

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color
		1	l. Paleocene - m. Eocene	(Mr)		T T T T T T	10YR 6/6 to 10YR 8/2

DESCRIPTION

MANGANESE-COATED, PHOSPHATIC LIMESTONE CONGLOMERATE

Major Lithology:

Manganese-coated, phosphatic RUDSTONE, brownish-yellow (10YR 6/6) with a few white clasts (10YR 8/2). "Matrix" is PLANKTONIC-FORAMINIFER SAND (PACKSTONE?) with bioclasts to 1 mm. Clasts are: (1) lithoclasts of SKELETAL GRAINSTONE, with foraminifers (benthic?) and rudist fragments of various sizes (~1/2 mm in one sample; to >2 mm in another), clasts are up to 1.5 cm in size; (2) bioclasts, mainly rudist (radiolite) fragments to 1 mm. There is a 1.5 cm shark(?) tooth at Section 1, 24 cm. The depositional texture is therefore rudstone with planktonic packstone matrix. MANGANESE RIND is black (N1/0) and up to 1.5 cm-thick. Outer portion (to 1 cm-thick) is very spongy with spectacular digitate "stromatolites" that enclose either pores or white pelagic limestone (the pores may be washouts, but this is unlikely because the limestone is well lithified). Porosity is locally 25%, and probably vuggy. Manganese habits are varied; much of it has clearly replaced the original material. The manganese cuts across the rudstone on a broad, generally sharp front, but in places is preceded by Mn "dendrites". Manganese also replaces skeletons, e.g., a large radiolite rudist. Manganese is most dense at the bioclast/matrix contact where it has encroached both into the matrix (planktonic packstone), along a sharp but very irregular front, and into the rudist, as dendrites. Some clasts (lithoclasts?) have thin manganese crusts and dendrites extending inward throughout (1 mm diameter); these could be coatings applied during reworking, since the matrix is not replaced. Manganese locally replaces phosphatized limestone. Fractures within the manganese crust are filled with pelagic foraminifer packstone. Digitate domal stromatolites of manganese extend into the fracture fill, replacing the packstone. Pelagic foraminifers and/or their molds are lightly coated by manganese. Bands within the larger manganese "stromatolites" are much more metallic than the norm; perhaps indicating concentration of other metals. The PHOSPHATIC REPLACEMENT (the brownish yellow stain?) is more pervasive and less

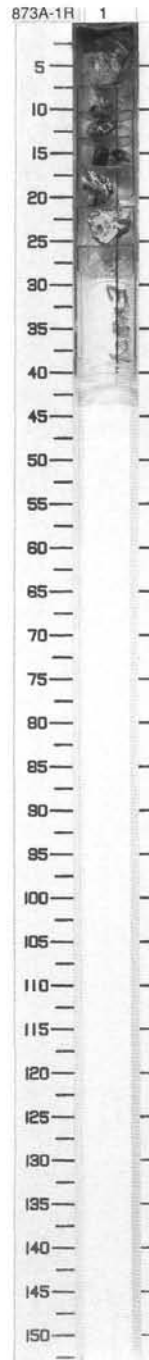
destructive of fabric than the manganese encrustations. Phosphate has generally replaced the rudstone, but locally is selective. A 10 mm lithoclast remains unreplaced, despite 10% moldic porosity. It is surrounded by concentric banding, to 4 mm, in the matrix. (Bio?)clasts within the lithoclast are heavily phosphatized (2 examples only). The intensity of color in bands and in clasts is taken as an index of phosphate concentration. Within the pelagic packstone (rudstone matrix), some skeletons are selectively replaced while others selectively spared, as with lithoclasts and larger bioclasts. In Section 1, 21-25 cm, the shells of planktonic foraminifers in the "matrix" are mostly phosphatized; mud, observed inside and outside the shells, is white. The matrix porosity of the rudstone is ~10%, moldic (after foraminifers); locally it is 15%. Where manganese replacements occur, porosity is negligible. (But note that outer, nonreplacive portion of manganese crust is also porous, where not filled by pelagic limestone or where carbonate has been leached). A few radiolites (rudists) retain intraparticle porosity (crSmsMO).

Specific Interval Features:

Manganese patterns increase the complexity of the facies. In Section 1, 8-21 cm, packstone (shallow biota) clasts have a manganese-replaced matrix; bioclasts within these clasts are largely unreplaced; many have a laminated manganese coat, up to several mm thick. The bioclasts are bordered by stubby digitate "stromatolites" of manganese that pass into more manganese dendrite halos. These halos extend 10 mm into the pelagic packstone matrix. Other clasts have manganese coats to 5 mm thick; there is very sparse replacement of clasts, but 10 mm stromatolite and dendrite haloes are observed. Some clasts of both types, manganese-replaced or manganese-spurred, have light phosphate replacement. Clasts that are not replaced by manganese, have internal moldic porosity of 10%, yet no manganese. Is porosity post-manganese replacement? Manganese-dendrites locally spare pelagic foraminifers; manganese also locally replaces the muddy fill within foraminifers, but not the tests, which have very high original porosity. In Section 1, 17-21 cm, manganese "domains" up to 10 mm long look like spalled bits of manganese crusts. Internal laminations may be truncated in some, but they are now fringed by (secondary?) laminated crusts and digitate "stromatolites". Matrix is pelagic packstone, white (10YR 8/1). In Section 1, 24 cm, a shark tooth is clear beneath the blue enamel (apatite?) exterior; perhaps replaced. The spongy interior (or intercrystalline contact) is lightly manganese-impregnated to produce a 3-dimensional image of the tooth interior -- a "hologram".

General description:

Rollers: Section 1, 0-7 cm and 20-25 cm; Drilling pebbles: Section 1, 7-20 cm. Thin section samples: Section 1, 0-7 cm, 13-16 cm, 16-20 cm, and 20-25 cm.



873A-1R CORED 54.3 – 59.8 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
		1	I. Paleocene-m. Eocene	F, CP8, CP11-12a, CP14a	R, P4, P8, P12	P	(Mr)		T	10YR 6/6 to 10YR 8/2

873A-2R CORED 59.8 – 69.3 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
		1		CP8, CP14	P4, P12		(Mr)		T	10YR 8/2 to 10YR 6/6

F, G, C, M
late Paleocene – middle Eocene

873A-3R CORED 69.3 – 78.7 mbsf

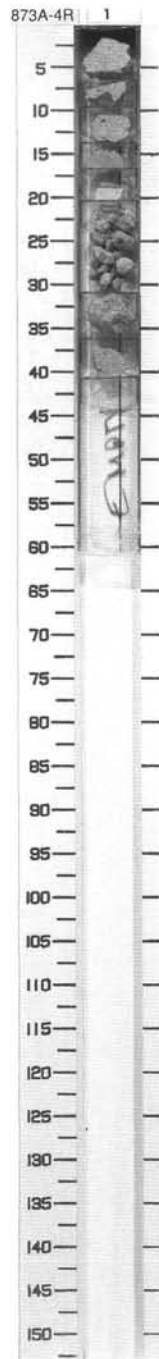
Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
		1	Maastrichtian	B	B		(Mr)		T	10YR 7/3



R, P

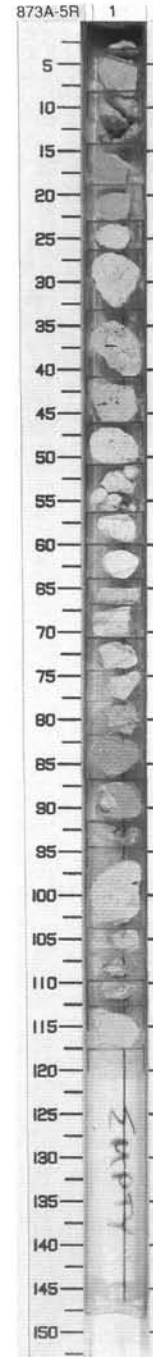
SITE 873 HOLE A CORE 4R

CORED 78.7-88.3 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	DESCRIPTION
		1	Maastrichtian			T T T T	10YR 8/3 10YR 7/2	<p>RUDIST PACKSTONE TO GRAINSTONE and MOLLUSK FORAMINIFER PACKSTONE</p> <p>Major Lithologies: Section 1, 0-36 cm: very pale brown (10YR 8/3) RUDIST GRAINSTONE to PACKSTONE, poorly sorted, fine to coarse grained. Skeletal grains are well rounded and include fragments of rudists (radiolitids), red algae (especially branching corallinaceans), echinoids, and bivalves; benthic foraminifers (mainly miliolids and orbitoids) are common. Large skeletal pieces are locally encrusted by red algae (corallinaceans). Whole specimens of rudists and large pieces of coral colonies are recovered in Section 1, 31-36 cm. The porosity is generally high, 15% to 20%, moldic after bivalve shells and corals, and intergranular with solution enlarged pores. The porosity is moderately reduced by drusy calcite cements. Section 1, 36-40 cm: light gray (10YR 7/2) MOLLUSK FORAMINIFER PACKSTONE, fine- to medium-grained. They include common molds of small bivalves and gastropods; benthic foraminifers (miliolids and textulariids) and micritized rudist fragments (radiolitids) are also common. Porosity (3%) is moldic (after leached mollusk shells and foraminifers) and intragranular.</p> <p>General Description: Rollers: Section 1, 0-16 cm and 31-40 cm; Drilling Pebbles: Section 1, 16-40 cm. Thin section samples: Section 1, 0-6 cm, 16-20 cm, 21-30 cm, 31-36 cm, and 36-40 cm.</p>

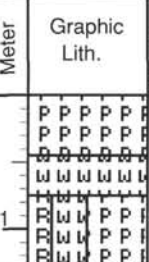



Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	DESCRIPTION
1	P P P P P W P P P P P P P P P P	1	Maastrichtian			T T T T	10YR 7/2	<p>RUDIST PACKSTONE, FORAMINIFER WACKESTONE, and BIVALVE FORAMINIFER PACKSTONE</p> <p>Major Lithologies: Section 1, 0–23 cm: light gray (10YR 7/2) RUDIST PACKSTONE, fine grained. These pieces are characterized by an abundance of rudist fragments (radiolitids), a few-mm to 3 cm in size. Coral molds, benthic foraminifers (millioids), tiny bivalve fragments, and echinoid fragments are also reported. Porosity (10%) is intergranular, moldic (after leached tiny bivalve fragments and foraminifers) and locally vuggy. The porosity is moderately reduced by drusy calcite cements. Section 1, 23–78 cm: white (10YR 8/2, 5YR 8/1), pinkish white (7.5YR 8/2, 5YR 8/2) to light gray (10YR 7/2) FORAMINIFER WACKESTONE. Conspicuous light gray (2.5Y 7/2) to very pale brown (10YR 8/5) mottling is due to bioturbation. Open spaces include tubular pores from 0.3 mm to 2 mm in diameter. Some may be burrows, others may be tiny tubular fenestrae (from escaping fluids). Y-shaped cavities narrowing downwards may be plant rootlets. Porosity (3%) is moderately reduced by light gray (2.5Y 7/2) silt-sized geopetal infillings or locally, by calcite cements (drusy, asymmetric, laminated crusts). These open spaces are usually stained yellow (2.5Y 8/6, 10YR 7/6) to red (2.5YR 5/6, 10R 4/6). The fossil content of the wackestone is poor and includes small benthic foraminifers (millioids), molds of gastropods and thin-shelled bivalves; green algae and worm tubes are rare. In Section 1, 64–71 cm, a cm-thick layer of foraminifer wackestone exhibits mm-sized, oxidized borings which are seemingly disrupted. Section 1, 82–118 cm; white (10YR 8/2), light gray (10YR 7/2) to very pale brown (10YR 7/3) BIVALVE FORAMINIFER PACKSTONE. The packstone includes benthic foraminifers (orbitoids - some of them are leached), peloids, molds of bivalves and gastropods, peloids and fragments of rudists (radiolitids) and red algae (corallinaceans). The moldic to vuggy porosity (1%) is moderately reduced by drusy and equant calcite cements. Bioturbation (mm-sized tubes) and fenestrae are observed in Section 1, 95–118 cm.</p> <p>General description: Rollers: Section 1, 3–8 cm, 13–51 cm, 56–92 cm, 95–107 cm, and 110–118 cm; Drilling Pebbles: Section 1, 0–3 cm, 8–13 cm, 51–56 cm, 92–95 cm, and 107–110 cm. Thin section samples: Section 1, 13–18 cm, 41–46 cm, 56–60 cm, 67–70 cm, 78–82 cm, and 104–107 cm.</p>



SITE 873 HOLE A CORE 6R

CORED 98.0–107.6 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color
1		1	Maastrichtian			T T T T	10YR 7/4 To 10YR 8/3

DESCRIPTION

MOLLUSK PACKSTONE, GASTROPOD WACKESTONE, MOLLUSK MILIOLID PACKSTONE, and SKELETAL RUDSTONE

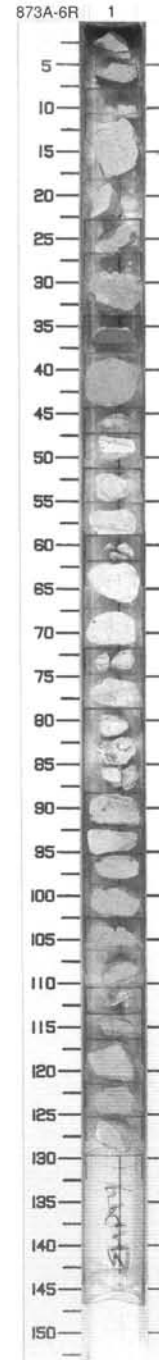
Major Lithologies:

Section 1, 0–47 cm: light yellowish brown (10YR 6/4) to very pale brown (10YR 7/4) MOLLUSK PACKSTONE. The grains, in order of abundance, are bivalves, gastropods, and miliolids. There are few rudist (radiolite) bivalves but cerithid gastropods (high-spired) are scattered throughout. Minor components are: corals (porites?, branching), other benthic foraminifers, echinoderm debris, encrusting worms and/or algae, dasycladacean algae, bryozoans and codiacian algae are rare(?). Peloids are doubtless common, but are hard to identify. Porosity is generally high (10%), but varies locally from 2%–20%. Porosity is almost entirely skelmoldic, with only minor intergranular porosity. Low porosity in Section 1, 18–27 cm is due to pervasive cementation by passive, equant calcite crusts (PE5, PE5C). Other molds are variably reduced by calcite cement. Porosity appears higher at the margins of pieces, especially in the upper part; this suggests that differential cementation and dissolution helped control breakage of the clasts during drilling. Patchy yellow stains are associated with molds. Section 1, 47–76 cm: very pale brown (10YR 8/3) GASTROPOD WACKESTONE, except at Section 1, 51–55 cm, where it is white (10YR 8/2). Gastropods are common, especially cerithids; there are many bivalves (radiolites are rare) and few miliolids. Porosity decreases downward from 10% (at Section 1, 47–55 cm) to 1%–2%, because of increased cementation. The porosity is comprised of skeletal molds (of mollusks and some miliolids) with a few vugs. Cement is passive, bladed, coarsely crystalline crusts of clear, euhedral calcite (PB5C). The contact near Section 1, 76 cm is very ragged, suggesting bioerosion or solution etching of this horizon. The intervals above and below the contact have been pervasively leached to form vuggy porosity. More of the upper interval (Section 1, 76–88 cm) has been removed close to the contact (>50% by volume) than the lower interval. The lower interval (Section 1, 76–88 cm) is cut by irregular vugs that contain pieces of the host lithology which can be fitted back into place along the

vug wall. Vugs in both of these intervals are filled by a fine-grained MOLLUSK MILIOLID PACKSTONE that has no recognizable equivalent uphole (though interval 144-873A-5R-1, 82–92 cm or -6R-1, 0–47 cm may be a match). Similar vugs and fill occur in interval 144-873A-5R-1, 104–107 cm, but may reflect a similar, but later, episode of dissolution. Very similar dense rims occur at interval 144-873-5R-1, 67–70 cm. Section 1, 76–88 cm: very pale brown (10YR 8/3) MOLLUSK MILIOLID PACKSTONE and WACKSTONE (patchy), containing many gastropods, miliolids, and mollusks (radiolite rudists rare). Mollusks, to 1.5 cm long, in one piece. Porosity (3%) as molds of gastropods and miliolids. Many molds, and locally matrix, are stained yellow. Molds are reduced and filled by passive, bladed, coarsely crystalline calcite crusts (PB5C). The top of a vug in Section 1, 76–88 cm is filled with coarse-grained cement to produce geopetals. The mold of a bivalve that once protruded into the vug stands open; it is unfilled by internal sediment or cement. The mold is indicative of a later solution event that is only recognized as post-dating deposition and cementation. Section 1, 88–130 cm: skeletal limestone that grades from SKELETAL RUDSTONE at the top (Section 1, 88–93 cm), through mixed SKELETAL PACKSTONE (dominant) and WACKESTONE, to MOLLUSK WACKESTONE at the base (Section 1, 125–130 cm). The mixing of packstone and wackestone is locally caused by burrowing (e.g., Section 1, 117–125 cm), but may in part reflect the slight compaction (dewatering) of a mud-supported fabric to produce a packstone “filled” by mud. The color of this interval is very pale brown (10YR 7/4), except at its base: Section 1, 125–130 cm is white (10YR 8/2). Yellow stains occur throughout this interval (from yellow (10YR 7/8) to yellowish brown (10YR 5/6)). The stain is mostly around molds, but locally includes matrix, especially the muddy matrix filling gastropods. Major particles are gastropods, bivalves, and miliolids. Gastropods are mostly low-spired forms; bivalves include radiolites (rare). Minor components include corals, other benthic foraminifers, encrusting worms and/or foraminifers, and echinoderm debris. Porosity varies from 1% (Section 1, 88–96 cm and 117–122 cm) to 8% (Section 1, 114–117 cm), and consists of molds (abundant) and vugs (rare). Calcite cement extensively fills the molds in less porous intervals. A sizable vug, represented only by one wall with vertical contact (Section 1, 107–111 cm), is largely filled by silt-sized calcite, loosely packed but cemented, which contains bioclasts from the host rock and a 0.5 mm terrigenous siltstone clast.

General description:

Rollers: Section 1, 11–44 cm, 62–71 cm, 88–103 cm, and 117–130 cm; Drilling Pebbles: Section 1, 0–11 cm, 44–62 cm, 71–88 cm, and 103–117 cm. Thin section samples: Section 1, 11–18 cm, 19–23 cm, 34–38 cm, 55–59 cm, 75–79 cm, 93–96 cm, 103–107 cm, and 117–120 cm.



SITE 873 HOLE A CORE 8R

CORED 117.3 – 126.9 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color
1		1	Maastrichtian	P		T T T T	10YR 7/3 10YR 6/1
2		2				T	

DESCRIPTION

PACKSTONE, GRAINSTONE, WACKESTONE, and MUDSTONE

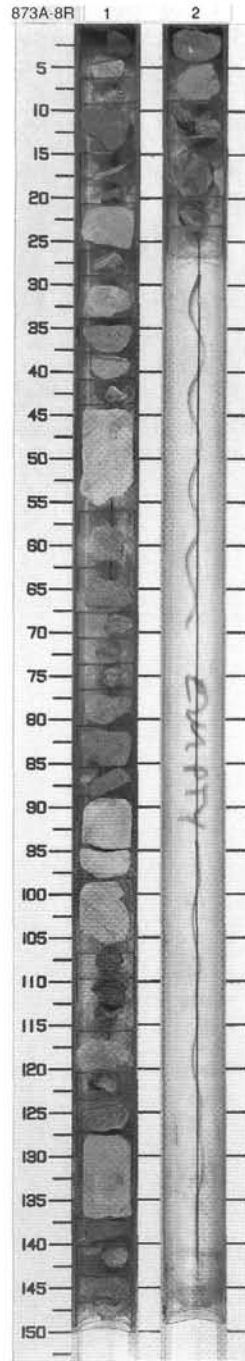
Major Lithologies:

Section 1, 0–3 cm: very pale brown (10YR 5/6) PACKSTONE as an internal mold of a bivalve with common miliolids; the internal mold is in contact with a SKELETAL RUDSTONE with phosphatized matrix and 40%–50% moldic and vuggy porosity. Section 1, 3–7 cm and 7–9 cm: very pale brown (10YR 7/3) SKELETAL PACKSTONE, shell fragments (bivalve?) abundant, algae (dasycladacean) common. Porosity is (5%) moldic after bivalves and algae filled or reduced by amber equant to bladed cement. Section 1, 9–14 cm and 17–20 cm: GRAINSTONE, peloids common, large benthic foraminifers may be common as lentil-shaped molds. If intergranular cement is neomorphosed mud, the original texture would be packstone. Section 1, 14–17 cm and 20–56 cm: very pale brown (10YR 7/3) GRAINSTONE, very fine grained sand texture (< 100 microns), burrowed, vuggy porosity (1%–2%). Section 1, 56–62 cm: WACKESTONE with moldic porosity after bivalves and gastropods. Section 1, 62–76 cm: very pale brown (10YR 7/3) FLOATSTONE to RUDSTONE with mudstone/packstone matrix. Rudist fragments and other mollusk debris are common. Geopetal fill in one partial rudist valve. Section 1, 76–89 cm: light gray (10YR 7/1) to gray (10YR 6/1) WACKESTONE to FLOATSTONE with wackestone matrix, common bivalve fragments, miliolids, gastropod molds, few rudist fragments. Section 1, 89–98

General description

Cylinders: Section 1, 43–56 cm, 89–107 cm, and 128–137 cm; Rollers: Section 1, 9–14 cm, 20–43 cm, 56–89 cm, 107–128 cm, 137–141 cm, and 144–147 cm, Section 2, 0–9 cm and 13–20 cm; Drilling pebbles: Section 1, 0–9 cm, 14–20 cm, 141–144 cm, and 147–150 cm, Section 2, 9–13 cm and 20–23 cm. Thin section samples: Section 1, 3–7 cm, 54–57 cm, 69–71 cm, 82–86 cm, 95–99 cm, and 125–128 cm, Section 2, 0–3 cm and 20–23 cm.

cm: gray (10YR 6/1) WACKESTONE with black to gray grains, some pellet-shaped, blackened shell fragments are common. Porosity is (<5%) moldic after mollusks. Section 1, 98–107 cm: dark gray (2.5YR 4/0) PACKSTONE, fine-grained; there are some grading and bedding apparent, and possible rip-up structures. Components include pyritized pellets and foraminifers, common miliolids (not pyritized), black peloids and blackened shell fragments. Section 1, 107–116 cm and 121–124 cm: dark gray (2.5YR 4/0) to light gray (10YR 7/1) CARBONACEOUS WACKESTONE, one piece has a pyritized algal or microbial encrustation. Section 1, 116–121 cm: light gray (10YR 7/1) MUDSTONE with fenestrae (possible fluid escape structures); associated with possible microbial encrustations. Section 1, 124–128 cm: light gray (10YR 7/1) PELOID(?) PACKSTONE. Porosity is 1%–2% moldic after mollusk debris. Section 1, 128–137 cm: gray (10YR 6/1) MUDSTONE, with some boring; there are also disseminated flakes of brown to black organic debris. Section 1, 137–141 cm and 144–147 cm: gray PACKSTONE, with common miliolids, molds of dasycladacean algae, and possible fragments of encrusting red algae. Section 1, 141–144 cm and 147–150 cm: gray WACKESTONE (drilling pebbles). Section 2, 0–4 cm: light gray PACKSTONE to WACKESTONE, burrowed (fill is wackestone). Contains abundant molds of dasycladacean algae, blackened grains and shell fragments; brown flakes in the finer portions. Section 2, 4–9 cm: light gray (2.5YR 7/1) MUDSTONE to very fine WACKESTONE, with 1 cm packstone-filled burrow. Section 2, 9–13 cm: this interval contains 6 drilling pebbles; one is a coralline RUDSTONE with a black mud matrix, and another is a gastropod RUDSTONE. Section 2, 13–23 cm: dark gray (2.5YR 4/0) RUDSTONE with mud matrix, some gastropod and coral molds, one possible rudist fragment with an inner aragonitic layer pseudomorphosed by muddy white sediment. Other molds are filled by same white sediment.



873A-7R CORED 107.6 - 117.3 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
1		1	Maastrichtian						T	
2		2	Maastrichtian	B	B	F,M			T	10YR 7/2

873A-8R CORED 117.3 - 126.9 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
1		1	Maastrichtian						T	
2		2	Maastrichtian	B	B	F,P			T	10YR 6/1
									T	10YR 7/3

873A-9R CORED 126.9 - 136.6 mbsf

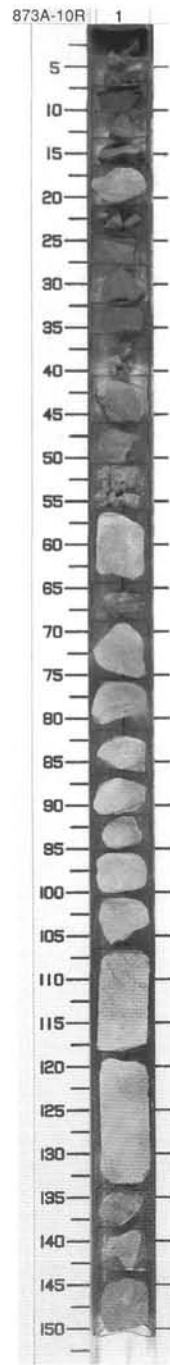
Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
1		1	Maastrichtian						T	
2		2	Maastrichtian	B	VR,P	F,M			T	10YR 3/1 To 10YR 7/1

SITE 873 HOLE A CORE 10R

CORED 136.6 – 146.2 mbsf

873A-10R

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	
1		1	Campanian – Maastrichtian			T T T T T	10YR 6/2 To 2.5YR 5/2	Section 1, 27–32 cm and 40–51 cm: light brownish gray (10YR 6/2) to grayish brown (2.5Y 5/2) BIVALVE ALGAL PACKSTONE, very fine-grained (1/16 to 1/8 mm) and locally bioturbated (burrows). Major components are fragmented or encrusting red algae (corallinaceans, squamariaceans), thin-shelled bivalves, often leached, and rudists (some whole radiolitids to 1 cm in diameter). Minor components include gastropods and coral fragments (in Section 1, 51–66 cm). Some grains are dark stained or pyritized. Porosity is moldic, intragranular and/or locally vuggy, and is reduced by the growth of drusy calcite cements. Section 1, 64–69 cm and 136–143 cm: is comprised of dark gray (2.5Y N4), light brownish gray (2.5Y 6/2) to dark grayish brown (2.5Y 4/2) BIVALVE FORAMINIFER WACKESTONE. Whole bivalves are well preserved and their valves are still in connection; rudists (radiolitids) are fragmented. Benthic foraminifers are common, especially orbitoids and miliolids; gastropods are rare. Some grains are dark-stained or pyritized. Burrows are common and are infilled by fine-grained, grayish brown (2.5Y 5/2) sediments. The porosity is low, and moldic. Section 1, 69–136 cm, is comprised of light brownish gray (2.5Y 6/2) FORAMINIFER PELOID PACKSTONE, very fine to fine grained with a conspicuous mottled aspect due to bioturbation. The texture in Section 1, 69–75 cm tends toward a grainstone. These packstones are rich in peloids and benthic foraminifers (mainly miliolids); micritized skeletal fragments (rudists-radiolitids and other bivalves) also occur. Black-stained grains are rare to common.
<p>DESCRIPTION</p> <p>RUDIST FORAMINIFER GRAINSTONE, BIVALVE ALGAL PACKSTONE, BIVALVE FORAMINIFER WACKESTONE, and FORAMINIFER PELOID PACKSTONE</p> <p>Major Lithologies: Section 1, 0–21 cm, 24–27 cm, 32–36 cm, and 56–64 cm: gray (5Y 5/1), light brownish gray (10YR 6/2) to grayish brown (2.5Y 5/2) RUDIST FORAMINIFER GRAINSTONE, fine-grained and well-sorted in Section 1, 0–13 cm and 56–64 cm. In Section 1, 13–21 cm, 24–27 cm, and 32–36 cm, the GRAINSTONE consists of alternations of fine- to medium-grained, and poorly sorted medium- to coarse-grained sediments. Grains include foraminifers (miliolids and orbitoids), micritized fragments of rudists (radiolitids) and algae (solenoporaceans, corallinaceans); coral fragments and worm tubes are rare. Thin red algal crusts may occur on large bioclasts. Grains are micritized and may be dark-stained or pyritized, especially the large benthic foraminifers. Black (7.5YR 2/0), carbonaceous particles occur in Section 1, 0–13 cm. Interparticle and moldic porosity is reduced by equant spar cements.</p> <p>General description: Cylinders: Section 1, 56–64 cm, 106–134 cm, and 143–150 cm; Rollers: Section 1, 16–21 cm, 27–36 cm, 41–51 cm, 64–106 cm, and 134–143 cm; Drilling pebbles: Section 1, 0–16 cm, 21–27 cm, 36–41 cm, 51–56 cm. Thin section samples: Section 1, 10–12 cm, 24–27 cm, 46–50 cm, 56–58 cm, 92–95 cm, 116–118 cm, and 139–142 cm.</p>								



Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color
1		1	Campanian – Maastrichtian			T T T T T T T T T T	N4 To 2.5Y N7/0
2		2				T T T T T T T T T T	

DESCRIPTION

BENTHIC FORAMINIFER GRAINSTONE, BIVALVE FORAMINIFER GRAINSTONE, SKELETAL GRAINSTONE, and CARBONACEOUS LIME PACKSTONE

Major Lithologies:

Section 1, 0–8 cm, 8–13 cm, and 13–17 cm: six pebbles of light gray (2.5Y 7/0), poorly sorted, well-packed BENTHIC FORAMINIFER GRAINSTONE. Foraminifera range in size from ~0.25 mm to 0.50 mm; many are elongate, a few are stained black. Red algae are rare. Porosity is ~1%, mostly interparticle. Matrix is calcite cement (PE4). One pebble in Section 1, 0–8 cm contains a "lithologic contact" between the overlying lithology and a dark gray (2.5Y 4/0) BENTHIC FORAMINIFER GRAINSTONE that has been highly leached. Porosity in this pebble is ~25%, both solution enlarged intraparticle and solution enlarged interparticle. A few pores are lined with calcite cement (PB3C). Black fragments of "organic matter" are common; red algae are few. Section 1, 17–21 cm: light gray (2.5Y 7/0), poorly sorted BIVALVE FORAMINIFER GRAINSTONE. This interval is coarser grained than overlying rocks. Rudist fragments are ~2.0 mm in size; there are bivalve molds and fragments (prisms?). Porosity is 3%–5%; interparticle. Finely disseminated pyrite occurs in regions of cement concentrations and micrite envelopes. Section 1, 21–27 cm: gray (2.5Y 6/0) SKELETAL GRAINSTONE. Gastropod molds and foraminifera are rare; there are few red algae. There is a stromatolite fragment that is ~6 mm long. Porosity (3%–5%) is mostly solution enlarged interparticle. Calcite cement is rare; mostly PB3C. Section 1, 27–34 cm: gray (2.5Y 6/0) BIVALVE GRAINSTONE. Matrix is heavily recrystallized. Very fine-grained pyrite is dispersed throughout the sample. Black organic matter (carbon?) is common. Most of the rock consists of bivalve fragments; possibly rudists. Coral fragments and benthic foraminifera

are rare. Porosity (10%) is mostly solution enlarged interparticle. Some pores are lined with PE4C. Section 1, 34–44 cm, is comprised of gray (2.5Y 6/0) SKELETAL GRAINSTONE. Most skeletal components are heavily recrystallized. Benthic foraminifera are rare; there are few bivalve fragments. Molds are rare. Very fine-grained pyrite is abundant. Porosity (15%–25%) is mostly solution enlarged interparticle and intraparticle. Calcite cement is PB4C and PE2C. Section 1, 44–53 cm, is comprised of gray (7.5YR 6/1) SKELETAL GRAINSTONE. Pyrite, bivalve fragments, and molds are common; there are few benthic foraminifera or black organic matter. Porosity (5%) is mostly moldic. Many of the skeletal molds (crWP) are lined with calcite cement PE4 and PB4C. One large bivalve mold is filled with orange-brown acicular crystals of unknown origin. Section 1, 53–97 cm, is comprised of gray (7.5YR 6/1) SKELETAL GRAINSTONE, with abundant bivalve fragments and common bivalve molds. There are few benthic foraminifera and little pyrite and black organic matter. The matrix is highly recrystallized to blocky calcite mosaics (PE5). There are few orange-brown acicular crystals (PB2C). Porosity is (5%–7%); it includes solution-enlarged interparticle and cement-reduced intraparticle. In Section 1, 66–76 cm, abundant algal fragments are present. In Section 1, 81–85 cm, a large, partially leached and partially replaced solitary coral (>6 mm in diameter) occurs. Benthic foraminifera are common; intraclasts occur in trace abundances. In Section 1, 85–89 cm, benthic foraminifera and bivalve fragments are common. The latter are up to 2.5 mm long. In 89–97 cm, bivalve fragments are abundant; many have been replaced by PE4 cement. A small rudist without an exterior wall (~2.5 mm in diameter) was also noted. Section 1, 97–115 cm, is comprised of varicolored gray (N/5) to very dark gray (N/3) CARBONACEOUS LIME PACKSTONE. Black organic matter is abundant; there are few bivalve fragments and little pyrite. Patches of carbonate-rich material are enclosed by wispy patches of organic-rich material. In addition, the carbonate-rich patches contain fragments of organic matter. Porosity is ~5%. The matrix of carbonate-rich patches is highly recrystallized. Section 1, 115–146 cm, is comprised of dark gray (N/4) SKELETAL GRAINSTONE. Organic matter is abundant; bivalve fragments are common. Benthic foraminifera are rare. Porosity is 5%; mostly solution enlarged interparticle. Calcite cement is rare; mostly PB4C and PE4C. Matrix is highly recrystallized. Layers of organic-rich material are distributed in a distinct pattern at an angle of ~20° (NW-SE) from the horizontal in Section 1, 129–136 cm. Rounded intraclasts occur from Section 1, 136–146 cm. Section 2, 0–17 cm, is comprised of gray (10YR 6/1) CARBONACEOUS LIME PACKSTONE, with silt-sized carbonate particles. Gray colored intervals in the very light gray carbonate (mud matrix of fine crystalline cement?) are likely pelleted mud. Particles are not identified; a very few are recognizably skeletal. Plant fragments to 3 cm-long (simple longitudinal laminations) are common, and help to define bedding planes. Finely disseminated pyrite is associated with the plant material. Wispy cross-lamination is observed throughout; possibly

herringbone (indeterminate in this section). Discrete burrows, flattened to 5 mm, locally disrupt the lamination. Geochemical analysis indicates a calcium carbonate content of 80.1%. Section 2, 17–23 cm, is comprised of dark gray (10YR 4/1) pyrite-rich CLAYEY CHALK. A smear slide analysis indicates 25% lime mud, 20% "inorganic calcite", 40% clay and 10% pyrite; the other 5% is phosphatic, with fish remains?, and nanofossils. Geochemical analysis indicates a calcium carbonate content of 66.0%. A drilling pebble within this clayey chalk is identical to the sediment from Section 2, 0–17 cm, except that there are more dark grains. Most are pyritized peloids (as in Section 2, 0–17 cm); others are gray or brown and translucent, with a white metallic luster. Section 2, 23–55 cm, is comprised of gray (2.5YR 6/0) SKELETAL GRAINSTONE. The grains include bivalves, gastropods, and large benthic foraminifera; most are unrecognizable. Carbonaceous fragments are scattered throughout. Average grain size is ~100 um; larger mollusk grains and molds are up to 400 um, (exceptionally to 8 mm). These grains are oriented to give the rock a distinct planar fabric. Porosity increases downward from 3%–10%; it is moldic after mollusks, few microvugs. Porosity increases abruptly at the edge of Section 2, 41–45 cm, to 40%. The adjacent bevel suggests that this is a vug having an edge at least 4 cm-long. Solution seams are at a 30°–45° angle to bedding. There is a contact at Section 2, ~55 cm, with the underlying lithology; this contact occurs in the drilling pebbles. Section 2, 55–74 cm, is gray (2.5Y 6/0), light gray (2.5Y 7/0), and white (2.5Y 8/0). The interval is coarser and cleaner at the top, approaching RUDSTONE; the base is a muddy PACKSTONE. Mollusks dominate this interval; radiolite (rudist) bivalves are found throughout. Caprinid fragments in Section 2, 56 cm, 65 cm, and 70 cm are preserved as mud fills in paleoconals; the remaining skeleton is a calcite-filled mold (cfMO). Other biota in this interval include gastropods (top), benthic foraminifera (e.g., orbitoids and miliolids), corals, encrusting foraminifera, and encrusting red algae. Porosity is 0–2%, as molds of mollusks. There are calcite-filled molds (cfMO) to 15% of total; pyrite is scattered throughout, about 1% in cements and skeletons. A distinct, dense, gray (N4), micritic layer at Section 2, 65 cm suggests alteration. Texture is micritic with many small, angular mollusk fragments (seen in thin section to be radiolite fragments). Alteration includes part of thick radiolite shell, which has an inner (aragonitic) layer that is remarkably well preserved. Borings contain geopetal mud. Section 2, 74–82 cm is comprised of light gray (N7) PELOID(?) WACKESTONE, with peloids and a few mollusks. There is no porosity. Pyrite is ~1%. Burrows are common; they are filled by skeletal packstone and light gray (2.5Y 7/2), coarse sand, ~1 mm in diameter. The wackestone is similar to the overlying lithology, but has less mud than at the base. The wackestone is cut by "soft" fractures that pass around grains; these fractures are cement-filled. A lithologic contact at Section 2, 82 cm, is encrusted by a sponge, that is possibly lithified. Section 2, 82–116 cm, is comprised of gray (N6) SKELETAL GRAINSTONE, with local interstitial mud (packstone). Components include bivalve fragments, large benthic foraminifera, red algae (abundant in thin section of

Site 873 Hole A Core 11R Description continued...

Section 2, 113–116 cm); gastropods and corals are rare. Porosity varies from 5% at the top to 15% at Section 2, 104–112 cm, to 3% at Section 2, 112–116 cm; the porosity is mainly from mollusk molds. Pyrite is ~1% throughout, and is disseminated in the cement.

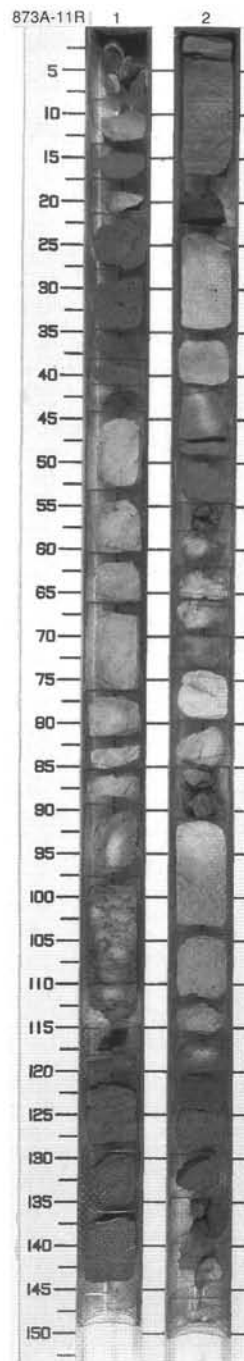
Geochemical analysis indicates a calcium carbonate content of 97.5% at Section 2, 95 cm; this corresponds to the position of a mud-filled burrow with miliolids. There are drilling pebbles in Section 2, 82–116 cm; two pieces are SKELETAL PACKSTONE, similar to that found in Section 2, 55–74 cm. One pebble is a PELLET WACKESTONE; it is light gray (N7), with soft(?) ovoid (fecal?) pellets that are 75 µm in diameter. Section 2, 91–116 cm is a fining upward sequence, from coarse sand (0.5 mm) to very fine sand (0.125 mm). Intraclasts are observed at Section 2, ~115 cm. Section 2, 116–140 cm is comprised of gray (N5) and dark gray (N4) PELOID GRAINSTONE. Peloids are abundant throughout (up to 70% of grains; 35% of volume). They are ovoid and cylinders ~125 µm in diameter. Some peloids show the longitudinal tubes which are diagnostic of Favreina (Crustacean? Fecal Pellet).

The rims of some pellets appear altered or coated.

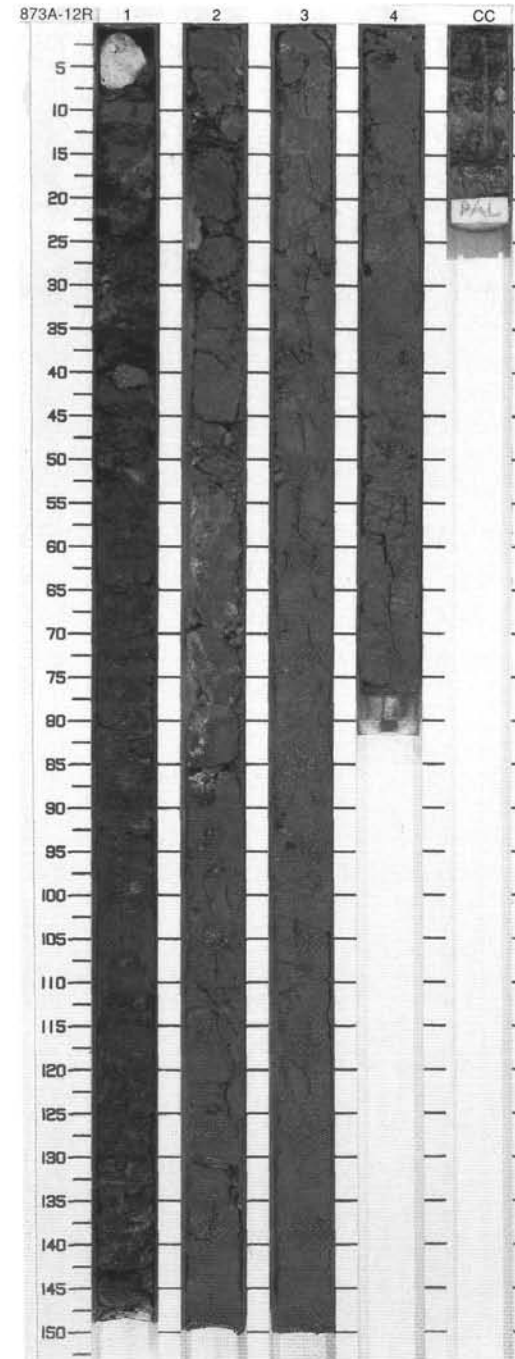
Skeletal components include large benthic foraminifers, both orbitoids (abundant in Section 2, 130–135 cm) and miliolids, mollusk fragments and echinoderm debris, and few red algae. Porosity is high, 15% to 25% throughout from molds, enlarged molds, and small vugs; only mollusk molds are recognizable. Pyrite is ~1% throughout and is found as very fine crystals, some concentrated in pellets; pyrite replaces foraminifers at the base of this interval, where abundance increases to 2%. Section 2, 140–146 cm is comprised of light brownish gray (2.5Y 6/1) RHODOLITH PACKSTONE (no matrix?, only rhodoliths were recovered). Rhodoliths nucleate on corals; in one case (out of 2) the coral continues to intergrow with the cortex. The cortex is formed by Squamaracean red algae and Corallinacean red algae (inner portion). Solenoporacean red algae is abundant; there are few encrusting worms. The cortex encloses lime mud (50%), skeletal grains (10%), algae (25%), pore space (now spar filled, 5%); pyrite is ~1%.

General Description:

Cylinders: Section 1, 21–34 cm, 44–81 cm, 89–115 cm, and 121–146 cm, Section 2, 0–16 cm, 22–49 cm, 73–79 cm, 91–112 cm, and 121–130 cm; Rollers: Section 1, 8–21 cm, 34–44 cm, and 81–89 cm, Section 2, 16–22 cm, 49–54 cm, 57–73 cm, 80–85 cm, 112–121 cm, and 130–134 cm; Drilling Pebbles: Section 1, 0–8 cm and 115–121 cm, Section 2, 54–57 cm, 85–91 cm, and 134–146 cm. Thin section samples: Section 1, 17–21 cm, 22–27 cm, 41–43 cm, 85–89 cm, 118–121 cm, and 130–136 cm, Section 2, 0–3 cm, 47–49 cm, 62–65 cm, 75–77 cm, 85–90 cm, 105–107 cm, 113–116 cm, 135–139 cm, and 140–145 cm.



Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	DESCRIPTION
1		1		◇ ◇ ◇ P		S T D	10R 3/6	<p>DESCRIPTION</p> <p>FERRUGINOUS CLAY and FERRUGINOUS CLAYSTONE</p> <p>Major Lithologies: Section 1 is a dark red (10R3/6) FERRUGINOUS CLAY; hydrated iron oxides are a dominant component. X-ray diffraction (XRD) indicates that hematite is abundant. Section 1, 0–7 cm, is a gray (10YR 5/1) PELOID GRAINSTONE. The grains uniformly have micrite envelopes that are about 10 microns-thick. The original grains were mostly skeletal, probably mollusks and foraminifers; they show up as clear calcite cores. Perhaps 5% of these grains are gray and translucent; most are probably fecal pellets, some may be benthic foraminifers. Rare particles are lithoclasts of dark gray (10YR 4/1) PELOID SKELETAL PACKSTONE (to 3 mm diameter), larger bioclasts (one radiolite, other mollusks), and a small (2 mm) rhodolith (mainly solenoporan red algae). Median grain size is 1/8 to 1/4 mm; sorting is excellent except for the large particles. Particles are very well rounded. There is no porosity. Pyrite is widely disseminated as very fine crystals, but much is concentrated in the gray, muddy peloids (fecal pellets?) and a few foraminifer tests. Total pyrite is about 1%. Section 1, 17–19 cm is a drilling pebble in the clay that is identical to Section 1, 0–7 cm, except more dark grains. Most are pyritized peloids, others are gray or brown and translucent, without metallic luster. There is a weathered BASALT clast in Section 1, 36–39 cm. Section 2, 0–23 cm is dark red (10R 3/6) with weak red (10R 4/4) mottles. Many sand-sized black particles are distributed irregularly in Section 2, 19–23 cm. Section 2, 23–54 cm is mainly olive (5Y 5/4) with dark red (10YR 3/6) mottles. The red spots are soft; the olive sediment is harder. Section 2, 54–88 cm, is mottled with dark red (10R3/6), pale red (10R 6/4), olive (5Y 5/4), and pinkish gray (5YR 7/2) colors. Section 2, 88–150 cm, is a claystone with a "marbled" structure; it looks like anastomosing veins between blocks. The internal parts of blocks are dark red (10R 3/6), the periphery is pinkish gray (5YR 7/2) or darker. Section 3, is a claystone with the marbled structure that began at the base of Section 2. The interiors of the blocks are weak red (10R 4/4); the "veins" between blocks are dusky red (10R 3/4). The centers of some veins are pinkish gray (5YR 7/2). Section 4 is similar to Section 3.</p>
2		2	?			S S S S	10R 3/6	
3		3				S	10R 3/4 To 10R 4/4	
4		4				S	10R 3/4 To 10R 4/4	
5		4				S	10R 3/4 To 10R 4/4	
		CC						



873A-10R CORED 136.6 - 146.2 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
1		1	Campanian - Maastrichtian	B	Campanian - Maastrichtian	Campanian - Maastrichtian			T T T T T T T T	10YR 6/2 To 2.5YR 5/2
					R,M	F,M				

873A-11R CORED 146.2 - 155.9 mbsf

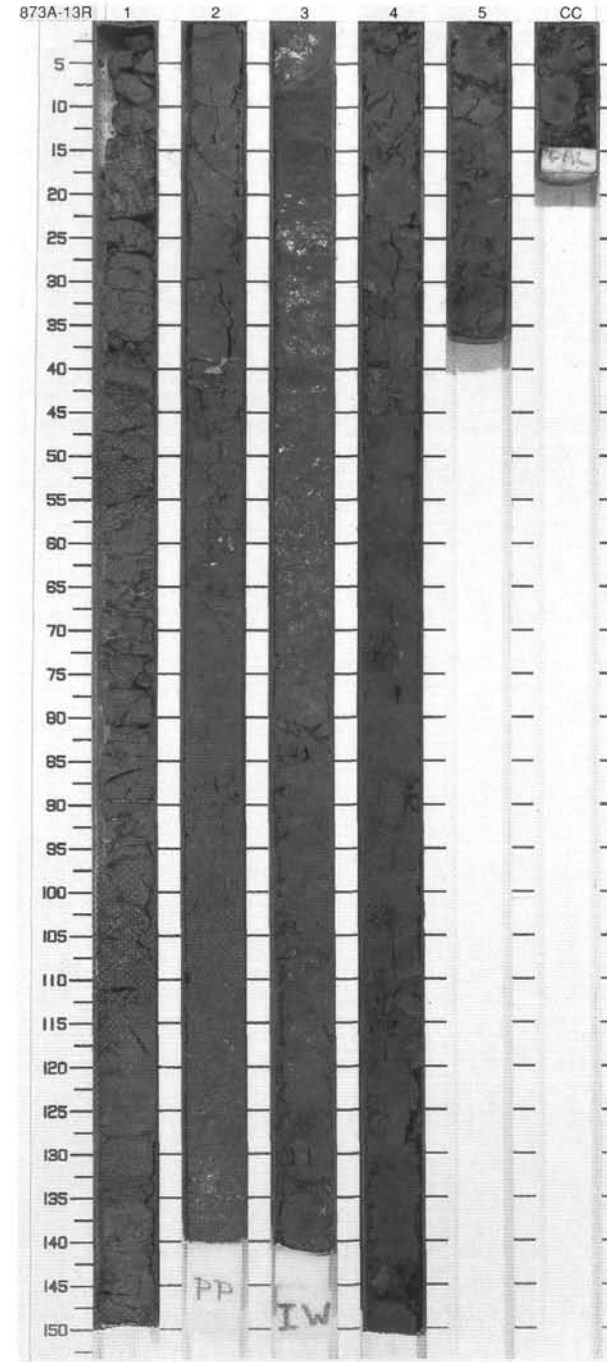
Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
1		1	Campanian						T T T T T T T T	N4 To 2.5Y N7/0
2		2	Campanian	R,M	B	F,M			T T T T T T T T	

873A-12R CORED 155.9 - 165.5 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
1		1							T T T T T T T T	10R 3/6
2		2	?						S S S S S S S S	
3		3							S S S S S S S S	10R 3/4 To 10R 4/4
4		4							S S S S S S S S	
5		CC							S S S S S S S S	

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	DESCRIPTION
1	[Dotted pattern]	1				S	10R 3/4	<p>DESCRIPTION</p> <p>FERRUGINOUS CLAY, FERRUGINOUS CLAYSTONE, and HIGHLY ALTERED BASALT</p> <p>Major Lithologies: Section 1 is FERRUGINOUS CLAYSTONE, cut by anastomosing veins or fractures. Blocks are weak red (10R 4/4) and are surrounded by thin (2-5 mm) borders of dusky red (10R 3/4). Some of the veins have a thin (1-2 mm) pinkish gray (5YR 7/2) core. Section 2, 100 cm, is FERRUGINOUS CLAYSTONE similar to Section 1, but becoming darker near 100 cm; the marbled texture disappears near 100 cm where the "veins" become vertical. Section 2, 100-140 cm is weak red (10R 4/3) to dusky red (10R 3/3) FERRUGINOUS CLAYSTONE, strongly disturbed by drilling, with 1-2 cm diameter darker red spots. The marbled texture described above is lacking in this interval; the interval is dotted with white zeolite patches shaped like vesicles (probably altered vesicular basalt). Section 3, 0-97 cm is weak red (10R 5/4), soft FERRUGINOUS CLAYSTONE with white spots and veins of zeolites. Drilling biscuits are common. Section 3, 97-120 cm is dusky red (10R 3/2) HIGHLY ALTERED BASALT, with rare vesicles that are filled by zeolites. Section 3, 120-145 cm is dusky red (10R 3/2) FERRUGINOUS CLAYSTONE in the form of drilling biscuits. Section 4 to CC is dusky red (2.5 YR 3/2) to very dusky red (2.5YR 2.5/2), hard FERRUGINOUS CLAYSTONE drilling biscuits. Small veins (to 1 mm) of white (5YR 8/1) and grayish green (10G 5/2) material crosscut the claystone. Rare vesicles are filled by white zeolites.</p>
2	[Dotted pattern]	2				S	To 10R 4/3	
3	[Dotted pattern]	3	?		Wavy	S P	10R 5/4	
4	[Dotted pattern]	3			Wavy	S S	10R 3/2	
5	[Dotted pattern]	4			Wavy	S I	2.5YR 2.5/2 To 2.5YR 3/2	
6	[Dotted pattern]	5			Wavy	S D		
		CC			Wavy	S M		

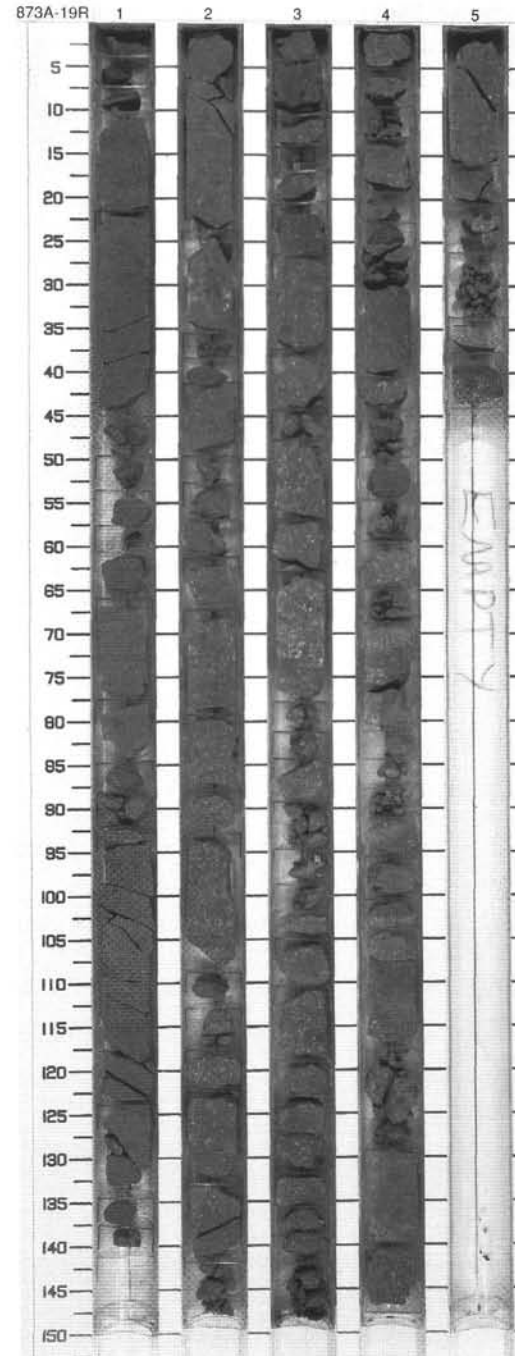
- 873A 14R HARD ROCK
- 873A 15R HARD ROCK
- 873A 16R NO RECOVERY
- 873A 17R NO RECOVERY
- 873A 18R HARD ROCK



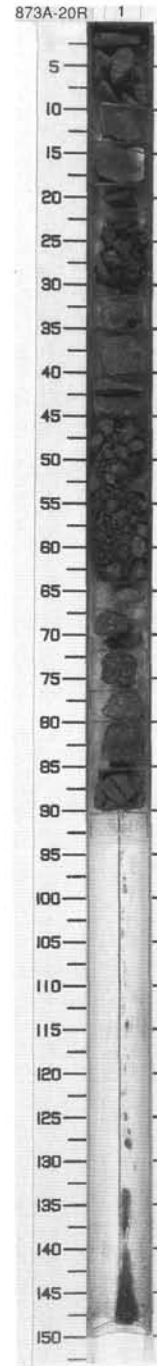
SITE 873 HOLE A CORE 19R

CORED 212.2–221.7 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	DESCRIPTION	
1		1		↑ F			5Y 5/2 To 10R 3/4	VOLCANIC BRECCIA Major Lithology: Olive gray (5Y5/2) VOLCANIC BRECCIA, comprised of poorly sorted, angular to subrounded clasts, that are 1.5 cm to several mm in size. The fine sand to clay size matrix is dusky red (10R 3/4) and of indeterminate composition. Several horizons (Section 1, 0–29 cm and 141–193 cm) fine upwards. In Section 1, 80–83 cm, there are low angle cross-laminae. The breccia is clast supported. In Section 2, the base of graded beds are at 30 cm, 75 cm, and 130 cm. Clasts at the base of graded beds are 1 cm in diameter, decreasing in size uphole to a few mm in size. Basal contact of graded beds is amalgamated. In Section 2, 75–95 cm, the clasts are rounded and moderately sorted; they are 8–10 mm in size. Some clasts appear to be highly altered vesicular basalt. In Section 3, colors become mottled downhole, with strong brown (7.5YR 4/6) and dark gray green (10Y 4/1), graded beds. At Section 3, 0–78 cm there are altered clasts of microcrystalline basalt and clasts of vesicular basalt with flow structure. A clast of scoria about 4 cm in size is enclosed at Section 3, 77 cm. Clasts of aphyric basalt, with about 10% of the vesicles filled by zeolites are noted at Section 3, 75–101 cm. Several thinner graded units, with bases at 111 cm and 119 cm have subangular clasts up to 2.3 cm in size. The color of the matrix grades downward in Section 4 to dark grayish green (10YR 3/2) with clasts grading to pale green (10Y 7/1) and occasionally, to light brown (7.5YR 6/4). In Section 4, 0–54 cm, the matrix is reddish brown (5YR 4/3). Two upward fining beds have bases at Section 4, 80 cm and 140 cm. Minor amounts of carbonate fill the intergranular voids in Section 4, 54–150 cm. Calcite forms about 3% of the cement in Section 5.	
2				↑ F					
3		↑ F							
4		↑ F							
5		↑ F							
6		↑ F	3				↑ F		7.5YR 4/6 To 10Y 4/1
		↑ F							
		↑ F	4				↑ F		10Y 3/2 To 10Y 7/1
		↑ F							
			5				↑ F		T
							↑ F		



Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	DESCRIPTION
		1					5GY 4/4	<p>VOLCANIC BRECCIA</p> <p>Major Lithology: Dark greenish gray (5GY 4/4), VOLCANIC BRECCIA with subangular, poorly sorted, green to brown clasts up to 1 cm in size. The breccia is clast supported. In Section 1, 80-85 cm, a thin bed of epiclastic sandstone overlies a very fine grain "clayey" layer. Vesicles are rarely visible in the highly altered clasts.</p>



873A-13R CORED 165.5 - 175.1 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
1	[Dotted pattern]	1							S	10R 4/3 To 10R 3/4
2	[Dotted pattern]	2						S		
3	[Dotted pattern]	3	?					S		10R 5/4
4	[Dotted pattern]	4						S		10R 3/2 To 2.5YR 3/2
5	[Dotted pattern]	5						S		2.5YR 2.5/2 To 2.5YR 3/2
6	[Dotted pattern]	6						S		

873A 14R HARD ROCK
 873A 15R HARD ROCK
 873A 16R NO RECOVERY
 873A 17R HARD ROCK
 873A 18R HARD ROCK

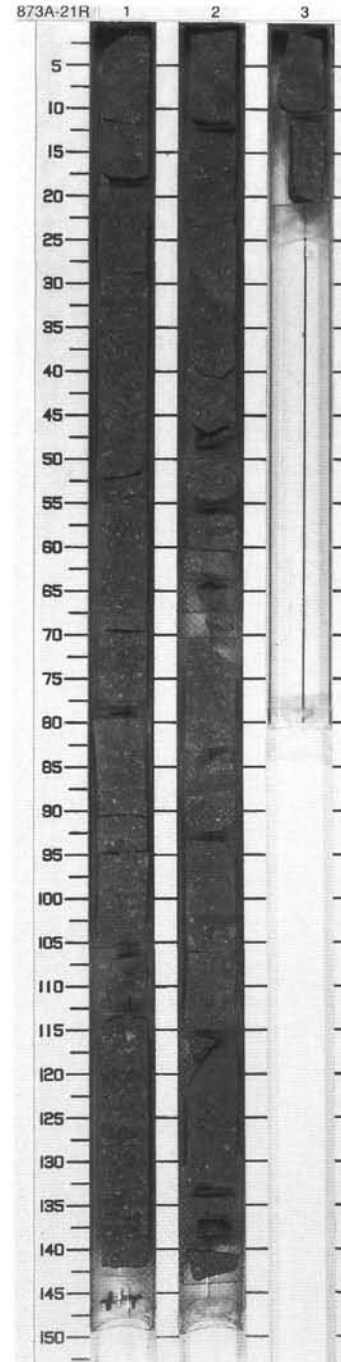
873A-19R CORED 212.2 - 221.7 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
1	[Dotted pattern]	1							↑ F	5Y 5/2 To 10R 3/4
2	[Dotted pattern]	2						↑ F		
3	[Dotted pattern]	3						↑ F		7.5Y 4/6 To 10Y 4/1
4	[Dotted pattern]	4						↑ F		10Y 3/2 To 10Y 7/1
5	[Dotted pattern]	5						↑ F		
6	[Dotted pattern]	6						↑ F		

873A-20R CORED 221.7 - 228.2 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
1	[Dotted pattern]	1							↑ F	5GY 4/4
2	[Dotted pattern]	2						↑ F		
3	[Dotted pattern]	3						↑ F		
4	[Dotted pattern]	4						↑ F		
5	[Dotted pattern]	5						↑ F		
6	[Dotted pattern]	6						↑ F		

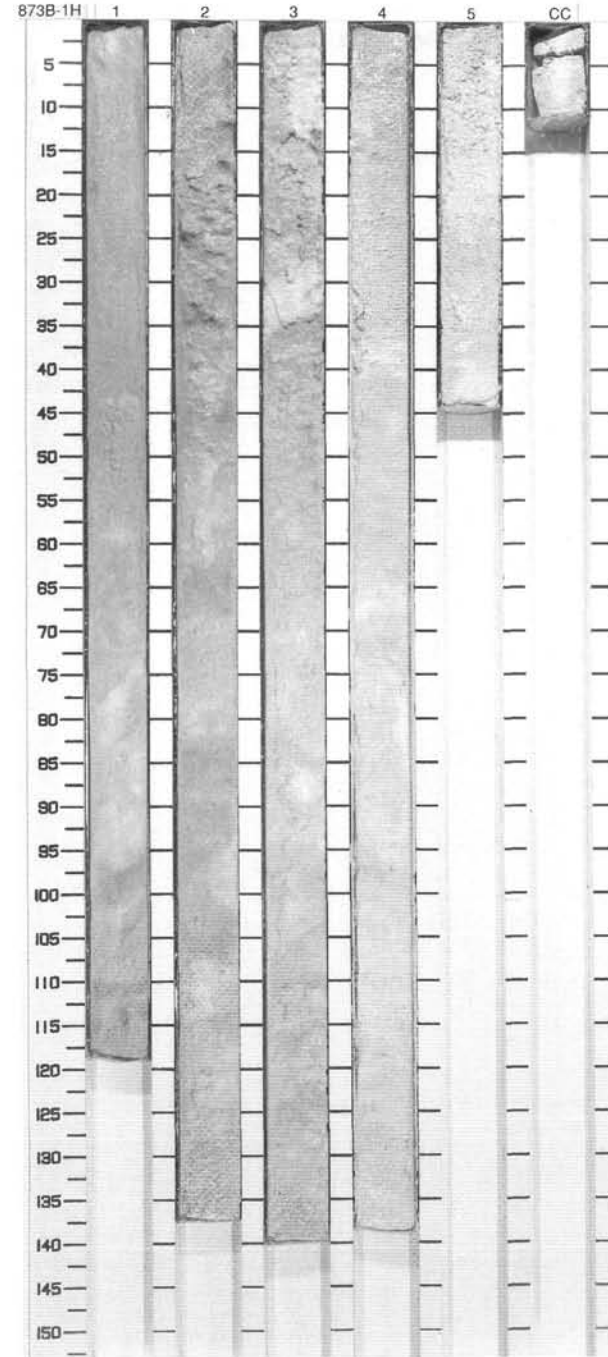
Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	DESCRIPTION
0-1	[Pattern]	1		== ↑F		T	5G 4/2	VOLCANIC BRECCIA Major Lithology: Grayish olive green (5G 4/2) VOLCANIC BRECCIA with mainly subangular clasts of pale yellowish green (10GY 7/2), grayish green (10G 4/2), and yellowish brown (10YR 5/6). The size of clasts ranges from 3 cm to a few mm in size. Some clasts are recognizable as vesicular basalt. Some clasts have darker rims and highly porous centers. 1–2 cm-thick laminae with fine-grained matrix in Section 1, 32 cm, 120 cm, 127 cm, and 139 cm. Calcite and zeolites are minor constituents of the matrix, which has the texture of fine-grained sand. Fining upward interval in Section 3, grades from 1.3 cm clasts at the base, to 5 mm clasts at the top.
1-2	[Pattern]	2		==		T		
2-3	[Pattern]	3		↑F		T		



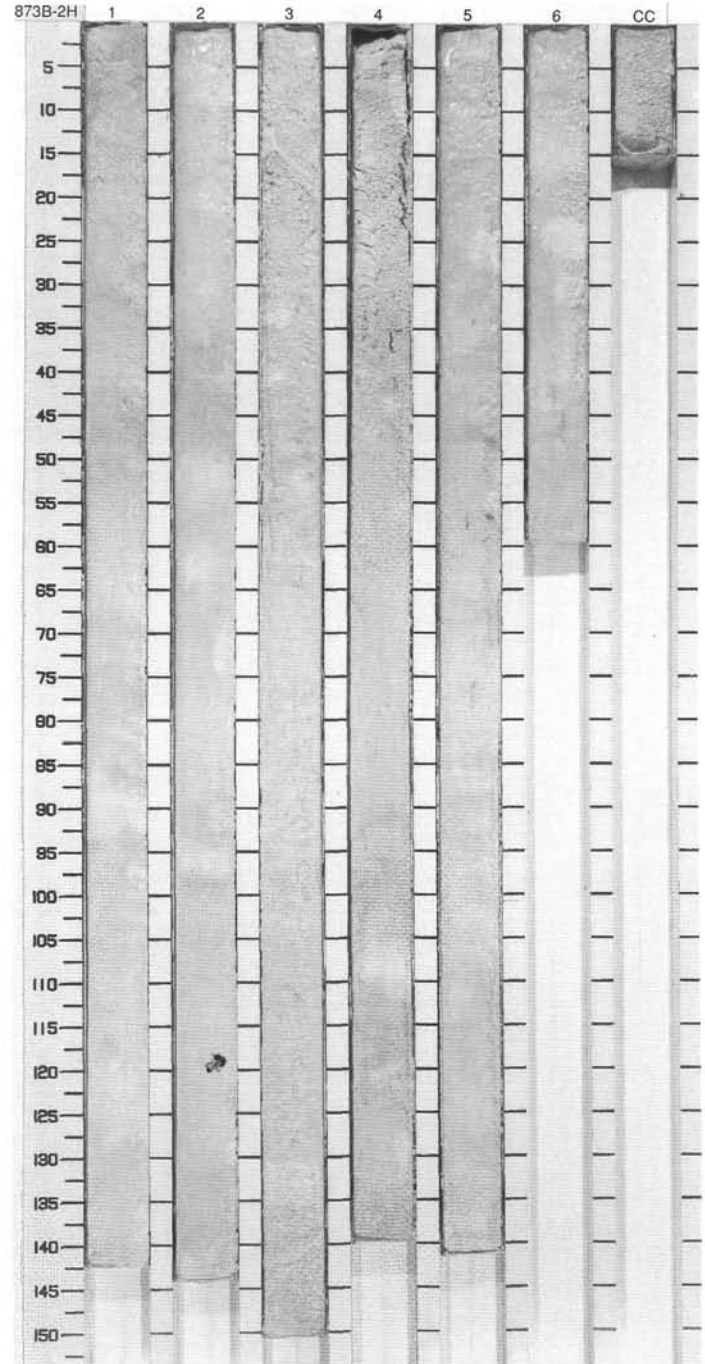
SITE 873 HOLE B CORE 1H

CORED 0.0 – 6.5 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	DESCRIPTION
1	[Cross-hatched pattern]	1	early Pleistocene	[Wavy lines]	[Circles]	S	10YR 7/2 To 10YR 8/2	<p>NANNOFOSSIL FORAMINIFER OOZE</p> <p>Major Lithology: Light gray (10YR 7/2), homogeneous NANNOFOSSIL FORAMINIFER OOZE, fine- to medium-grained, soupy nature. Many black sand-size particles (possibly iron-manganese micronodules) are dispersed throughout Sections 1 and 4. Vague white (10YR 8/2) banding occurs throughout the core. There are 7 bands within Section 1, 59–119 cm. Gray (10YR 6/2) mottles occur with the white bands in Section 1, 59–119 cm. Bands are also observed in: Section 2, 40–45 cm, 50–55 cm, 95–105 cm, 108–112 cm, and 120–125 cm; Section 3, 0–5 cm, 30–35 cm, and 80–85 cm; Section 4, 36–38 cm, 65–67 cm, 92–94 cm, and 133–138 cm; and Section 5, 7–12 cm.</p>
2		2		[Wavy lines]	[Circles]	S		
3		3	[Wavy lines]	[Circles]				
4		4	[Wavy lines]	[Circles]				
5		5	late Pliocene	[Wavy lines]	[Circles]			
		CC						



Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	DESCRIPTION
1	[Cross-hatched pattern]	1	late Pliocene	[Cross-hatched pattern]	[Circle pattern]	S	10YR 7/2 To 10YR 8/2	<p>NANNOFOSSIL FORAMINIFER OOZE</p> <p>Major Lithology: Light gray (10YR 7/2) NANNOFOSSIL FORAMINIFER OOZE with vague layers of white (10YR 8/2) in Section 1, 87-90 cm and 118-129 cm; Section 2, 4-9 cm, 56-67 cm, 62-63 cm, 70-76 cm, 94-99 cm, 121-122 cm, and 128-131 cm; Section 3, 32-35 cm, 38-40 cm, 50-54 cm, and 131-146 cm; Section 4, 0-10 cm, 40-45 cm, 106-111 cm, 121-122 cm, and 130-135 cm; Section 5, 15-20 cm, 110-112 cm, and 138-141 cm; and Section 6, 15-20 cm, 25-30 cm, and 43-45 cm. Black particles (possibly iron-manganese nodules) are disseminated throughout the core and reach a maximum concentration at Section 2, 37-50.</p>
2		2						
3		3						
4		4						
5		5						
6		6						
7		CC						
8		CC						



873A-21R CORED 228.2 - 232.3 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno. plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
0-1		1				↑ F		T	5G 4/2
1-2		2						T	
2-3		3				↑ F			

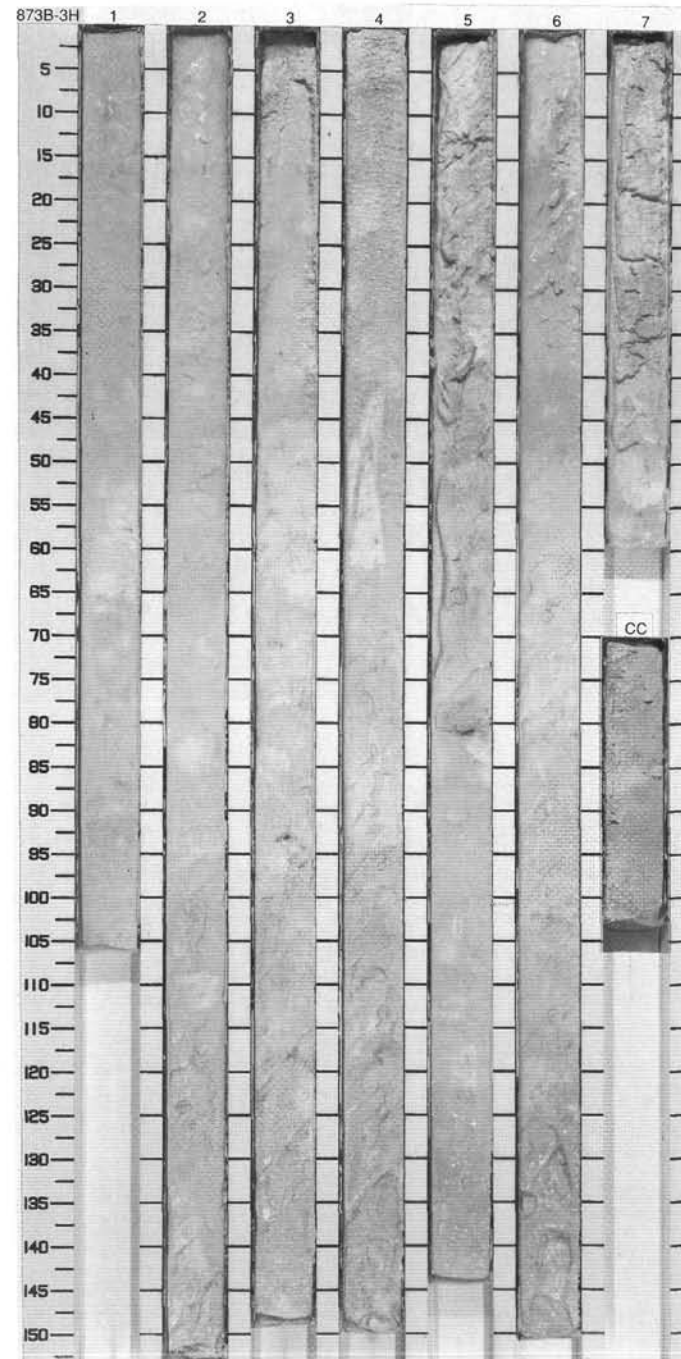
873B-1H CORED 0.0 - 6.5 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno. plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
0-1		1						S	10YR 7/2 To 10YR 8/2
1-2		2	early Pleistocene	<i>H. sellii</i>	N22			S	
2-3		3		<i>C. macintyreii</i>					
3-4		4	late Pliocene		N21				
4-5		5	CN12d						
5-6		6							

873B-2H CORED 6.5 - 16.0 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno. plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
0-1		1		CN12d	N21				10YR 7/2 To 10YR 8/2
1-2		2		CN12c					
2-3		3	late Pliocene						
3-4		4			N19/20				
4-5		5	CN12a						
5-6		6							
6-7		7							
7-8		8	CC		A,G	A,G	B		

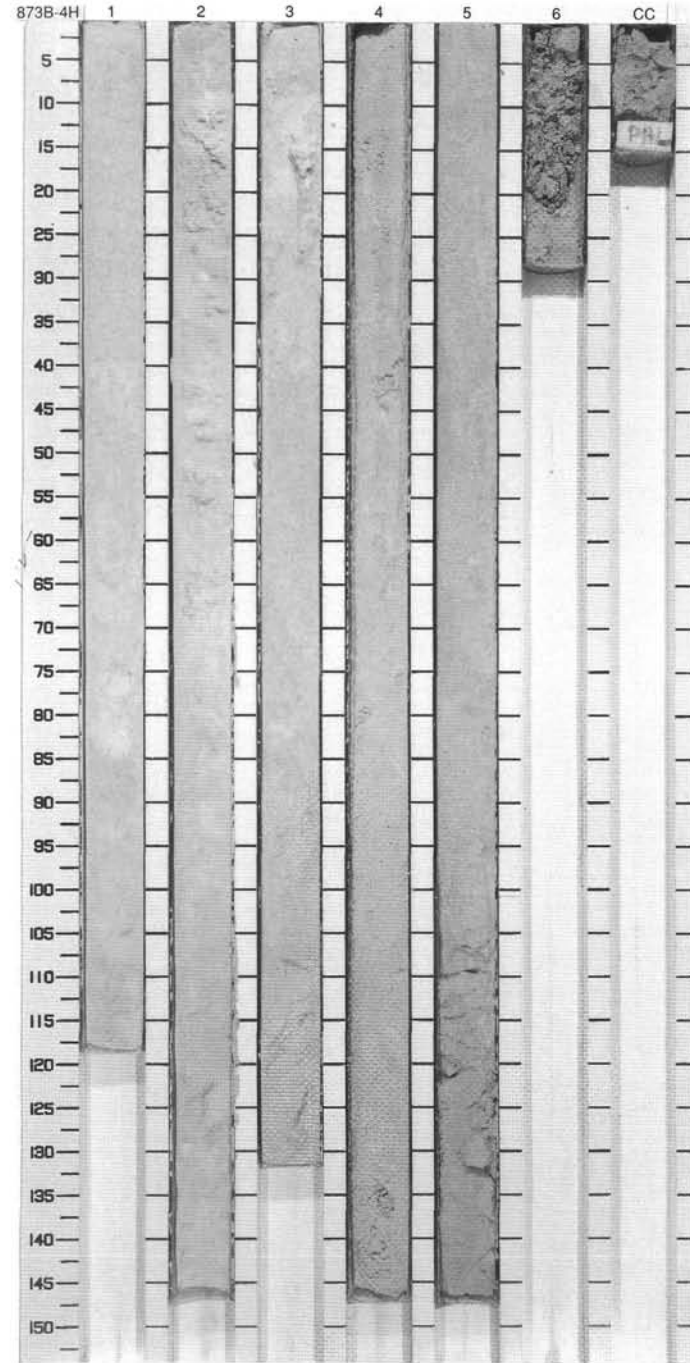
Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	DESCRIPTION
1	[Cross-hatched pattern]	1	early Pliocene - late Pliocene	-	○	S	10YR 7/2 To 10YR 8/2	<p>NANNOFOSSIL FORAMINIFER OOZE</p> <p>Major Lithology: Light gray (10YR 7/2), homogeneous NANNOFOSSIL FORAMINIFER OOZE. Several small patches of white (10YR 8/2) NANNOFOSSIL FORAMINIFER OOZE occur in various sections: Section 1, 50-70 cm; Section 2, 18-20 cm, 35-37 cm, 39-41 cm, 76-81 cm, and 109-113 cm; Section 3, 45-55 cm, 58-63 cm, 65-66 cm, 78-79 cm, 84-85 cm, 94-95 cm, 97-99 cm, 104-107 cm, 120-125 cm, and 146-150 cm; Section 4, 0-5 cm, 15-20 cm, 36-44 cm, 46-55 cm, 86-90 cm, 105-113 cm, 145-150 cm, Section 5, 0-10 cm, 33-36 cm, 81-85 cm, 87-89 cm, 98-103 cm, 115-117 cm, and 118-124 cm; Section 6, 0-10 cm, 42-43 cm, 90-92 cm, 100-102 cm, 108-110 cm, 116-125 cm, and 142-150 cm. There are 10 splotches within Section 7, 0-60 cm; and also some in Section CC, 0-5 cm and 10-13 cm. Several stains of gray (10YR 5/1) are observed within Section 3, 35-100 cm.</p>
2		2						
3		3						
4		4						
5		4						
6		5						
7		6						
8		6						
9		7						
		CC						



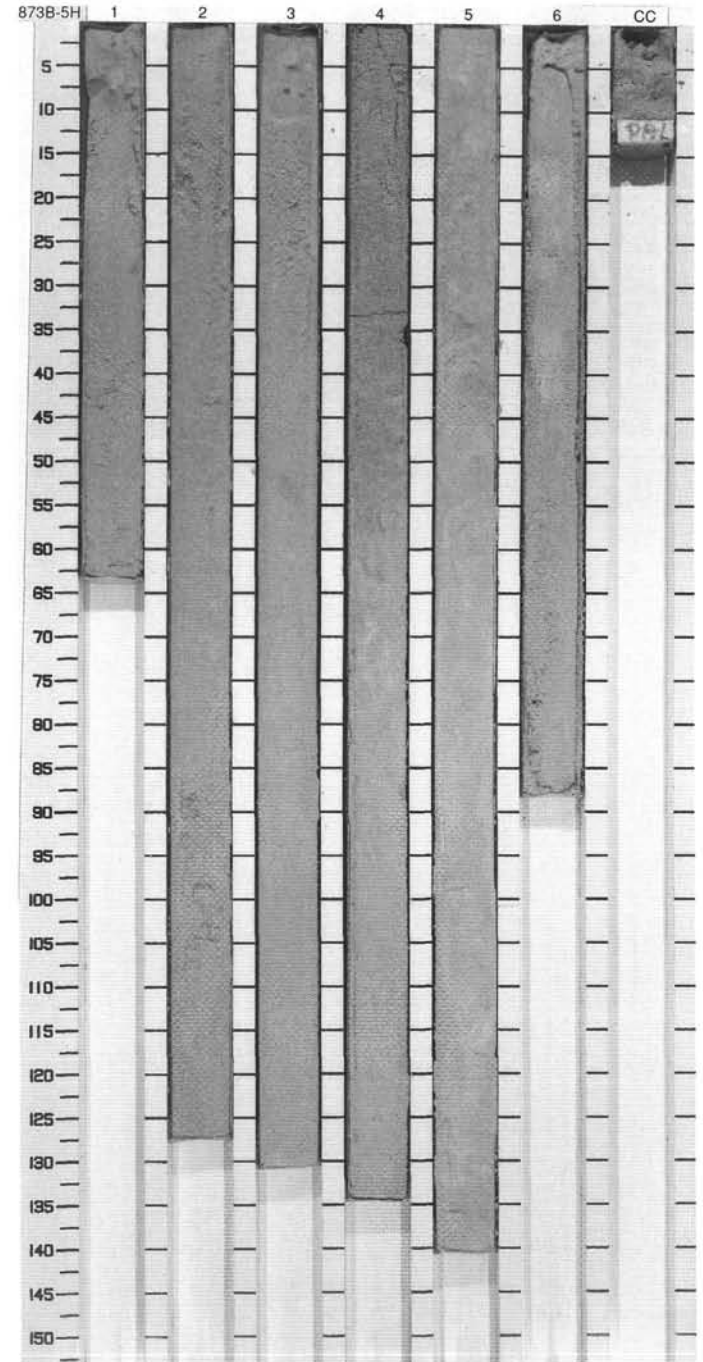
SITE 873 HOLE B CORE 4H

CORED 25.5 – 35.0 mbsf

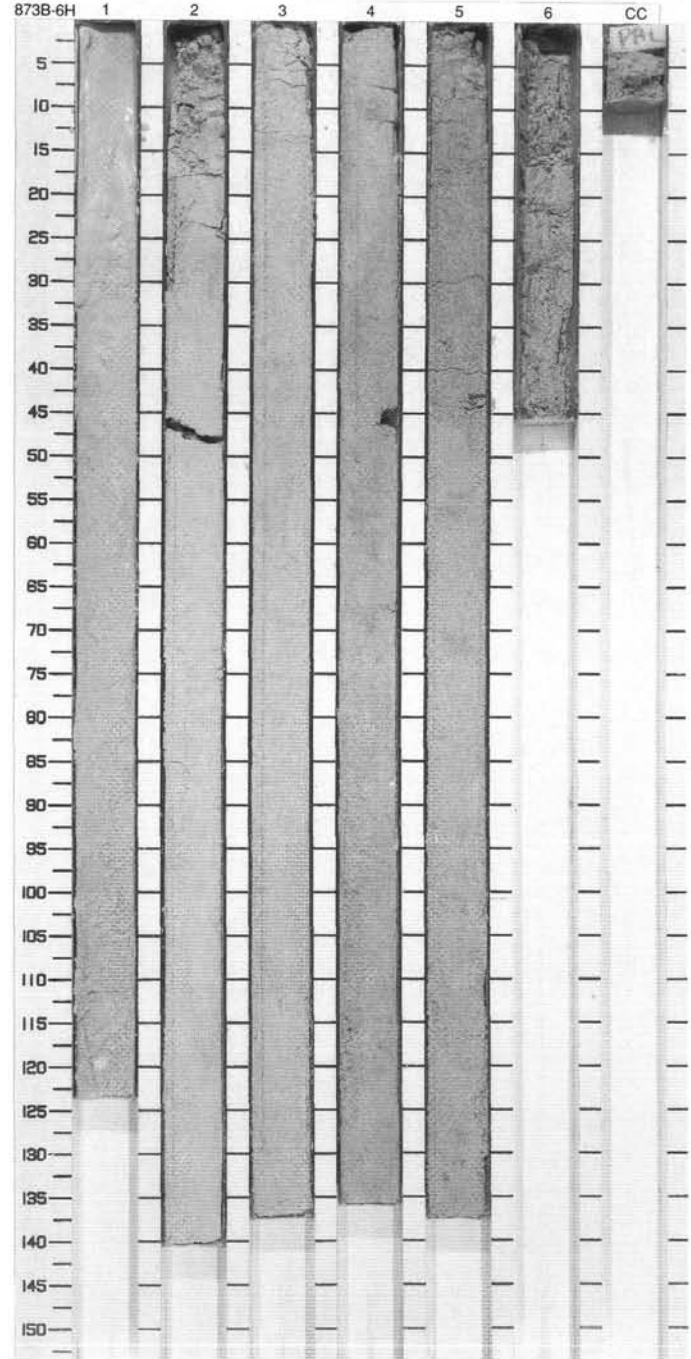
Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	DESCRIPTION
1	[Cross-hatched pattern]	1	middle Miocene	}}	○	S	10YR 7/2 To 10YR 8/2	<p>NANNOFOSSIL FORAMINIFER OOZE and FORAMINIFER OOZE</p> <p>Major Lithologies: Light gray (10YR 7/2), homogeneous NANNOFOSSIL FORAMINIFER OOZE. Section 1, 40–86 cm is mottled white (10YR 8/2) and gray (10YR 6/1). In Section 2, sediment texture becomes slightly coarser-grained; the nannofossil content is declining. Foraminifers are stained brown (possibly by iron). White (10YR 8/2) splotches in Section 2, 5–13 cm and 27–29 cm, Section 3, 15–20 cm and 35–40 cm. By Section 3, 82 cm, the sediment is classified as a FORAMINIFER OOZE. The latter sediment is homogeneous, soupy, and light gray (10YR 7/2) in Section 3, to very pale brown (10YR 7/3) below Section 3. Several light gray stains are seen at Section 4, 19 cm, 31 cm, 44 cm, 60 cm, and 113–115 cm. Larger light gray patches in Section 5, 38–52 cm and 65–78 cm. Sections 6 and CC are coarser, and are light brownish gray (10YR 6/2) in color.</p>
2		2						
3		3						
4		4						
5		5						
6		6						
7	CC						10YR 6/3	



Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	DESCRIPTION	
1		1	middle Miocene		○	S	10YR 7/3	<p>FORAMINIFER Ooze</p> <p>Major Lithology: Very pale brown (10YR 7/3), homogeneous FORAMINIFER Ooze. Sediment texture is medium-grained sand. Minor evidence of bioturbation (small patches of very pale brown (10YR 8/3) occur in Section 4, 5-7 cm and 70-125 cm.</p>	
2		2							
3		3							
4		4					I		10YR 7/3 To 10YR 8/3
5		5							
6		6					10YR 7/3		
7		CC							

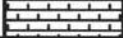


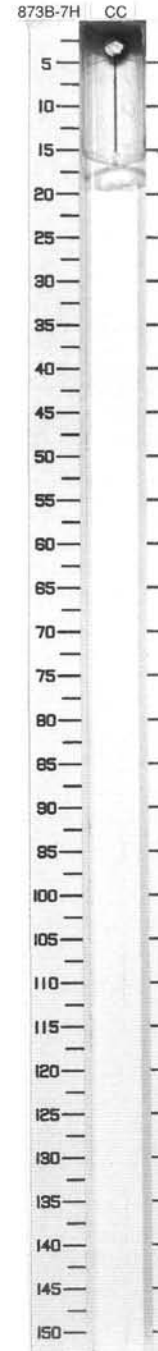
Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	DESCRIPTION
1	[Cross-hatched pattern]	1	middle Miocene		[Vertical line of small circles]	S		Major Lithology: Very pale brown (10YR 7/3), homogeneous FORAMINIFER OOZE. Color changes to pale brown (10YR 6/3) at Section 4, 30 cm. Small opaque black grains are dispersed throughout the pale brown FORAMINIFER OOZE and are especially prevalent in Section 5, 0-46 cm. Sediment texture becomes conspicuously sandy from Section 5, 45 cm to Section CC, 9 cm.
2		2				10YR 7/3		
3		3						
4		4						
5		4						
6		5				10YR 6/3		
7		6						
		CC						



SITE 873 HOLE B CORE 7H

CORED 54.0 – 58.0 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	DESCRIPTION
		CC		(Mn)			N2	MANGANESE OXIDE CRUST Major Lithology: Two pebbles of MANGANESE OXIDE CRUST. Small (1 cm) patches of white CHALK are cemented to each pebble.
early Miocene								



Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color
1		1	Maastrichtian		T	T	10YR 7/4
2		2			T	T	

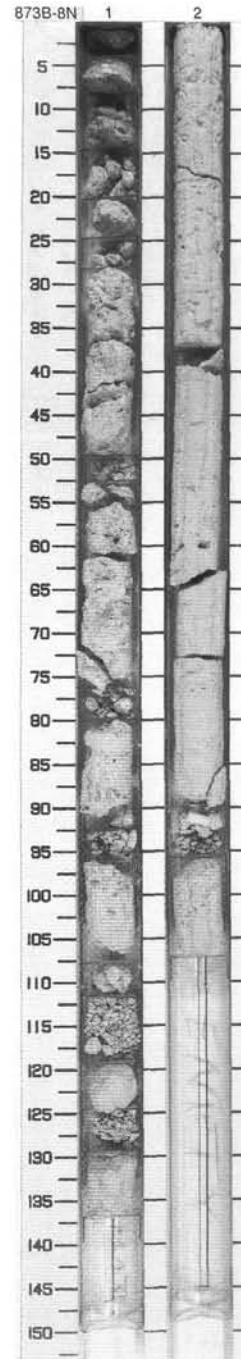
DESCRIPTION

MANGANESE ENCRUSTED LIMESTONE, ALGAL RUDIST RUDSTONE, and SKELETAL GRAINSTONE

Major Lithologies:

Section 1, 0–14 cm: MANGANESE ENCRUSTED LIMESTONE, with black (N2) manganese crusts to 3 cm-thick (top piece). The crusts are almost entirely "digitate stromatolites" (i.e., branching growths with finely laminated, hemispheric segments); hemispheres are sub-mm scale. PELAGIC FORAMINIFER PACKSTONE, white (10YR 8/2) to yellow (5Y 7/6), occurs: (1) plastered on Mn crust in lenses to 5 mm-thick, (2) in borings and intraparticle pores within neritic limestones, and (3) apparently intimately intermixed with neritic forms without sharp boundaries, although in "domains" that may be a kind of filling. RUDIST SKELETAL GRAINSTONE, like the underlying brown stain (probably phosphatization), is patchily distributed throughout. Minimal manganese and phosphate patches to Section 1, 30 cm. Section 1, 14–88 cm: ALGAL RUDIST RUDSTONE, with skeletal grainstone matrix, very pale brown (10YR 7/4) overall. Rudists are light yellowish brown (10YR 6/4), algae are white (N8). Algae, rudist, and coral fragments are up to 3–5 cm in size. Matrix is fine sand (1/8–1/4 mm). Rudists are exclusively radiolites; some are large fragments, but none are quite whole nor in growth position (orientation is nearly random; radiolites are highly gregarious and usually occur in clusters). Some are well rounded or angular spallings. Algae are corallines; they are red in

color. They encrust extensively, especially radiolites, but also occur as broken, rounded fragments, and as large (0.3mm) concentric growths (rhodolites). A few large platy skeletons may be corals (Section 1, 44 cm and 72 cm). There are few bivalves and gastropods (molds); encrusting worms are rare. Matrix is rounded with few skeletons identified, except foraminifers (miliolids, small benthics). Porosity is very high (15% to 30%); it appears to decrease downward and change from 25% interparticle, 5% moldic at the top, to 10% moldic, 5% interparticle at Section 1, 75 cm. Large-scale porosity (vugs to 4 cm) may appear in the lower portion; the vugs are hard to distinguish from coring washouts. Cementation is very light, except in a few patches such as the center of a large algal encrustation in Section 1, 70 cm and 88 cm. Alternatively, the algae may have encrusted a cemented lump. Visible cement is medium-grained equant crust (PE4C). Geopetal sediment fills in borings or molds, suggesting that they were open during deposition. Section 1, 88–137 cm is comprised of very pale brown (10YR 7/4) SKELETAL GRAINSTONE. There are many mollusks (bivalve and gastropods; radiolite rudists very rare), but few fragments of coralline algae. No other taxa were identified except the foraminifer *Omphalocyclus*. Most of the volume is made up of fine skeletal sand (1/8–1/4 mm). A concentration of shells (bivalves, red algae) in Section 1, 99–102 cm produces a local rudstone texture. Porosity is 20%–25%, except in Section 1, 119–123 cm, where it decreases to 5%. Small interparticle porosity is generally 10%–20% (smsBP 10%–20%). Moldic porosity, after mollusks, is 5%–15%, with local increases to 20% (cr lms BP 5%–15%). "Matrix Porosity" may include some micromolds. Highly cemented patches, irregular to elliptical in outline (up to 2 cm-wide) have virtually no porosity. A few have some slightly coarser skeletons (*Omphalocyclus*) but most show no textural contrasts with the surrounding, poorly cemented grainstone. algae) in Section 1, 99–102 cm produces a local rudstone texture. Porosity is 20%–25%, except in Section 1, 119–123 cm, where it decreases to 5%. Small interparticle porosity is generally 10%–20% (smsBP 10%–20%). Moldic porosity, after mollusks, is 5%–15%, with local increases to 20% (cr lms BP 5%–15%). "Matrix Porosity" may include some micromolds. Highly cemented patches, irregular to elliptical in outline (up to 2 cm-wide) have virtually no porosity. A few have some slightly coarser skeletons (*Omphalocyclus*) but most show no textural contrasts with the surrounding, poorly cemented grainstone.



873B-6H CORED 44.5 - 54.0 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
1		1	middle Miocene	CN3/4	N8				S	10YR 7/3
2		2								
3		3								
4		4								
5		4								
6		5								
7		6								
	CC									
				C,M,A,G						

873B-7H CORED 54.0 - 58.0 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
				CN1b A.G			(Mn)			N2

early Miocene

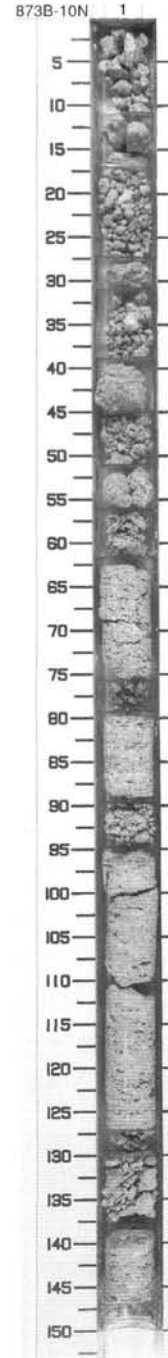
873B-8N CORED 58.0 - 62.5 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
1		1	Maastrichtian						T	
2		2								
				B	B	F,M			T	
									T	
									T	

SITE 873 HOLE B CORE 10N

CORED 67.0 – 69.0 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	DESCRIPTION
1		1	Maastrichtian			T T	10YR 6/4	<p>SKELETAL GRAINSTONE and SKELETAL PACKSTONE</p> <p>Major Lithologies: The upper 60 cm of the core is highly fragmented, with pieces <1 cm in diameter. Section 1, 0–27 cm; is comprised of a mixture of two distinct lithologies. These are: (1) white (10YR 8/2), medium-grained SKELETAL PACKSTONE, composed of mollusk debris (30%), gastropods (rare) and other finer grained, unidentifiable particles. The cement is micritized. Leached, moldic porosity (5%) mainly formed by the dissolution of mollusk shells; some of the voids are coated by a white chalky film that is overgrown by dogtooth sparry calcite. The packstone is bioturbated. This lithology is most probably caved. (2) The second lithology is considered to be in situ and, as can be deduced from fragments, is the same lithology as is described below at Section 1, 27 cm. Section 1, 27–139 cm, is comprised of SKELETAL GRAINSTONE, light yellowish brown (10YR 6/4), with alternating laminae about 1 cm-thick of coarse to very coarse and medium-grained grainstone. Laminae are parallel, with poorly developed cross-bedding of 10 degrees at Section 1, 112–115 cm. Laminations are accentuated by parallel orientation of leached mollusk shells. Some of the shells are occasionally imbricated. A very coarse, fining upward grainstone with grains 1 mm to 5 mm in size occurs at Section 1, 80 cm. The grainstone consists of 30% red algae, mollusk debris (20%), with less than 10% of latter being rudists; foraminifers occur in traces. Mollusk debris are mostly leached out; thus producing leached, intraparticle porosity. In the coarse-grained beds the cementation is incomplete, with primary unfilled voids. Porosity ranges from 7% to 20%. Porosity ranges from 7% to 20%. The fabric in the coarse-grained laminae show a very low degree of grain packing. Grains are cemented by dogtooth sparry calcite, which forms isopachous rims around grains; the cement fills the interparticle cavities and rims the internal walls of voids. The medium-grained grainstone is much more intensively cemented than the coarser-grained grainstone. Section 1, 139–147 cm is comprised of medium-grained GRAINSTONE, light yellowish brown (10YR 6/4), with thinned, coarse-grained laminae (5 mm-thick). Red algae debris is more common in coarser-grained laminae. The composition of the grainstone is the same as at Section 1, 27–139 cm.</p>

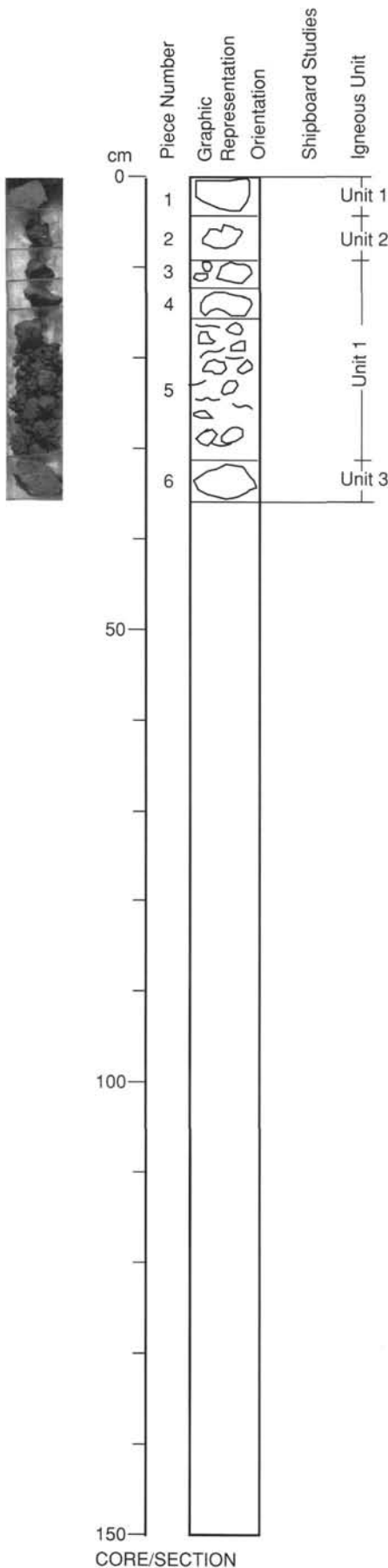


873B-9N CORED 62.5 - 67.0 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
1		1	Maastrichtian					+	T	10YR 7/3 To 10YR 8/4
		N		B	B	C, M				

873B-10N CORED 67.0 - 69.0 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
1		1	Maastrichtian					+	T	10YR 6/4
				B	B	C, M				



UNIT 1: BASALT

Pieces 1, 3-5

CONTACTS: None. Pieces are mixed up; Piece 2 is part of Unit 2.

PHENOCRYSTS:

Plagioclase - 40%; 0.5 mm; Meshwork of white (N9) laths.

GROUNDMASS: Aphanitic.

VESICLES: 3%; 3-5 mm; Round; Filled with dark yellowish green (10GY 4/4) celadonite.

COLOR: Dusky green (5G 3/2).

STRUCTURE: None.

ALTERATION: Color and vesicle fill suggest that the unit has undergone significant clay development.

VEINS/FRACTURES: None.

ADDITIONAL COMMENTS: None.

UNIT 2: BASALT

Piece 2

CONTACTS: None. Pieces are mixed up; More Unit 1 pieces below Unit 2.

PHENOCRYSTS: None.

GROUNDMASS: Aphanitic.

VESICLES: 10%; <3 mm; Elongate; 20% are filled with dark yellowish green (10GY 4/4) celadonite.

COLOR: Very dusky red purple (5RP 2/2).

STRUCTURE: None.

ALTERATION: Color suggests that the unit has undergone significant clay development and oxidation.

VEINS/FRACTURES: None.

ADDITIONAL COMMENTS: None.

UNIT 3: BASALT

Piece 6

CONTACTS: None.

PHENOCRYSTS: None.

GROUNDMASS: Aphanitic.

VESICLES: 10%; <5 mm; Round; 20% are filled with dark yellowish brown (10YR 4/2) clay.

COLOR: Dark gray (N3).

STRUCTURE: None.

ALTERATION: Addition of clays in vesicles and veins.

VEINS/FRACTURES: 2%-10%; 0.5-2 mm; Subhorizontal; Anastomosing fractures, spaced about every 5 mm, filled with dusky green (5G 3/2) clay.

ADDITIONAL COMMENTS: None.

144-873A-15R-1

UNIT 4: BASALT

Pieces 2-6

CONTACTS: None. Piece 1 is pale red (10R 6/4) claystone.

PHENOCRYSTS:

Plagioclase - 40%; 0.5 mm; Randomly oriented laths.

GROUNDMASS: Aphanitic.

VESICLES: 5%; 1-5 mm; Round; Filled with calcite.

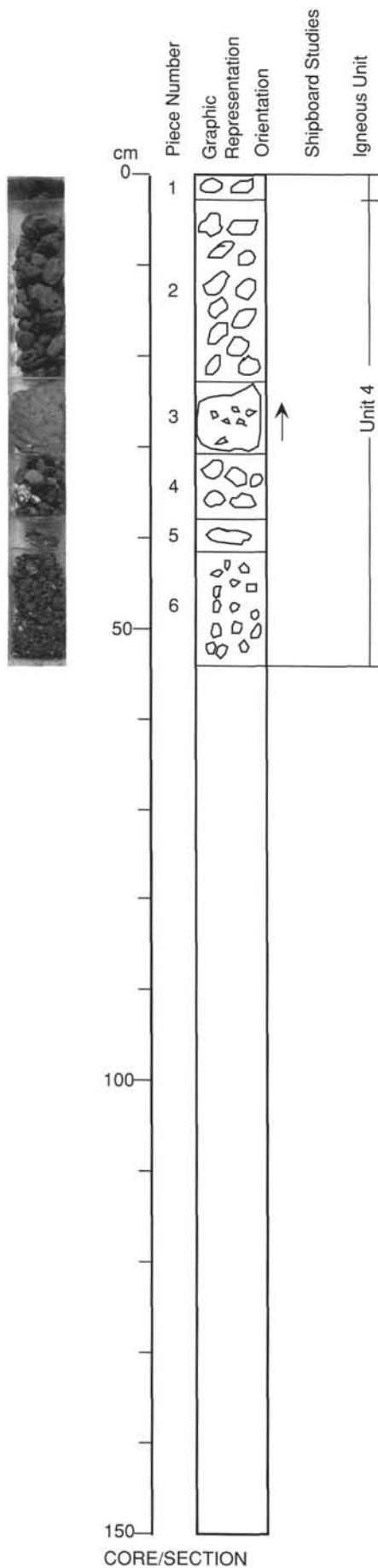
COLOR: Medium gray (N5).

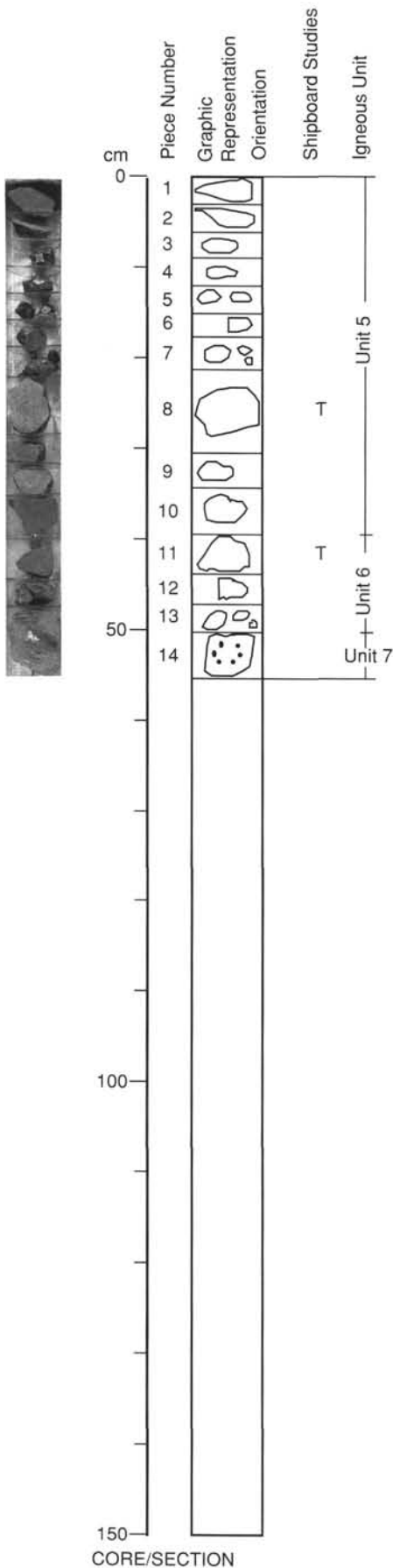
STRUCTURE: None.

ALTERATION: Addition of calcite; probable clay development.

VEINS/FRACTURES: <1%; 1-2 mm; Filled with calcite.

ADDITIONAL COMMENTS: None.





UNIT 5: BASALT

Pieces 1–10

CONTACTS: None.
PHENOCRYSTS: None.
GROUNDMASS: Microcrystalline.
VESICLES: None.
COLOR: Medium gray (N5).
STRUCTURE: None.
ALTERATION: Color indicates some clay development.
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: Numerous small pieces fragmented by drilling.

UNIT 6: BASALT

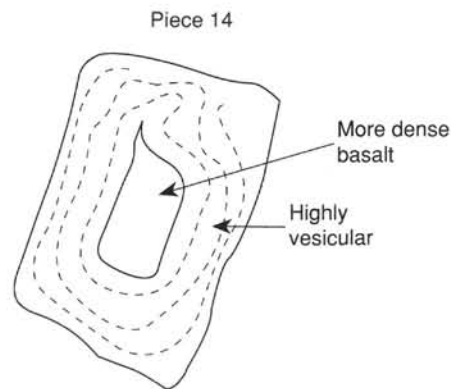
Pieces 11–13

CONTACTS: None.
PHENOCRYSTS: None.
GROUNDMASS: Aphanitic.
VESICLES: None.
COLOR: Very dusky red purple (5RP 2/2).
STRUCTURE: None.
ALTERATION: Color indicates oxidation. Presumably there is significant clay development as well.
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: Possibly more siliceous than Unit 5. Fine horizontal lineations defined by anastomosing, very fine bands of lighter color reflect trachytic texture.

UNIT 7: BASALT

Piece 14

CONTACTS: None.
PHENOCRYSTS: None.
GROUNDMASS: Aphanitic.
VESICLES: 15%; 1–2 mm; Elongate; Aligned in concentric rings around the outer 2 cm of the bomb.
COLOR: Light brownish gray (5YR 6/1).
STRUCTURE: Appears to be a pyroclastic bomb.
ALTERATION: Color indicates oxidation, but otherwise it appears quite fresh.
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: Unit 7 is a single piece with a dense core and a vesicular outer 2 cm rim. The vesicles are arranged in concentric rings around the core. This appearance is typical of pyroclastic bombs.






144-873A-18R-1

UNIT 8: CLINOPYROXENE BASALT

Pieces 1-15

CONTACTS: None.
PHENOCRYSTS: Concentrated in several 3-5 mm wide bands. Notable bands in intervals 52-70, 81-88, and 98-100 cm.
 Clinopyroxene - 3%-25%; 0.5-2 mm; Dusky green (5G 3/2), subhedral.
GROUNDMASS: Microcrystalline.
VESICLES: None.
COLOR: Dark gray (N3).
STRUCTURE: Banded by concentrations of clinopyroxene grains.
ALTERATION: Relatively fresh.
VEINS/FRACTURES: Irregular, interconnected calcite patches to 3% and 8 mm.
ADDITIONAL COMMENTS: Immediately below this unit, Sections 18R-1, 133 cm to 19R-3, 95 cm contain volcanic breccia which is described in the Lithostratigraphy section of this chapter. Unit 9 begins at Section 19R-3, 95 cm.

-  Calcite vein
-  Irregular patchy calcite
-  Brecciated zone

