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8. Data Report: Oligocene Benthic Foraminifers from the Eastern Equatorial Pacific, Sites 1218 and 1219, ODP Leg 199[1]

Hiroyuki Takata[2] and Ritsuo Nomura[3]

ABSTRACT

We investigated benthic foraminiferal assemblages from Sites 1218 and 1219, Ocean Drilling Program Leg 199, to understand the abyssal response of the eastern equatorial Pacific to the Oligocene climate. *Globocassidulina subglobosa*, *Oridorsalis umbonatus*, *Gyroidinoides* spp., *Cibicidoides* spp., and *Pullenia* spp. are common in the lower Oligocene, whereas *Nuttallides umbonifer, a* dominant species in carbonate corrosive deep water, often dominates the upper Oligocene assemblage at both sites.

INTRODUCTION

The Oligocene and Eocene epochs are critical for understanding the Earth climate system because they correspond to a transitional phase between the early Paleogene greenhouse and the Neogene icehouse. During this time, associated with the opening of the Tasmanian Seaway and Drake Passage, the Antarctic Ice Sheet markedly increased in size and the formation of cold deep water began in the Southern Ocean (e.g., Kennett, 1977; Lawver and Gahagan, 2003). Many proxy-based paleoceanographic studies in the Southern Ocean (foraminiferal stable oxygen isotopes and the occurrence of ice-rafted debris) have clarified that the formation of Southern Component Water (SCW) is closely re-

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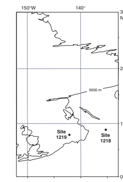
lated to Antarctic cooling during the late Eocene–Oligocene (Zachos et al., 1993, 1996; Zachos et al., 2001).

In contrast, studies of the Oligocene paleoenvironment of the abyssal Pacific Ocean are relatively rare because researchers have focused on upper to middle bathyal deposits, which are sufficiently above the carbonate compensation depth to guarantee carbonate preservation. However, it is important to investigate paleoenvironments in various water depths and regions to understand the behavior and influence of SCW. For example, paleoceanographic information from various paleodepths is necessary in reconstructing the properties and distribution of deep-water masses in the Indian Ocean (Nomura et al., 1997).

For this study, we investigated Oligocene–early Miocene abyssal benthic foraminiferal assemblages at Sites 1218 (4826 m water depth) and 1219 (5063 m water depth) of Ocean Drilling Program (ODP) Leg 199 (Fig. F1) in the eastern equatorial Pacific. Because of good age constraints and good preservation of microfossils, the Oligocene at these sites is ideal for study of the equatorial Pacific abyssal environment. We report the preliminary results of the abyssal benthic foraminiferal assemblages in understanding properties and distribution of the deepest water masses of the eastern equatorial Pacific region during the Oligocene.

F1. Locations of ODP sites, p. 8.



MATERIALS AND METHODS

A total of 165 and 114 sediment samples were collected at 1–2 samples per section from Cores 199-1218A-9H through 24X and 199-1219A-6H through 17H, respectively, corresponding in age from the earliest early Oligocene to early Miocene. The major lithologies of these samples are white calcareous nannofossil ooze (partly chalk) and brownish radiolarian ooze with minor dark brownish clay.

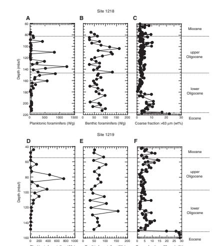
Samples (~20 cm^3) were dried at 40°C and weighed. They were processed with <3% hydrogen peroxide solution and washed on a 250-mesh (63 µm opening) sieve. These residues were dried at 40°C. Their dry weights were recorded, and weight percentages of coarse fraction (>63 µm) of each sample were calculated. Approximately 100–300 benthic foraminiferal specimens were picked, and the numbers of planktonic foraminifers were counted from adequate split aliquots ($^1/_2$–$^1/_{32}$) of the >105-µm fraction of 42 and 23 samples from Sites 1218 and 1219, respectively, which correspond to 2–3 samples per core (i.e., 3 m stratigraphic interval). These specimens were identified to species and counted.

RESULTS

Site 1218

Sufficient numbers of benthic foraminifers for faunal analysis are present between Samples 199-1218A-9H-1, 58–60 cm, and 23X-5, 90–95 cm (75.28–221.4 meters below seafloor [mbsf]). Below this depth the lithology is characterized by high amounts of coarse-grained material (Fig. F2C), mainly composed of radiolarian tests containing rare and poorly preserved foraminifers (two individuals per gram) in Sample 199-1218A-24X-1, 10–14 cm (215.2 mbsf). This marked lithologic transition to decreased foraminiferal abundance in the equatorial Pacific

F2. Foraminiferal abundances and coarse fraction, Sites 1218 and 1219, p. 9.



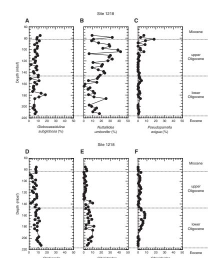
Ocean is thought to correspond to a deepening of the carbonate compensation depth (CCD) from the Eocene to the Oligocene as shown by van Andel et al. (1975) and Lyle, Wilson, Janecek, et al. (2002).

Planktonic foraminifers are abundant between ~120 and 160 mbsf (Fig. F2A), an interval characterized by carbonate-rich sediment (fig. F16 of Shipboard Scientific Party, 2002). The number of benthic foraminifers ranges between 27 and 162 individuals per gram and does not show any trend (Fig. F2B).

Nuttallides umbonifer, *Pseudoparrella exigua*, *Globocassidulina subglobosa*, *Oridorsalis umbonatus*, *Cibicidoides mundulus*, *Cibicidoides* sp. A, *Gyroidinoides* spp., and *Pullenia* spp. are the most common benthic foraminiferal species at Site 1218 (Table T1). *G. subglobosa*, *O. umbonatus*, and *Cibicidoides* spp. are common in the lower Oligocene (~145–212.4 mbsf), whereas *N. umbonifer* is often the dominant component in the upper Oligocene (75.28 to ~145 mbsf) (Fig. F3). *P. exigua* is abundant around the Oligocene/Miocene boundary.

T1. Foraminiferal occurrences, Sites 1218 and 1219, p. 13.

F3. Relative abundances of major species, Site 1218, p. 10.

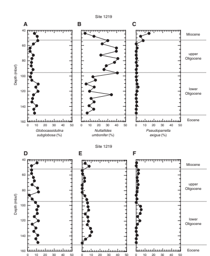


Site 1219

Sufficient numbers of foraminifers were obtained between Samples 199-1219A-6H-1, 10–14 cm, and 17H-1, 20–24 cm (44.1–148.7 mbsf). At the basal Oligocene, there is a similar record of a paucity of foraminifers and a distinct lithologic change (Fig. F2F) as at Site 1218. Such an occurrence at Site 1219 is also thought to correspond to CCD deepening (van Andel et al., 1975; Lyle, Wilson, Janecek, et al., 2002). Planktonic foraminifers are abundant between ~70 and 100 mbsf (Fig. F2D) The number of benthic foraminifers ranges between 31 and 159 individuals per gram and does not show a marked trend (Fig. F2D).

N. umbonifer, *P. exigua*, *G. subglobosa*, *O. umbonatus*, *C. mundulus*, *Cibicidoides* sp. A, *Gyroidinoides* spp., and *Pullenia* spp. are common (Table T1). They are also characteristic taxa at Site 1218, but agglutinated forms (especially tube-shaped species) occur more frequently at Site 1219 than at Site 1218. *G. subglobosa*, *O. umbonatus,* and *Cibicidoides* spp. are common in the lower Oligocene (~95–148.7 mbsf), whereas *N. umbonifer* occurs dominantly associated with *P. exigua* in the upper Oligocene (44.1 to ~95 mbsf) (Fig. F4). The occurrence of *N. umbonifer* at Site 1219 (~25%–40%) is more consistent than at Site 1218 (10%–40%) (Fig. F5).

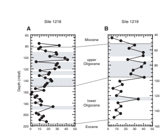
F4. Relative abundances of major species, Site 1219, p. 11.



Occurrence of *N. umbonifer* in the Eastern Equatorial Pacific during the Oligocene

Previous foraminiferal studies from lower bathyal to abyssal depths have reported occurrences of *N. umbonifer*. This species is often the most abundant species with *Stilostomella* spp. during the entire Oligocene at Site 689 (Maud Rise, Southern Ocean) (Thomas, 1992). In the North Atlantic, a peak abundance of this species was reported in the mid-Oligocene at Site 119 (Miller, 1983; Miller and Katz, 1987; Katz et al., 2003). In contrast, our data (Fig. F5) indicate that *N. umbonifer* in the eastern equatorial Pacific region dominated during the earliest late Oligocene, whereas a marked change of this species is not observed in the earliest early Oligocene, although there is a single spikelike abundance of this species at about the middle early Oligocene. Thus, our results differ from above-mentioned studies. Similar stratigraphic occurrences of *N. umbonifer* have been reported from Site 756, Ninetyeast Ridge, eastern Indian Ocean (Nomura, 1991). *N. umbonifer* is common today at

F5. Relative abundance of *Nuttallides umbonifer,* p. 12.



abyssal depths under the influence of Antarctic Bottom Water and is also regarded as a characteristic species of SCW ("resistant species to corrosive bottom water from Southern Ocean") in the late Cenozoic (e.g., Nomura, 1995). We will discuss the details of these foraminiferal occurrences in another paper with additional samples.

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APPENDIX

Faunal References

Faunal examples are shown in Plates **P1, P2, P3, P4, P5, P6, P7,** and **P8.**

Alabaminella weddellensis (Earland) = *Eponides weddellensis* Earland, 1936

Astrononion echolsi Kennett, 1967

Bolivina huneri Howe, 1939

Bulimina alazanensis Cushman, 1927

Buliminella parvula Brotzen, 1948

Cibicidoides grimsdalei (Nuttal) = *Cibicides grimsdalei* Nuttal, 1930

Cibicidoides havanensis (Cushman and Bermudez) = *Cibicides havanensis* Cushman and Bermudez, 1937

Cibicidoides lamontdohertyi Miller and Katz, 1987

Cibicidoides mundulus (Brady, Parker, and Jones) = *Truncatulina mundulus* Brady, Parker, and Jones, 1888

Cibicidoides wuellerstorfi (Schwager) = *Anomalina wuellerstorfi* Schwager, 1866

Cystammina pauciloculata (Brady) = *Trochammina pauciloculata* Brady, 1879

Eggerella bradyi (Cushman) = *Vereuilina bradyi* Cushman, 1911

Evolvecassidulina cf. *howei* (Cushman) = cf. *Cassidulinoides howei* Cushman, 1946

Favocassidulina spinifera (Cushman and Jarvis) = *Cassidulina spinifera* Cushman and Jarvis, 1929

Favocassidulina subfavus Resig, 1982

Globocassidulina subglobosa (Brady) = *Cassidulina subglobosa* Brady, 1881

Glomospira charoides (Jones and Parker) = *Trochammina squamata* var. *charoides* Jones and Parker, 1860

Glomospira gordialis (Jones and Parker) = *Trochammina squamata* var. *gordialis* Jones and Parker, 1860

Gyroidinoides soldanii (d'Orbigny) = *Gyroidina soldanii* d'Orbigny, 1826

Karreriella chapapotensis (Cole) = *Textularia chapapotensis* Cole, 1928

Laticarinina pauperata (Parker and Jones) = *Pulvulina repanda* var. *mennardii* subvar. *pauperata* Parker and Jones, 1865

Martinotiella communis (d'Orbigny) = *Clavulina communis* d'Orbigny, 1826

Nonion affine (Reuss) = *Nonionina affinis* Reuss, 1851

Nonion havanensis Cushman and Bermudez, 1937

Nuttallides umbonifer (Cushman) = *Pulvinulinella umbonifera* Cushman, 1933

Oridorsalis umbonatus (Reuss) = *Rotalia umbonata* Reuss, 1851

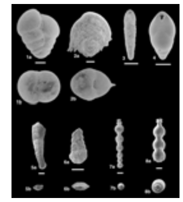
Pseudoparrella exigua (Brady) = *Pulvinulina exigua* Brady, 1884

Pullenia bulloides (d'Orbigny) = *Nonionina bulloides* d'Orbigny, 1846

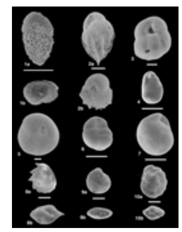
Pullenia osloensis Feyling-Hanssen, 1954

Pullenia quinqueloba Reuss = *Pullenia compressiuscula* Reuss var. *quinqueloba* Reuss, 1867

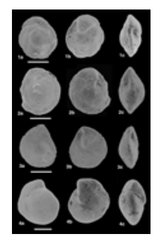
P1. *Karreriella, Vuvulina, Pleurostomella, Spiroplectammina, Siphonodosaria,* p. 19.



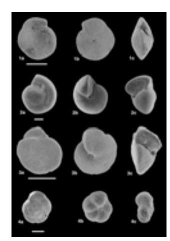
P2. *Bolivina, Bulimina, Buliminella, Evolvecassidulina, Globocassidulina, Cassidulina, Favocassidulina,* p. 20.



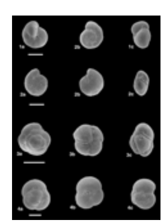
P3. *Nuttallides, Pseudoparrella, Oridorsalis*, p. 21.



P4. *Oridorsalis, Gyroidinoides, Gyroidina,* p. 22.



P5. *Gyroidinoides, Alabaminella, Sphaeroidina,* p. 23.



Pullenia salisburyi R.E. Stewart and K.C. Stewart, 1930

Pullenia subcarinata (d'Orbigny) = *Nonionina subcarinata* d'Orbigny, 1851

Quadrimorphina profunda Schnitker and Tjalsma, 1980

Uvigerina hispid Schwager, 1866

Vuvulina spinosa Cushman, 1927

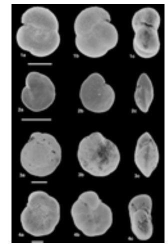
Sphaeroidina bulloides d'Orbigny, 1826

Siphonodosaria antillea (Cushman) = *Nodosaria antillea* Cushman, 1923

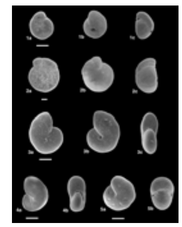
Siphonodosaria spinata (Cushman) = *Nodogenerinaspinata* Cushman, 1934

Spiroplectammina spectablis (Grzybowski) = *Spiroplecta spectablis* Grzybowski, 1898

P6. *Quadrimorphina, Cibicidoides,* p. 24.



P7. *Cibicidoides, Anomalinoides, Nonion, Astrononion,* p. 25.



P8. *Nonion, Pullenia,* p. 26.

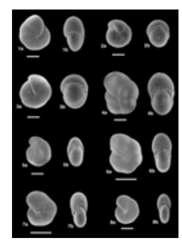


Figure F1. Locations of the ODP sites included in this report (modified from Lyle, Wilson, Janecek, et al., 2002).

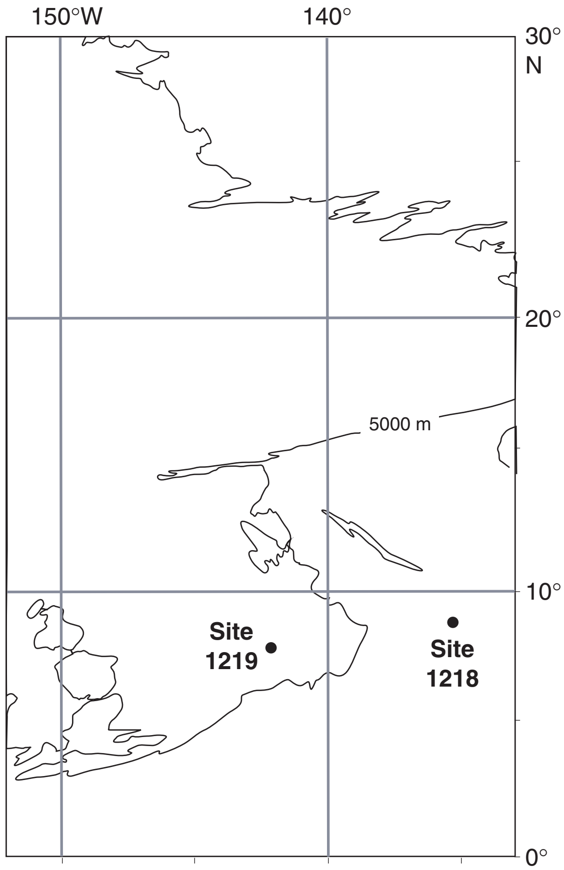


Figure F2. Downcore profiles of foraminiferal abundances and weight percent of coarse fraction at Sites 1218 and 1219. **A.** Planktonic foraminifers per unit weight. **B.** Benthic foraminifers per unit weight. **C.** Coarse fraction (>63 µm) at Site 1218. **D.** Planktonic foraminifers per unit weight. **E.** Benthic foraminifers per unit weight. **F.** Coarse fraction (>63 µm) at Site 1219.

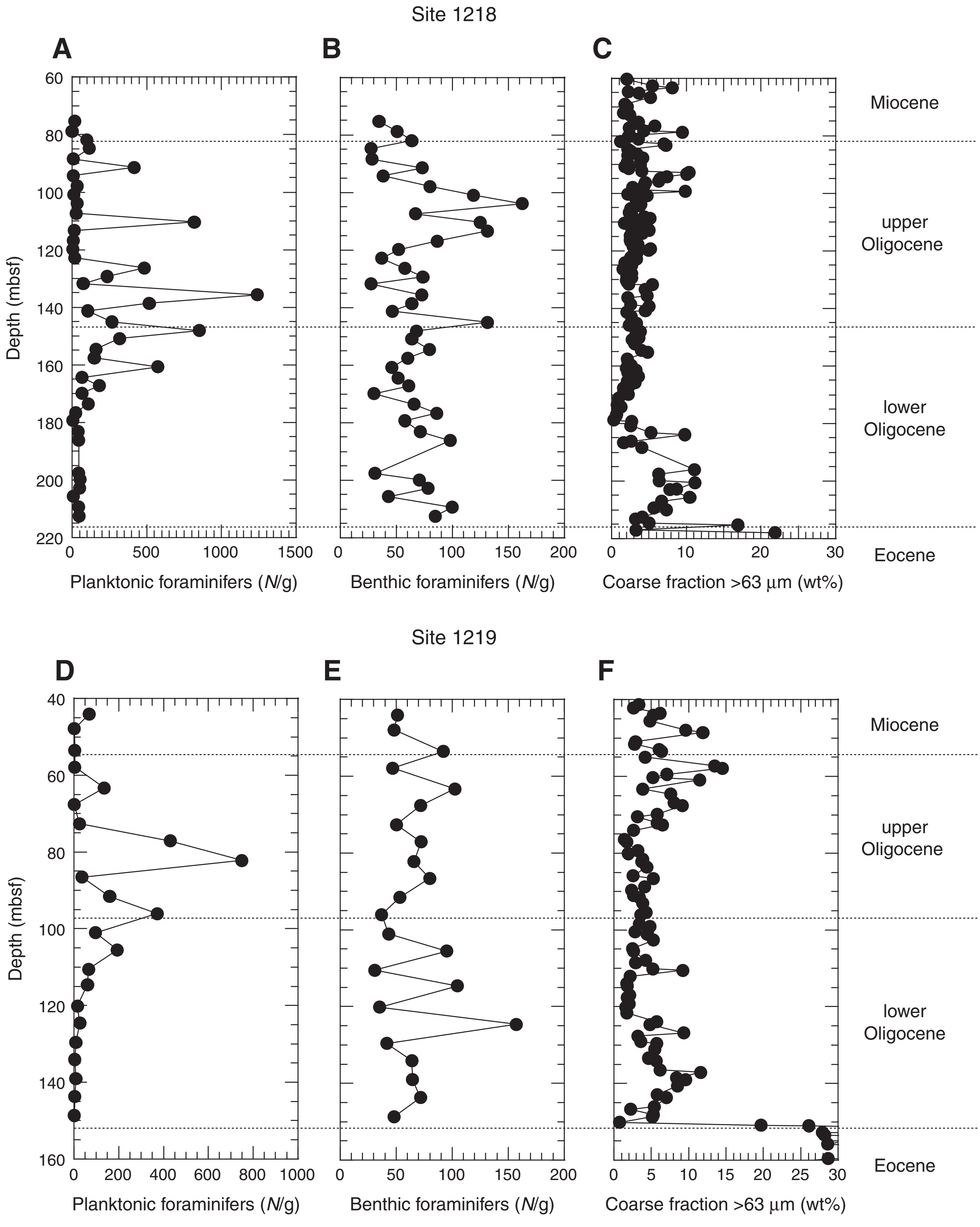
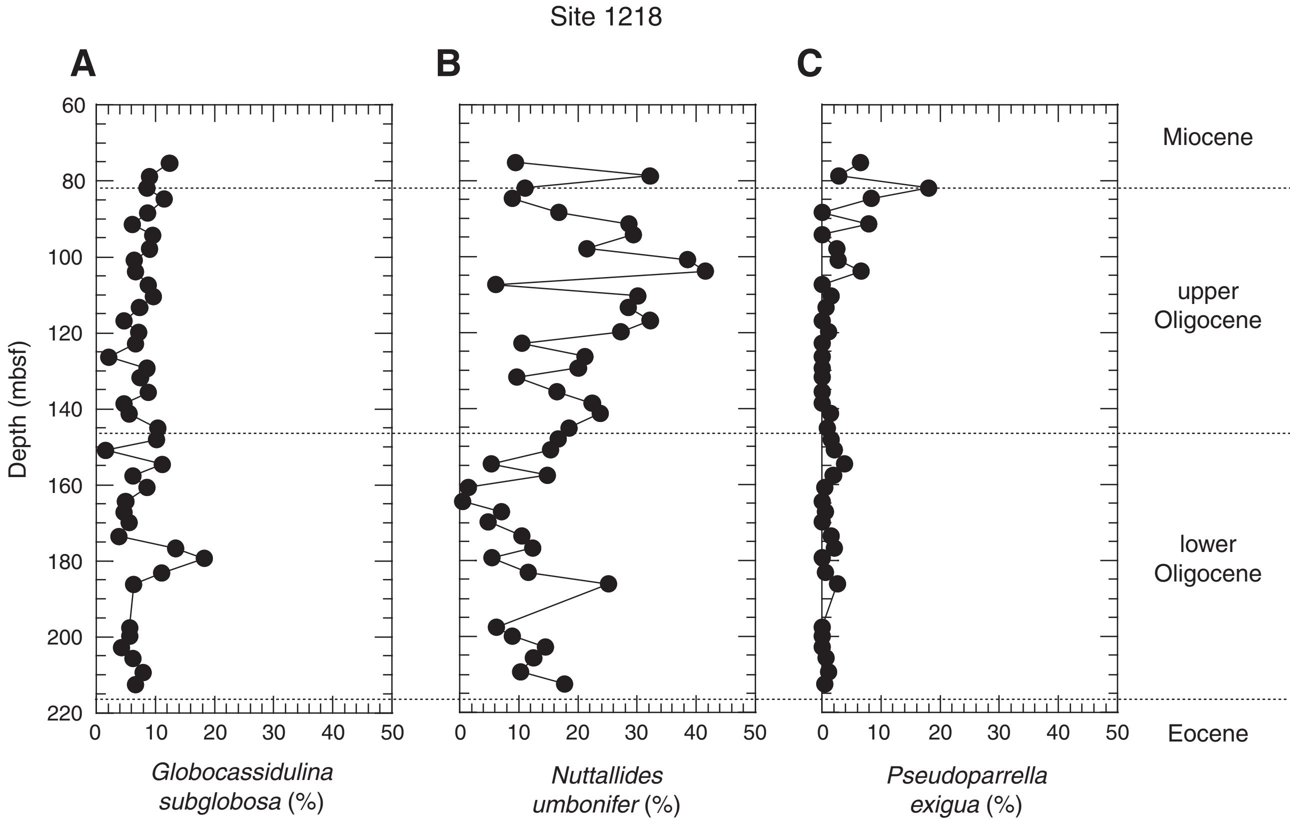


Figure F3. A–F. Downcore profiles of relative abundances of major species at Site 1218.



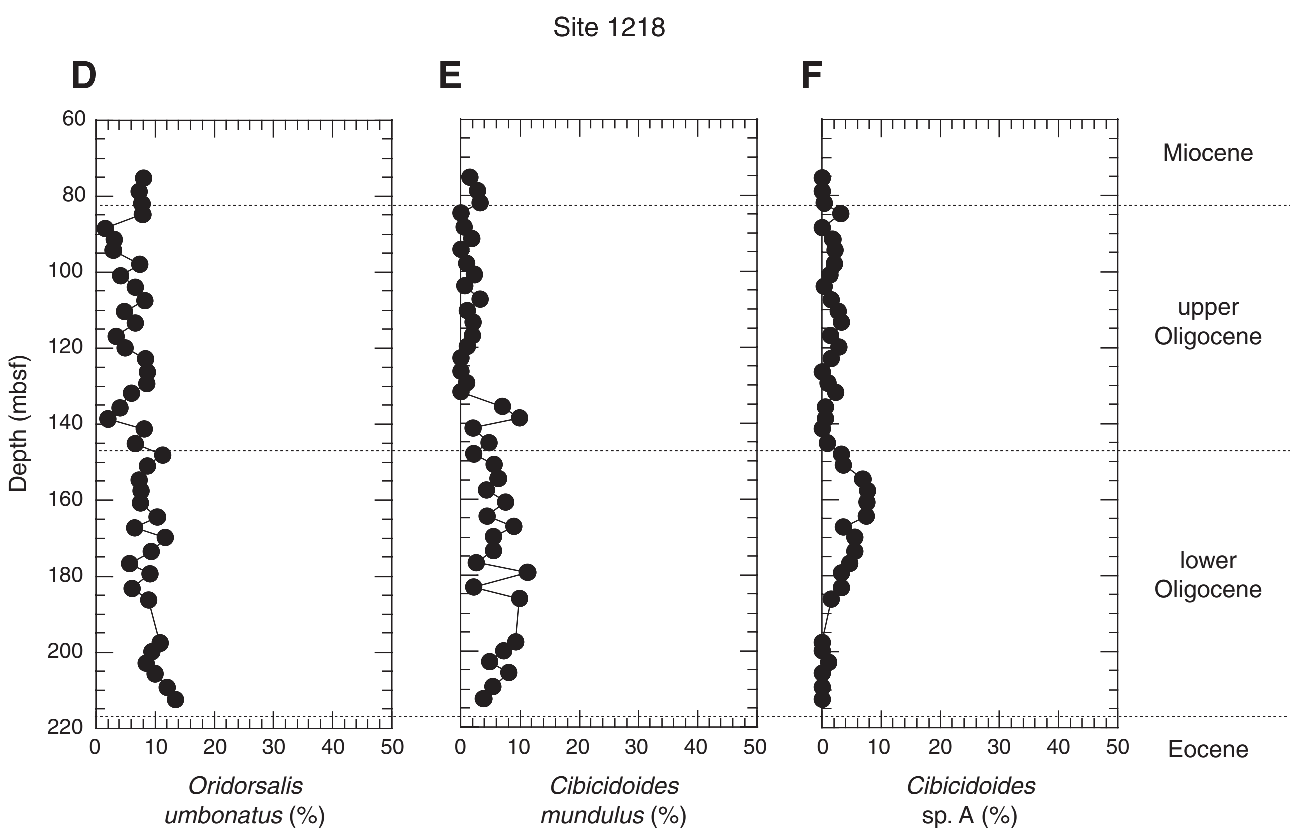


Figure F4. A–F. Downcore profiles of relative abundances of major species at Site 1219.

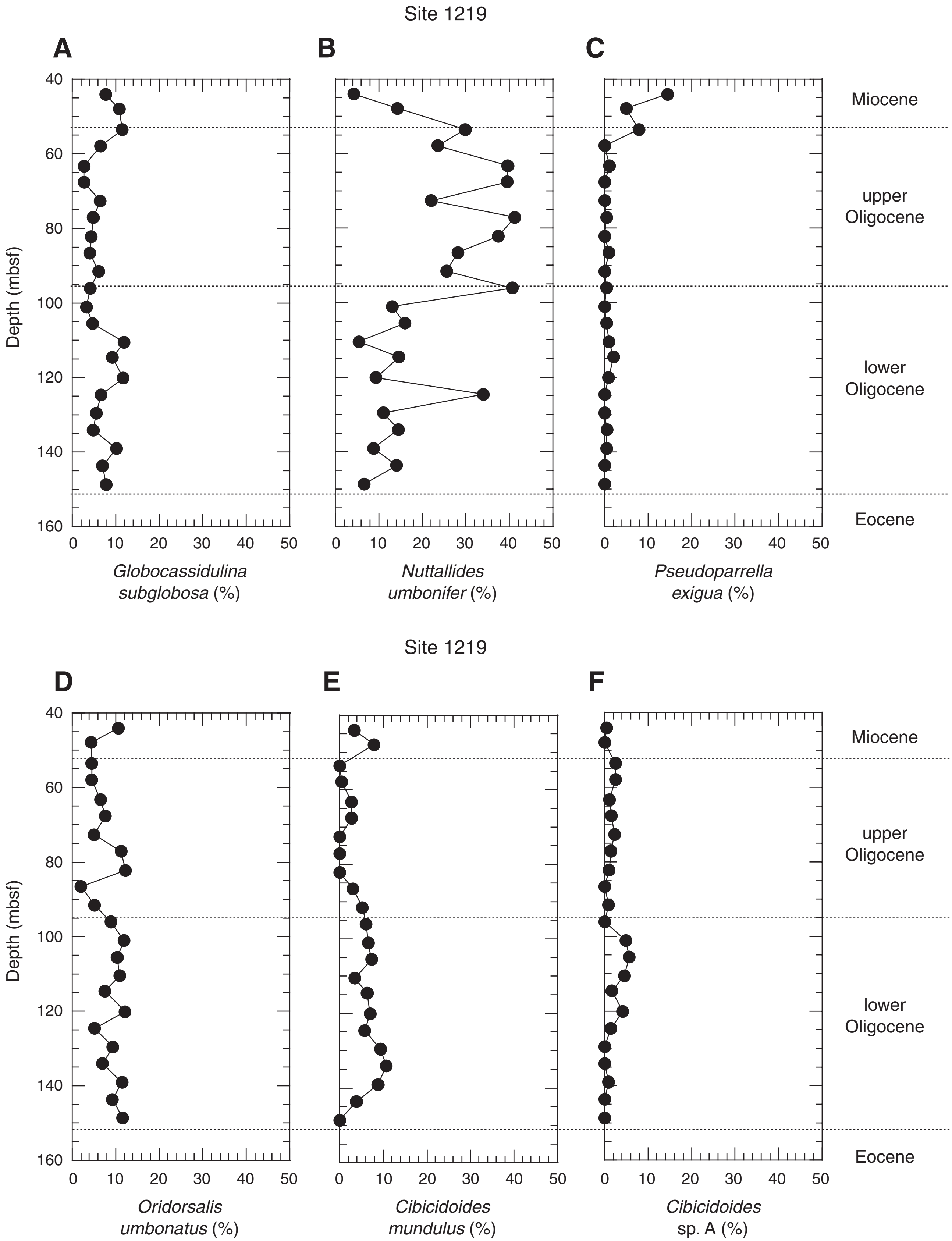


Figure F5. Stratigraphic changes of relative abundance of *Nuttallides umbonifer* at Sites (**A**) 1218 and (**B**) 1219. Shading shows abundant occurrence of *N. umbonifer* (up to ~20%).

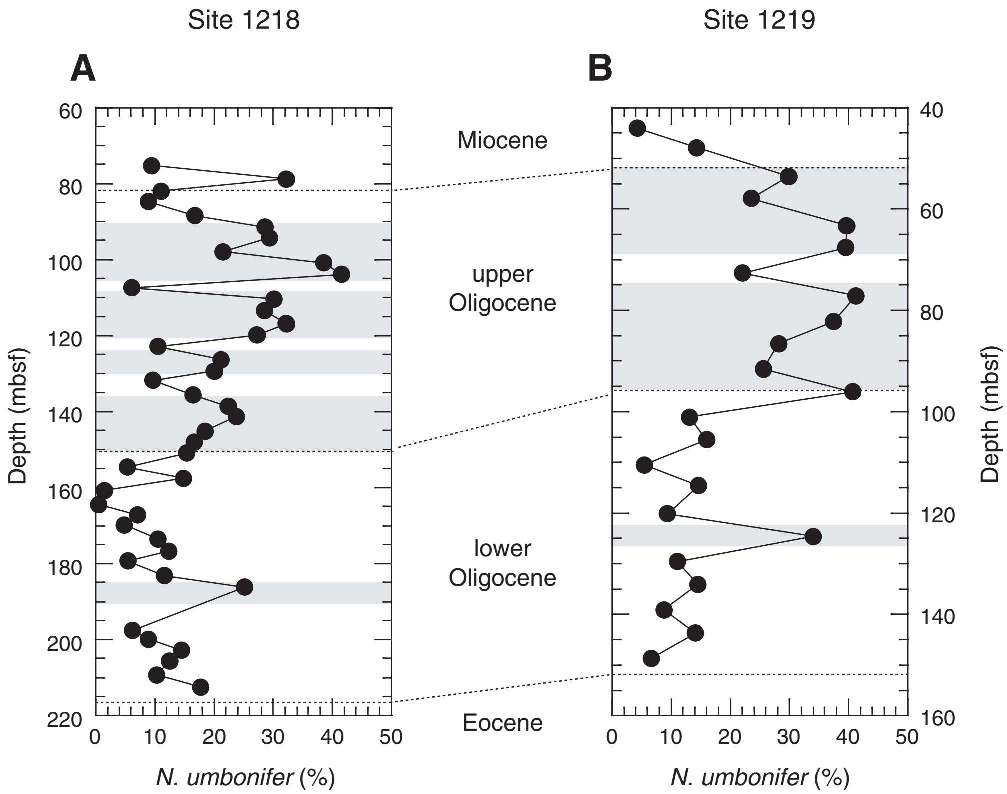


Table T1. Foraminiferal occurrences (counted number), Sites 1218 and 1219. (Continued on next five pages.)

Core, section, interval (cm)	Depth (mbsf)	*Alabaminella weddellensis* (Earland)	*Allomorphina* sp.	*Alveolophragmium* sp.	*Amphicoryna* spp.	*Anomalinoides* sp. A	*Anomalinoides* sp. indet.	*Astrononion echolsi* Kennett	*Astrononion* sp. A	*Astrononion* sp. B	*Astrononion* sp. C	*Astrononion* sp. D	*Astrononion* sp. E	*Bigenerina* sp.	*Bolivina huneri* Howe	*Bolivina* sp. A	*Bolivina* sp. B	*Bolivina* sp. C	*Bolivina* sp. D	*Bolivina* sp. E	*Botuloides* spp.	*Brizalina* spp.	*Bulimina alazanensis* Cushman	*Bulimina* sp. A	*Bulimina* sp. B	*Bulimina* sp. C	*Bulimina* sp. D	*Buliminella parvula* Brotzen	*Cassidulina* sp. A	*Cassidulina* sp. B	*Cassidulina* sp. C	*Cassidulina* sp. indet.	*Chilostomella* sp.	*Cibicidoides grimsdalei* (Nuttal)	*Cibicidoides havanensis* (Cushman and Bermudez)	*Cibicidoides* cf. *havanensis* (Cushman and Bermudez)	*Cibicidoides lamontdohertyi* Miller and Katz	*Cibicidoides mundulus* (Brady, Parker, and Jones)	*Cibicidoides wuellerstorfi* (Schwager)	*Cibicidoides* sp. A	*Cibicidoides* sp. B	*Cibicidoides* sp. C	*Cibicidoides* sp. D	*Cibicidoides* sp. E	*Cibicidoides* sp. F	*Cibicidoides* sp. G	*Cibicidoides* sp. H	*Cibicidoides* sp. I	*Cibicidoides* sp. J	*Cibicidoides* sp. K	*Cibicidoides* sp. L	*Cibicidoides* sp. M	*Cibicidoides* sp. N	*Cibicidoides* sp. O	*Cibicidoides* sp. P	*Cibicidoides* sp. Q	*Cibicidoides* sp. R	*Cibicidoides* sp. S	*Cibicidoides* sp. indet.	*Cribrostomoides* spp.	*Cyclogyra* sp.	*Cystammina pauciloculata* (Brady)
199-1218A-																																																														
9H-1, 58–60	75.28																							1								3					1	2	1							2													1			
9H-3, 118–120	78.88				1																								1			2		3				5						1				1											6			
9H-5, 118–120	81.88					1	1																		1			2	2			3						8		1																			5			
10H-1, 58–60	84.78	1				1		1											1		1			1	1				3			1		1			1		1	6																						
10H-3, 118–120	88.4					3		5							2								2		1			1	1			6		1			1	1																					6			
10H-5, 118–120	91.38	1												1	3									1	1							4		2				3	1	3																						
11H-1, 58–60	94.28							2							3						1			1								2		3					2	3																			1			
11H-3, 118–120	97.88	2						2							1						1		1	1								3		1			3	2	1	4																			7			
11H-5, 118–120	100.88	2						2							1		2						1						1			1						5		3																			6			
12H-1, 58–60	103.78	1				1		4																								5		1				2		1																			1			
12H-3, 118–120	107.38	4						1							2		3						1		1							4	1					6		3																			8			
12H-5, 118–120	110.38	3				1								3	8			1			1		5	1								2		1			1	2		5																						
13H-1, 58–60	113.28		1					2																	1			3	1			3		3			1	3	1	5																			2			
13H-3, 118–120	116.88	3						2							5	1							5	1	1				4	1		4		1				4		3																			4			
13H-5, 118–120	119.88	1						2			1	1																	2			5			3			2		5																			11			
14H-1, 58–60	122.77	1	1		1			6															1		1				4	1		2					1			3	3	1							1										4			
14H-3, 118–120	126.37	1			1	2		5															1					1				2		2	2														1										2			
14H-5, 118–120	129.37	1																							1				1			4					1	2		2						1													3			
15H-1, 10–14	131.8		1					1															1	2					6			3		1	1		2			3																						
15H-3, 90–94	135.6		1			1		3															1	5					3	1		7		1			1	12		1										1									1			
15H-5, 90–94	138.6							5							1														6			4					3	19		1																			1			
16H-1, 10–14	141.3	1	1			1		4							5								1					4	3			8						4	1							1													5			
16H-3, 90–94	145.1	3	1					9							4										1	1			5	1		5					3	10		2																			4			
16H-5, 90–94	148.1	2													1								1					3		1		4	3				2	4		6																						
17H-1, 10–14	150.8	3	1					2														2	1	1				3	2			3		2			4	11	1	7			1																2			
17H-3, 90–94	154.6	4	3			1																	1					3	2		1	7		1			5	13		14											1								1			
17H-5, 90–94	157.6	1				2				1														1		1		5	2			4					1	9		16									1										4			
18H-1, 58–60	160.78					1														1								4	4			7		4			3	15		15																						
18H-3, 118–120	164.38	2				1		13									1								1			4	2			2		1				9		15												1							4			
18H-5, 118–120	167.3							9						2														10				1		2			1	15		6																			2			
19H-1, 10–14	169.8	1																					1					6				1		1			1	8		8												1	1						3			
19H-3, 90–94	173.6	2																				1	5					2				4						10		10																1			8			
19H-5, 90–94	176.6	1				2									5													7				12					1	5		9						1													3			

Table T1. (Continued).

Core, section, interval (cm)	Depth (mbsf)	*Alabaminella weddellensis* (Earland)	*Allomorphina* sp.	*Alveolophragmium* sp.	*Amphicoryna* spp.	*Anomalinoides* sp. A	*Anomalinoides* sp. indet.	*Astrononion echolsi* Kennett	*Astrononion* sp. A	*Astrononion* sp. B	*Astrononion* sp. C	*Astrononion* sp. D	*Astrononion* sp. E	*Bigenerina* sp.	*Bolivina huneri* Howe	*Bolivina* sp. A	*Bolivina* sp. B	*Bolivina* sp. C	*Bolivina* sp. D	*Bolivina* sp. E	*Botuloides* spp.	*Brizalina* spp.	*Bulimina alazanensis* Cushman	*Bulimina* sp. A	*Bulimina* sp. B	*Bulimina* sp. C	*Bulimina* sp. D	*Buliminella parvula* Brotzen	*Cassidulina* sp. A	*Cassidulina* sp. B	*Cassidulina* sp. C	*Cassidulina* sp. indet.	*Chilostomella* sp.	*Cibicidoides grimsdalei* (Nuttal)	*Cibicidoides havanensis* (Cushman and Bermudez)	*Cibicidoides* cf. *havanensis* (Cushman and Bermudez)	*Cibicidoides lamontdohertyi* Miller and Katz	*Cibicidoides mundulus* (Brady, Parker, and Jones)	*Cibicidoides wuellerstorfi* (Schwager)	*Cibicidoides* sp. A	*Cibicidoides* sp. B	*Cibicidoides* sp. C	*Cibicidoides* sp. D	*Cibicidoides* sp. E	*Cibicidoides* sp. F	*Cibicidoides* sp. G	*Cibicidoides* sp. H	*Cibicidoides* sp. I	*Cibicidoides* sp. J	*Cibicidoides* sp. K	*Cibicidoides* sp. L	*Cibicidoides* sp. M	*Cibicidoides* sp. N	*Cibicidoides* sp. O	*Cibicidoides* sp. P	*Cibicidoides* sp. Q	*Cibicidoides* sp. R	*Cibicidoides* sp. S	*Cibicidoides* sp. indet.	*Cribrostomoides* spp.	*Cyclogyra* sp.	*Cystammina pauciloculata* (Brady)
20H-1, 10–14	179.3					2																		1				2	1			9		1			2	21	1	6								1						1					7			
20H-3, 90–94	183.1					2																		1				2				4		2				4		6		1				1													3			
20H-5, 90–94	186.1	1				1							2															9				1		1			2	19		3																			7			
22X-2, 10–14	197.5					2								1														3	1			3		6				18								5	1					2							6			
22X-3, 90–95	199.8					7								2														3				1		3				13											1													
22X-5, 90–95	202.8					1		2							1									2				9	2	1		1		2				8		2							1												3			
23X-1, 10–15	205.6					2		3								1												5	1			1		3				13				1										1							5			
23X-3, 90–95	209.4	2				3		6																4				3	5			4					5	9																						1	1	
23X-5, 90–95	212.4	1				2		3							2									4		1			5					1			2	8				1	1																3			
199-1219A-																																																														
6H-1, 10–14	44.1																								1							1						8		1												1							3			
6H-3, 90–94	47.9							5																								11		2	1	1		16	1																				3			
7H-1, 10–14	53.6							3																															2	5																						
7H-4, 10–14	57.94							2							1		1																	1				1		5																			5			3
8H-1, 35–39	63.35																								2				1			1						5	1	2																			1			
8H-4, 10–14	67.6	2				1																	1		1									1	3			5		3																			9			
9H-1, 10–14	72.6	1			1	2		7															1						1			1		1			1			5						1													1			
9H-4, 10–14	77.1					1		3																								2					1			3									1													
10H-1, 30–34	82.3																						1											1						2																						
10H-4, 10–14	86.6	2						12									1								1							1						6																					5			
11H-1, 10–14	91.6	2				1		13	1																				2			1		2				11		2	1																		5			
11H-4, 10–14	96.1	2						1																				1				3		2				13																	1				4			
12H-1, 10–14	101.1																								1			1				1		1	2		1	12		9																			6			
12H-4, 10–14	105.6					5		1										2					1	1	1			4				4		1			1	17		13									1			1							16			
13H-1, 10–14	110.6	1						1																	1							3		1	1		1	7		9																	1		6			
13H-4, 10–14	114.66					1		2																1	1							2	1	1			8	15		4												1							7			
14H-1, 10–14	120.1																												1				1	2			3	15		9																			6			
14H-4, 10–14	124.6	1					1	1																	1		1	1				4		1				12		3																			2			
15H-1, 10–14	129.6					2																			1			6	1					3			1	17														1							6			
15H-4, 10–14	134.1					7		1																				2				2					2	20														1							8			
16H-1, 10–14	139.1					4		1																	1			2		1		3		5				19		2												3						2	3			
16H-4, 10–14	143.66					3		6																				12				3		2			3	7																					3			
17H-1, 20–24	148.7			2		5		6																2								2		4										1															3			

Table T1. (Continued).

Core, section, interval (cm)	Depth (mbsf)	*Cystammina* sp. indet.	*Dentalina* spp.	*Eggerella bradyi* (Cushman)	*Eggerella* sp. A	*Eggerella* sp. B	*Eggerella* sp. indet.	*Epistominella* spp.	*Evolvecassidulina* cf. *howei* (Cushman)	*Favocassidulina spinifera* (Cushman and Jarvis)	*Favocassidulina subfavus* Resig	*Fissurina* spp.	*Fistulose?* sp.	*Globobulimina* sp.	*Globocassidulina subglobosa* (Brady)	*Globocassidulina* sp. A	*Globocassidulina* sp. B	*Glomospira charoides* (Jones and Parker)	*Glomospira gordialis* (Jones and Parker)	*Glomospira* sp. A	*Glomospira* sp. indet.
199-1218A-																					
9H-1, 58–60	75.28								1			5			17						
9H-3, 118–120	78.88								2		2	1			16						
9H-5, 118–120	81.88								1	1	2	3			21	4	1				
10H-1, 58–60	84.78									2	2	3			22						
10H-3, 118–120	88.4		2							1	2	5			16	3					
10H-5, 118–120	91.38									3		3			10	4					
11H-1, 58–60	94.28		1												13	4					
11H-3, 118–120	97.88		1						3	5	2	2			18						
11H-5, 118–120	100.88		1						5	5					14						
12H-1, 58–60	103.78									10		5			19	2					
12H-3, 118–120	107.38									2		6			16	2					
12H-5, 118–120	110.38								1		2	2			18						
13H-1, 58–60	113.28								1	5	3	4			11						
13H-3, 118–120	116.88									3	1	2			10	4					
13H-5, 118–120	119.88		1							5	1	1			13		2				
14H-1, 58–60	122.77		1						4	3	6	4			12		1				
14H-3, 118–120	126.37		1					1	2			5	1		4	10					
14H-5, 118–120	129.37		2						3	2	2	4			17						
15H-1, 10–14	131.8		2						1	1	1	3			10						
15H-3, 90–94	135.6		4									5			15						
15H-5, 90–94	138.6		3					1				6			9						
16H-1, 10–14	141.3							4	2			3			11						
16H-3, 90–94	145.1											5			22	1					
16H-5, 90–94	148.1		1						1			2			19						
17H-1, 10–14	150.8		2						5			7			3	3					
17H-3, 90–94	154.6				1				1			2			23	2					
17H-5, 90–94	157.6		1						3			6		1	13		1				
18H-1, 58–60	160.78		1						1			4			17						
18H-3, 118–120	164.38											4			10	3					
18H-5, 118–120	167.3											4			8	1	5				
19H-1, 10–14	169.8		1						1						8	2	1				
19H-3, 90–94	173.6								1			5			7						
19H-5, 90–94	176.6								2			4			26	6					
20H-1, 10–14	179.3			1					2			1	1		34	1					
20H-3, 90–94	183.1											1			20	1					

Core, section, interval (cm)	Depth (mbsf)	*Guttulina* spp.	*Gyroidinoides soldanii* (d'Orbigny)	*Gyroidinoides* sp. A	*Gyroidinoides* sp. B	*Gyroidinoides* sp. C	*Gyroidinoides* sp. D	*Gyroidinoides* sp. E	*Gyroidinoides* sp. F	*Gyroidinoides* sp. G	*Gyroidinoides* sp. H	*Haplophragmoides* spp.	*Heronallenia* sp.	*Hyalinonetrion* spp.	*Karreriella chapapotensis* (Cole)	*Karreriella* cf. *chapapotensis* (Cole)	*Karreriella* sp. A
199-1218A-																	
9H-1, 58–60	75.28		7	2	2	1	2	1					1		1		
9H-3, 118–120	78.88		3		3	1	2						2		1		
9H-5, 118–120	81.88		2	6	5	2		5		2			1				
10H-1, 58–60	84.78			2	11	4	1	4					1	1	1		
10H-3, 118–120	88.4			3	4	2		6		1					1		
10H-5, 118–120	91.38			1	6		2	1		1			3				
11H-1, 58–60	94.28	1	2	1	2	1	1	2		2				1			
11H-3, 118–120	97.88		3	4	6	5		3									
11H-5, 118–120	100.88		1	1		5		5					1	2			
12H-1, 58–60	103.78		4	4	6	14	1	2					1				
12H-3, 118–120	107.38		2	5	3	5	2	7		1			2				
12H-5, 118–120	110.38			3	13	6		1		1			1	1			
13H-1, 58–60	113.28			4	1	1	2	3		1							
13H-3, 118–120	116.88				6	5		4				1					
13H-5, 118–120	119.88		2	2	3	4	2	2					1		1		
14H-1, 58–60	122.77		3	4	8	3		4		1			3		1		
14H-3, 118–120	126.37		1	5	14	6	1	2		1				2	1		
14H-5, 118–120	129.37		6	4	9	1		4		4			2		3		
15H-1, 10–14	131.8		3	1	1	7		3							2		
15H-3, 90–94	135.6		4	2	1	6	1	2		2			2				
15H-5, 90–94	138.6		8	4	1	4	4	5		1			2		2		
16H-1, 10–14	141.3			1	4	6	1	6	1				1	1			
16H-3, 90–94	145.1		2	2	6	8		3					1				
16H-5, 90–94	148.1		6		4	6	2						1				
17H-1, 10–14	150.8		1	3	3	5		7					1	1			
17H-3, 90–94	154.6		6	3	1	5			2	2			1				
17H-5, 90–94	157.6		6	1	4	4	3	9					1		2		
18H-1, 58–60	160.78	1	12	1	6	5	2	1					3		3		
18H-3, 118–120	164.38		1		1	12	3	7		2							
18H-5, 118–120	167.3		9	3	5	6	1	4		1					1		
19H-1, 10–14	169.8		9	1	5	10	1	1									
19H-3, 90–94	173.6		6		3	7	3	2									
19H-5, 90–94	176.6		3	2	5	1	2	4									
20H-1, 10–14	179.3		2	4	4	5	1	2					1				
20H-3, 90–94	183.1		7	6	7	7	1	2		1		1	2		1		

Core, section, interval (cm)	Depth (mbsf)	*Lagena* spp.	*Laticarinina pauperata* (Parker and Jones)	*Lenticulina* spp.	*Lingulonodosaria* spp.	*Martinotiella communis* (d'Orbigny)	*Martinotiella* sp. A	*Neoeponides* sp.	*Nodogenerina* sp.	*Nodosaria* spp.	*Nonion affine* (Reuss)	*Nonion havanensis* Cushman and Bermudez	*Nuttallides umbonifer* (Cushman)	*Oridorsalis umbonatus* (Reuss)	*Oridorsalis* sp. A	*Oridorsalis* sp. indet.	*Orthomorphina* spp.	*Osangularia* sp.	*Paracassidulina* spp.
199-1218A-																			
9H-1, 58–60	75.28			1									13	11					
9H-3, 118–120	78.88			1							1		57	13	1				
9H-5, 118–120	81.88			1							1		27	19			2		
10H-1, 58–60	84.78		2						2			4	17	15			1		
10H-3, 118–120	88.4	1	3	2							4		31	3			1		
10H-5, 118–120	91.38										1	4	47	5					
11H-1, 58–60	94.28			1					4		2	1	40	4			2		
11H-3, 118–120	97.88	1	1	2					1			1	43	15					
11H-5, 118–120	100.88	1	5						2			4	84	9			1		
12H-1, 58–60	103.78		1	1								3	119	19	2				
12H-3, 118–120	107.38		1	1					4		1	4	11	15			3		
12H-5, 118–120	110.38		1						1		1	1	56	9					
13H-1, 58–60	113.28		1					1			2	1	43	10	1		1		
13H-3, 118–120	116.88		1	2					1		2	1	67	7					
13H-5, 118–120	119.88										3	2	49	9					
14H-1, 58–60	122.77	1							1		3	1	19	15					
14H-3, 118–120	126.37	4		1					4		2		39	16					
14H-5, 118–120	129.37	1		1		1							40	17					
15H-1, 10–14	131.8						1		2		1	4	13	8					
15H-3, 90–94	135.6					1						1	28	7			1		
15H-5, 90–94	138.6	1		2					1				43	4					
16H-1, 10–14	141.3	2		1							2	1	47	16			1	1	
16H-3, 90–94	145.1			1					2			2	39	14					
16H-5, 90–94	148.1	2		1				2				1	31	21	1				
17H-1, 10–14	150.8	2		1							1	3	30	17	2				1
17H-3, 90–94	154.6								1				11	15					
17H-5, 90–94	157.6			2					1		2		31	16	2				
18H-1, 58–60	160.78								4		3	1	3	15	1				
18H-3, 118–120	164.38	2			4				1		2		1	21	1		1		
18H-5, 118–120	167.3			3	2					1	2	4	12	11					
19H-1, 10–14	169.8		1		1						1	7	7	17			1		
19H-3, 90–94	173.6			1					2			2	19	17			1		
19H-5, 90–94	176.6	1									1	2	24	11					
20H-1, 10–14	179.3	1		1									10	17					
20H-3, 90–94	183.1	1							6	1		3	21	11	1				

Table T1. (Continued).

Core, section, interval (cm)	Depth (mbsf)	*Cystammina* sp. indet.	*Dentalina* spp.	*Eggerella bradyi* (Cushman)	*Eggerella* sp. A	*Eggerella* sp. B	*Eggerella* sp. indet.	*Epistominella* spp.	*Evolvecassidulina* cf. *howei* (Cushman)	*Favocassidulina spinifera* (Cushman and Jarvis)	*Favocassidulina subfavus* Resig	*Fissurina* spp.	*Fistulose?* sp.	*Globobulimina* sp.	*Globocassidulina subglobosa* (Brady)	*Globocassidulina* sp. A	*Globocassidulina* sp. B	*Glomospira charoides* (Jones and Parker)	*Glomospira gordialis* (Jones and Parker)	*Glomospira* sp. A	*Glomospira* sp. indet.	*Guttulina* spp.	*Gyroidinoides soldanii* (d'Orbigny)	*Gyroidinoides* sp. A	*Gyroidinoides* sp. B	*Gyroidinoides* sp. C	*Gyroidinoides* sp. D	*Gyroidinoides* sp. E	*Gyroidinoides* sp. F	*Gyroidinoides* sp. G	*Gyroidinoides* sp. H	*Haplophragmoides* spp.	*Heronallenia* sp.	*Hyalinonetrion* spp.	*Karreriella chapapotensis* (Cole)	*Karreriella* cf. *chapapotensis* (Cole)	*Karreriella* sp. A	*Lagena* spp.	*Laticarinina pauperata* (Parker and Jones)	*Lenticulina* spp.	*Lingulonodosaria* spp.	*Martinotiella communis* (d'Orbigny)	*Martinotiella* sp. A	*Neoeponides* sp.	*Nodogenerina* sp.	*Nodosaria* spp.	*Nonion affine* (Reuss)	*Nonion havanensis* Cushman and Bermudez	*Nuttallides umbonifer* (Cushman)	*Oridorsalis umbonatus* (Reuss)	*Oridorsalis* sp. A	*Oridorsalis* sp. indet.	*Orthomorphina* spp.	*Osangularia* sp.	*Paracassidulina* spp.
20H-5, 90–94	186.1		1	1								1			12	1	2						3	2	3	11	1	4					1		2	1		1			1				1		1		48	17					
22X-2, 10–14	197.5		3									3			11	2							6		3	6	1	4					1			1					1				8			4	12	21	1				
22X-3, 90–95	199.8								1			3			10	1	1						6		11	3	6	4		1					1	1											5	7	16	17	3		1		
22X-5, 90–95	202.8														7		1						7	1	3	3	5	5					3		1					2	1				5			1	24	14					
23X-1, 10–15	205.6														10								5	1	3	6	3	4					2		4										5			4	20	16			1		1
23X-3, 90–95	209.4											3			13								1	1	3	1												1		1					1			6	17	20		2			
23X-5, 90–95	212.4											2			14								4		4	6	6	1													3						7	6	37	28					
199-1219A-																																																							
6H-1, 10–14	44.1		2					3	1		3	4			18	2						1	2		5	10	1	5		5			2		1	1				1	1					1			10	25	1				
6H-3, 90–94	47.9		1							1	1	1			22								3		2	5	1	6							1				2	1									29	9					
7H-1, 10–14	53.6									2		1			23								1	1	2	5	1	4		1		1	2								1								60	9					
7H-4, 10–14	57.94					1				3	1				13				1	1			2		2	1		4		4									2							2		1	47	9	1				
8H-1, 35–39	63.35		1								3	1			5								4	1	3	3	1	2		3			1						1								1		73	12					
8H-4, 10–14	67.6				2			2	1	4	1				5						1		1		3	3	2	2														1							72	14			1		
9H-1, 10–14	72.6		1						1		3	2			14	2							2	1	14	3		17							1			3		2	2						1	3	48	11					
9H-4, 10–14	77.1											2			10								2	1	2	7	1	7		1							1							1			2		84	23	1				
10H-1, 30–34	82.3								2			2		1	9	4							3	2	12	2	2	5		1										2									76	25					
10H-4, 10–14	86.6								2			4			8									3	7	2		3					1		1			2		2						1		4	55	4					
11H-1, 10–14	91.6											6		1	13								2	1	9	3	1	2			1												1					1	54	11					
11H-4, 10–14	96.1											5		1	9								5	1	2	1	2	3		3										2	2								87	19					
12H-1, 10–14	101.1			1					1			3			6								1	3	7	11	2	4		1																			24	22					
12H-4, 10–14	105.6											2			11	1							1	1	5	12	2	3		1			1							3							1		37	24	1				
13H-1, 10–14	110.6								1			2			24	2							8	1	8	2	1	8		1		1			1			1		1	4				1		1	3	11	22	5				
13H-4, 10–14	114.66		1									3			22	3	1						5	1	14	12	1	6		1					1			2		1		1			1		1	2	35	18					
14H-1, 10–14	120.1	1	1									6			25	1							4		4	6	3	3		3			1		1										2		2	4	20	26			2		
14H-4, 10–14	124.6											3			14	4									7	9	3	3		1			2												1			1	71	11					
15H-1, 10–14	129.6		1									1			10	2		1					3	4	6	7	3	3					2							1	2				2		1	1	20	17	1				
15H-4, 10–14	134.1											3			9	2							3	4	5	3	1	8					1							1	1				3			6	27	13					
16H-1, 10–14	139.1														22	2							6		9	6	1	4							1						2				4		1	3	19	25					
16H-4, 10–14	143.66						1					1			13	9							5		8	4	2	1					1		2												2	5	26	17					
17H-1, 20–24	148.7		1		1							3			14	2							5		4	8	5	4					1							1			4		3			2	12	21					

Table T1. (Continued).

Core, section, interval (cm)	Depth (mbsf)	*Pleurostomella* sp. A	*Pleurostomella* sp. B	*Pleurostomella* sp. C	*Pleurostomella* sp. D	*Pleurostomella* sp. E	*Pleurostomella* sp. indet.	*Pseudonodosaria* spp.	*Pseudoparrella exigua* (Brady)	*Pseudoparrella*(?) spp.	*Pullenia bulloides* (d'Orbigny)	*Pullenia osloensis* Feyling-Hanssen	*Pullenia quinqueloba* Reuss	*Pullenia salisburyi*	*Pullenia subcarinata*	*Pullenia* sp. A	*Pullenia* sp. B	*Pullenia* sp. C	*Pullenia* sp. D	*Pyrulina* spp.	*Quadrimorphina profunda* Schnitker and Tjalsma	*Quinqueloculina* spp.	*Recurvoides* sp. A	*Recurvoides* sp. B	*Reticulophragmium* sp. A	*Reticulophragmium* sp. B	*Reticulophragmium* sp. C	*Reticulophragmium* sp. indet.	*Siphonodosaria antillea* (Cushman)	*Siphonodosaria spinata* (Cushman)	*Sphaeroidina bulloides* d'Orbigny	*Spiroculina* spp.	*Spiroplectammina spectablis* (Grzybowski)	*Spiroplectammina* sp. A	*Spiroplectammina* sp. indet.	*Stilostomella* sp. A	*Stilostomella* sp. B	*Stilostomella* sp. C	*Stilostomella* sp. D	*Stilostomella* sp. E	*Stilostomella* sp. F	*Stilostomella* sp. G	*Stilostomella* sp. indet.	*Textularia* sp. A	*Textularia* sp. B	*Textularia* sp. C	*Textularia* sp. D	*Textularia* sp. indet.	*Trochammina* sp.	Tube-shaped agglutinated form	*Uvigerina hispid* Schwager	*Uvigerinella*? sp.	*Vaginulina* sp.	*Vulvulina spinosa* Cushman	Agglutinated foram. gen. et sp. indet.	Calcareous hyaline foram. gen. et. sp. indet.
199-1218A-																																																								
9H-1, 58–60	75.28	11		1					9		4		3		1	5	1												1		1					5							3					1							1	14
9H-3, 118–120	78.88	2		4					5		11		1			4				2									1	2	2					2		2					1												3	9
9H-5, 118–120	81.88			1					44		9		1	1		5				3										3	6					4		1										1						1	1	33
10H-1, 58–60	84.78	10		3					16		4			1		6				4										3	3					5							5		1					2						13
10H-3, 118–120	88.4	2	2	2	1						3	2	1		1	2	1			1										3	7		1			4		1					2		1					2	2				2	15
10H-5, 118–120	91.38								13		2			2	1	2	3			1		1								4	5					4							3										1		1	10
11H-1, 58–60	94.28	7	1								3				2	2	1														1					4							1							1				1	1	8
11H-3, 118–120	97.88	4		1					5		2		5		5	2	3			1									1		7					2																			1	16
11H-5, 118–120	100.88	4	1						6		2	1	2	1	1	3	1			1											5		2			1							1													16
12H-1, 58–60	103.78	3							19				2	1		3	2			3									1		7					4							2													10
12H-3, 118–120	107.38	3		2							4		1	1	1	1	2			2		1								1	13		1			2								2										1		17
12H-5, 118–120	110.38			1					3		2		2	1	1	2	2			3										1	1					2																				13
13H-1, 58–60	113.28			2					1		2		2		1	1	3														7												3	1												6
13H-3, 118–120	116.88	2		1							1		2	4		4	2			2										3	6					1							6										2		2	15
13H-5, 118–120	119.88	8						1	2		1		1				2												1		4		1			4							3												2	14
14H-1, 58–60	122.77	2		5							3		1	2	2	1				3		1							1	2	7					1							1		1					1				1	3	14
14H-3, 118–120	126.37	5	1								3	1	1		2	2	4			3		1								1	6	1				1																				9
14H-5, 118-120	129.37	5	1								5		6	5		1	2			1		1									6					4							3												1	19
15H-1, 10–14	131.8	3									3	3	1		1	1	4			3		1							1		2		2			2							4											1	2	15
15H-3, 90–94	135.6	5	1								2		1		4		4			1		1							2	4	4					3																1			3	13
15H-5, 90–94	138.6	6		2							5	1		3	3	2	1			2									3		3					3		1					3											1		12
16H-1, 10–14	141.3	3							3		1		1		1	3				1		1								2	3					9							3							1						14
16H-3, 90–94	145.1								2		2				3	2	4			3										1	8					1							3		1											24
16H-5, 90–94	148.1	4							3		1	1		3		2	1			2									3	3	3	4	1					1	1				3							1				1	1	19
17H-1, 10–14	150.8			1					4		1	4	2	2			1			1									1	3	4	1	2			2							1										1	1		20
17H-3, 90–94	154.6								8		13	10	2		2	2	2												1	4	5		3	1																				1		18
17H-5, 90–94	157.6	1		2					4		2	1	1		2	1				2		1								3	8		1			1																		1		21
18H-1, 58–60	160.78	1		2					1		5			1	4		3			1									2	6	4		5	1		1							1		1	1								1	5	14
18H-3, 118–120	164.38	2										5	2		2	5	2			4										1	6	1	2							1			1							1					1	35
18H-5, 118–120	167.3			1					1	1			1		2		1												2	1	5		1	2			2																	1	1	15
19H-1, 10–14	169.8		1								4		1		2	1				2										1	5		1			1		1												1					1	16
19H-3, 90–94	173.6	1							3		2				1	1	4			1									2		9					1							3					1					1		2	30
19H-5, 90–94	176.6	2		1					4		5		1	2	1	1	3			1									1	2	7		1												1		1									20

Table T1. (Continued).

Core, section, interval (cm)	Depth (mbsf)	*Pleurostomella* sp. A	*Pleurostomella* sp. B	*Pleurostomella* sp. C	*Pleurostomella* sp. D	*Pleurostomella* sp. E	*Pleurostomella* sp. indet.	*Pseudonodosaria* spp.	*Pseudoparrella exigua* (Brady)	*Pseudoparrella*(?) spp.	*Pullenia bulloides* (d'Orbigny)	*Pullenia osloensis* Feyling-Hanssen	*Pullenia quinqueloba* Reuss	*Pullenia salisburyi*	*Pullenia subcarinata*	*Pullenia* sp. A	*Pullenia* sp. B	*Pullenia* sp. C	*Pullenia* sp. D	*Pyrulina* spp.	*Quadrimorphina profunda* Schnitker and Tjalsma
20H-1, 10–14	179.3			1							3		3		1	1	4			1	
20H-3, 90–94	183.1		3	1					1		7				2		1			1	10
20H-5, 90–94	186.1								5						2		2			1	1
22X2, 10–14	197.5	5		1							1	2	1			1	3			8	2
22X3, 90–95	199.8			2								1	1	2	1	3	2			2	1
22X5, 90–95	202.8	1	1	1							3	1	1			4	1		1	3	
23X1, 10–15	205.6	2							1		2	2				3	4			2	
23X3, 90–95	209.4	4		2					2		4		3		3	3				3	1
23X5, 90–95	212.4								1		5	4				7	2			2	3
199-1219A-																					
6H-1, 10–14	44.1	14		3					34		2	1	2			4	2			9	
6H-3, 90–94	47.9	6		1					10		6			4	2	2	4			1	
7H-1, 10–14	53.6	5							16		5	2		1		3					
7H-4, 10–14	57.94	3									5		2		1	2	1				
8H-1, 35–39	63.35	5		3					2	1	3	3		1	1		4				
8H-4, 10–14	67.6	2									1	2				1					
9H-1, 10–14	72.6	8		1							1	3		1	2	2	1			4	
9H-4, 10–14	77.1								1		2	1		1	1		1				
10H-1, 30–34	82.3	4									1	2	2	2			2			3	
10H-4, 10–14	86.6	1							2		1	2	1		3	1				1	
11H-1, 10–14	91.6											3	1			7	2				
11H-4, 10–14	96.1	2		1					1		2		1								
12H-1, 10–14	101.1		3								3	1	1	1		1	1			2	
12H-4, 10–14	105.6	3							1			1	2	3	1		1				
13H-1, 10–14	110.6								2		8	3	1		2	4				2	
13H-4, 10–14	114.66	1	1	1					5		2			1			5				
14H-1, 10–14	120.1	5							2				4			1	3			6	
14H-4, 10–14	124.6	7									2	1		3	3					2	
15H-1, 10–14	129.6	2		1			2				2		1			3	1			2	1
15H-4, 10–14	134.1	1		1					1		1					3	3			5	2
16H-1, 10–14	139.1	4		1		1			1		4	2			1	3	2	1		2	5
16H-4, 10–14	143.66	1	1								2	2		1		5	4				
17H-1, 20–24	148.7	4	3	2							4	5				2	2			3	

Core, section, interval (cm)	Depth (mbsf)	*Quinqueloculina* spp.	*Recurvoides* sp. A	*Recurvoides* sp. B	*Reticulophragmium* sp. A	*Reticulophragmium* sp. B	*Reticulophragmium* sp. C	*Reticulophragmium* sp. indet.	*Siphonodosaria antillea* (Cushman)	*Siphonodosaria spinata* (Cushman)	*Sphaeroidina bulloides* d'Orbigny	*Spiroculina* spp.	*Spiroplectammina spectablis* (Grzybowski)	*Spiroplectammina* sp. A	*Spiroplectammina* sp. indet.	*Stilostomella* sp. A	*Stilostomella* sp. B	*Stilostomella* sp. C	*Stilostomella* sp. D	*Stilostomella* sp. E	*Stilostomella* sp. F
20H-1, 10–14	179.3								2	1	2					2					
20H-3, 90–94	183.1				1					1	5		3								1
20H-5, 90–94	186.1										4		3	1							
22X2, 10–14	197.5										8		5	1		1					
22X3, 90–95	199.8								4	1	2		1	3							
22X5, 90–95	202.8										1			2							
23X1, 10–15	205.6								1		3			1							
23X3, 90–95	209.4								1		5		1					1			
23X5, 90–95	212.4								2	1	5		1			4					1
199-1219A-																					
6H-1, 10–14	44.1	2							1	5	10										
6H-3, 90–94	47.9								1		10	1				3					
7H-1, 10–14	53.6									3	11					12					
7H-4, 10–14	57.94					1		1		2	8	1	1			11		3			
8H-1, 35–39	63.35	1								2	6					4					
8H-4, 10–14	67.6	1			3					3	1					5					
9H-1, 10–14	72.6							1	1	3	8		1								
9H-4, 10–14	77.1	3								3	11	1				1					
10H-1, 30–34	82.3	1							2	3	8		3			4					
10H-4, 10–14	86.6						2			1	5	1				6					
11H-1, 10–14	91.6								4	5	4			1		9					
11H-4, 10–14	96.1										3	1				3					
12H-1, 10–14	101.1				1					2	10			1		2					
12H-4, 10–14	105.6								5		6			2		2		1			
13H-1, 10–14	110.6	1						1	1		9	1				4					
13H-4, 10–14	114.66		2		1					4	7				1						
14H-1, 10–14	120.1									2	5	1				2					
14H-4, 10–14	124.6										4					6		1			1
15H-1, 10–14	129.6		2		1				1		7										
15H-4, 10–14	134.1		1						4		6					2					
16H-1, 10–14	139.1		2						7		4		1		1						
16H-4, 10–14	143.66			2	1				1		6		1								
17H-1, 20–24	148.7				1				2		7			1		2				1	

Core, section, interval (cm)	Depth (mbsf)	*Stilostomella* sp. G	*Stilostomella* sp. indet.	*Textularia* sp. A	*Textularia* sp. B	*Textularia* sp. C	*Textularia* sp. D	*Textularia* sp. indet.	*Trochammina* sp.	Tube-shaped agglutinated form	*Uvigerina hispid* Schwager	*Uvigerinella*? sp.	*Vaginulina* sp.	*Vulvulina spinosa* Cushman	Agglutinated foram. gen. et sp. indet.	Calcareous hyaline foram. gen. et. sp. indet.
20H-1, 10–14	179.3		1												5	16
20H-3, 90–94	183.1		1					1							1	14
20H-5, 90–94	186.1		2												2	7
22X2, 10–14	197.5		2					1							4	12
22X3, 90–95	199.8		2											1	3	19
22X5, 90–95	202.8		4											2		21
23X1, 10–15	205.6													1		17
23X3, 90–95	209.4															19
23X5, 90–95	212.4		1			2								3	2	11
199-1219A-																
6H-1, 10–14	44.1		2							1						23
6H-3, 90–94	47.9							1	2	3					3	18
7H-1, 10–14	53.6															19
7H-4, 10–14	57.94	1					1			10				4	12	15
8H-1, 35–39	63.35		1	1						1					3	14
8H-4, 10–14	67.6									5					3	14
9H-1, 10–14	72.6									4					1	21
9H-4, 10–14	77.1		1		3										1	17
10H-1, 30–34	82.3									1						13
10H-4, 10–14	86.6									12					6	23
11H-1, 10–14	91.6		2							6					1	19
11H-4, 10–14	96.1		2												3	26
12H-1, 10–14	101.1									4					1	30
12H-4, 10–14	105.6							1		2					2	23
13H-1, 10–14	110.6		2													19
13H-4, 10–14	114.66									7						22
14H-1, 10–14	120.1						2			2					3	23
14H-4, 10–14	124.6		2							2					2	15
15H-1, 10–14	129.6									8					3	18
15H-4, 10–14	134.1		1							2				1	2	17
16H-1, 10–14	139.1		1		1									2		20
16H-4, 10–14	143.66		2					1						1	2	16
17H-1, 20–24	148.7		1							1				1		23

Plate P1. **1.** *Karreriella chapapotensis* (Cole) (Sample 199-1218A-9H-1, 58–60 cm). **2.** *Vulvulina spinosa* Cushman (Sample 199-1218A-18H-1, 58–60 cm). **3.** *Pleurostomella* sp. A (Sample 199-1218A-9H-1, 58–60 cm). **4.** *Pleurostomella* sp. C (Sample 199-1218A-9H-1, 58–60 cm). **5**, *Spiroplectammina spectablis* (Grzybowski) (Sample 199-1218A-18H-1, 58–60 cm). **6.** *Spiroplectammina* sp. A (Sample 199-1218A-22X-3, 90–95 cm). **7.** *Siphonodosaria spinata* (Cushman) (Sample 199-1218A-18H-1, 58–60 cm). **8.** *Siphonodosaria antillea* (Cushman) (Sample 199-1218A-18H-1, 58–60 cm). Scale bar = 100 µm.

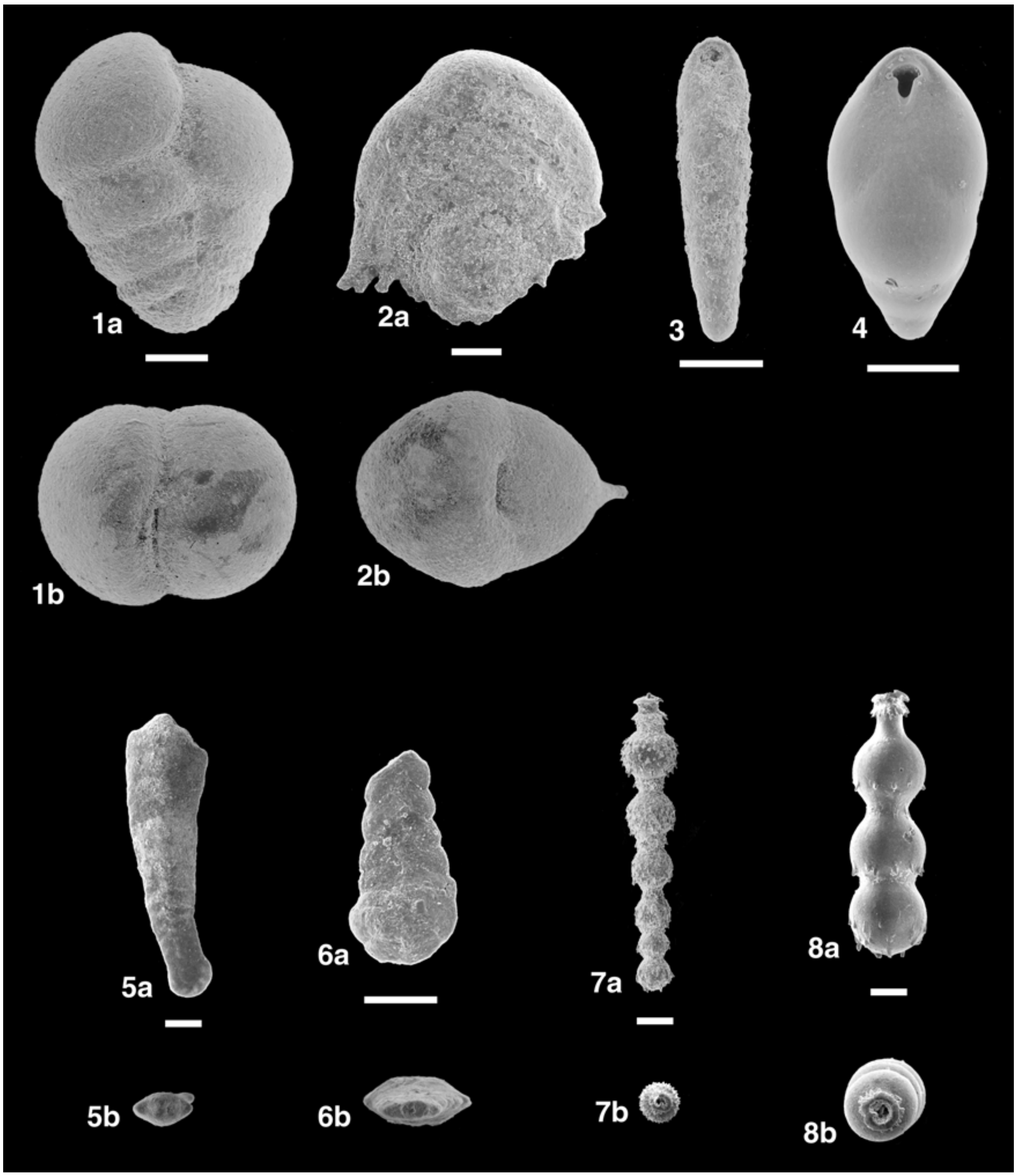


Plate P2. **1.** *Bolivina huneri* Howe (Sample 199-1218A-12H-5, 118–120 cm). **2.** *Bulimina alazanensis* Cushman (Sample 199-1218A-19H-3, 90–94 cm). **3.** *Buliminella parvula* Brotzen (Sample 199-1218A-17H-3, 90–94 cm). **4.** *Evolvecassidulina* cf. *howei* (Cushman) (Sample 199-1218A-14H-1, 58–60 cm). **5.** *Globocassidulina subglobosa* (Brady) (Sample 199-1218A-17H-3, 90–94 cm). **6.** *Globocassidulina* sp. A (Sample 199-1218A-13H-3, 118–120 cm). **7.** *Cassidulina* sp. A (Sample 199-1218A-13H-3, 118–120 cm). **8.** *Favocassidulina spinifera* (Cushman and Jarvis) (Sample 199-1218A-14H-1, 58–60 cm). **9.** *Globocassidulina* sp. B (Sample 199-1218A-18H-5, 118–120 cm). **10.** *Favocassidulina subfavus* Resig (Sample 199-1218A-14H-1, 58–60 cm). Scale bar = 100 µm.

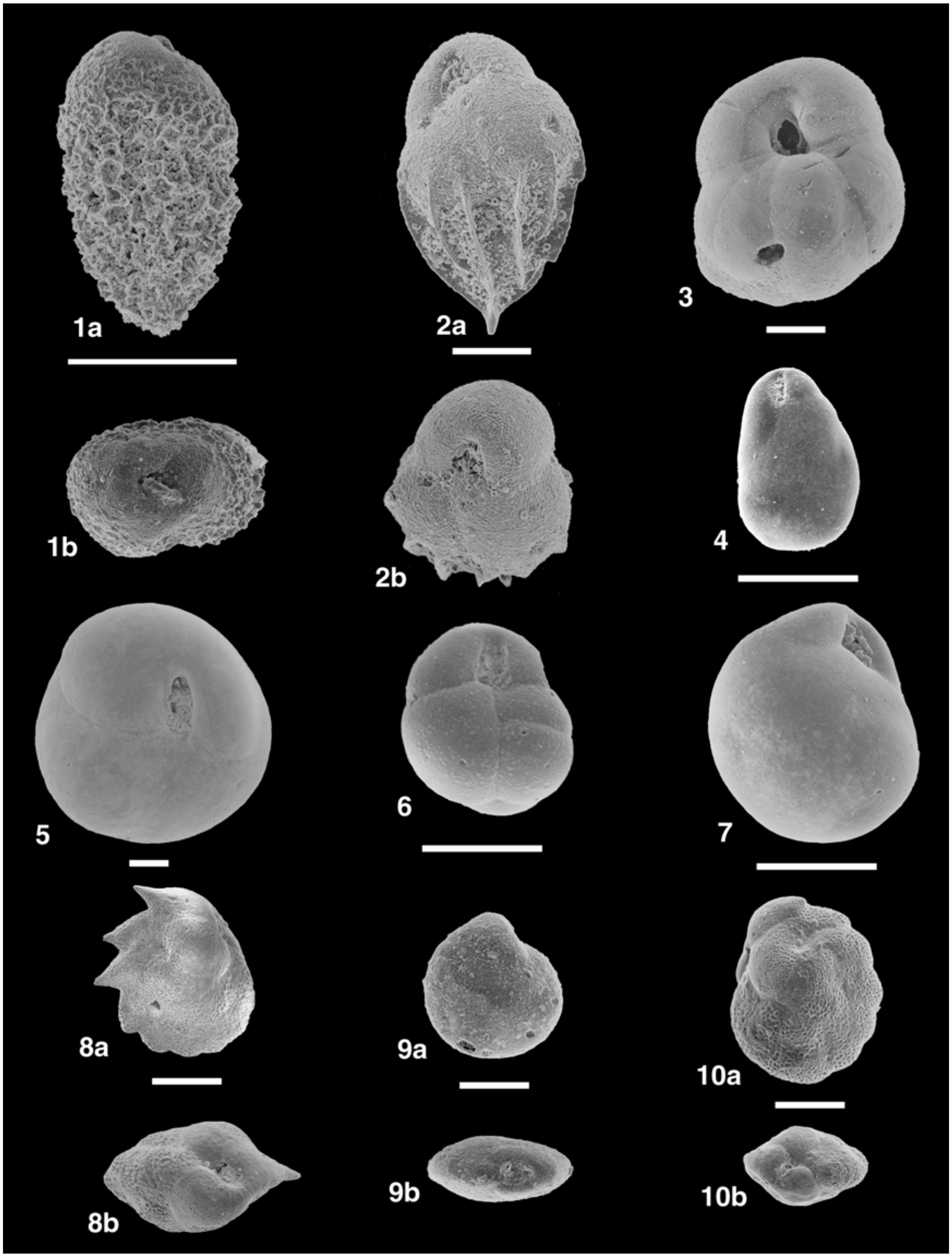


Plate P3. **1, 2.** *Nuttallides umbonifer* (Cushman) (Sample 199-1218A-13H-3, 118 20 cm). **3.** *Pseudoparrella exigua* (Brady) (Sample 199-1218A-9H-1, 58–60 cm). **4.** *Oridorsalis umbonatus* (Reuss) (Sample 199-1218A-14H-3, 118–120 cm). Scale bar = 100 µm.

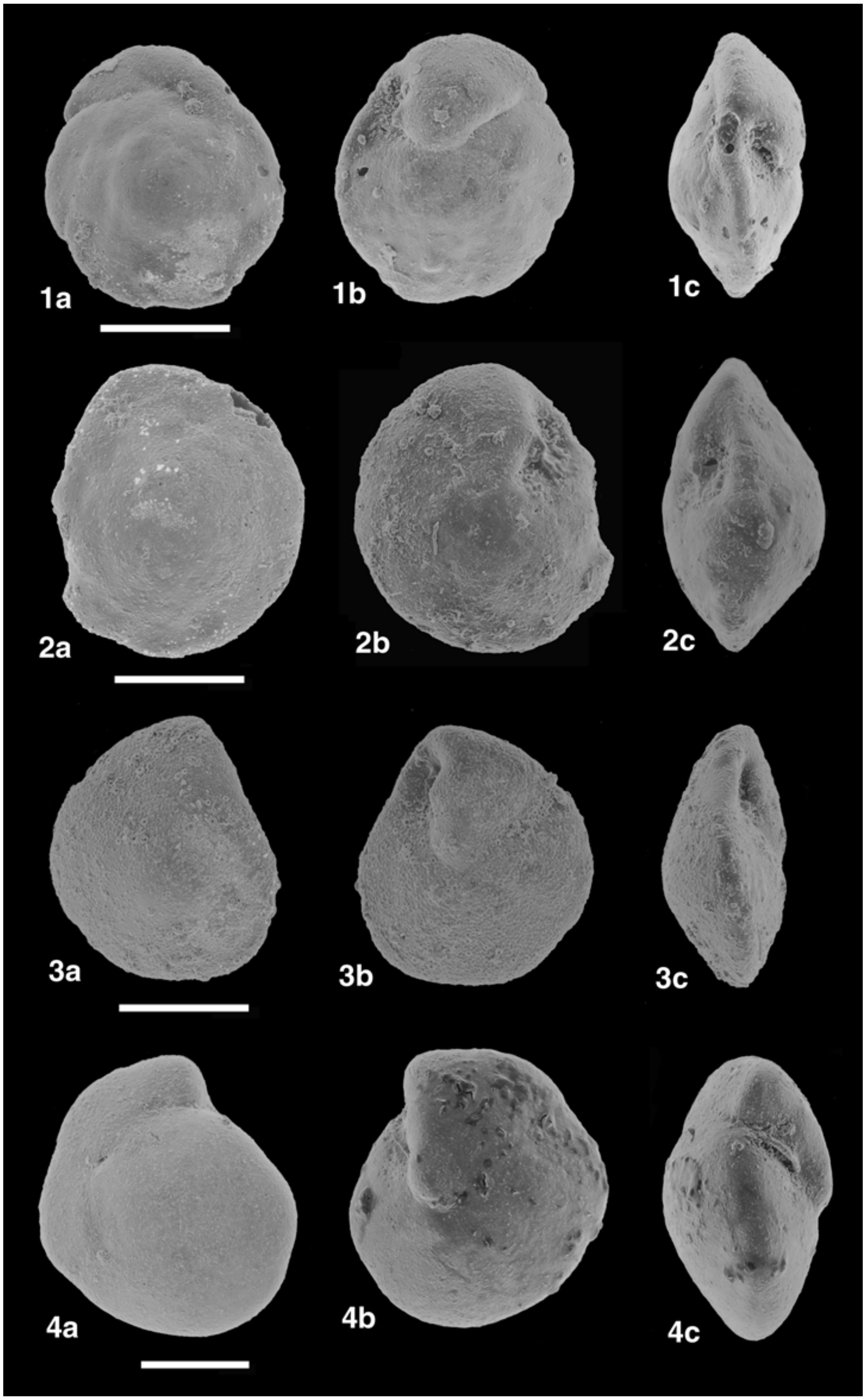


Plate P4. **1.** *Oridorsalis umbonatus* (Reuss) (Sample 199-1218A-14H-3, 118–120 cm). **2.** *Gyroidinoides soldanii* (d'Orbigny) (Sample 199-1218A-15H-5, 90–94 cm). **3.** *Gyroidinoides* sp. A (Sample 199-1218A-12H-1, 58–60 cm). **4.** *Gyroidina* E (Sample 199-1218A-14H-1, 58–60 cm). Scale bar = 100 µm.

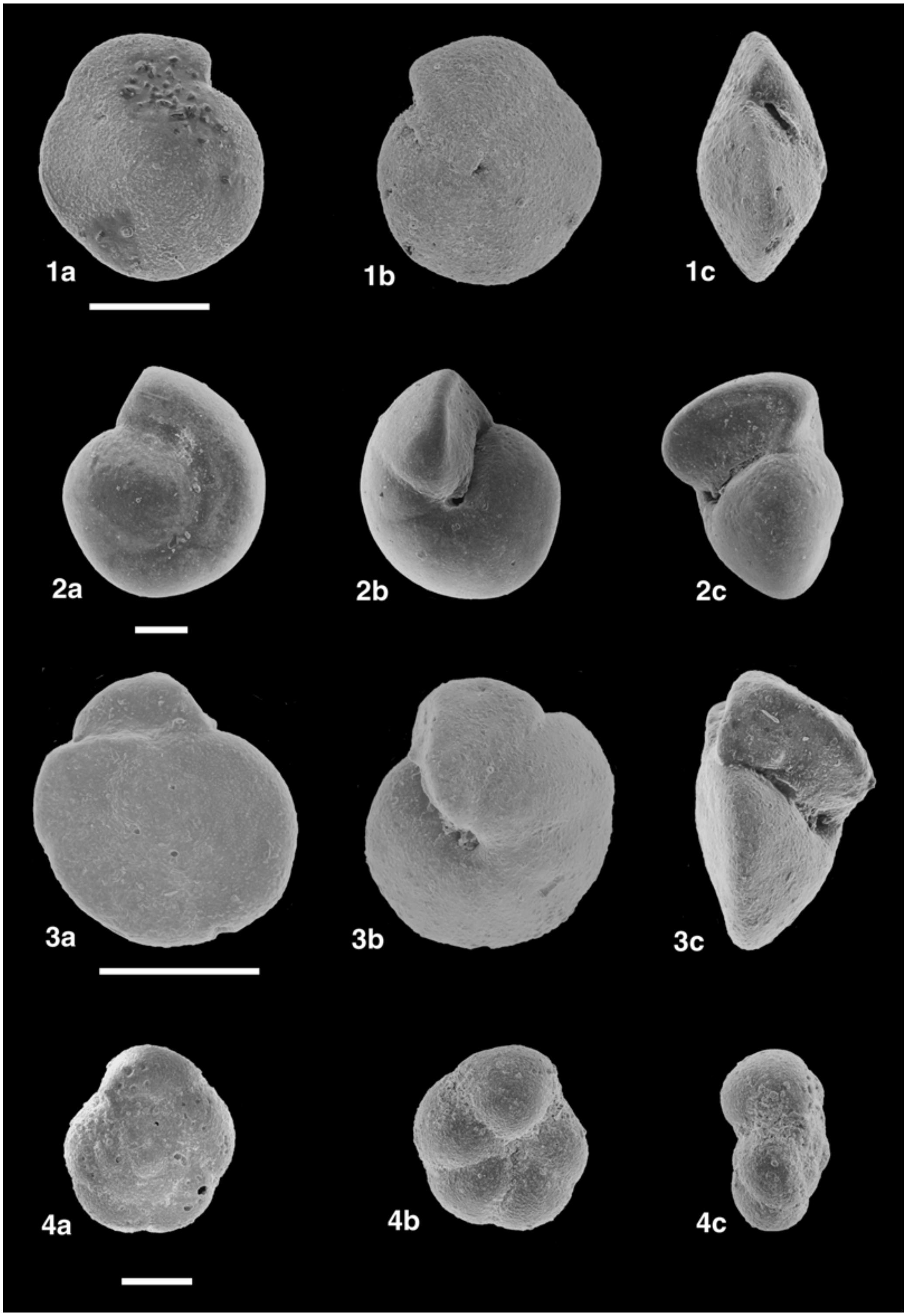


Plate P5. **1.** *Gyroidinoides* sp. B (Sample 199-1218A-12H-5, 118–120 cm). **2.** *Gyroidinoides* sp. C (Sample 199-1218A-12H-1, 58–60 cm). **3.** *Alabaminella weddellensis* (Earland) (Sample 199-1218A-12H-3, 118–120 cm). **4.** *Sphaeroidina bulloides* d'Orbigny (Sample 199-1218A-14H-1, 58–60 cm). Scale bar = 100 µm.

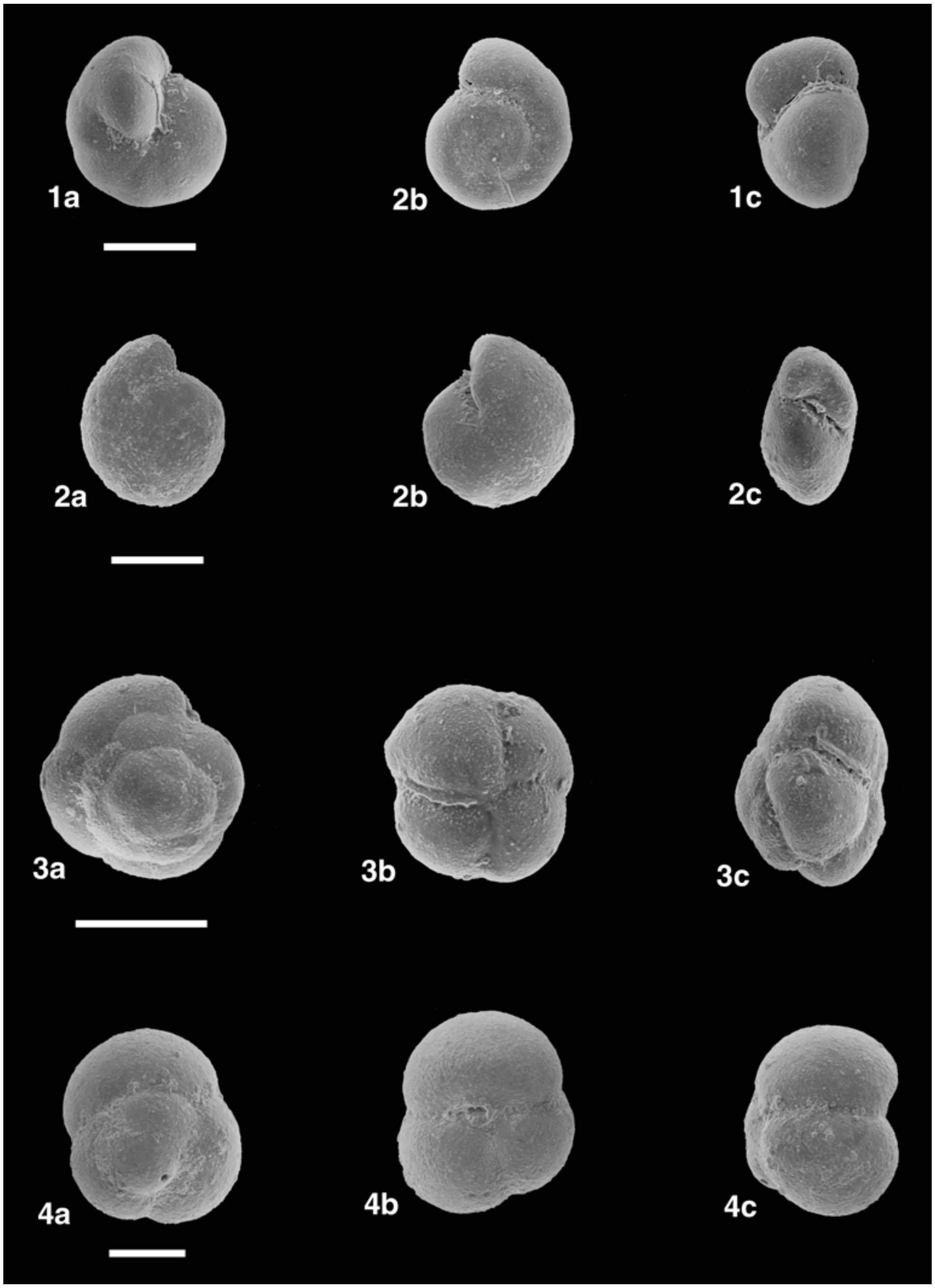


Plate P6. **1.** *Quadrimorphina profunda* Schnitker and Tjalsma (Sample 199-1218A-20H-3, 90–94 cm). **2.** *Cibicidoides lamontdohertyi* Miller and Katz (Sample 199-1218A-17H-3, 90–94 cm). **3.** *Cibicidoides mundulus* (Brady, Parker, and Jones) (Sample 199-1218A-18H-1, 58–60 cm). **4.** *Cibicidoides* sp. A (Sample 199-1218A-18H-1, 58–60 cm). Scale bar = 100 µm.

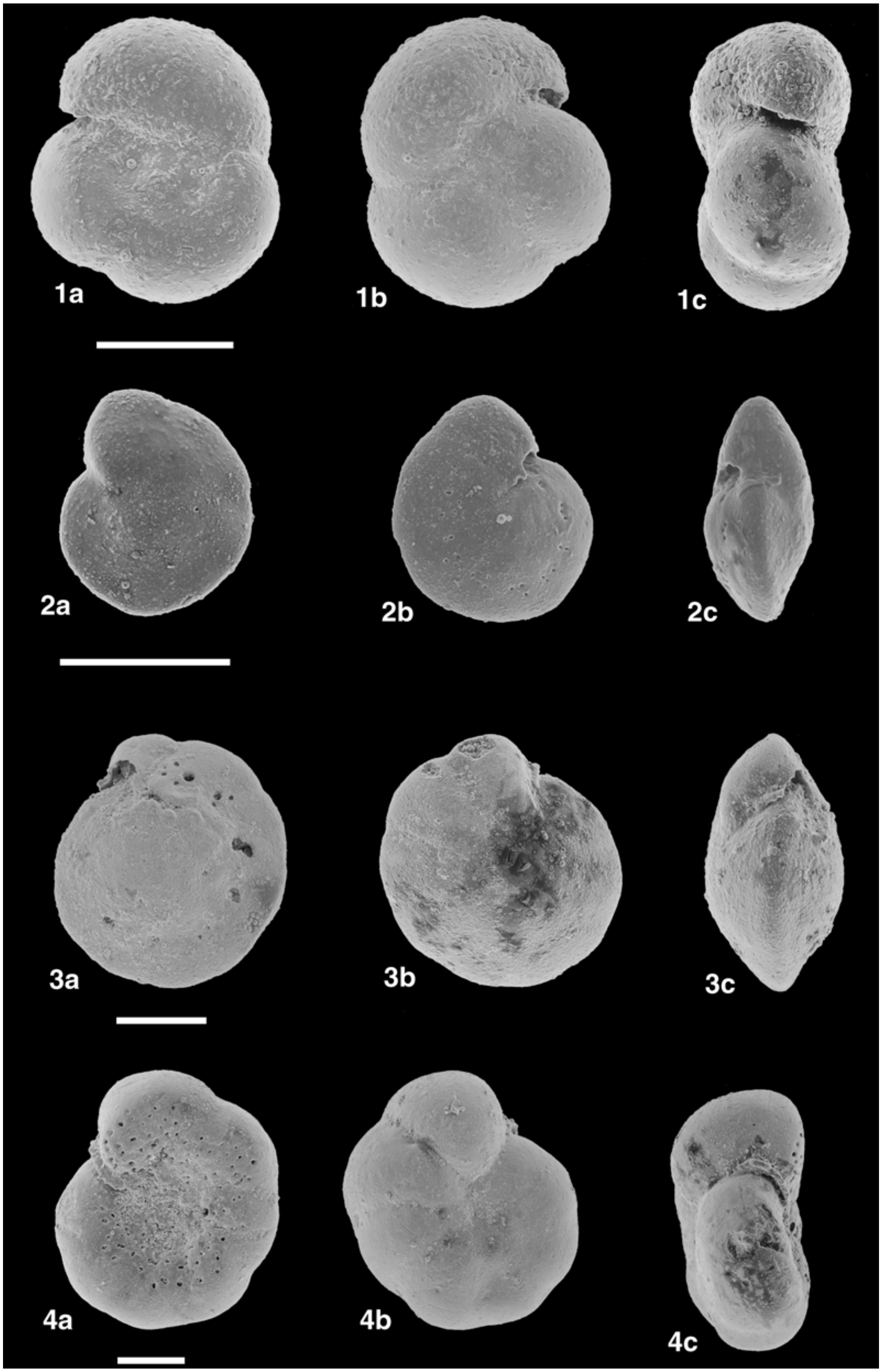


Plate P7. 1, 2. *Cibicidoides grimsdalei* (Nuttal); (1) Sample 199-1218A-22X-2, 10–14 cm, (2) Sample 199-1218A-18H-1, 58–60 cm. **3.** *Anomalinoides* sp. A (Sample 199-1218A-10H-3, 118–120 cm). **4.** *Nonion affine* (Reuss) (199-1218A-18H-3, 118–120 cm). **5.** *Astrononion echolsi* Kennett (Sample 199-1218A-18H-3, 118–120 cm). Scale bar = 100 µm.

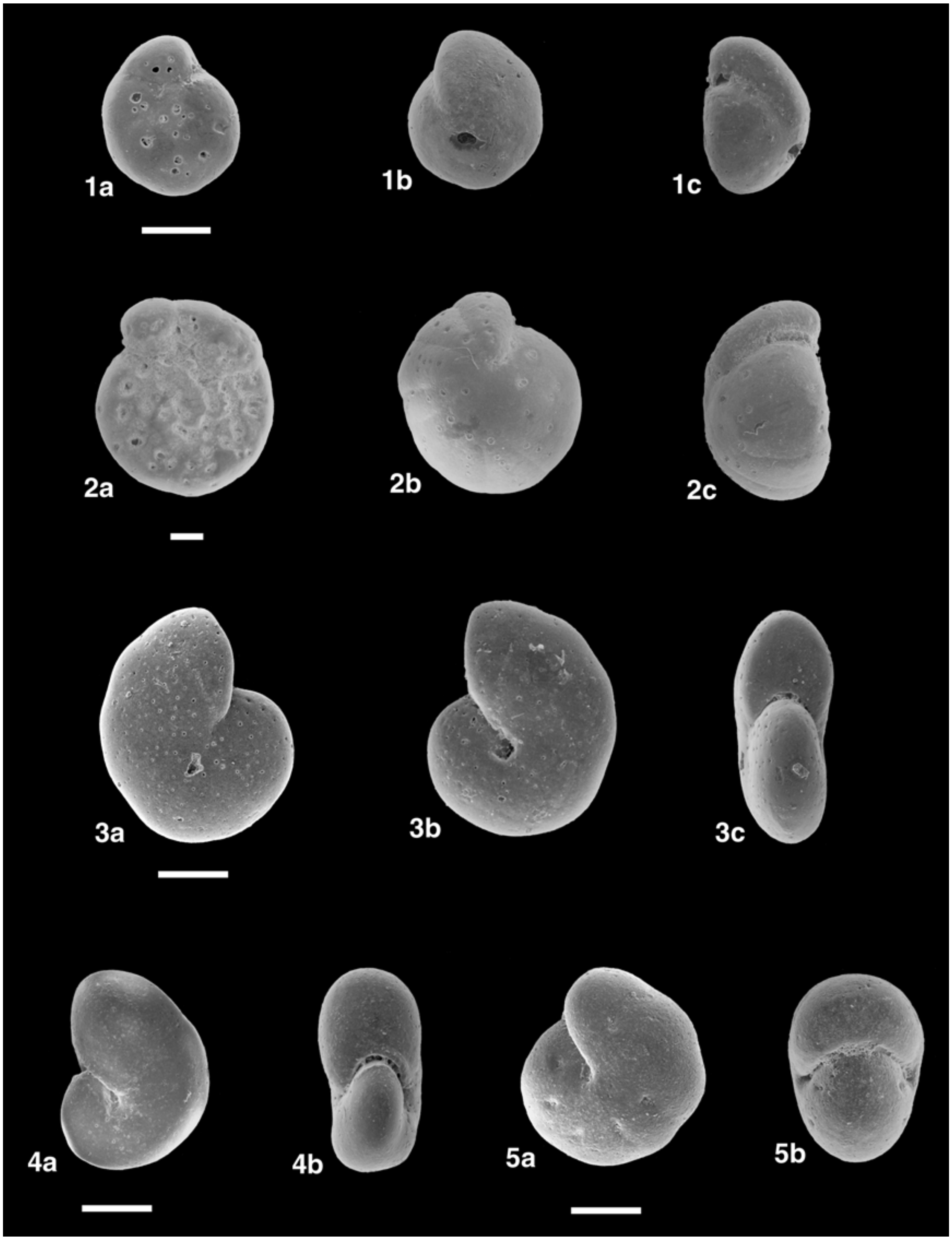


Plate P8. **1.** *Nonion havanensis* Cushman and Bermudez (Sample 199-1218A-19H-1, 10–14 cm). **2.** *Pullenia bulloides* (d'Orbigny) (Sample 199-1218A-17H-3, 90–94 cm). **3.** *Pullenia osloensis* Feyling-Hanssen (Sample 199-1218A-17H-3, 90–94 cm). **4.** *Pullenia quinqueloba* (Reuss) (Sample 199-1218A-18H-5, 118–120 cm). **5.** *Pullenia* sp. A (Sample 199-1218A-15H-1, 10–14 cm). **6.** *Pullenia* sp. B (Sample 199-1218A-13H-5, 118–120 cm). **7.** *Pullenia salisburyi* Stewart and Stewart (Sample 199-1218A-10H-3, 118–120 cm). **8.** *Pullenia subcarinata* (d'Orbigny) (Sample 199-1218A-14H-3, 118–120 cm). Scale bar = 100 µm.