C	.	.	F	.	.
16R-2, 129–131		M	A	.	.	R	.	.	.	R	C	.	.	.	F	.	.	.	.	.	.	.	F	.	.	F	.	.
16R-3, 129–131		M–G	A	.	.	F	.	.	.	F	C	.	.	.	C	.	.	.	.	.	.	.	F	.	.	C	.	.
16R-4, 129–131		M–P	A	.	.	.	.	.	.	.	F	.	.	.	F	.	.	.	.	.	.	.	F	.	.	F	.	.
16R-5, 129–131		M	A	.	.	F	.	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	F	.	.	F	.	.
16R-6, 129–131		M	A	.	.	.	.	.	.	.	C	.	.	.	F	.	.	.	.	.	.	.	F	.	.	F	.	.
16R-CC		M	A	.	.	R	.	.	.	F	F	.	.	.	F	.	.	.	.	.	.	.	C	.	.	F	.	.
17R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17R-3				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17R-4, 80–82		M	A	.	.	F	.	.	.	F	F	.	.	.	C	.	.	.	.	.	.	.	F	.	.	F	.	.
17R-5				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17R-6				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17R-CC		M	A	.	.	F	.	.	.	F	F	.	.	.	F	.	.	.	.	.	.	.	F	.	.	R	.	.
18R-1, 75–76		M	A	.	.	F	.	.	.	F	F	.	.	.	F	.	.	.	.	.	.	.	F	.	.	R	.	.
18R-2, 26–27		M	A	.	.	C	.	.	.	R	F	.	.	.	F	.	.	.	.	.	.	.	F	.	.	F	.	.
18R-3, 92–93		M	A	.	.	F	.	.	.	R	.	.	.	.	F	.	.	.	.	.	.	.	F	.	.	F	.	.
18R-4, 137–138		M	A	.	.	C	.	.	.	R	F	.	.	.	F	.	.	.	.	.	.	.	F	.	.	F	.	.
18R-5, 6–7		M–P	F	.	.	.	.	.	.	R	F	.	.	.	F	.	.	.	.	.	.	.	F	.	.	F	.	.
18R-CC		M–G	A	.	.	F	.	.	.	R	F	.	.	.	F	.	.	.	.	.	.	.	C	F	.	F	.	.
19R-1, 106–108		M	A	.	.	C	.	.	.	F	F	.	.	.	F	.	.	.	.	.	.	.	F	.	.	R	.	.
19R-2, 12–13		M	A	.	.	C	.	.	.	F	F	.	.	.	F	.	.	.	.	.	.	.	F	.	.	F	.	.
19R-3, 72–73				.	.	C	.	.	.	F	F	.	.	.	F	.	.	.	.	.	.	.	F	.	.	R	.	.
19R-4, 145–146		M	A	.	.	C	.	.	.	F	F	.	.	.	F	.	.	.	.	.	.	.	F	.	.	F	.	.
19R-5, 33–34		P	C	.	.	F	.	.	.	.	F	.	.	.	F	.	.	.	.	.	.	.	C	.	.	.	.	.
19R-CC		M–P	C	.	.	C	.	.	.	F	F	.	.	.	F	.	.	.	.	.	.	.	F	.	.	F	.	.
20R-1, 43–44		M	C	.	.	F	.	.	.	F	R	.	.	.	F	.	.	.	.	.	.	.	F	.	.	R	.	.
20R-2, 47–48		M	A	.	.	C	.	.	.	F	F	.	.	.	F	.	.	.	.	.	.	.	C	.	.	F	.	.
20R-3, 67–68		M	C	.	.	C	.	.	.	.	R	.	.	.	C	.	.	.	.	.	.	.	C	.	.	R	.	.
20R-4, 21–22		M	A	.	.	C	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	C	F	.	R	.	.
20R-CC		M	A	.	.	C	.	.	.	.	R	.	.	.	F	.	.	.	.	.	.	.	C	F	.	R	.	.
21R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
21R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
21R-CC				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
10R-3, 13–14		M–P	A	.	.	.	.	.	.	.	F	.	.	F	.	.	A	F	F	.	.	.	.	.	.	.	C	F

Table 2 (continued).

Core, section, interval (cm)	Biostratigraphic horizon/ zone	Preservation	Sedimentary abundance	*Prediscosphaera honjoi*	*Prediscosphaera spinosa*	*Quadrum garneri*	*Quadrum gothicum*	*Quadrum sissinghi*	*Quadrum trifidum*	*Radiolithus planus*	*Reinhardtites anthophorus*	*Reinhardtites levis*	*Rhagodiscus angustus*	*Rhagodiscus asper*	*Rucinolithus irregularis*	*Rucinolithus wisei*	*Scampanella cornuta*	*Stephanolithion laffittei*	*Tetrapodorhabdus coptensis*	*Tetrapodorhabdus decorus*	*Tranolithus exiguus*	*Tranolithus gabalus*	*Tranolithus phacelosus*	*Vagalapilla matalosa*	*Vekshinella stradneri*	*Watznaueria barnesae*	*Watznaueria biporta*	*Watznaueria supracretacea*	*Zeugrhabdotus erectus*	*Zeugrhabdotus pseudanthophorus*	*Zeugrhabdotus theta*
123-766C-10R-2, 68–69		M	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.
10R-2, 141–142	1a	M–P	A	.	.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	C	F	.	.	.	.
10R-CC		M–P	C	.	.	.	R	.	.	.	.	F	.	C	.	.	.	R	.	.	.	.	.	.	.	C	.	.	.	.	.
11R-1, 99–100		P	C	.	.	.	.	R	R	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.	.	.	.	.
11R-2, 99–100		M	A	F	.	F	F	.	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	A	.	.	.	.	.
11R-3, 98–99		M	A	R	R	F	F	F	.	.	F	C	.	.	.	.	.	.	.	.	.	.	.	.	.	A	.	.	.	.	.
11R-4, 98–99		M–P	C	F	.	F	F	F	.	.	F	C	.	F	.	.	.	.	.	.	.	.	.	.	.	A	.	.	.	.	.
11R-5, 99–100		M–P	A	R	.	F	F	.	.	.	F	C	.	.	.	.	.	.	.	.	.	.	.	.	.	A	.	.	.	.	.
11R-6, 99–100		M	A	.	.	F	R	F	F	.	F	C	.	.	.	.	.	.	.	.	.	.	.	.	.	A	F	.	.	.	.
11R-CC		M	A	F	.	F	R	F	F	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	A	.	.	.	.	.
12R-1, 114–115		P	C	.	.	F	.	F	F	.	F	F	.	F	.	.	.	.	.	.	.	.	.	.	.	C	.	.	.	.	.
12R-2, 27–28		M	A	R	.	F	.	F	F	.	C	F	.	.	.	.	.	.	.	.	.	.	.	.	.	A	.	.	.	.	.
12R-CC		M–P	C	.	.	F	.	F	F	.	C	F	.	F	.	.	.	.	.	.	.	.	.	.	.	C	.	.	.	.	.
13R-1, 38–39		M	C	R	.	.	.	.	.	.	C	.	.	F	.	.	.	.	.	.	.	.	.	.	.	C	F	.	.	R	.
13R-2, 29–30		M	A	.	.	F	.	.	.	.	C	?	.	F	.	.	.	.	.	.	.	.	R	.	.	A	.	.	.	.	R
13R-3, 68–69	16	M–P	C	.	.	F	.	.	.	.	F	.	.	F	.	.	.	.	.	.	.	.	.	.	.	A	F	.	.	.	.
13R-CC	-CC16	M–P	C	.	.	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	A	F	.	.	.	.
14R-1, 46–47		M	C	.	F	C	.	.	.	.	R	.	.	F	.	.	.	.	.	.	.	.	.	.	.	A	F	.	.	.	.
14R-2, 22–23		M–P	F	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	F	.	.	.	F
14R-3, 23–24		M–P	F	.	F	F	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	A	F	.	.	.	.
14R-4, 27–28		M–P	C	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	A	F	.	.	.	.
14R-CC		M–P	C	.	.	F	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	F	.	.	A	F	F	F	.	.
15R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15R-3				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15R-4				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15R-5				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15R-CC		M–P	A	.	.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	A	F	.	C	.	F
16R-1, 129–131		M	A	.	.	.	.	.	.	R	.	.	.	.	.	.	.	R	.	.	.	F	.	.	.	A	.	F	F	.	C
16R-2, 129–131		M	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	F	R	.	.	A	.	.	F	.	C
16R-3, 129–131		M–G	A	.	.	.	.	.	.	.	.	.	F	F	.	.	.	.	.	.	.	.	R	F	.	A	.	.	F	.	C
16R-4, 129–131		M–P	A	.	.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	R	R	.	.	C	.	F	F	.	C
16R-5, 129–131		M	A	.	.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	F	.	.	A	R	F	.	.	F
16R-6, 129–131		M	A	.	.	.	.	.	.	.	.	.	.	F	.	.	.	R	.	.	.	R	R	.	.	A	.	F	F	.	.
16R-CC		M	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	R	.	.	A	R	R	F	.	.
17R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17R-3				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17R-4, 80–82		M	A	.	.	.	.	.	.	.	.	.	R	F	.	.	.	R	.	.	.	F	F	.	.	A	.	F	.	.	C
17R-5				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17R-6				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17R-CC		M	A	.	.	.	.	.	.	.	.	.	.	C	.	.	.	R	.	.	.	.	R	.	.	A	.	F	.	.	C
18R-1, 75–76		M	A	.	.	.	.	.	.	.	.	.	.	.	R	.	.	R	.	.	.	R	R	.	.	A	.	F	.	.	C
18R-2, 26–27		M	A	.	.	.	.	.	.	.	.	.	.	C	.	.	.	.	.	.	.	.	R	.	.	A	.	F	.	.	C
18R-3, 92–93		M	A	.	.	.	.	.	.	R	.	.	.	.	F	R	R	.	R	.	R	R	F	R	.	A	.	F	.	.	C
18R-4, 137–138		M	A	.	.	.	.	.	.	R	.	.	F	C	F	.	.	.	.	.	.	.	R	R	.	A	.	C	.	.	F
18R-5, 6–7		M–P	F	.	.	.	.	.	.	.	.	.	F	C	F	.	.	.	.	.	.	R	.	.	.	A	.	F	.	.	F
18R-CC		M–G	A	.	.	.	.	.	.	R	.	.	F	C	F	F	.	R	.	.	.	F	.	.	.	C	.	F	.	.	F
19R-1, 106–108		M	A	.	.	.	.	.	.	R	.	.	F	C	F	R	.	F	.	.	.	.	.	.	.	A	.	F	.	.	F
19R-2, 12–13		M	A	.	.	.	.	.	.	R	.	.	F	C	F	R	.	F	.	.	.	.	.	R	.	A	.	F	.	.	C
19R-3, 72–73				.	.	.	.	.	.	F	.	.	F	C	C	R	.	F	.	.	.	R	.	.	.	A	.	F	.	.	C
19R-4, 145–146		M	A	.	.	.	.	.	.	.	.	.	F	F	C	F	.	F	.	.	.	.	.	.	F	A	R	F	.	.	F
19R-5, 33–34		P	C	.	.	.	.	.	.	.	.	.	F	F	R	.	.	.	.	.	.	.	.	.	.	C	.	F	R	.	C
19R-CC		M–P	C	.	.	.	.	.	.	.	.	.	.	C	C	F	.	F	F	.	.	.	.	.	.	C	R	F	.	F	C
20R-1, 43–44		M	C	.	.	.	.	.	.	.	.	.	F	C	R	R	.	R	R	.	.	.	.	F	.	C	.	F	.	F	F
20R-2, 47–48		M	A	.	.	.	.	.	.	.	.	.	F	C	.	F	.	R	.	.	.	.	.	F	.	A	.	F	F	F	F
20R-3, 67–68		M	C	.	.	.	.	.	.	.	.	.	F	C	.	.	.	R	.	.	.	.	.	F	F	A	.	F	R	F	.
20R-4, 21–22		M	A	.	.	.	.	.	.	.	.	.	F	C	.	F	.	F	.	.	.	.	.	F	.	A	.	F	R	F	.
20R-CC		M	A	.	.	.	.	.	.	.	.	.	R	C	.	R	.	R	.	R	.	.	.	F	C	A	.	F	F	F	.
21R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
21R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
21R-CC				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
10R-3, 13–14		M–P	A	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.	.	.	.	.

Table 3. Cretaceous calcareous nannofossils from Site 766.

Core, section, interval (cm)	Biostratigraphic horizon/ zone	Preservation	Sedimentary abundance	*Apsidolithus parcus*	*Biantholithus sparsus*	*Biscutum constans*	*Blackites spinosus*	*Braarudosphaera bigelowi*	*Bramletteius serraculoides*	*Calcidiscus macintyrei*	*Calcidiscus protoannulus*	*Campylosphaera eodela*	*Ceratolithoides aculeus*	*Chiasmolithus altus*	*Chiasmolithus bidens*	*Chiasmolithus californicus*	*Chiasmolithus consuetus*	*Chiasmolithus danicus*	*Chiasmolithus eograndis*	*Chiasmolithus expansus*	*Chiasmolithus grandis*	*Chiasmolithus oamaruensis*	*Chiasmolithus solitus*	*Chiasmolithus titus*	*Chiphragmalithus acanthodes*	*Coccolithus eopelagicus*	*Coccolithus pelagicus*	*Coccolithus pliopelagicus*
123-765C-14R-CC	CN1c	G	C	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.
15R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16R-1, 132–133	CP19b	M	A	.	.	.	.	.	R	.	F	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	C	F
16R-2, 36–37	CP19b	M	A	.	.	.	.	R	R	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.
16R-3, 71–72	CP19b	M	A	.	.	.	.	R	R	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	R
16R-4, 146–148			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16R-CC	CP19b	M–G	A	.	.	.	.	R	.	.	F	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	C	.
17R-1, 70–71			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17R-2, 79–80	CP19a	M–P	A	.	.	.	.	C	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	C	.
17R-3, 31–32	CP19a	M–P	C	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	R	.	F	C	.
17R-4, 86–87	CP19a	M	A	.	.	.	.	F	.	.	F	.	.	R	.	.	.	.	.	.	.	.	.	.	.	R	C	.
17R-CC	CP19a	M	A	.	.	.	.	R	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	C	.
18R-1, 39–40	CP19a	M	A	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	C	.
18R-2, 134–136	CP16b	M	A	R	.	.	R	R	F	.	F	.	.	.	.	.	.	.	.	.	R	.	.	F	.	F	A	.
18R-3, 24–26	CP16b	M	A	.	.	.	.	R	R	.	F	.	.	.	.	R	.	.	.	.	R	.	.	F	.	.	A	.
18R-4, 27–29	CP16b	M	A	R	.	.	R	R	R	.	F	.	.	.	.	.	.	.	.	.	R	R	.	F	.	C	A	.
18R-5, 17–19	CP16b	M	A	.	.	.	R	R	R	.	F	.	.	.	.	.	.	.	.	.	.	.	.	R	.	F	A	.
18R-CC	CP16b	G	A	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.
19R-1, 11–13	CP16b	M	C	.	.	.	F	R	R	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	C	.
19R-1, 105–106	CP16b	M	A	.	.	.	F	R	.	.	.	.	.	.	.	.	.	.	.	.	R	F	.	.	.	F	C	.
19R-1, 128–129	CP16b	M–G	A	.	.	.	F	R	F	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	C	.
19R-2, 58–59	CP15b	M	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.
19R-2, 105–109	CP15b	M–G	A	.	.	.	.	.	F	.	F	.	.	.	.	.	.	.	.	.	R	F	.	.	.	.	A	.
19R-2, 120–121	CP12a	M–P	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	C	.
19R-2, 148–149	CP12a	M–G	A	.	.	.	.	.	.	.	R	R	.	.	.	.	R	.	.	.	.	.	R	.	.	.	C	.
19R-3, 112–113	CP12a	M	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	F	.	.	.	.	.	A	.
19R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
20R-1, 24–25	CP11	M	A	.	.	.	.	.	.	.	.	F	.	.	R	.	F	.	F	.	.	.	.	.	F	F	C	.
20R-2, 47–48	CP11	M	A	.	.	.	.	.	.	.	.	R	.	.	.	R	F	.	.	.	.	.	.	.	F	.	C	.
20R-CC	CP9b	M–P	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.
21R-1, 16–17	CP9a	M–P	C	R	.	.	.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	F	.
21R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22R-1, 149–150	CP6	M	C	R	.	.	.	.	.	.	.	.	.	.	F	.	.	F	.	.	.	.	.	.	.	.	C	.
22R-2, 01–02	CP5	M	C	.	.	.	.	.	.	.	.	.	.	.	F	.	.	F	.	.	.	.	.	.	.	.	C	.
22R-3, 02–03	CP4	M	A	.	R	R	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	C	.
22R-4, 19–20	CP3	M–P	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.
22R-4, 108–109	CP2–CP3	M–P	R	R	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.
22R-5				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Key to symbols: RE = Reworked; R = Rare; F = Few; C = Common; A = Abundant; VA = Very abundant; ? = Questionable presence; . = Not present.

(*Calculites obscurus* Zone) based on the presence of *C. obscurus*, *Reinhardtites anthophorus*, and *M. furcatus* and are late Santonian/early Campanian in age. The stratigraphic gap between Samples 123-765C-25R-2, 48–49 cm, and -25R-1, 33–35 cm, suggests a significant decrease in sedimentation rate (highly condensed section) or the presence of an unconformity or unconformities in this interval. Good recovery in Core 123-765C-25R (71.6%, Ludden, Gradstein, et al., 1990) supports this interpretation because this suggests that little material was lost because of drilling.

Material between Samples 123-765C-24R-3, 55–58 cm, and 123-765-24R-1, 36–37 cm, was placed in Zone CC19 (*Calculites ovalis* Zone) based on the presence of *Aspidolithus parcus*, *R. anthophorus*, *C. obscurus*, and the last appearance of *M. furcatus* in Sample 123-765C-24R-4, 41–43 cm. This zonal assignment indicates an age of middle Campanian. Considering the relative length of Zone CC18 (*Aspidolithus parcus* Zone), a condensed section or unconformity may exist between Samples 123-765C-24R-4, 41–43 cm, and -24R-3, 55–58 cm (slightly more than 1.5 m). Fairly good recovery in Core 123-765C-24R (58.9%, Ludden, Gradstein, et al., 1990)) supports this interpretation. Middle Campanian sediments also were found in Sample 123-765C-23R-CC, which was placed in Zone CC20 (*Ceratolithoides aculeus* Zone) based on the presence of *C. aculeus*. Samples 123-765C-23R-4, 93–95 cm, and -23R-3, 94–95 cm, were placed in Subzone CC22b (*Quadrum trifidum* Zone) based on the presence of *Q. trifidum* and are late Campanian in age. The lack of Zone CC21 suggests

Table 3 (continued).

Core, section, interval (cm)	Biostratigraphic horizon/zone	Preservation	Sedimentary abundance	*Coronocyclus nitescens*	*Cretarhabdus crenulatus*	*Cribrocentrum reticulatum*	*Cribrosphaerella ehrenbergi*	*Cruciplacolithus cribellum*	*Cruciplacolithus frequens*	*Cruciplacolithus primus*	*Cruciplacolithus tenuis*	*Cyclagelosphaera alta*	*Cyclagelosphaera reinhardti*	*Cyclicargolithus abisectus*	*Cyclicargolithus floridanus*	*Dictyococcites antarcticus*	*Dictyococcites bisectus*	*Dictyococcites callidus*	*Dictyococcites daviesi*	*Discoaster adamanteus*	*Discoaster barbadiensis*	*Discoaster calculosus*	*Discoaster deflandrei*	*Dicoaster diastypus*	*Discoaster druggi*	*Discoaster gemmeus*	*Discoaster kuepperi*	*Discoaster lodoensis*
123-765C-14R-CC	CN1c	G	C	F	.	.	.	.	.	.	.	.	.	.	C	R	.	.	.	.	.	R	C	.	C	.	.	.
15R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16R-1, 132–133	CP19b	M	A	F	.	.	.	.	.	.	.	.	.	C	A	.	C	.	.	F	R	.	A	.	.	.	.	.
16R-2, 36–37	CP19b	M	A	F	.	.	.	.	.	.	.	.	.	F	A	.	C	.	.	F	R	.	C	.	.	.	.	.
16R-3, 71–72	CP19b	M	A	F	.	.	.	.	.	.	.	.	.	F	A	.	C	.	.	F	R	.	A	.	.	.	.	.
16R-4, 146–148			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16R-CC	CP19b	M–G	A	F	.	.	.	.	.	.	.	.	.	F	.	V	F	.	.	R	.	.	A	.	.	.	.	.
17R-1, 70–71			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17R-2, 79–80	CP19a	M–P	A	F	.	.	.	.	.	.	.	.	.	C	A	.	C	.	.	F	.	.	A	.	.	.	.	.
17R-3, 31–32	CP19a	M–P	C	R	.	R	.	.	.	.	.	.	.	C	A	.	C	.	.	R	R	.	A	.	.	.	.	.
17R-4, 86–87	CP19a	M	A	F	.	R	.	.	.	.	.	.	.	F	A	.	F	.	.	F	.	.	F	.	.	.	.	.
17R-CC	CP19a	M	A	.	.	.	.	.	.	.	.	.	.	C	A	.	F	.	.	.	.	.	.	.	.	.	.	.
18R-1, 39–40	CP19a	M	A	F	.	.	.	.	.	.	.	.	.	C	A	.	.	.	.	F	.	.	C	.	.	.	.	.
18R-2, 134–136	CP16b	M	A	F	.	R	R	.	.	.	.	.	.	.	A	.	C	.	F	.	R	.	C	.	.	.	.	.
18R-3, 24–26	CP16b	M	A	F	.	R	.	.	.	.	.	.	.	.	A	.	A	.	F	.	R	.	C	.	.	.	.	.
18R-4, 27–29	CP16b	M	A	R	.	R	.	.	.	.	.	.	.	.	A	.	A	.	.	.	.	.	C	.	.	.	.	.
18R-5, 17–19	CP16b	M	A	.	.	.	R	.	.	.	.	.	.	.	A	.	C	.	F	.	R	.	F	.	.	.	R	.
18R-CC	CP16b	G	A	.	.	.	.	.	.	.	.	.	.	.	A	.	C	C	.	.	.	.	.	.	.	.	.	.
19R-1, 11–13	CP16b	M	C	R	.	.	.	.	.	.	.	.	.	.	A	.	C	.	.	.	.	.	F	.	.	.	.	.
19R-1, 105–106	CP16b	M	A	F	.	.	.	.	.	.	.	.	.	.	A	.	C	.	.	F	R	.	C	.	.	.	.	.
19R-1, 128–129	CP16b	M–G	A	F	.	.	.	.	.	.	.	.	.	.	A	.	C	.	.	.	R	.	C	.	.	.	.	.
19R-2, 58–59	CP15b	M	F	.	.	.	.	.	.	.	.	.	.	.	C	.	C	.	.	.	R	.	F	.	.	.	.	.
19R-2, 105–109	CP15b	M–G	A	F	.	R	.	.	.	.	.	.	.	.	A	.	C	.	.	.	C	.	F	.	.	.	.	.
19R-2, 120–121	CP12a	M–P	C	.	.	.	.	.	.	.	.	.	.	.	C	.	.	.	.	.	C	.	C	.	.	.	C	C
19R-2, 148–149	CP12a	M–G	A	.	.	.	.	.	.	.	.	.	.	.	C	.	.	.	.	.	C	.	C	.	.	.	F	C
19R-3, 112–113	CP12a	M	A	.	.	.	.	F	.	.	.	.	.	.	F	.	.	.	.	.	C	.	.	.	.	R	R	C
19R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
20R-1, 24–25	CP11	M	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	F	F	.	.	C	C
20R-2, 47–48	CP11	M	A	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.	C	F	.	.	F	F
20R-CC	CP9b	M–P	C	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	C	.	.	C	.	.	.	.
21R-1, 16–17	CP9a	M–P	C	.	.	.	.	.	.	.	F	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
21R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22R-1, 149–150	CP6	M	C	.	.	.	.	.	R	.	F	.	R	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.
22R-2, 01–02	CP5	M	C	.	R	.	.	.	R	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22R-3, 02–03	CP4	M	A	.	R	.	R	.	.	R	C	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22R-4, 19–20	CP3	M–P	F	.	R	.	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22R-4, 108–109	CP2–CP3	M–P	R	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22R-5				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

another condensed section/unconformity between Samples 123-765C-23R-CC and -23R-4, 93–95 cm. Good recovery in Core 123-765C-23R(70.6%, Ludden, Gradstein, et al., 1990) supports this interpretation.

Distinction of Maestrichtian material and the Cretaceous/Tertiary boundary was difficult in sediments from Hole 765C because of the absence of nannofossils in much of the sampled material and because of restrictions on sampling of critical boundary material (Cores 123-765C-23R and -22R). An age of early Paleogene was found in Sample 123-765C-22R-4, 108–109 cm, which was placed in undifferentiated Zones CP2–CP3 (*Chiasmolithus danicus–Ellipsolithus macellus* Zones) based on the presence of *Cruciplacolithus tenuis* and *Toweius eminens* (Fig. 3). Extensive reworking of Late Cretaceous nannofossils occurs in this sample. Early Paleocene material also can be found in Sample 123-765C-22R-4, 19–20 cm, which was tentatively placed in Zone CP3 and in Sample 123-765C-22R-3, 2–3 cm, which was placed in Zone CP4 (*Fasciculithus tympaniformis* Zone) based on the presence of *F. tympaniformis*. Late Paleocene material was found in Samples 123-765C-22R-2, 1–2 cm, and 123-765C-22R-1, 149–150 cm, which were placed in Zones CP5 (*Heliolithus kleinpelli* Zone) and CP6 (*Discoaster mohleri* Zone), respectively, based on the presence of both *H. kleinpelli* and *D. mohleri*.

Eocene sediment first occurs in Sample 123-765C-21R-1, 16–17 cm, and was placed in Subzone CP9a (*Tribrachiatus contortus* Subzone) based on the presence of *Discoaster diastypus*. Poor recovery in Core 23-765C-21R-1 (6.8%, Ludden, Gradstein, et al., 1990) and an intervening barren sample (Sample 123-765C-21R-CC) suggest that Zones CC7 (*Discoaster nobilis* Zone) and CC8 (*Discoaster multiradiatus* Zone) may be present between

Table 3 (continued).

Core, section, interval (cm)	Biostratigraphic horizon/ zone	Preservation	Sedimentary abundance	*Discoaster mohleri*	*Discoaster multiradiatus*	*Discoaster nobilis*	*Discoaster nodifer*	*Discoaster robustus*	*Discoaster saipanensis*	*Discoaster subdeflandrei*	*Discoaster sublodoensis*	*Discoaster tani*	*Discoaster toralus*	*Discoaster wemmelensis*	*Eiffellithus turriseiffeli*	*Ellipsagelosphaera britannica*	*Ellipsolithus lajollaensis*	*Ellipsolithus macellus*	*Eprolithus floralis*	*Ericsonia fenestrata*	*Ericsonia formosa*	*Ericsonia obruta*	*Ericsonia robusta*	*Ericsonia subdisticha*	*Fasciculithus bobii*	*Fasciculithus thomasi*	*Fasciculithus tympaniformis*	*Hayaster perplexus*
123-765C-14R-CC	CN1c	G	C	.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.
15R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16R-1, 132–133	CP19b	M	A	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	C	R	.	.	.	.	.	.	.
16R-2, 36–37	CP19b	M	A	.	.	.	R	.	R	.	.	R	.	.	.	.	.	.	.	F	R	.	.	.	.	.	.	.
16R-3, 71–72	CP19b	M	A	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	F	R	.	.	R	.	.	.	.
16R-4, 146–148			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16R-CC	CP19b	M–G	A	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	C	R	.	.	.	.	.	.	.
17R-1, 70–71			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17R-2, 79–80	CP19a	M–P	A	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	C	.	.	.	.	.	.	.	F
17R-3, 31–32	CP19a	M–P	C	.	.	.	.	.	R	.	.	R	.	.	.	.	.	.	.	F	R	.	.	.	.	.	.	.
17R-4, 86–87	CP19a	M	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.	.	.	.	.	.	R	F
17R-CC	CP19a	M	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	R	.	.	.	.	.	.	.
18R-1, 39–40	CP19a	M	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	R	.	.	R	.	.	.	.
18R-2, 134–136	CP16b	M	A	.	.	.	.	.	R	.	.	C	.	.	.	.	.	.	.	F	F	.	.	F	.	.	.	.
18R-3, 24–26	CP16b	M	A	.	.	.	.	.	R	.	.	F	.	.	.	.	.	.	.	F	F	.	.	F	.	.	.	.
18R-4, 27–29	CP16b	M	A	.	R	.	.	.	R	.	.	F	.	.	.	.	.	.	.	F	C	.	.	C	.	.	.	.
18R-5, 17–19	CP16b	M	A	.	R	.	F	.	R	.	.	F	.	.	.	.	.	.	.	F	C	.	.	F	.	.	.	.
18R-CC	CP16b	G	A	.	.	.	.	.	.	F	.	F	.	.	.	.	.	.	.	F	R	.	.	R	.	.	.	.
19R-1, 11–13	CP16b	M	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	F	.	.	F	.	.	.	.
19R-1, 105–106	CP16b	M	A	.	.	.	F	.	R	.	.	.	.	.	.	.	.	.	.	F	F	.	.	F	.	.	.	.
19R-1, 128–129	CP16b	M–G	A	.	.	.	F	.	.	.	.	F	.	.	.	.	.	.	.	F	F	.	.	C	.	.	.	.
19R-2, 58–59	CP15b	M	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.	F	.	.	.	.
19R-2, 105–109	CP15b	M–G	A	.	.	.	C	.	C	.	.	.	.	.	.	.	.	.	.	.	C	.	.	.	.	.	R	.
19R-2, 120–121	CP12a	M–P	C	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.
19R-2, 148–149	CP12a	M–G	A	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	F	C	.	.	.	.	.	.	.
19R-3, 112–113	CP12a	M	A	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	?	C	.	.	.	.	.	.	.
19R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
20R-1, 24–25	CP11	M	A	.	F	.	.	F	.	.	.	.	.	R	.	.	R	.	.	.	F	F	.	.	.	.	.	.
20R-2, 47–48	CP11	M	A	.	F	.	.	F	.	.	.	.	.	.	.	.	R	.	.	.	.	F	F	.	.	.	R	.
20R-CC	CP9b	M–P	C	.	F	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.	.	.	.	.
21R-1, 16–17	CP9a	M–P	C	F	F	F	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	F	.	F	.	C	.
21R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22R-1, 149–150	CP6	M	C	F	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	R	.	.	.	.	.	C	.
22R-2, 01–02	CP5	M	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.	.	C	.
22R-3, 02–03	CP4	M	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	R	F	.
22R-4, 19–20	CP3	M–P	F	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.
22R-4, 108–109	CP2–CP3	M–P	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	R	.	.	.	.	.
22R-5				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Samples 123-765C-22R-1, 149–150 cm, and -21R-1, 16–17 cm. However, the presence of a condensed section/unconformity in this interval cannot be ruled out.

The presence of *Tribrachiatus orthostylus* and last appearance of *F. tympaniformis* indicates Subzone CP9b (*Discoaster binodosus* Subzone) and an age of early Eocene for Sample 123-765C-20R-CC. Samples 123-765C-20R-2, 47–48 cm, and 20R-1, 24–25 cm, were placed in Zone CP11 (*Discoaster lodoensis* Zone) based on the presence of *D. lodoensis* and are early Eocene in age. Poor recovery in Core 123-765C-20R (25.9%, Ludden, Gradstein, et al., 1990) may be responsible for the absence of Zone CP10.

Sediments between Samples 123-765C-19R-3, 112–113 cm, through -19R-2, 120–121 cm, were placed in Subzone CP12a (*Discoasteroides kuepperi* Subzone) based on the presence of *Discoaster sublodoensis* and are early Eocene in age. Samples 123-765C-19R-2, 105–109 cm, and -19R-2, 58–59 cm, were placed in Subzone CP15b (*Isthmolithus recurvus* Subzone) based on the presence of *I. recurvus*. A significant unconformity exists between Samples 123-765C-19R-2, 120–121 cm, and 123-765C-19R, 105–109 cm, as indicated by the absence of most of the late Eocene (Zones CP13 and CP14 and Subzone CP15a). Fairly good recovery in Core 123-765C-19R (47.9%, Ludden, Gradstein, et al., 1990) supports this interpretation. According to Berggren et al. (1985) this hiatus should span at least 12 Ma.

Early Oligocene sediments were first found in Sample 123-765C-19R-1, 128–129 cm, and continues through Sample 123-765C-18R-2, 134–136 cm. This interval was placed in Subzone CP16b (*Ericsonia formosa* Subzone) based on the presence of *E. formosa* and *I. recurvus*. The next available sample (Sample 123-765C-18R-1, 39–40 cm) was placed in Subzone CP19a (*Cy-*

Table 3 (continued).

Core, section, interval (cm)	Biostratigraphic horizon/zone	Preservation	Sedimentary abundance	*Hayella situliformis*	*Helicopontosphaera bramlettei*	*Helicopontosphaera compacta*	*Helicopontosphaera euphratis*	*Helicopontosphaera intermedia*	*Helicopontosphaera inversa*	*Helicopontosphaera kamptneri*	*Helicopontosphaera mediterranea*	*Helicopontosphaera obliqua*	*Helicopontosphaera perch-nielseniae*	*Helicopontosphaera recta*	*Helicopontosphaera reticulata*	*Helicopontosphaera salebrosa*	*Helicopontosphaera seminulum*	*Helicopontosphaera wilcoxoni*	*Heliolithus kleinpelli*	*Heliolithus riedeli*	*Holodiscolithus solidus*	*Isthmolithus recurvus*	*Lanternithus minutus*	*Lophodolithus acutus*	*Markalius inversus*	*Micrantholithus pinguis*	*Microrhabdulus decoratus*	*Micula decussata*
123-765C-14R-CC	CN1c	G	C	.	.	.	F	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16R-1, 132–133	CP19b	M	A	.	.	R	F	F	.	.	.	R	.	F	.	.	.	.	.	.	.	R	R	.	.	.	.	.
16R-2, 36–37	CP19b	M	A	R	.	R	F	F	.	.	.	R	.	F	R	.	.	.	.	.	.	.	R	.	.	.	.	.
16R-3, 71–72	CP19b	M	A	R	.	R	F	F	.	.	R	.	.	F	.	.	.	.	.	.	.	.	R	.	.	.	.	.
16R-4, 146–148			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16R-CC	CP19b	M–G	A	.	.	.	F	F	.	.	R	F	.	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17R-1, 70–71			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17R-2, 79–80	CP19a	M–P	A	.	.	.	F	R	.	.	.	F	.	C	.	.	.	.	.	.	F	.	.	.	.	R	.	.
17R-3, 31–32	CP19a	M–P	C	.	.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	R	.	.	.	.	.
17R-4, 86–87	CP19a	M	A	R	.	.	F	R	.	.	.	F	.	C	.	.	.	.	.	.	.	.	R	.	.	R	.	.
17R-CC	CP19a	M	A	.	.	R	F	R	.	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.
18R-1, 39–40	CP19a	M	A	.	.	.	F	R	.	.	.	R	.	F	.	.	.	.	.	.	.	.	F	.	.	.	.	.
18R-2, 134–136	CP16b	M	A	.	.	F	.	.	.	.	.	.	.	F	F	.	.	.	.	.	.	R	.	.	.	.	.	.
18R-3, 24–26	CP16b	M	A	R	.	C	.	.	.	.	.	R	.	F	F	.	.	.	.	.	.	R	F	.	.	.	.	.
18R-4, 27–29	CP16b	M	A	F	.	F	R	.	.	.	.	R	F	R	F	.	.	.	.	.	.	R	C	.	.	.	.	.
18R-5, 17–19	CP16b	M	A	.	.	F	R	.	.	.	.	.	R	R	F	.	.	.	.	.	.	.	C	.	.	.	.	R
18R-CC	CP16b	G	A	R	F	F	F	F	.	.	.	.	.	R	C	F	.	.	.	.	.	.	C	.	.	.	.	.
19R-1, 11–13	CP16b	M	C	R	.	F	F	F	.	.	.	.	.	.	F	.	.	F	.	.	.	.	C	.	.	.	.	.
19R-1, 105–106	CP16b	M	A	.	F	F	.	R	.	.	.	.	.	F	F	.	R	F	.	.	A	.	F	.	.	.	.	.
19R-1, 128–129	CP16b	M–G	A	F	F	C	R	F	F	.	.	.	.	F	F	.	F	F	.	.	A	R	C	.	.	.	.	.
19R-2, 58–59	CP15b	M	F	.	.	F	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	R	.	.	.	.	.	.
19R-2, 105–109	CP15b	M–G	A	R	.	F	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	F	.	.	.	.	.	.
19R-2, 120–121	CP12a	M–P	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19R-2, 148–149	CP12a	M–G	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19R-3, 112–113	CP12a	M	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	?	.	.	.
19R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
20R-1, 24–25	CP11	M	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
20R-2, 47–48	CP11	M	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.
20R-CC	CP9b	M–P	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.	R
21R-1, 16–17	CP9a	M–P	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	R	.	.	.
21R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22R-1, 149–150	CP6	M	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.	.	.	.	.	.	.	.	R
22R-2, 01–02	CP5	M	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	R	.	.	.	.	.	.	.	R
22R-3, 02–03	CP4	M	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R
22R-4, 19–20	CP3	M–P	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R
22R-4, 108–109	CP2–CP3	M–P	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	R	R
22R-5				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

clicargolithus floridanus Subzone) based on the presence of *Sphenolithus ciperoensis* and is late Oligocene in age. The zonal assignment of this sample reveals another significant hiatus comprising most of the early Oligocene, as evidenced by the absence of Zones CP17 and CP18. This is supported by the good recovery of Core 123-765C-18R (78.3%, Ludden, Gradstein, et al., 1990), which suggests that few sediments were lost because of drilling. According to Berggren et al. (1985), this hiatus should span at least 8.5 Ma. Samples 123-765C-17R-CC through -17R-2, 79–80 cm, also were placed in Subzone CP19a. Samples 123-765C-17R-1, 70–71 cm, through -16R-CC were placed in Subzone CP19b (*Dictyococcites bisectus* Subzone) based on the presence of *S. ciperoensis* and last appearance of *Sphenolithus distentus* in Sample 123-765C-17R-2, 79–80 cm, and also are late Oligocene in age.

The Oligocene/Miocene boundary is indistinguishable in material from Hole 765C because of the absence of nannofossils in Core 123-765C-15R. The next available sample (Sample 123-765C-14R-CC) was placed in Subzone CN1c (*Discoaster druggii* Subzone) based on the presence of *D. druggii* and is early Miocene in age.

Site 766

Shipboard sedimentologic work indicated that the Albian–lower Eocene section of Hole 766A (Units II through IV) consists primarily of hemipelagic to pelagic zeolitic calcareous nannofossil oozes and clay (Ludden, Gradstein, et al., 1990). Consequently, reworking is minimal, and nannofossils from this interval are generally abundant as a sedimentary component, while assemblages are diverse and moderately to well-preserved (Tables 3 and

Table 3 (continued).

Core, section, interval (cm)	Biostratigraphic horizon/ zone	Preservation	Sedimentary abundance	*Neococcolithes protenus*	*Neocrepidolithus bukryi*	*Neocrepidolithus cruciatus*	*Neocrepidolithus dirimosus*	*Orthozygus aureus*	*Parhabdolithus embergeri*	*Pedinocyclus larvalis*	*Pemma basquensis*	*Pemma papillatum*	*Peritrachelina joidesa*	*Placozygus sigmoides*	*Pontosphaera callosa*	*Pontosphaera desueta*	*Pontosphaera enormis*	*Pontosphaera japonica*	*Pontosphaera latoculata*	*Pontosphaera multipora*	*Pontosphaera ocellata*	*Pontosphaera pectinata*	*Pontosphaera plana*	*Pontosphaera scissura*	*Prediscosphaera cretacea*	*Prinsius bisulcus*	*Prinsius martini*	*Pyrocyclus inversus*
123-765C-14R-CC	CN1c	G	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.
15R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16R-1, 132–133	CP19b	M	A	.	.	.	.	.	.	R	.	.	.	R	.	R	.	R	.	F	.	.	.	.	.	.	.	.
16R-2, 36–37	CP19b	M	A	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	F	.	.	.	R	.	.	.	.
16R-3, 71–72	CP19b	M	A	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	R	.	.	.	F	.	.	.	.
16R-4, 146–148			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16R-CC	CP19b	M–G	A	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	R	.	.	.	R
17R-1, 70–71			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17R-2, 79–80	CP19a	M–P	A	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.
17R-3, 31–32	CP19a	M–P	C	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F
17R-4, 86–87	CP19a	M	A	.	.	.	.	.	.	R	.	R	.	R	.	.	.	.	.	.	.	.	R	.	.	.	.	F
17R-CC	CP19a	M	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
18R-1, 39–40	CP19a	M	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	R
18R-2, 134–136	CP16b	M	A	.	.	.	.	.	.	R	.	.	R	.	.	.	.	.	.	.	.	.	.	F	.	.	.	.
18R-3, 24–26	CP16b	M	A	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F
18R-4, 27–29	CP16b	M	A	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F
18R-5, 17–19	CP16b	M	A	.	.	.	.	.	.	R	.	.	.	R	.	.	.	.	.	.	.	.	.	R	.	.	.	R
18R-CC	CP16b	G	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	R	.	R	.	.	.	.	.	.
19R-1, 11–13	CP16b	M	C	.	.	.	.	.	.	F	.	.	R	.	C	R	R	.	.	F	.	F	F	.	.	.	.	F
19R-1, 105–106	CP16b	M	A	.	.	.	.	C	.	.	.	.	.	.	C	.	.	.	R	F	.	.	.	R	.	.	.	.
19R-1, 128–129	CP16b	M–G	A	.	.	.	.	C	.	F	.	.	F	.	C	R	.	.	.	F	R	F	.	R	.	.	.	.
19R-2, 58–59	CP15b	M	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19R-2, 105–109	CP15b	M–G	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19R-2, 120–121	CP12a	M–P	C	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19R-2, 148–149	CP12a	M–G	A	R	R	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19R-3, 112–113	CP12a	M	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
20R-1, 24–25	CP11	M	A	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
20R-2, 47–48	CP11	M	A	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
20R-CC	CP9b	M–P	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
21R-1, 16–17	CP9a	M–P	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
21R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22R-1, 149–150	CP6	M	C	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	F	.	.
22R-2, 01–02	CP5	M	C	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	F	.	.
22R-3, 02–03	CP4	M	A	.	.	R	R	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	F	F	.
22R-4, 19–20	CP3	M–P	F	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.
22R-4, 108–109	CP2–CP3	M–P	R	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	R	.	.	.
22R-5				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

4). Average recovery for the entire sediment section was 63.1%, with a slightly lower average value for the Upper Cretaceous–Paleogene interval (Ludden, Gradstein, et al., 1990). Shipboard biostratigraphic work indicated a nearly complete Albian–early Eocene record (Ludden, Gradstein, et al., 1990), which is confirmed here. Good recovery combined with a relatively complete stratigraphic record and diverse, well-preserved nannofossil assemblages allowed for an accurate, high-resolution biostratigraphic correlation and the establishment of a useful temporal framework for the hole.

At the base of the studied interval, a thick section of Zone CC8 (*Prediscosphaera columnata* Zone) is present that includes Samples 123-766A-21R-CC through -17R-CC (Fig. 2). The zonal assignment is based on the presence of *P. columnata* and denotes an Albian age. The next available sample (Sample 123-766A-17R-4, 80–82 cm) contains *E. turriseiffeli* and was placed in Zone CC9 (*Eiffellithus turriseiffeli* Zone), indicating an age of Albian–Cenomanian. Albian–Cenomanian sediments continue through Sample 123-766A-15R-CC, and all intervening samples also were placed in Zone CC9.

Samples 123-766A-14R-CC and -14R-4, 27–28 cm, were placed in Zone CC11 (*Quadrum gartneri* Zone), as determined by the presence of *Q. gartneri,* and indicates an age of Turonian. Distinction of Zone CC10 and the Cenomanian/Turonian boundary is impossible here because of sampling restrictions. Samples 123-766A-14R-3, 23–24 cm, and -14R-2, 22–23 cm, were placed in Zones CC12 (*Lucianorhabdus maleformis* Zone) and CC13 (*Marthasterites furcatus* Zone), respectively, based on the presence of both *E. eximius* and *M. furcatus.* This denotes an age of late Turonian–Coniacian for these two samples.

Table 3 (continued).

Core, section, interval (cm)	Biostratigraphic horizon/ zone	Preservation	Sedimentary abundance	*Pyrocyclus orangensis*	*Reinhardtites levis*	*Reticulofenestra hampdenensis*	*Reticulofenestra hillae*	*Reticulofenestra minuta*	*Reticulofenestra pseudoumbilica*	*Reticulofenestra umbilica*	*Rhabdosphaera tenuis*	*Sphenolithus anarrhopus*	*Sphenolithus capricornutus*	*Sphenolithus ciperoensis*	*Sphenolithus conicus*	*Sphenolithus delphix*	*Sphenolithus distentus*	*Sphenolithus distentus* (transitional)	*Sphenolithus editus*	*Sphenolithus furcatolithoides*	*Sphenolithus moriformis*	*Sphenolithus obtusus*	*Sphenolithus pacificus*	*Sphenolithus predistentus*	*Sphenolithus primus*	*Sphenolithus pseudoradians*	*Sphenolithus radians*	*Toweius callosus*
123-765C-14R-CC	CN1c	G	C	.	.	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	C	.	.	.	.	.	.	.
15R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16R-1, 132–133	CP19b	M	A	.	.	.	.	.	.	R	.	.	.	C	F	F	.	.	.	.	C	.	.	C	.	.	.	.
16R-2, 36–37	CP19b	M	A	R	.	.	.	.	.	R	.	.	F	C	F	F	.	.	.	.	C	.	.	C	.	R	.	.
16R-3, 71–72	CP19b	M	A	F	.	.	.	.	.	R	.	.	.	F	F	.	.	.	.	.	C	R	.	C	.	.	.	.
16R-4, 146–148			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16R-CC	CP19b	M–G	A	.	.	.	.	.	.	.	.	.	.	C	F	F	.	.	.	.	C	.	.	R	.	.	.	.
17R-1, 70–71			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17R-2, 79–80	CP19a	M–P	A	.	.	.	.	.	.	.	.	.	.	C	.	.	F	.	.	.	A	.	.	F	.	.	.	.
17R-3, 31–32	CP19a	M–P	C	.	.	.	.	.	.	R	.	.	.	F	R	.	F	.	.	.	C	.	.	F	.	.	.	.
17R-4, 86–87	CP19a	M	A	.	.	.	.	.	.	R	.	.	.	C	R	.	F	.	.	.	C	.	.	F	.	.	.	.
17R-CC	CP19a	M	A	R	.	.	.	.	.	R	.	.	.	C	.	.	F	.	.	.	.	.	.	F	.	.	.	.
18R-1, 39–40	CP19a	M	A	.	.	.	.	.	.	.	.	.	.	C	.	.	F	.	.	.	C	.	.	C	.	.	.	.
18R-2, 134–136	CP16b	M	A	.	.	.	.	.	.	F	.	.	.	.	.	.	.	F	.	.	C	.	.	C	.	R	.	.
18R-3, 24–26	CP16b	M	A	.	.	.	.	.	.	F	.	.	.	.	.	.	.	F	.	R	C	.	.	C	.	R	.	.
18R-4, 27–29	CP16b	M	A	.	.	.	.	.	.	C	.	.	.	.	.	.	.	R	.	R	C	.	.	C	.	R	.	.
18R-5, 17–19	CP16b	M	A	.	.	.	.	.	.	C	.	.	.	.	.	.	.	R	.	R	C	.	.	C	.	R	.	.
18R-CC	CP16b	G	A	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	C	.	.	C	.	.	.	.
19R-1, 11–13	CP16b	M	C	.	.	.	F	.	.	F	.	.	.	.	.	.	.	.	.	.	C	.	.	C	.	.	.	.
19R-1, 105–106	CP16b	M	A	.	.	.	.	.	.	F	F	.	.	.	.	.	.	.	.	.	C	.	.	C	.	F	.	.
19R-1, 128–129	CP16b	M–G	A	.	.	.	.	.	.	F	.	.	.	.	.	.	.	F	.	.	C	.	.	F	.	R	.	.
19R-2, 58–59	CP15b	M	F	.	.	R	.	.	.	F	.	.	.	.	.	.	.	.	.	.	F	.	.	R	.	.	.	.
19R-2, 105–109	CP15b	M–G	A	.	.	F	.	.	.	C	F	.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.
19R-2, 120–121	CP12a	M–P	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	C	.
19R-2, 148–149	CP12a	M–G	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.	.	.	.	.	F	.
19R-3, 112–113	CP12a	M	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	F	R	.	.	.	.	F	.
19R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
20R-1, 24–25	CP11	M	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	C	.	R	.	.	.	C	F
20R-2, 47–48	CP11	M	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.	C	.	F	.	.	R	F	F
20R-CC	CP9b	M–P	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	F	F
21R-1, 16–17	CP9a	M–P	C	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	C	.	.	.
21R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22R-1, 149–150	CP6	M	C	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	C	.	.	.
22R-2, 01–02	CP5	M	C	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.	.
22R-3, 02–03	CP4	M	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.	.	.
22R-4, 19–20	CP3	M–P	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.
22R-4, 108–109	CP2–CP3	M–P	R	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22R-5				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Sample 123-766A-14R-1, 46–47 cm, was placed in Zone CC15 (*Reinhardtites anthophorus* Zone) based on the presence of *R. anthophorus* and is of Santonian age. Good recovery in Core 123-766A-14R (>50%, Ludden, Gradstein, et al., 1990) and the absence of Zone CC14 suggest an unconformity or condensed section between Samples 123-766A-14R-2, 22–23 cm, and -14R-1, 46–47 cm. Samples 123-766A-13R-CC and 123-766A-13R-3, 68–69 cm, were placed in undifferentiated Zones CC15–CC16 (*Reinhardtites anthophorus–Lucianorhabdus cayeuxii* zones) based on the presence of species indicative of this zonal interval and also are of Santonian age. The next available samples (Samples 123-766A-13R-2, 29–30 cm, and -13R-1, 38–39 cm) were placed in Zone CC19 (*Calculites ovalis* Zone) based on the presence of *A. parcus* and *Lucianorhabdus cayeuxii* and are early Campanian in age. Poor recovery in Core 123-766A-13R (<50%, Ludden, Gradstein, et al., 1990) may account for the absence of Zones CC17 and CC18 between Samples 123-766A-13R-3, 68–69 cm, and -13R-2, 29–30 cm; however, the presence of an unconformity or condensed section cannot be ruled out.

Sample 123-766A-12R-CC was placed in Zone CC21 (*Quadrum nitidum* Zone) based on the presence of *Q. nitidum* and is late Campanian in age. Poor recovery in Core 123-766A-13R (<50%, Ludden, Gradstein, et al., 1990) may account for the absence of Zone CC20; however, a disconformity may exist between Samples 123-766A-13R-1, 38–39 cm, and -12R-CC. Samples 123-766A-12R-2, 27–28 cm, and -12R-1, 114–115 cm, were placed in Subzone CC22a (*Quadrum trifidum* Zone) based on the presence of *Q. trifidum* and are late Campanian in age. Samples 123-

Table 3 (continued).

Core, section, interval (cm)	Biostratigraphic horizon/ zone	Preservation	Sedimentary abundance	*Toweius crassus*	*Toweius eminens*	*Toweius gammation*	*Toweius magnicrassus*	*Toweius occultatus*	*Toweius pertusus*	*Toweius selandianus*	*Toweius tovae*	*Transversopontis latus*	*Transversopontis pulcheroides*	*Transversopontis rectipons*	*Tribrachiatus orthostylus*	*Triquetrorhabdulus carinatus*	*Triquetrorhabdulus inversus*	*Triquetrorhabdulus milowi*	*Triquetrorhabdulus rugosus*	*Umbellosphaera irregularis*	*Umbilicosphaera sibogae*	*Watznaueria barnesae*
123-765C-14R-CC	CN1c	G	C	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	F	.
15R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16R-1, 132–133	CP19b	M	A	.	R	.	.	.	.	.	.	.	.	.	.	C	.	.	F	.	.	.
16R-2, 36–37	CP19b	M	A	.	.	.	.	.	.	.	.	.	.	.	.	F	.	R	R	.	.	.
16R-3, 71–72	CP19b	M	A	.	.	.	.	.	.	.	.	.	.	.	.	F	.	R	R	R	.	.
16R-4, 146–148			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16R-CC	CP19b	M–G	A	.	.	.	.	.	.	.	.	.	.	.	.	F	.	R	.	.	.	.
17R-1, 70–71			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17R-2, 79–80	CP19a	M–P	A	.	.	.	.	.	.	.	.	.	.	.	.	C	.	R	.	.	.	R
17R-3, 31–32	CP19a	M–P	C	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.
17R-4, 86–87	CP19a	M	A	.	.	.	.	.	.	.	.	.	.	.	.	C	.	R	.	.	.	.
17R-CC	CP19a	M	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
18R-1, 39–40	CP19a	M	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
18R-2, 134–136	CP16b	M	A	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.
18R-3, 24–26	CP16b	M	A	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R
18R-4, 27–29	CP16b	M	A	.	R	.	.	.	.	.	.	R	.	.	.	.	.	.	.	R	.	.
18R-5, 17–19	CP16b	M	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	R
18R-CC	CP16b	G	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19R-1, 11–13	CP16b	M	C	.	.	.	.	.	.	.	.	R	.	R	.	.	.	.	.	.	.	.
19R-1, 105–106	CP16b	M	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19R-1, 128–129	CP16b	M–G	A	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	.	.
19R-2, 58–59	CP15b	M	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19R-2, 105–109	CP15b	M–G	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.
19R-2, 120–121	CP12a	M–P	C	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19R-2, 148–149	CP12a	M–G	A	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19R-3, 112–113	CP12a	M	A	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
20R-1, 24–25	CP11	M	A	C	.	C	.	R	.	.	.	.	.	.	C	.	.	.	.	.	.	.
20R-2, 47–48	CP11	M	A	F	.	C	.	.	.	.	.	.	.	.	F	.	R	.	.	.	.	.
20R-CC	CP9b	M–P	C	.	R	.	.	.	.	.	.	.	.	.	C	.	.	.	.	.	.	.
21R-1, 16–17	CP9a	M–P	C	.	C	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.
21R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22R-1, 149–150	CP6	M	C	.	C	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22R-2, 01–02	CP5	M	C	.	C	.	.	F	.	.	F	.	.	.	.	.	.	.	.	.	.	F
22R-3, 02–03	CP4	M	A	.	F	.	.	.	C	C	.	.	.	.	.	.	.	.	.	.	.	.
22R-4, 19–20	CP3	M–P	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R
22R-4, 108–109	CP2–CP3	M–P	R	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R
22R-5				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22R-CC			Barren	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23R-1				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23R-2				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

766A11R-CC through -11R-1, 99–100 cm, were placed in Subzone CC22b (*Quadrum trifidum* Zone) based on the presence of *Reinhardtites levis* and *Q. trifidum* and are late Campanian in age.

Sample 123-766A-10R-CC was placed in Subzone CP23a (*Tranolithus phacelosus* Zone) based on the last appearance of *R. anthophorus* and is late Campanian–Maestrichtian in age. The next overlying sample (Sample 123-766A-10R-3, 13–14 cm) was placed in Zone CC26 (*Nephrolithus frequens* Zone) based on the presence of *Micula murus* and is late Maestrichtian in age. Poor recovery in Core 123-766A-10R (<50%, Ludden, Gradstein, et al., 1990) may be responsible for the lack of significant material of Maestrichtian age, but the presence of an unconformity or condensed section cannot be ruled out.

Cretaceous/Tertiary boundary material was found in Sample 123-766A-10R-2, 141–142 cm, and this sample was placed in the undifferentiated Zone/Subzone CC26–CP1a (*Nephrolithus frequens* Zone/*Cruciplacolithus primus* Subzone) based on the presence of *Biantholithus sparsus* and substantial late Maestrichtian and other reworked Late Cretaceous species. Shipboard sedimentologists found material in Core 123-766A-10R that consisted of a mottled nannofossil ooze, suggesting extensive bioturbation (Ludden, Gradstein, et al., 1990). Reworking and co-occurrence of chronostratigraphically exclusive taxa further support this interpretation. Sample 123-766A-10R-2, 68–69 cm, was confidently placed in Subzone CP1a (*Cruciplacolithus primus* Subzone) based on the presence of *Cruciplacolithus edwardsii* and represents an age of early Paleocene.

Samples 123-766A-10R-1, 120–121 cm, through -9R-CC were placed in Subzone CP1b (*Cruciplacolithus tenuis* Subzone) based on the presence of *Cruciplacolithus tenuis* s.s. (Hay and Mohler,

Epoch	Zone		Subzone	Argo Abyssal Hole 765C	Exmouth Plateau Hole 766A
Oligocene	*S. ciperoensis*	CP19	b	16R → 18R-1, 40	
			a		
	S. distentus	CP18			
	S. predistentus	CP17			
	H. reticulata	CP16	c		
			b	18R-2, 136 → 19R-1, 129	
			a		
Eocene	*D. barbadiensis*	CP15	b	19R-2, 58 → 19R-2, 109	
			a		
	R. umbilica	CP14	b		
			a		
	N. quadrata	CP13	c		
			b		
			a		
	D. sublodoensis	CP12	b		
			a	19R-2, 121 → 19R3, 113	3R-1, 119 → 3R-5, 93
	D. lodoensis	CP11		20R-1, 26 → 20R-2, 47	3R-6, 116 → 4R-2, 102
	T. orthostylus	CP10			
	D. diastypus	CP9	b	20R-CC	4R, CC → 6R-5, 105
			a	21R-1, 17	
Paleocene	*D. multiradiatus*	CP8	b		6R-6, 114 → 6R-CC
			a		7R
	D. nobilis	CP7			8R-1, 95
	D. mohlerii	CP6		22R-1, 150	8R-2, 31 → 8R-CC
	H. kleinpellii	CP5		22R-2, 2	
	F. tympaniformis	CP4		22R-3, 3	
	E. macellus	CP3		22R-4, 19-108	9R-1, 111 → 9R-3, 111
	C. danicus	CP2			9R-4, 111 → 9R-5, 111
	P. sigmoides	CP1	b		9R-CC → 10R-1, 120
			a		10R-2, 68 → 10R-2, 142

Figure 3. Distribution of Paleogene sediments from Leg 123 based on calcareous nannofossil biostratigraphy.

1967) and denote an age of early Paleocene (Fig. 3). Early Paleocene sediments continue in Samples 123-766A-9R-5, 109–111 cm, through -9R-4, 109–111 cm, and were placed in Zone CP2 (*Chiasmolithus danicus* Zone) based on the presence of *Chiasmolithus danicus*. Samples 123-766A-9R-3, 109–111 cm, through -9R-1, 109–111 cm, were placed in undifferentiated Zones CP2–CP3 (*Chiasmolithus danicus/Ellipsolithus macellus* zones) and are early Paleocene in age.

A thick, late Paleocene–early Eocene sediment section that includes a complete Paleocene/Eocene boundary can be found first in Sample 123-766A-8R-CC and continues through Sample 123-766A-4R-CC. Samples 123-766A-8R-CC through -8R-2, 31–34 cm, were placed in Zone CP6 (*Discoaster mohleri* Zone) based on the presence of *D. mohleri*. Zone CP7 (*Discoaster nobilis* Zone), and this zone was assigned to sediments in Sample 123-766A-8R-1, 92–95 cm, based on the presence of *D. nobilis*. Samples 123-766A-7R-CC through -6R-6, 114–116 cm, were placed in Zone CP8 (*Discoaster multiradiatus* Zone) based on the presence of *D. multiradiatus* with a subdivision to Subzone CC8b (*Camplyosphaera eodela* Subzone) first occurring in Sample 123-766A-6R-CC based on the first appearance of *C. eodela*. Zone CP9 (*Discoaster diastypus* Zone) was assigned to sediments in Samples 123-766A-6R-5, 100–105 cm, through -4R-CC based on the presence of *D. diastypus*, but could not be differentiated into Subzones CP9a and CP9b because of the absence of *Tribrachiatus contortus*.

The completeness of the late Paleogene–early Eocene record and the high diversity of nannofossil assemblages make this interval unique. Members of the genera *Fasciculithus, Toweius,* and *Chiasmolithus* are particularly diverse. High assemblage diversities may result from the mid-latitude position of this site during this time. In modern waters, the highest diversity of coccolithophorids occurs in mid-latitude (between 15° and 30°) zones of upwelling (Okada and Honjo, 1973). This evidence combined with the absence of certain ecologically controlled marker species (such as *Tribrachiatus* Perch-Nielsen, 1985) further support an interpretation of a mid-latitude position for Site 766 during this time.

Table 4. Paleogene calcareous nannofossils from Site 766.

Core, section, interval (cm)	Biostratigraphic horizon/zone	Preservation	Sedimentary abundance	*Apsidolithus parcus*	*Arkhangelskiella cymbiformis*	*Biantholithus sparsus*	*Biscutum parvulum*	*Bomolithus elegans*	*Calcidiscus protoannulus*	*Campylosphaera dela*	*Campylosphaera eodela*	*Chiasmolithus eodens*	*Chiasmolithus californicus*	*Chiasmolithus consuetus*	*Chiasmolithus danicus*	*Chiasmolithus eograndis*	*Chiasmolithus grandis*	*Chiasmolithus solitus*	*Chiasmolithus titus*	*Coccolithus eopelagicus*	*Coccolithus pelagicus*	*Coronocyclus prionion*	*Coronosphaera mediterranea*	*Cretarhabdus crenulatus*	*Cribrocentrum martinii*	*Cribrosphaerella ehrenbergi*	*Cruciplacolithus cribellum*	*Cruciplacolithus edwardsii*
123-765C-3R-1, 119–122	CP12	M	A	.	.	.	.	.	C	.	F	R	.	.	.	.	F	.	F	.	C	.	.	.	.	.	.	.
3R-2, 14–17	CP12	M	A	.	.	.	.	.	C	.	F	.	R	.	.	.	F	F	F	.	C	.	.	.	.	.	.	.
3R-3, 58–62	CP12	M	A	.	.	.	.	.	F	.	F	.	.	.	.	.	F	.	.	.	C	.	.	.	.	.	.	.
3R-4, 55–58	CP12	M	A	.	.	.	.	.	F	.	F	.	R	.	.	.	C	R	.	.	A	.	.	.	.	.	.	.
3R-5, 93–96	CP12	M	A	.	.	.	.	.	C	.	C	.	.	.	.	.	F	.	.	.	A	.	.	.	.	.	.	.
3R-6, 113–116	CP11	M–G	A	.	.	.	.	.	A	.	C	R	R	.	.	.	F	.	.	.	C	.	.	.	.	.	.	.
3R-CC	CP10	M–G	A	.	.	.	.	.	.	C	F	.	R	.	.	F	C	.	.	.	C	F	.	.	.	.	.	.
4R-1, 100–101	CP11	M–G	A	.	.	.	.	.	.	.	F	.	F	.	.	.	.	.	.	.	C	.	.	.	.	.	.	.
4R-2, 101–102	CP11	M–G	A	.	.	.	.	.	F	.	F	F	F	.	.	.	F	.	.	.	C	.	.	.	.	.	.	.
4R-CC	CP9	M	A	.	.	.	.	.	.	F	F	F	R	F	F	.	F	F	.	.	C	F	.	.	.	.	.	.
5R-1, 44–46	CP9	M–P	A	.	.	.	.	.	?	.	F	F	F	.	.	.	F	.	.	.	C	.	.	.	.	.	.	.
5R-2, 44–46	CP9	M–P	A	.	.	.	.	.	F	.	F	F	F	.	.	.	F	.	.	F	C	.	.	.	.	.	.	.
5R-3, 44–46	CP9	M–P	A	.	.	.	.	.	.	.	F	F	F	F	.	.	F	R	.	.	A	.	.	.	.	.	.	.
5R-4, 44–46	CP9	M	A	.	.	.	.	.	.	.	F	.	F	F	.	.	F	F	.	.	A	.	.	.	.	.	.	.
5R-5, 44–46	CP9	M	A	.	.	.	.	.	.	.	F	F	.	F	.	.	F	R	.	.	A	.	.	.	.	.	.	.
5R-6, 44–46	CP9	M	A	.	.	.	.	.	.	.	F	F	F	F	.	.	F	.	.	.	A	.	.	.	.	.	.	.
5R-CC	CP	M–G	A	.	.	.	.	.	.	.	C	F	F	C	F	R	F	.	.	.	A	F	.	.	.	.	F	.
6R-1, 144–146	CP9	M	A	.	.	.	.	.	.	.	C	F	.	.	.	.	F	.	.	.	A	.	.	.	.	.	.	.
6R-2, 144–146	CP9	M	A	.	.	.	.	.	.	.	F	C	.	F	.	.	F	.	.	.	A	.	.	.	.	.	.	.
6R-3, 99–101	CP9	M–G	A	.	.	.	.	.	.	.	F	F	.	F	.	.	.	F	.	.	A	.	F	.	.	.	.	.
6R-4, 47–49	CP9	M	A	.	.	.	.	.	.	.	C	F	.	F	.	.	.	.	.	.	A	.	.	.	.	.	.	.
6R-5, 100–105	CP9	M–G	A	.	.	.	.	.	.	.	C	F	F	F	.	.	F	F	.	F	A	.	F	.	.	.	.	.
6R-6, 114–116	CP8b	M	A	.	.	.	.	.	.	.	F	F	.	F	.	.	.	F	.	.	C	.	.	.	.	.	.	.
6R-CC	CP8b	M–P	A	.	.	.	.	.	.	.	F	F	.	R	R	F	F	F	.	.	C	.	.	.	.	.	R	.
7R-1, 99–102	CP8a	M	A	.	.	.	.	.	.	.	.	F	F	F	.	.	.	.	.	.	C	.	.	.	R	.	.	.
7R-2, 99–102	CP8a	M	A	.	.	.	.	.	.	.	.	F	.	F	.	.	.	.	.	C	.	.	.	.	.	.	.	.
7R-3, 99–102	CP8a	M	A	.	.	.	.	.	.	.	.	F	.	F	.	.	.	.	.	.	C	.	.	.	.	.	.	.
7R-4, 98–100	CP8a	M	A	.	.	.	.	R	.	.	.	F	.	F	.	.	.	F	.	.	C	.	.	.	.	.	.	.
7R-5, 99–101	CP8a	M–G	A	.	.	.	.	.	.	.	.	F	.	F	.	.	.	F	.	.	A	.	.	.	.	.	.	.
7R-6, 99–101	CP8a	M	A	.	.	.	.	.	.	.	.	F	F	F	.	.	.	.	.	.	C	.	.	.	.	.	.	.
7R-CC	CP8a	G	VA	.	.	.	.	.	.	.	.	C	F	C	F	F	.	C	.	.	C	.	.	.	.	.	.	.
8R-1, 92–95	CP7	M–G	A	.	.	.	.	.	.	.	.	F	F	F	.	.	.	.	.	F	A	.	.	.	.	.	.	.
8R-2, 31–34	CP6	M–P	A	.	.	.	.	.	.	.	.	.	F	F	.	.	.	.	.	F	C	.	.	.	.	.	.	.
8R-CC	CP6	M–P	A	.	.	.	.	.	.	.	.	.	.	.	F	F	.	F	.	.	C	.	.	.	.	.	.	.
9R-1, 109–111	CP2–CP3	M–P	A	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	A	.	.	.	.	.	.	.
9R-2, 109–111	CP2–CP3	M–P	A	.	.	.	.	.	.	.	.	F	.	.	F	.	.	.	.	.	A	.	.	.	.	.	.	.
9R-3, 109–111	CP2–CP3	M–P	A	.	.	.	.	.	.	.	.	F	.	.	F	.	.	.	.	.	A	.	.	.	.	.	.	.
9R-4, 109–111	CP2	M–P	A	.	.	.	R	.	.	.	.	.	.	.	F	.	.	.	.	.	A	.	.	.	.	.	.	F
9R-5, 109–111	CP2	M	A	.	R	.	R	.	.	.	.	.	.	.	F	.	.	.	.	.	V	.	.	R	.	R	.	F
9R-CC	CP1b	M	C	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	V	.	.	R	.	R	.	F
10R-1, 68–69	CP1b	M	A	R	R	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	A	.	.	R	.	R	.	.
10R-1, 89–90	CP1b	M	A	.	R	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	A	.	.	R	.	R	.	.
10R-1, 120–121	CP1b	M–P	A	.	R	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.	.	R	.	R	.	C
10R-2, 68–69	CP1a	M	C	.	R	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	F
10R-2, 103–104				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Key to symbols: RE = Reworked; R = Rare; F = Few; C = Common; A = Abundant; VA = Very abundant; ? = Questionable presence; . = Not present.

Early Eocene sediments continue in Samples 123-766A-4R-2, 101–102 cm, through -3R-6, 113–116 cm, and these were placed in Zone CP11 (*Discoaster lodoensis* Zone) based on the presence of *D. lodoensis*. Samples 123-766A-3R-5, 93–96 cm, through -3R-1, 119–122 cm, were placed in Zone CP12a (*Discoasteroides kuepperi* Subzone) based on the presence of *Discoaster sublodoensis* and *D. kuepperi* and are of early Eocene age. A significant unconformity overlies Core 123-766A-3R, with late/early Pliocene sediments found in Sample 123-766A-2R-CC. According to Berggren et al. (1985), this unconformity spans at least 24.1 Ma.

DISCUSSION AND CONCLUSIONS

Calcareous nannofossil biostratigraphy of core material obtained from Holes 765C and 766A during Leg 123 revealed thick and relatively complete sections of Upper Cretaceous–Paleogene sediments in each hole. Hole 765C has a nearly complete Albian–Oligocene interval that contains abundant and generally moderate

Table 4 (continued).

Core, section, interval (cm)	Biostratigraphic horizon/ zone	Preservation	Sedimentary abundance	*Cruciplacolithus frequens*	*Cruciplacolithus latipons*	*Cruciplacolithus primus*	*Cruciplacolithus tenuis*	*Cyclagelosphaera alta*	*Cyclagelosphaera reinhardti*	*Cyclicargolithus marismontium*	*Dictyococcites callidus*	*Discoaster barbadiensis*	*Discoaster cruciformis*	*Discoaster deflandrei*	*Discoaster diastypus*	*Discoaster gemmeus*	*Discoaster kuepperi*	*Discoaster lenticularis*	*Discoaster lodoensis*	*Discoaster mahmoudi*	*Discoaster mohleri*	*Discoaster multiradiatus*	*Discoaster nobilis*	*Discoaster robustus*	*Discoaster sublodoensis*	*Discoaster tani*	*Eiffellithus turriseiffeli*	*Ellipsolithus bolli*
123-765C-3R-1, 119–122	CP12	M	A	.	R	.	.	.	.	F	C	F	.	F	.	F	C	.	A	.	.	.	.	.	F	.	.	.
3R-2, 14–17	CP12	M	A	.	R	.	.	.	.	.	F	F	.	C	.	R	C	.	A	.	.	.	.	.	F	.	.	.
3R-3, 58–62	CP12	M	A	.	.	.	.	.	.	.	.	.	.	C	.	R	C	.	C	.	.	.	.	.	F	F	.	.
3R-4, 55–58	CP12	M	A	.	.	.	.	.	.	.	.	F	.	F	.	R	A	.	A	.	.	.	.	.	F	F	.	.
3R-5, 93–96	CP12	M	A	.	R	.	.	.	.	.	.	F	R	F	.	R	C	.	A	.	.	.	.	.	F	F	.	.
3R-6, 113–116	CP11	M–G	A	.	.	.	.	.	.	.	.	C	.	F	.	R	C	.	A	.	.	?	.	.	.	.	.	.
3R-CC	CP10	M–G	A	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	C	.	.	.	.	.	.	.	.	.
4R-1, 100–101	CP11	M–G	A	.	F	.	.	.	.	.	.	C	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	.
4R-2, 101–102	CP11	M–G	A	.	F	.	.	.	.	.	.	C	.	.	F	.	.	F	.	.	.	F	.	F	.	.	.	.
4R-CC	CP9	M	A	.	.	.	F	.	.	.	.	.	.	.	C	.	.	.	.	.	F	F	.	.	.	.	.	.
5R-1, 44–46	CP9	M–P	A	.	.	.	.	.	.	.	.	C	.	.	.	.	.	F	.	.	.	C	.	.	.	.	.	.
5R-2, 44–46	CP9	M–P	A	.	.	.	.	.	.	.	.	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
5R-3, 44–46	CP9	M–P	A	.	R	.	.	.	.	.	.	C	.	.	.	.	.	.	.	.	F	C	.	.	.	.	.	.
5R-4, 44–46	CP9	M	A	F	.	.	.	.	.	.	.	.	.	.	F	.	F	.	.	.	.	C	.	F	.	.	.	.
5R-5, 44–46	CP9	M	A	.	.	.	.	.	.	.	.	F	.	.	F	.	.	.	.	.	.	C	.	F	.	.	.	.
5R-6, 44–46	CP9	M	A	F	.	.	.	.	.	.	.	F	.	.	F	.	F	F	.	.	.	C	.	F	.	.	.	.
5R-CC	CP	M–G	A	F	.	.	F	.	.	.	.	.	.	.	C	.	.	.	.	.	F	C	.	.	.	.	.	.
6R-1, 144–146	CP9	M	A	F	.	.	.	.	.	.	.	.	.	.	F	.	.	F	.	.	.	C	.	.	.	.	.	.
6R-2, 144–146	CP9	M	A	F	.	.	.	.	.	.	.	F	.	.	R	.	F	F	.	R	F	C	.	F	.	.	.	.
6R-3, 99–101	CP9	M–G	A	.	.	.	.	.	.	.	.	F	.	.	F	.	.	.	.	.	.	C	.	F	.	.	.	.
6R-4, 47–49	CP9	M	A	.	.	.	.	.	.	.	.	C	.	.	F	.	.	.	.	.	.	C	.	.	.	.	.	.
6R-5, 100–105	CP9	M–G	A	.	.	.	.	.	.	.	.	C	.	.	C	.	.	.	.	.	.	C	.	.	.	.	.	.
6R-6, 114–116	CP8b	M	A	.	.	.	.	.	.	.	.	F	.	.	.	.	.	R	.	.	.	C	.	.	.	.	.	R
6R-CC	CP8b	M–P	A	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	F	C	.	.	.	.	.	.
7R-1, 99–102	CP8a	M	A	.	.	.	.	.	.	.	.	F	.	F	.	.	.	.	.	F	.	C	F	.	.	.	.	.
7R-2, 99–102	CP8a	M	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.	.	C	.	.	.	.	.	F
7R-3, 99–102	CP8a	M	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	C	.	.	.	.	.	F
7R-4, 98–100	CP8a	M	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.	.	.	.	.	F
7R-5, 99–101	CP8a	M–G	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	C	.	.	.	.	.	F
7R-6, 99–101	CP8a	M	A	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.	.	.	.	.	.
7R-CC	CP8a	G	VA	F	.	.	C	.	.	.	.	.	.	.	.	.	.	.	.	.	F	A	.	.	.	.	.	.
8R-1, 92–95	CP7	M–G	A	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	F	.	.	.	.	.
8R-2, 31–34	CP6	M–P	A	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.	.	.	.	.	.	.
8R-CC	CP6	M–P	A	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	C	.	.	.	.	.	.	.
9R-1, 109–111	CP2–CP3	M–P	A	.	F	.	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9R-2, 109–111	CP2–CP3	M–P	A	.	F	.	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9R-3, 109–111	CP2–CP3	M–P	A	.	F	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9R-4, 109–111	CP2	M–P	A	.	F	.	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9R-5, 109–111	CP2	M	A	.	R	.	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9R-CC	CP1b	M	C	.	.	F	F	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
10R-1, 68–69	CP1b	M	A	.	.	F	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.
10R-1, 89–90	CP1b	M	A	.	.	F	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.
10R-1, 120–121	CP1b	M–P	A	.	.	.	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.
10R-2, 68–69	CP1a	M	C	.	.	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
10R-2, 103–104				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

to well-preserved nannofossils that allow one to correlate accurately. Although turbidite deposition dominates in the upper part of this hole, reworking is minimal below the Miocene section. A particularly thick Aptian section exists in this hole that spans 13 cores. Hole 766A has a thick and relatively complete Albian–lower Eocene interval. The hemipelagic to pelagic depositional environment of the sediments found in this hole allowed for generally good preservation of diverse nannofossil assemblages and nominal reworking.

Several confidently interpreted unconformities occur in sections of each hole. In the Upper Cretaceous section of Hole 765C, the most confidently interpreted unconformities span much of the Santonian, lower Campanian, and Maestrichtian. Paleogene unconformities occur in the upper Eocene and lower Oligocene. Following the time scale data of Berggren et al. (1985), the late Eocene unconformity spans at least 12 Ma, while the early Oligocene unconformity spans at least 8.5 Ma. In the Upper Cretaceous of Hole 766A, confidently interpreted unconformities span much of the Coniacian, lower Campanian, and Maestrichtian. The most significant Paleogene unconformity in this hole spans the upper Eocene to the lower Pliocene, and, following Berggren et al. (1985), spans at least 24.1 Ma. The chronostratigraphic position

Table 4 (continued).

Core, section, interval (cm)	Biostratigraphic horizon/ zone	Preservation	Sedimentary abundance	*Ellipsolithus distichus*	*Ellipsolithus lajollaensis*	*Ellipsolithus macellus*	*Ericsonia cava*	*Ericsonia fenestrata*	*Ericsonia formosa*	*Ericsonia obruta*	*Ericsonia robusta*	*Ericsonia subpertusa*	*Fasciculithus bobii*	*Fasciculithus clinatus*	*Fasciculithus involutus*	*Fasciculithus lillianae*	*Fasciculithus magnus*	*Fasciculithus mitreus*	*Fasciculithus richardii*	*Fasciculithus schaubi*	*Fasciculithus tympaniformis*	*Fasciculithus ulii*	*Hagius circumradiatus*	*Heliolithus kleinpelli*	*Lanternithus minutus*	*Lithraphidites carniolensis*	*Lithraphidites quadratus*	*Lophodolithus nascens*
123-765C-3R-1, 119–122	CP12	M	A	.	.	.	.	F	F	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3R-2, 14–17	CP12	M	A	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3R-3, 58–62	CP12	M	A	.	.	.	.	F	F	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3R-4, 55–58	CP12	M	A	.	.	.	.	.	.	.	F	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3R-5, 93–96	CP12	M	A	.	.	.	.	F	F	.	.	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3R-6, 113–116	CP11	M–G	A	.	.	.	.	F	F	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3R-CC	CP10	M–G	A	.	.	.	.	.	R	F	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4R-1, 100–101	CP11	M–G	A	.	.	.	.	.	F	.	.	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F
4R-2, 101–102	CP11	M–G	A	.	R	F	.	.	.	F	F	A	.	.	R	.	.	.	.	.	.	.	.	R	.	.	.	R
4R-CC	CP9	M	A	.	.	F	.	.	.	R	F	C	.	.	.	.	.	.	.	.	R	.	.	R	.	.	.	.
5R-1, 44–46	CP9	M–P	A	.	.	F	.	.	.	.	.	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R
5R-2, 44–46	CP9	M–P	A	.	.	F	.	.	.	F	C	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
5R-3, 44–46	CP9	M–P	A	.	.	F	.	.	.	F	R	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R
5R-4, 44–46	CP9	M	A	.	.	F	.	.	.	F	.	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F
5R-5, 44–46	CP9	M	A	R	.	F	.	.	.	F	F	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F
5R-6, 44–46	CP9	M	A	.	F	F	.	.	.	F	.	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F
5R-CC	CP	M–G	A	.	.	F	.	.	.	F	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
6R-1, 144–146	CP9	M	A	.	R	R	.	.	.	F	.	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F
6R-2, 144–146	CP9	M	A	.	R	F	.	.	.	F	.	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F
6R-3, 99–101	CP9	M–G	A	.	F	R	.	.	.	F	.	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F
6R-4, 47–49	CP9	M	A	.	.	.	.	.	.	F	.	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F
6R-5, 100–105	CP9	M–G	A	.	F	.	.	.	R	F	.	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
6R-6, 114–116	CP8b	M	A	.	.	.	.	.	R	F	.	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
6R-CC	CP8b	M–P	A	R	.	.	.	.	.	.	.	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
7R-1, 99–102	CP8a	M	A	.	.	R	.	.	.	.	.	A	.	.	.	F	.	.	F	F	C	.	.	.	.	.	.	.
7R-2, 99–102	CP8a	M	A	.	.	R	.	.	.	.	.	A	.	.	.	F	.	.	F	F	F	.	.	.	.	.	.	.
7R-3, 99–102	CP8a	M	A	.	.	F	.	.	.	.	.	A	.	.	F	F	F	.	F	.	C	.	.	.	.	.	.	.
7R-4, 98–100	CP8a	M	A	R	.	.	.	.	.	.	.	A	.	F	.	F	.	F	F	F	C	F	.	.	.	.	.	.
7R-5, 99–101	CP8a	M–G	A	.	.	.	.	.	.	.	.	A	.	F	F	C	F	F	F	.	C	.	.	.	.	.	.	.
7R-6, 99–101	CP8a	M	A	.	.	.	.	.	.	.	C	A	.	.	F	.	.	.	F	F	C	.	.	.	.	.	.	.
7R-CC	CP8a	G	VA	F	.	R	.	.	.	.	.	C	.	.	C	C	.	.	.	A	A	F	.	.	.	.	.	.
8R-1, 92–95	CP7	M–G	A	.	.	R	.	.	.	.	C	F	.	F	F	.	.	.	.	.	C	.	.	.	.	.	.	.
8R-2, 31–34	CP6	M–P	A	.	.	.	.	.	.	.	F	C	F	F	.	.	.	.	.	.	A	.	.	.	.	.	.	.
8R-CC	CP6	M–P	A	.	.	R	.	.	.	.	C	.	F	.	F	.	.	.	R	.	C	.	.	.	.	.	.	.
9R-1, 109–111	CP2–CP3	M–P	A	.	.	.	.	.	?	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9R-2, 109–111	CP2–CP3	M–P	A	.	.	.	.	.	?	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.	.
9R-3, 109–111	CP2–CP3	M–P	A	.	.	.	.	.	?	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9R-4, 109–111	CP2	M–P	A	.	.	.	C	.	?	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9R-5, 109–111	CP2	M	A	.	.	.	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	R	.	.
9R-CC	CP1b	M	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
10R-1, 68–69	CP1b	M	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	R	.
10R-1, 89–90	CP1b	M	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	R	.
10R-1, 120–121	CP1b	M–P	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.
10R-2, 68–69	CP1a	M	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.
10R-2, 103–104				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

and length of all these unconformities may have considerable significance for reconstructing the sedimentary history and for interpreting the paleoceanography of this region.

Calcareous nannofossil assemblages found in the Upper Cretaceous–Paleogene section of Hole 765C and the Upper Cretaceous section of Hole 766A are fairly standard and do not differ significantly from assemblages typical of established, low-latitude zonations, such as those discussed by Sissingh (1977) and Okada and Bukry (1980). Extensive reworking of nannofossil species occurs in the lower Oligocene and near the Cretaceous/Paleogene boundary of Hole 765C.

Although the nannofossil assemblages from the thick and complete Paleogene/Eocene section of Hole 766A were correlated successfully using the low-latitude zonation of Okada and Bukry (1980), biostratigraphic resolution was reduced by the absence of the marker taxon *Tribrachiatus contortus* and the resultant inability to differentiate Subzones CP9a and CP9b. Paradoxically, assemblages are diverse in this interval and contain a large number of species in the genera *Fasciculithus*, *Toweius*, and *Chiasmolithus*. Specimens of less typical genera, such as *Neocrepidolithus* and *Neochiastozygus*, also are commonly present. These data (absence of ecologically restricted marker species and high as-

Table 4 (continued).

Core, section, interval (cm)	Biostratigraphic horizon/ zone	Preservation	Sedimentary abundance	*Lophodolithus reniformis*	*Manivitella pemmatoidea*	*Markalius apertus*	*Markalius inversus*	*Microrhabdulus decoratus*	*Micula decussata*	*Micula murus*	*Neochiastozygus chiastus*	*Neochiastozygus distentus*	*Neochiastozygus modestus*	*Neocrepidolithus biskayae*	*Neocrepidolithus bukryi*	*Neocrepidolithus coheni*	*Neocrepidolithus cruciatus*	*Neocrepidolithus dirimosus*	*Neocrepidolithus neocrassus*	*Octolithus multiplus*	*Parhabdolithus embergeri*	*Pedinocyclus larvalis*	*Placozygus sigmoides*	*Pontosphaera plana*	*Prediscosphaera cretacea*	*Prediscosphaera grandis*	*Prinsius bisulcus*	*Prinsius martini*
123-765C-3R-1, 119–122	CP12	M	A	.	.	.	R	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.
3R-2, 14–17	CP12	M	A	.	.	.	R	.	.	.	.	.	.	.	F	.	.	.	.	.	.	R	.	.	.	.	.	.
3R-3, 58–62	CP12	M	A	.	.	.	F	.	.	.	.	R	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3R-4, 55–58	CP12	M	A	.	.	.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.
3R-5, 93–96	CP12	M	A	.	.	.	.	R	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.
3R-6, 113–116	CP11	M–G	A	.	.	.	R	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.
3R-CC	CP10	M–G	A	.	.	.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.
4R-1, 100–101	CP11	M–G	A	.	.	R	F	.	.	.	.	R	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.
4R-2, 101–102	CP11	M–G	A	.	.	.	F	.	.	.	.	R	.	.	F	.	.	.	.	.	.	.	F	.	.	.	.	.
4R-CC	CP9	M	A	R	.	.	R	.	.	.	.	.	.	R	F	.	.	.	.	.	.	.	.	.	.	.	F	.
5R-1, 44–46	CP9	M–P	A	.	.	.	F	.	.	.	.	R	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.
5R-2, 44–46	CP9	M–P	A	.	.	.	F	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.
5R-3, 44–46	CP9	M–P	A	.	.	.	F	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.
5R-4, 44–46	CP9	M	A	.	.	.	.	.	.	.	.	R	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.
5R-5, 44–46	CP9	M	A	.	.	.	R	.	.	.	.	R	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.
5R-6, 44–46	CP9	M	A	.	.	.	R	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	F	.	.	.	.	.
5R-CC	CP	M–G	A	.	.	R	.	.	.	.	.	.	.	R	F	.	.	.	.	.	.	.	.	.	.	.	.	.
6R-1, 144–146	CP9	M	A	.	.	.	.	.	.	.	.	R	.	.	F	.	.	.	.	.	.	.	F	.	.	.	.	.
6R-2, 144–146	CP9	M	A	.	.	.	R	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	F	.	.	.	.	.
6R-3, 99–101	CP9	M–G	A	.	.	.	R	.	.	.	.	F	.	.	F	.	.	.	.	.	.	.	F	.	.	.	.	.
6R-4, 47–49	CP9	M	A	.	.	.	.	.	.	.	.	F	.	.	F	.	.	.	.	.	.	.	F	.	.	.	.	.
6R-5, 100–105	CP9	M–G	A	.	.	F	F	.	.	.	.	F	.	.	F	.	.	.	.	.	.	.	F	.	.	.	.	.
6R-6, 114–116	CP8b	M	A	.	.	.	R	.	.	.	.	R	.	.	F	.	.	.	.	.	.	.	F	.	.	.	.	.
6R-CC	CP8b	M–P	A	.	.	.	R	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	R	.	.	.	F	.
7R-1, 99–102	CP8a	M	A	.	.	.	R	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	F	.	.	.	.	.
7R-2, 99–102	CP8a	M	A	.	.	.	R	.	.	.	.	.	.	R	F	.	.	.	.	.	.	.	F	.	.	.	.	.
7R-3, 99–102	CP8a	M	A	.	.	.	R	.	.	.	.	.	.	R	R	.	.	.	.	.	.	.	.	.	.	.	.	.
7R-4, 98–100	CP8a	M	A	.	.	.	.	.	.	.	.	.	.	F	R	.	.	.	.	.	.	.	R	.	.	.	.	.
7R-5, 99–101	CP8a	M–G	A	.	.	.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	F	.	.	.	.	.
7R-6, 99–101	CP8a	M	A	.	.	.	F	.	.	.	.	.	.	.	F	.	.	.	.	.	.	.	F	.	.	.	.	.
7R-CC	CP8a	G	VA	.	.	.	.	.						.	F	.	.	.	.	.	.	.	R	.	.	.	.	.
8R-1, 92–95	CP7	M–G	A	.	.	.	.	.	.	.	.	.	.	R	R	.	.	.	.	.	.	.	R	.	.	.	R	.
8R-2, 31–34	CP6	M–P	A	.	.	F	.	.	.	.	R	.	.	R	R	.	.	.	.	.	.	.	.	R	.	.	.	.
8R-CC	CP6	M–P	A	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.	.	F	.	.	.	.	.
9R-1, 109–111	CP2–CP3	M–P	A	.	.	R	F	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	C	.	.	.	F	.
9R-2, 109–111	CP2–CP3	M–P	A	.	.	.	R	.	.	.	F	.	.	.	.	.	.	.	R	.	.	.	C	.	.	.	F	.
9R-3, 109–111	CP2–CP3	M–P	A	.	.	R	F	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	C	.	.	.	.	F
9R-4, 109–111	CP2	M–P	A	.	.	R	F	.	.	.	.	.	.	.	.	.	.	.	.	F	.	.	C	.	R	.	F	.
9R-5, 109–111	CP2	M	A	.	.	F	F	R	R	.	.	.	.	.	.	R	.	.	.	F	R	.	C	.	R	.	F	.
9R-CC	CP1b	M	C	.	.	.	F	.	R	.	.	.	.	.	.	R	.	.	.	.	.	.	C	.	R	.	.	.
10R-1, 68–69	CP1b	M	A	.	R	F	F	R	R	.	.	.	.	.	.	.	C	.	.	F	R	.	F	.	R	R	.	F
10R-1, 89–90	CP1b	M	A	.	.	F	F	R	R	.	.	.	.	.	.	.	F	.	.	.	.	.	C	.	R	R	.	F
10R-1, 120–121	CP1b	M–P	A	.	.	F	C	R	R	.	.	.	R	.	.	F	F	F	.	.	.	.	C	.	R	.	.	.
10R-2, 68–69	CP1a	M	C	.	.	.	C	.	R	R	.	.	.	.	.	F	.	.	.	.	.	.	A	.	R	.	.	.
10R-2, 103–104				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

semblage diversity) suggest that this site may have had a mid-latitude position during the upper Paleocene–lower Eocene, which is supported by the following evidence:

1. According to Okada and Honjo (1973), in modern waters the highest diversity of coccolithophorids occurs between 15° and 30° in mid-latitude zones of upwelling.
2. Perch-Nielsen (1985) indicated that members of the genus *Tribrachiatus* are generally found only in low paleolatitudes.

Other shipboard nannofossil biostratigraphic data for Site 766 (Ludden, Gradstein, et al., 1990) suggest a mid-latitude position during this time, including (1) the successful application of the mid-latitude Subzone CN10d (*Amaurolithus delicatus* Bukry, 1981) in Neogene sediments from Hole 766A, (2) the persistence of *Dictyococcites* spp. into the Neogene, and (3) the absence of *Tribrachiatus* spp. in the lower Eocene.

ACKNOWLEDGMENTS

I would first like to thank the Ocean Drilling Program and the United States Science Advisory Committee (USSAC) for providing financial support while completing this project. The facilities for generating and managing the data of this study were provided by the Geology Department of the University of Nebraska and are

Table 4 (continued).

Core, section, interval (cm)	Biostrati-graphic horizon/zone	Preservation	Sedimentary abundance	*Reticulofenestra dictyoda*	*Rhomboaster cuspis*	*Scampanella magnifica*	*Sphenolithus anarrhopus*	*Sphenolithus conspicuus*	*Sphenolithus editus*	*Sphenolithus moriformis*	*Sphenolithus primus*	*Sphenolithus radians*	*Striatococcolithus pacificanus*	*Toweius callosus*	*Toweius crassus*	*Toweius eminens*	*Toweius gammation*	*Toweius magnicrassus*	*Toweius occultatus*	*Toweius pertusus*	*Toweius selandianus*	*Toweius tovae*	*Tribrachiatus orthostylus*	*Umbellosphaera irregularis*	*Umbilicosphaera sibogae*	*Watznaueria barnesae*	*Zygodiscus adamas*	*Zygodiscus bramlettei*	*Zygodiscus plectopons*	*Zygrhablithus bijugatus*
123-765C-3R-1, 119–122	CP12	M	A	F	.	.	.	.	.	C	.	F	.	.	F	.	F	.	.	.	.	.	.	R	.	.	.	.	.	C
3R-2, 14–17	CP12	M	A	F	.	.	.	.	.	F	.	C	.	.	F	.	F	.	.	.	.	.	.	.	R	.	.	.	.	C
3R-3, 58–62	CP12	M	A	.	.	.	.	.	.	.	.	C	R	.	F	.	F	.	.	.	.	.	F	F	.	.	.	.	.	C
3R-4, 55–58	CP12	M	A	R	.	.	.	.	.	C	.	C	.	.	F	.	F	.	.	.	.	.	F	.	.	.	.	.	.	C
3R-5, 93–96	CP12	M	A	.	.	.	.	.	.	F	.	C	R	.	C	.	F	.	.	.	.	.	F	F	.	.	.	.	.	C
3R-6, 113–116	CP11	M–G	A	.	.	.	.	.	.	C	.	A	F	F	C	.	.	F	.	.	.	.	F	F	.	.	.	.	.	F
3R-CC	CP10	M–G	A	.	.	.	.	.	.	F	.	F	F	.	F	F	.	F	.	.	.	.	?	.	.	.	.	.	R	F
4R-1, 100–101	CP11	M–G	A	.	.	.	.	.	F	C	.	F	R	F	F	.	F	.	.	F	.	.	F	F	.	.	.	.	.	C
4R-2, 101–102	CP11	M–G	A	.	.	.	.	F	R	C	.	F	.	C	F	F	F	.	.	F	.	F	C	R	.	.	R	.	.	C
4R-CC	CP9	M	A	.	.	.	.	.	.	.	F	F	F	F	C	F	.	F	.	.	.	R	.	.	.	.	.	R	R	F
5R-1, 44–46	CP9	M–P	A	.	.	.	.	.	.	C	.	C	.	C	.	.	.	.	.	F	.	.	C	.	.	.	.	.	.	C
5R-2, 44–46	CP9	M–P	A	.	.	.	.	.	F	C	.	F	.	C	.	F	.	.	.	.	.	.	C	.	.	.	.	.	.	F
5R-3, 44–46	CP9	M–P	A	.	.	.	.	F	F	F	.	F	.	C	.	F	.	.	.	F	.	F	F	R	.	.	.	.	.	F
5R-4, 44–46	CP9	M	A	F	.	.	.	.	R	C	.	F	.	A	.	F	.	.	.	F	C	.	F	.	.	.	.	.	.	C
5R-5, 44–46	CP9	M	A	.	.	.	.	.	R	C	.	.	.	A	.	.	.	.	.	.	F	.	.	.	.	.	.	.	.	.
5R-6, 44–46	CP9	M	A	.	.	.	.	.	.	C	.	.	.	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C
5R-CC	CP	M–G	A	.	.	.	.	.	.	F	.	.	F	C	.	.	.	.	F	V	.	.	.	.	.	.	.	R	.	.
6R-1, 144–146	CP9	M	A	.	.	.	.	.	.	C	.	.	.	C	.	F	.	.	.	F	.	.	.	.	.	.	.	.	.	F
6R-2, 144–146	CP9	M	A	.	.	.	.	.	.	A	.	F	R	C	.	C	.	.	.	R	.	.	.	.	.	.	.	.	.	F
6R-3, 99–101	CP9	M–G	A	.	F	.	.	.	.	C	.	.	R	C	.	.	.	.	.	.	.	.	.	F	.	.	.	.	.	.
6R-4, 47–49	CP9	M	A	F	.	.	.	.	.	C	.	.	.	A	.	F	.	.	F	F	.	F	.	F	.	.	.	.	.	F
6R-5, 100–105	CP9	M–G	A	.	.	.	.	.	.	C	.	.	F	F	.	C	.	.	.	F	.	F	F	R	.	.	.	.	.	F
6R-6, 114–116	CP8b	M	A	.	.	.	.	.	.	C	.	.	F	C	.	F	.	.	F	.	F	F	.	F	.	.	.	.	.	F
6R-CC	CP8b	M–P	A	.	.	.	.	.	.	C	.	.	.	F	.	.	.	.	.	A	.	F	.	.	.	.	.	.	.	.
7R-1, 99–102	CP8a	M	A	.	.	.	.	.	.	C	.	.	R	.	.	C	.	.	C	F	.	F	.	R	.	.	.	.	.	F
7R-2, 99–102	CP8a	M	A	.	.	.	.	.	.	C	.	.	.	.	.	C	.	.	F	C	F	F	.	R	.	.	.	.	.	F
7R-3, 99–102	CP8a	M	A	.	.	.	.	.	.	C	.	.	.	F	.	C	.	.	F	F	C	.	.	R	.	.	.	.	.	.
7R-4, 98–100	CP8a	M	A	.	.	.	.	.	.	C	.	.	.	.	.	C	.	.	C	.	F	F	.	R	.	.	.	.	.	.
7R-5, 99–101	CP8a	M–G	A	.	.	R	.	.	.	C	.	.	.	.	.	C	.	.	C	F	F	F	.	R	.	.	.	.	.	.
7R-6, 99–101	CP8a	M	A	.	.	.	.	.	.	C	.	.	.	.	.	C	.	.	F	C	F	F	.	F	.	.	.	.	.	.
7R-CC	CP8a	G	VA	.	.	.	.	.	.	C	.	.	.	.	.	F	.	.	A	F	.	.	.	.	.	.	.	.	.	.
8R-1, 92–95	CP7	M–G	A	.	.	.	R	.	.	C	.	.	F	C	.	C	.	.	.	F	F	F	.	F	.	.	.	.	.	.
8R-2, 31–34	CP6	M–P	A	.	.	.	R	.	.	C	.	.	R	C	.	C	.	.	.	F	C	C	.	R	.	.	.	.	.	.
8R-CC	CP6	M–P	A	.	.	.	.	.	.	C	.	.	.	C	.	F	.	.	A	F	.	F	.	.	.	.	.	.	.	.
9R-1, 109–111	CP2–CP3	M–P	A	.	.	.	.	.	.	V	.	.	.	.	.	.	.	.	.	F	.	F	.	R	.	.	.	.	.	.
9R-2, 109–111	CP2–CP3	M–P	A	.	.	.	.	.	.	C	.	.	.	.	.	R	.	.	.	F	F	F	.	R	.	.	.	.	.	.
9R-3, 109–111	CP2–CP3	M–P	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	F	F	.	.	.	.	.	.	.	.
9R-4, 109–111	CP2	M–P	A	.	.	.	.	.	.	.	.	.	.	?	.	.	.	.	.	.	.	.	.	R	.	.	.	.	.	.
9R-5, 109–111	CP2	M	A	.	.	.	.	.	.	.	.	.	.	?	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9R-CC	CP1b	M	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
10R-1, 68–69	CP1b	M	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	R	.	.	.	.
10R-1, 89–90	CP1b	M	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	F	.	R	.	.	.	.
10R-1, 120–121	CP1b	M–P	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	R	.	.	.	.
10R-2, 68–69	CP1a	M	C	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	R	.	.	.	.
10R-2, 103–104				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

gratefully acknowledged. Thanks also are extended to the Geology Department of the University of Papua New Guinea for providing support during production of the manuscript.

REFERENCES

Berggren, W. A., Kent, D. V., and Flynn, J. J., 1985. Jurassic to Paleogene: Part 2, Paleogene geochronology and chronostratigraphy. *In* Snelling, N. J. (Ed.), *The Chronology of the Geologic Record*: New York (Blackwell Scientific Publications), 141–195.

Hay, W. W., 1970. Calcareous nannofossils from cores recovered on Leg 4. *In* Bader, R. G., Gerard, R. D., et al., *Init. Repts. DSDP*, 4: Washington, D.C. (U.S. Govt. Printing Office), 445–501.

Hay, W. W. and Mohler, D., 1967. Calcareous nannoplankton from early Tertiary rocks at Pont Labau, France, and Paleocene-Eocene correlations. *J. Paleontol.*, 41:1505–1541.

Ludden, J. N., Gradstein, F. M., et al., 1990. *Proc. ODP, Init. Repts*, 123: College Station, TX (Ocean Drilling Program).

Moran, M. J., and Watkins, D. K., 1988. Oligocene calcareous nannofossil biostratigraphy from Leg 101, Site 628, Little Bahama Bank Slope. *In* Austin, J. A., Jr., Schlager, W., Palmer, A. A., et al., *Proc. ODP, Sci. Results*, 101: College Station, TX (Ocean Drilling Program), 87–103.

Okada, H., and Honjo, S., 1973. The distribution of oceanic coccolithophorids in the Pacific. *Deep-Sea Res.*, 20:355–374.

Okada, H., and Bukry, D., 1980. Supplementary modification and introduction of code numbers to the "low-latitude coccolith biostratigraphic zonation" (Bukry 1973; 1975). *Mar. Micropaleontol.*, 5:321–325.

Perch-Nielsen, K., 1979. Calcareous nannofossils from the Cretaceous between the North Sea and the Mediterranean. IUGS Ser. A, 6:223–272.

_______, 1985. Cenozoic calcareous nannofossils. *In* Bolli, H. M., Saunders, J. B., and Perch-Nielsen, K. (Eds.), *Plankton Stratigraphy*: Cambridge (Cambridge University Press), 427–554.

Sissingh, W., 1977. Biostratigraphy of Cretaceous calcareous nannoplankton. *Geol. Minjbouw.*, 56(1):37–65.

Watkins, D. K., and Bowdler, J. L., 1984. Cretaceous calcareous nannofossils from Deep Sea Drilling Project Leg 77, Southeast Gulf of Mexico. *In* Buffler, R. T., Schlager, W., et al., *Init. Repts. DSDP*, 77: Washington, D.C. (U.S. Govt. Printing Office), 649–674.

Date of initial receipt: 15 June 1990
Date of acceptance: 12 September 1991
Ms 123B-118