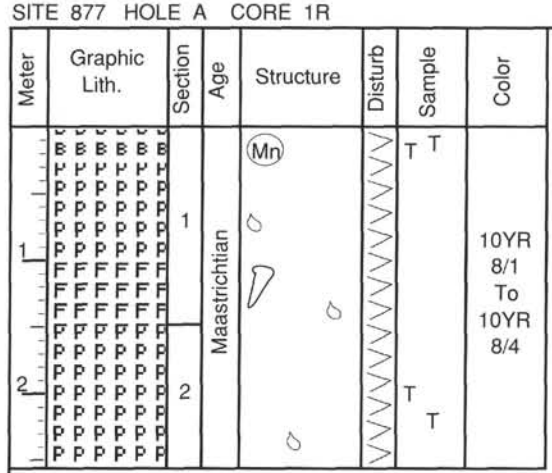
CORED 0.0 - 9.5 mbsf

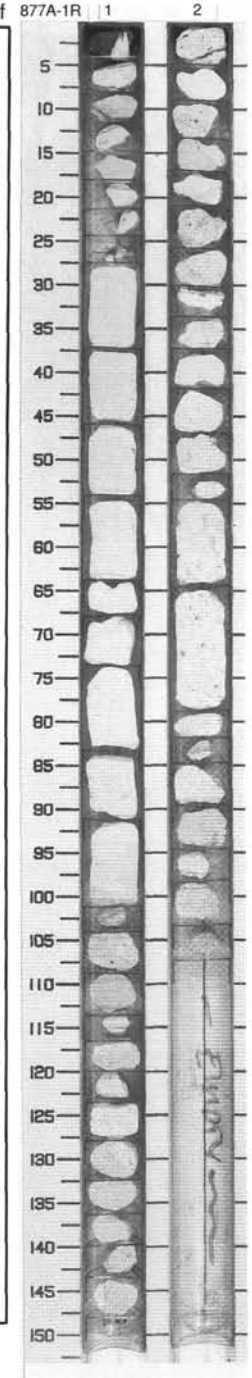


DESCRIPTION

MANGANESE CRUST, ALGAL BINDSTONE, SKELETAL PACKSTONE, and RUDIST BOUNDSTONE

Major Lithologies:
Section 1, 0–2.7 cm, is comprise of a thick, black (N2), MANGANESE CRUST that cuts the underlying rock at apparent angles of 45° and 120°, as indicated by geopetal sediment fill. The crust appears structureless, except for lenses of white (10YR 8/1) PELAGIC PACKSTONE and white (10YR 8/2) WACKESTONE (the host rock), centripetally replaced by botryoidal manganese dendrites (150 µm in diameter). The apparent sequence of events adjacent to the crust at Section 1, 0–3 cm, is: a) wackestone sedimentation and lithification; b) leaching (or bioerosion) to form large vugs (ircf mg VUG); c) precipitation of 2 bands (100–200 µm) of isopachous calcite cement in vugs (cr mg VUG; PF34C), the first is white and translucent, the second is light gray and semitransparent; d) deposition and lithification of very light brown (10YR 8/4) packstone with fragments of red algae, bivalves, and foraminifers as internal sediment in vugs (cr, ir VUG); e) dissolution of packstone to form small vug (cr if lms VUG); (f) precipitation of 2 bands of isopachous cement (150 µm-thick PF4C, light gray (N6), translucent) in vug and shelter pores (ir cf SH) in packstone; (g) precipitation of clear bladed calcite cement (PB5C) in shelter pores (sequence uncertain, may postdate h, i, or j); (h) sedimentation of laminated peloid packstone and mudstone in vug; (i) sedimentation of pelagic packstone, with abundant planktonic foraminifers and rare echinoderms in vug; (j) impregnation of packstone by phosphorous and partial impregnation by manganese. Section 1, 2.7–24 cm, consists of white (10YR 8/2) and very pale brown (10YR 8/4) ALGAL BINDSTONE, with large fragments of stromatoporoids, corals, caprinid rudists, and other bivalves; they are heavily encrusted and, in some cases, bound together by pervasive red algae (corallinaceans). Ecrusting foraminifers and/or worms contribute to the binding. Matrix is skeletal packstone, similar to stage (d), above. Porosity (1%) is mostly moldic with minor shelter porosity. Moldic porosity is about 5% in Section 1, 21–24 cm. In Section 1, 11–14 cm, shelter pores are reduced by isopachous crusts of translucent calcite, probably with fibrous habit (PF4C). Cement in molds is equant, medium crystalline calcite (PE4C). In Section 1, 7–12 cm, the bindstone may be cut or internally filled by a sequence of interlaminated, white (10YR 8/1), burrowed mudstone and wackestone. The burrows are filled by skeletal packstone, with fragments of radiolitid rudists, coralline algae, other skeletons, and peloids. The bindstone is patchily stained black (manganese?) and yellow (phosphate?). The laminated sequence is cut by a planar contact, nearly vertical (oriented by laminae in 3-dimensions), with pelagic wackestone that contains many planktonic foraminifers, rare echinoderms, and other skeletal fragments. The sequence is light yellow (5Y 8/4); some grains are yellow-brown (10YR 6/4), reflecting phosphorus impregnation. The contact and adjacent limestones are black, and manganese impregnated. Section 1, 24–99 cm, consists of white (10YR 8/2) SKELETAL PACKSTONE. Mud matrix is about 40%. Constituents include: few algal fragments (few to many corallines and very rare squamariaceans); few bivalves, including caprinid rudists; rare calcisponges (stromatoporoids); and very rare corals, dasycladacean algae, and peloids. Porosity varies from 1% to 3%; it is mostly moldic. Crusts of bladed, coarsely crystalline calcite (PB45C) line molds and fill intraparticle pores. Section 1, 99–148 cm, consists of very pale brown (10YR 8/3) RUDIST FRAMESTONE? OR RUDSTONE. The matrix varies from packstone to white (N8) mudstone. Components are: rare to common caprinid rudists; rare radiolitids; rare other bivalves; rare to many gastropods (below Section 1, 118 cm); few to many large benthic foraminifers; rare to many fragments and encrustations of red algae (corallinaceans); very rare stromatoporoids; and few to many dasycladacean algae in Section 1, 108–117 cm. Porosity (1% to 10%, average 4%) is mostly moldic with minor additions from intraparticle (Section 1, 102–108 cm), interparticle (Section 1, 104–198 cm), and burrows (Section 1, 113–117 cm). Most visible cements are crusts of medium to coarsely crystalline calcite (PB45C) in molds. An early phase forms an isopachous crust of medium crystalline translucent calcite (PF?4C) in Section 1, 117–120 cm and 133–143 cm, where it is covered by white mudstone. An earlier phase in Section 1, 117–120 cm is a finely crystalline, isopachous crust of clear calcite (PF?3C). The upper contact at Section 1, 99 cm is slightly irregular and is cut by 4 or 5 borings filled with white packstone; the packstone is similar to the overlying lithology. A coral, stands 35 mm high above the contact, probably as an encruster. Section 2, 0–37 cm, consists of coarse-grained (> 2 mm grain size), white (5YR 8/1) PACKSTONE. Constituents are: many large benthic foraminifers (orbitoids); few ostracods; few thin-wall mollusk shell casts; and few algae. Debris of rudist shells, up to 3 cm in size, are scattered. Various cavities, infilled by white micrite, are common. Some have laminae stained orange. Some of the voids have traces of manganese. Porosity (3%) is vuggy, leached. Mud matrix averages 40%. Section 2, 37–107 cm, consists of very coarse-grained (especially in Section 2, 54–79 cm), pinkish white (5YR 8/2) PACKSTONE. Caprinid shells, up to 7 cm in length, are present. Other constituents are: common red algae debris; common mollusk shell fragments; rare hydrozoan debris; and many foraminifers. Poorly developed rhodoliths (1 cm in diameter) are present in Section 2, 103–107 cm. Skeletal fragments are difficult to distinguish from the surrounding micritic matrix. Porosity (5%) is leached, vuggy. Some of the vugs are lined by drusy sparry calcite. Some of the vugs have walls stained yellow by limonite. There is a rounded solution pipe, or a burrow, infilled by orange, silt-size packstone with planktonic foraminifers and a few manganese dendrites in Section 2, 90–95 cm.

General Description:
Cylinders: Section 1, 27–63 cm and 67–101 cm, Section 2, 54–79 cm; Rollers: Section 1, 0–16 cm, 63–67 cm, 104–113 cm, and 117–148 cm, Section 2, 0–51 cm, 79–81 cm, 85–95 cm, and 99–103 cm; Drilling pebbles: Section 1, 16–27 cm, 101–104 cm, and 113–117 cm, Section 2, 51–54 cm, 81–85 cm, 95–99 cm, and 103–107 cm. Thin section samples: Section 1, 1–4 cm and 8–10 cm, Section 2, 42–46 cm and 62–64 cm.



SITE 877 HOLE A CORE 2R CORED 9.5 - 19.0 mbsf

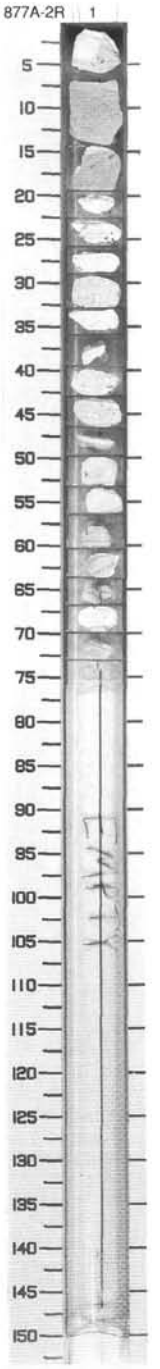
Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color
.5		1	Maastrichtian	Mn		T	10YR 7/3 10YR 8/4 To 10YR 7/3 10YR 8/2

DESCRIPTION

SKELETAL WACKESTONE, MANGANIFEROUS LIMESTONE, SKELETAL WACKESTONE-PACKSTONE, *and* BIVALVE GRAINSTONE

Major Lithologies:
Section 1, 0–6 cm, is comprised of very pale brown (10YR 7/3) SKELETAL WACKESTONE, with few bivalve fragments and rare large benthic foraminifers. Porosity (10%) is mostly moldic and intraparticle. Almost 40% of this drilling pebble consists of very dense mudstone with faint horizontal laminations. One of the laminae is stained orange brown. The contact between the two lithologies is bored and probably has been eroded. Section 1, 6–20 cm, is comprised of mottled, very pale brown (10YR 8/4 and 7/3) MANGANIFEROUS LIMESTONE. The lighter colored sediment is rich in pelagic material. Black, manganese microconcretion fragments (< 0.25 mm) are abundant. There are many brown (phosphate?) grains (< 0.10 mm). A few bivalve fragments have been recrystallized. Porosity (10%) is mostly microvuggy and moldic. The pelagic component decreases with depth in the core (Section 1, 14–20 cm). Section 1, 20–29 cm, is comprised of white (10YR 8/2) and very pale brown (10YR 7/3) SKELETAL WACKESTONE-PACKSTONE with bivalves, many caprinid fragments, many gastropods, and few large benthic foraminifers. Gastropod molds are partially filled with orange-brown, geopetal sediment. Yellow brown pelagic sediment fills cavities on the back-side of this sample. Section 1, 29–73 cm, consists of white (10YR 8/2), poorly sorted, well-cemented BIVALVE GRAINSTONE, with abundant thin-shelled bivalve fragments, few large benthic foraminifers and few red algae. Bivalve abundance and size decreases with depth, from abundant to common, and from very coarse sand, to coarse sand size. Porosity (5%) is mostly cement reduced moldic and intraparticle. Calcite cement is abundant, mostly coarsely crystalline bladed crusts (PB5C) and neomorphic sparry calcite. A few of the pores are lined with cements that have a "bulbous" morphology.

General Description:
Cylinders: Section 1, 6–14 cm; Rollers: Section 1, 0–6 cm, 14–35 cm, 39–63 cm, and 67–70 cm; Drilling pebbles: Section 1, 35–39 cm, 63–67 cm, and 70–73 cm. Thin section sample: Section 1, 53–56 cm.



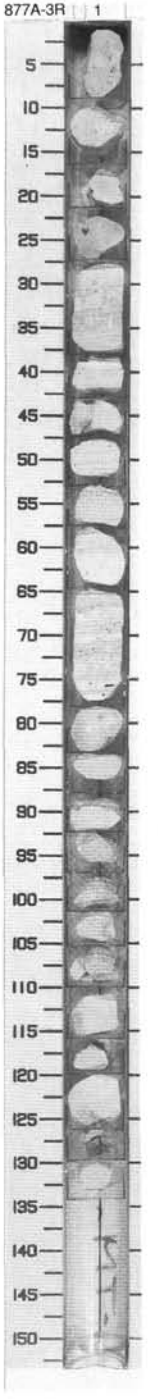
Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color
1	P P P W W W P P P W W W P P P W W W P P P W W W P P P W W W P P P W W W P P P W W W	1	Maastrichtian			T T	10YR 8/2 To 10YR 7/2

DESCRIPTION

SKELETAL PACKSTONE TO WACKESTONE, FENESTRAL WACKESTONE, SKELETAL PACKSTONE, and MUDSTONE

Major Lithologies:
Section 1, 0–27 cm, is comprised of poorly sorted (medium- to very coarse-grained sand and gravel) and bioturbated (burrowed) SKELETAL PACKSTONE-WACKESTONE, white (10YR 8/2) with pinkish (5YR 8/3) patches, well cemented with a "crystalline" aspect. Grains are angular to subrounded. Abundant fragments of rudists including radiolitids and caprinids (large fragments in Section 1, 9–16 cm and 21–27 cm). Other constituents include a few fragments of other bivalves, fragments of red algae, and a few benthic foraminifers. A well-rounded lithoclast (1 cm long) of skeletal wackestone is noted in Section 1, 21–27 cm. Porosity is interparticle, moldic to vuggy, locally, with isopachous, coarsely crystalline, bladed crusts; overall, porosity is low. A large caprinid fragment (in Section 1, 0–9 cm) is filled by micrite, with small benthic foraminifers and fragments of thin-shelled bivalves, thus implying dissolution prior to sediment infilling of the moldic porosity. In Section 1, 0–9 cm (top), there is a cm-thick, brown (7.5YR 5/4) layer (with foraminifers?). The contact between the infilling of the rudist shell and the brown layer is irregular and locally gradational. Scattered black specks in this brown layer may be manganese grains. The contact between the skeletal packstone and wackestone is in Section 1, 16–21 cm. On the backside of this piece, a cm-sized cavity is partly filled by geopetal, white, micritic material. The upper part of the cavity has isopachous, "botryoidal", banded, calcite cements. The backside of Section 1, 21–27 cm, has yellow (10YR 8/6), silt-sized material, partly infilling a cavity floored by "bulbous" banded calcite cements. Section 1, 27–78 cm, consists of light gray (10YR 7/2) to white (10YR 8/2), laminated and/or banded FENESTRAL WACKESTONE, containing very small gastropods, fragments of thin-shelled bivalves (leached), and rare benthic foraminifers (miliolids). A few dark grains are pyritized fragments (especially of worms?). The laminations (alternations of light gray (10YR 7/2) and white (10YR 8/2)) are reminiscent of microbial mats; they appear to be laterally continuous, irregular (undulating), or even disrupted. Fenestrae are rounded, may form networks of vertically elongated tiny canalicules, and are reminiscent of fluid escape structures. Some fenestrae are aligned horizontally and stacked ("Laminoid Fenestral Fabric"). Vertical cavities of a few millimeters in diameter are probably borings. Cavities, several mm in size, are rounded to vertically-elongated and are fully to partially filled with white (10YR 8/2), micritic material that is similar to the overlying wackestone. Some of these cavities have geopetal fill; some may result from bioturbation, especially at the top of this laminated light gray wackestone. The edges of the cavities are sharp and cut the grains of the encasing sediment, suggesting an early lithification of the micrite. Porosity is fenestral and moldic (leaching of bivalves). On the backside of Section 1, 27–38 cm, the white wackestone appears as the infilling of a network of cavities in the gray wackestone. The origin of these cavities could be related to bioturbation. In Section 1, 38–53 cm, there are angular intraclasts of light gray wackestone. There is a contact between two white (10YR 8/1 to 10YR 8/2) wackestones in Section 1, 58–65 cm. These wackestones differ in that, the greatest abundance of fenestrae is in the upper layer (high fenestral porosity). The contact between them is sharp; the upper surface of the lower wackestone has locally small borings, suggesting an early lithification of the lower wackestone. Section 1, 78–92 cm, consists of pale brown (10YR 6/3) to white (10YR 8/2), very fine to fine-grained SKELETAL PACKSTONE, with rudist fragments (radiolitids and caprinids), orbitoids, gastropods, and small bivalve fragments. Porosity is solution enlarged moldic, interparticle and vuggy with bladed, coarsely crystalline calcite crusts. Large cavities, up to several cm, are partly filled with calcitic cements that exhibit a "bulbous" morphology. In Section 1, 88–92 cm, a rudist packstone is overlain by a thin layer of gastropod packstone; the packstone has a conspicuous vuggy porosity, giving an alveolar aspect. Section 1, 92–97 cm, is comprised of very pale brown (10YR 8/4) MUDSTONE, with manganese dendrites and grains, and also phosphate grains; possible planktonic foraminifers are stained yellow to brown by phosphate. This interval is similar to Section 144-877A-2R-1, at 6–20 cm: late Paleocene pelagic sediments. Section 1, 102–105 cm, is comprised of white (10YR 8/2) MOLLUSK WACKESTONE to PACKSTONE; mollusks include small bivalves (thin-shelled) and gastropods. There is high moldic porosity; cm-sized cavities are filled by light gray (10YR 7/2) micritic sediments. On the backside of this piece, silt-sized, very pale brown (10YR 8/4) sediments are also infilling part of a large cavity. Section 1, 105–120 cm, is comprised of white (10YR 8/2) to very pale brown (10YR 7/3) RUDIST PACKSTONE, with fragments of caprinids, red algae, small fragments of bivalves and benthic foraminifers. Section 1, 120–134 cm, consists of white (10YR 8/2) to light gray (10YR 7/2), mottled, bioturbated RUDIST GASTROPOD WACKESTONE with gastropods, benthic foraminifers, and a few fragments of rudists (especially radiolitids and rare caprinid fragments stained in black). Tiny fenestrae (rounded to tubular) are noted.

General Description:
Cylinders: Section 1, 27–38 cm and 65–78 cm; Rollers: Section 1, 0–27 cm, 38–43 cm, 47–65 cm, 78–116 cm, 120–126 cm, and 130–134 cm; Drilling pebbles: Section 1, 43–47 cm, 116–120 cm, and 126–130 cm. Thin section samples: Section 1, 9–11 cm and 13–133 cm.



877A-1R CORED 0.0 - 9.5 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
1, 2		1 2	Maastrichtian	B	B	C/M	Mn		T T T T	10Y 8/1-10YR 8/4

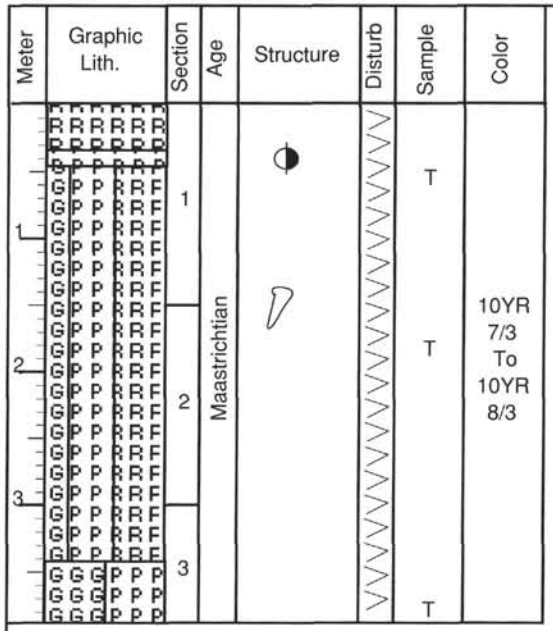
877A-2R CORED 9.5 - 19.0 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
5		1	Maastrichtian	B	B	F/M	Mn		T	10YR 8/2 10YR 8/4 TO 10YR 7/3 10YR 7/3

877A- 3R CORED 19.0 - 28.4 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
1		1	Maastrichtian	B	B	Maastrichtian F/M			T T	10YR 8/2 To 10YR 7/2

CORED 28.4 - 38.0 mbsf

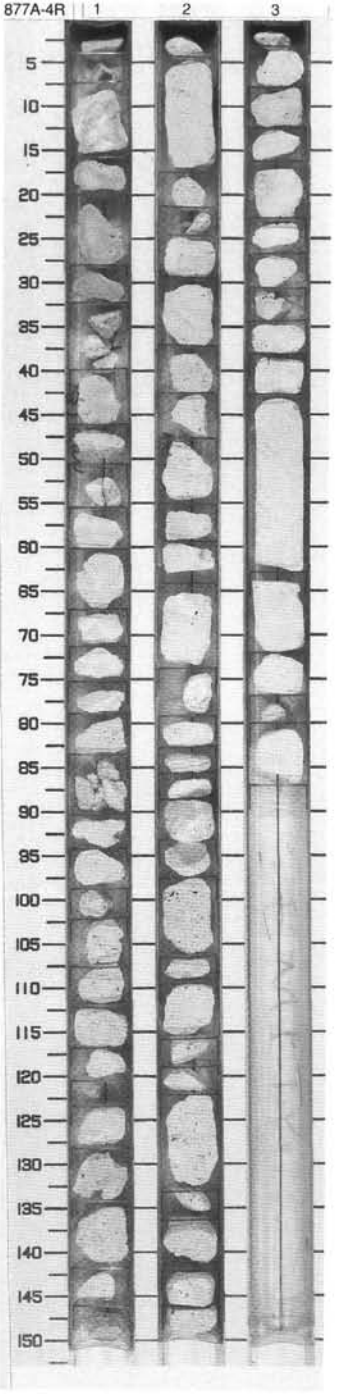


DESCRIPTION

RUDIST RUDSTONE, FORAMINIFER PACKSTONE, and SKELETAL GRAINSTONE/PACKSTONE

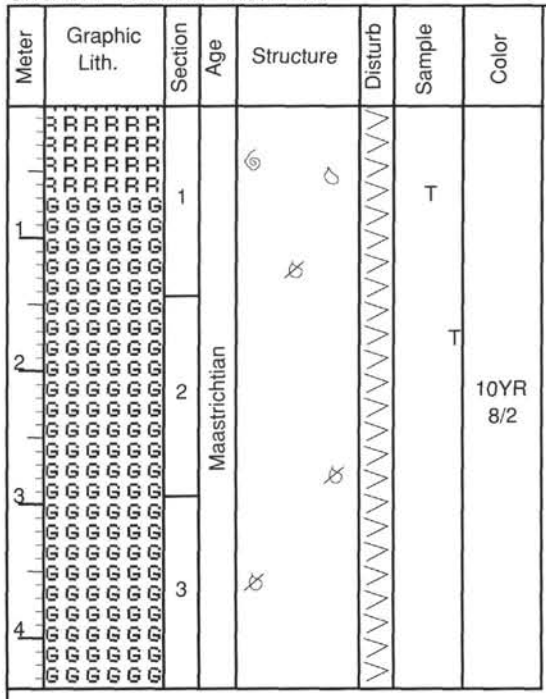
Major Lithologies:
Section 1, 0–4 cm, contains one piece of caprinid shell with tightly packed, polygonal canals (0.3–0.5 mm in diameter) recrystallized to clear or translucent calcite. Many canals are lined with finely crystalline bladed calcite crust, some are completely filled. Section 1, 4–32 cm, is comprised of very pale brown (10YR 7/3) RUDIST RUDSTONE with caprinid rudist pieces (up to 5 cm x 2 cm) with closely packed polygonal canals (same preservation as in Section, 0–4 cm); there are a few radiolitid fragments, to 0.5 cm. One skeletal fragment may be a calcisponge, some kind of encruster, or a poorly preserved caprinid piece. The matrix is a well-cemented PELOID PACKSTONE, peloids are vague. The packstone is laminated in places. Some skeletal debris is also present, though not identified. Matrix is well cemented/neomorphed by clear to translucent calcite; crystals are not visible. A few large rudist fragments are apparently replaced by coarsely crystalline calcite, but the crystal shape is vague. Porosity is almost zero except for a few mm-cm vugs, most of which have finely to medium crystalline bladed calcite crusts. Section 1, 32–46 cm is comprised of very pale brown (10YR 8/3) FORAMINIFER PACKSTONE, coarse grained (1–2 mm). Constituents are: abundant large benthic foraminifers, common red algae (fragments and some encrusting grains), many radiolite fragments, and few caprinid fragments. Shapes that look like micritic envelopes (about 0.4 mm or less) are common throughout the matrix. There is a 1.5 cm "rind" on one side of the piece in Section 1, 40–46 cm, that has a distinct chalky aspect and a higher microporosity than the remainder of the piece. The composition is the same (though foraminifers are of a smaller size). It is not clear if this is a diagenetic or primary lithologic contact. Section 1, 46–94 cm, is comprised of very pale brown (10YR 8/3) to white (10YR 8/2) RUDIST RUDSTONE (possibly bafflestone, but the rudists seem fragmented, probably transported). Rudist fragments, mostly caprinids, are 2–4 cm in size. The matrix varies from well-packed algal peloid grainstone (medium to coarse sand) to algal foraminifer peloid grainstone. Red algae fragments are abundant, small foraminifers (<.25 mm) common; there are few radiolitid rudist fragments and few nonrudist bivalve molds. Porosity varies from 0% to 2%–3%, variably vuggy and moldic. Molds and vugs are commonly, but not always, filled by bladed, fine to medium crystalline crusts. There is very little intergranular porosity; most is filled by translucent to clear cement. Section 1, 94–151 cm, is comprised of very pale brown (10YR 8/3) RUDIST RUDSTONE, with abundant rudist fragments (mm to cm scale) in a fine to medium sand peloid? grainstone or packstone matrix. Most fragments are radiolitids, some nearly whole, 0.5 to 1 cm in diameter. There are many 1–3 cm size caprinid pieces, few coral fragments, common red algae and large benthic foraminifers, and few other bivalves. The rudstone is well cemented. Porosity (1%–2%) is vuggy (up to 0.5 cm); there is some moldic porosity after bivalves, and some may be original intergranular porosity. All pore space is lined with cement crusts up to mm-thick. There may be more than one generation of calcitic crust (need thin section). Most recent crust is medium to coarse crystalline (PB45C). Section 2, is similar to Section 1, 94–151 cm, with minor variations in matrix grain size and variations in coarse grain composition and size. There are fewer radiolitids and a decrease in overall grain size in Section 2, 0–24 cm. Porosity and cements are same as at the base of Section 1. There are no cm-sized grains until Section 2, 25–30 cm, 37–42 cm, and 59–74 cm, where there are large caprinid fragments. Section 2, 97–106 cm, has a colony of radiolitids that are similar to the base of Section 1. There are still more caprinid pieces (2–3 cm in size) to the base of Section 2. The overall matrix composition includes abundant large benthic foraminifers, red algae, smaller rudist fragments, peloids, and small benthic foraminifers, but few gastropods. Section 3, 0–43 cm, is the same as Section 2, but with a finer matrix. Section 3, 43–87 cm, consists of medium sand size GRAINSTONE to PACKSTONE, with abundant shell fragments (radiolitid and other bivalves?). The fragments are <1 mm-long, rectangular, and mostly unidentified. There are abundant red algae and few large benthic foraminifers. A few shell molds are cm-scale; there is one 1.5 cm round chunk of caprinid rudist. Intergranular space is filled by cement (PB45C) in the few molds and vugs; these are mostly filled by calcite cement (intergrown crusts).

General Description:
Cylinders: Section 1, 7–16 cm, Section 2, 4–17 cm, 30–37 cm, 64–74 cm, 97–107 cm, and 122–133 cm, Section 3, 43–72 cm; Rollers: Section 1, 16–32 cm, 40–50 cm, 55–83 cm, 90–99 cm, 102–121 cm, and 124–151 cm, Section 2, 25–30 cm, 37–42 cm, 48–55 cm, 89–97 cm, 110–116 cm, and 136–150 cm, Section 3, 3–12 cm, 16–30 cm, 34–43 cm, 72–77 cm, and 80–87 cm; Drilling pebbles: Section 1, 0–7 cm, 32–40 cm, 50–55 cm, 83–90 cm, 99–102 cm, and 121–124 cm, Section 2, 0–4 cm, 17–25 cm, 42–48 cm, 55–64 cm, 74–89 cm, 107–110 cm, 116–122 cm, and 133–136 cm, Section 3, 0–3 cm, 12–16 cm, 30–34 cm, and 77–80 cm. Thin Section samples: Section 1, 43–45 cm, Section 2, 18–21 cm, Section 3, 73–77 cm.



SITE 877 HOLE A CORE 5R

CORED 38.0 - 47.6 mbsf

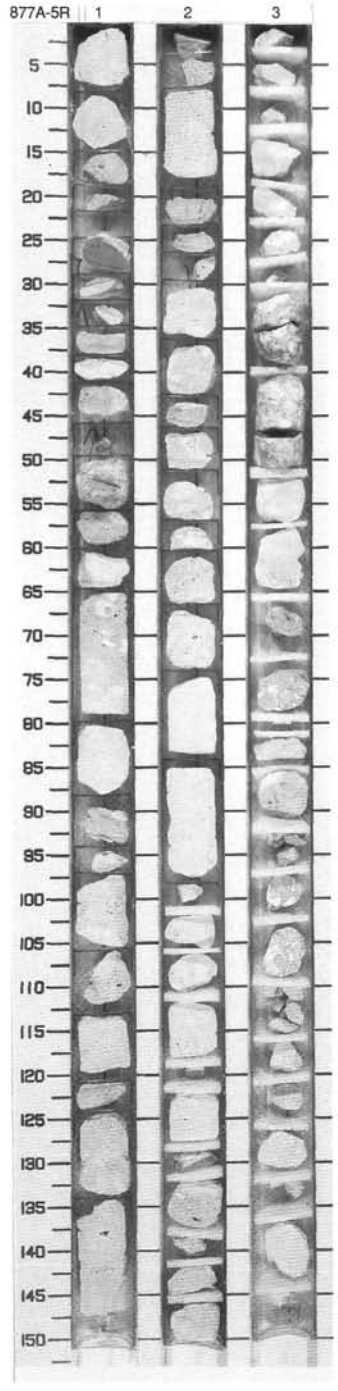


DESCRIPTION

ALGAL RUDIST RUDSTONE, SKELETAL GRAINSTONE, and RUDIST RUDSTONE

Major Lithologies:
Section 1, 0–71 cm, is comprised of white (10YR 8/2), well-cemented, recrystallized ALGAL RUDIST RUDSTONE with abundant red algae fragments (< 2 mm) and abundant rudist (mostly caprinid) fragments (>2 mm). Few of the rudist fragments are encrusted by red algae. Porosity (5%) is mostly intraparticle, rarely moldic. Calcite cement is abundant, mostly bladed, coarsely crystalline crusts. In Section 1, 25–28 cm, a 6-cm roller consists almost entirely of a single caprinid with a recrystallized but fabric-retentive shell wall texture. Section 1, 41–46 cm, is the internal cavity of a caprinid; it is filled with skeletal grainstone with abundant bivalve and red algae fragments. Large rudist fragments decrease in abundance with depth and by Section 1, 71 cm, this facies is a SKELETAL GRAINSTONE. Section 1, 71–151 cm, consists of white (10YR 8/2) SKELETAL GRAINSTONE with rare gravel-size rudist fragments. Grain size is very coarse sand that is well packed. Large benthic foraminifers and rudist fragments are abundant. Red algae are common and encrust skeletal fragments. Porosity (5%) is mostly moldic, interparticle, and intraparticle. Calcite cement is common and includes coarsely crystalline bladed crusts. There is a caprinid fragment (5 cm across) in Section 1, 103–108 cm. Internal molds of burrows are preserved in a dissolved bivalve fragment in Section 1, 134–150 cm. Section 2, 0–151 cm, is comprised of very pale brown (10YR 7/3), poorly sorted, well-cemented SKELETAL GRAINSTONE, with abundant rudist fragments, abundant red algae, and abundant large benthic foraminifers. Most of the rudists are caprinids with radiolitids. Grain size is very coarse sand with a few large (>2 mm in diameter) rudist fragments. Internal molds of burrows are few. Porosity (7%) is mostly intraparticle with rare molds. Calcite cement is mostly medium crystalline bladed crusts. There is a decrease in grain size, to coarse sand with rare large caprinid fragments, in Section 2, 74–98 cm. In Section 2, 122–128 cm there are three large (4–6 cm across) caprinid fragments; one large (4 cm across) caprinid fragment is found in Section 2, 132–138 cm. Section 3, 0–30 cm, is comprised of very pale brown (10YR 7/3), well-packed, well-cemented SKELETAL GRAINSTONE; the constituents are: abundant rudists, mostly caprinids (3–4 cm long) and rare radiolitids; abundant red algae; and many large benthic foraminifers. Grain size is very coarse sand. Porosity (7%) is mostly interparticle, especially within the canals of caprinids. Calcite cement (many) is especially medium crystalline bladed crusts. Section 3, 30–51 cm, is comprised of white (10YR 8/2) and very pale brown (10YR 7/3) RUDIST RUDSTONE, with large (pebble size >4 mm) fragments of caprinids. The white caprinids look chalky, whereas the very pale brown ones are recrystallized. There is spectacular preservation of the caprinid shell wall structure despite recrystallization. Near Section 3, 40 cm, a "chalkified" caprinid and a recrystallized caprinid are separated by no more than 1 mm. Thus, the difference in the style of preservation is intriguing indeed. Section 3, 51–66 cm, is comprised of white (10YR 8/2) SKELETAL GRAINSTONE, with abundant rudist fragments (caprinids and radiolitids), large benthic foraminifers, and red algae. Squamaracean rhodoliths occur between Section 3, 51–57 cm. Porosity is less than 3%, mostly moldic. Section 3, 66–109 cm, consists of white (10YR 8/2) and very pale brown (10YR 7/3), very well-cemented RUDIST RUDSTONE. Skeletal components are dominated by rudist fragments, with only a few large benthic foraminifers. Few of the caprinid fragments are rounded. One caprinid has its internal cavity filled with sediment. White "chalky" allochems include caprinids, other bivalves, and perhaps red algae fragments. Porosity is less than 5%. Calcite cement is abundant. Section 3, 109–144 cm, consists of white (10YR 8/2), well-cemented SKELETAL GRAINSTONE. Skeletal components include abundant red algae fragments, common bivalve fragments, and few large benthic foraminifers. Grain size is coarse sand. Calcite cement is few, mostly medium crystalline bladed crusts (PB3C).

General Description:
Cylinders: Section 1, 0–15 cm, 65–88 cm, 97–106 cm, 113–120 cm, and 124–151 cm, Section 2, 8–19 cm, 74–98 cm, 111–119 cm, and 122–129 cm, Section 3, 30–51 cm and 57–66 cm; Rollers: Section 1, 15–18 cm, 25–29 cm, 41–46 cm, 49–65 cm, 88–94 cm, and 106–113 cm, Section 2, 29–42 cm, 46–57 cm, 60–74 cm, 106–111 cm, 132–138 cm, and 146–151 cm, Section 3, 12–23 cm, 51–57 cm, 72–79 cm, 82–91 cm, 97–109 cm, 126–132 cm, and 136–144 cm; Drilling pebbles: Section 1, 18–25 cm, 29–41 cm, 46–49 cm, 94–97 cm, and 121–124 cm, Section 2, 0–8 cm, 19–29 cm, 42–46 cm, 57–60 cm, 98–106 cm, 119–122 cm, 129–132 cm, and 138–146 cm, Section 3, 0–12 cm, 23–30 cm, 66–72 cm, 79–82 cm, 91–97 cm, 109–126 cm, and 132–136 cm. Thin section samples: Section 1, 56–60 cm, Section 2, 19–22 cm.



SITE 877 HOLE A CORE 6R

CORED 47.6 - 57.3 mbsf

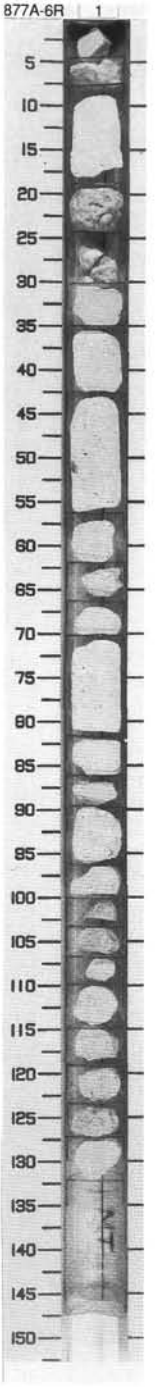
Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color
1		1	Maastrichtian			T T	10YR 8/3 To 10YR 8/4

DESCRIPTION

SKELETAL PACKSTONE, RUDIST RUDSTONE, and RUDIST BOUNDSTONE

Major Lithologies:
Section 1, 0–30 cm, is comprised of very pale brown (10YR 8/3) SKELETAL PACKSTONE, grading down into RUDIST RUDSTONE with packstone matrix. A few grains are identifiable at the top of section; these include: large benthic foraminifers, red algae (rare to few), caprinid rudists (which become common at the the base, Section 1, 15–30 cm), radiolitids (rare to common), red algae (many including encrusting and broken fragments), gastropods (rare), corals (very rare), dasyclad algae (very rare), and peloids (Section 1, 15–30 cm). Matrix mud content is very low. Porosity is 1% at the top, but increases to 10% at the base. Pores, are molds of various sizes (small mesopores to small megapores), with minor shelter and boring porosity (0%–7%) and intraparticle porosity (24%–30%); there are minor crusts of finely crystalline equant calcite in molds. Section 1, 30–90 cm, is comprised of very pale brown (10YR 8/4), coarse sand-size SKELETAL PACKSTONE with little mud. Constituents are: large benthic foraminifers (few to common); caprinid rudist fragments (absent to common, in Section 1, 62–66 cm); red algae (mostly corallinaceans, squamariaceans in Section 1, 33–45 cm), bivalve fragments; and encrusting foraminifers. Porosity is roughly 3%, mostly moldic with minor interparticle. Two generations of cement are recognized: (1) isopachous, medium crystalline calcite crust, possibly fibrous (PF?4C) in intergranular pores; and, (2) bladed crust (PB4C) in intercrystalline pores and molds. Section 1, 90–132 cm, is comprised of very pale brown (10YR 8/3) RUDIST BOUNDSTONE, with a muddy skeletal packstone matrix. Clusters of small (10–20 mm in diameter) radiolitid rudists, throughout, may be in situ. Other components are red algae (corallinaceans), caprinid bivalves (rare), large benthic foraminifers, bivalves, gastropods, and encrusting foraminifers. Many geopetal structures are identified, as well as a few borings. Porosity is about 3%, both moldic and intraparticle. Two cements are present: (1) a crust of medium to coarsely crystalline calcite (PF?45C), and (2) equant calcite crusts in molds (PE5C).

General Description:
Cylinders: Section 1, 7–19 cm, 35–56 cm, 70–86 cm, and 90–96 cm; Rollers: Section 1, 19–24 cm, 30–35 cm, 56–62 cm, 96–100 cm, 110–124 cm, and 127–132 cm; Drilling pebbles: Section 1, 0–7 cm, 24–30 cm, 62–70 cm, 86–90 cm, 100–110 cm, and 124–127 cm. Thin section samples: 73–76 cm and 115–119 cm.



877A-4R CORED 28.4 - 38.0 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
1 2 3	R P G	1 2 3	Maastrichtian	B	B	C/M			T T T	10Y 7/3 To 10YR 8/3

877A-5R CORED 38.0 - 47.6 mbsf

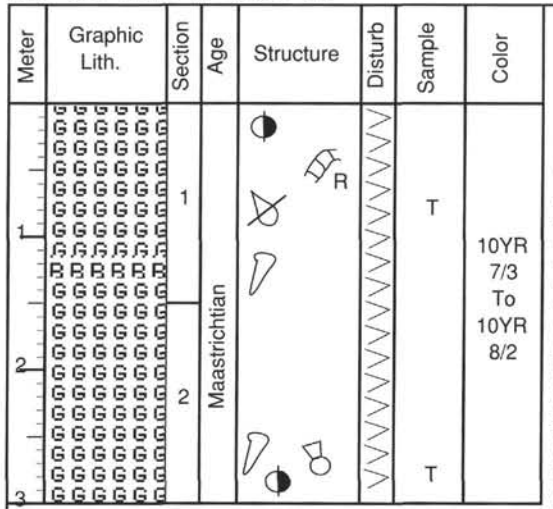
Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
1 2 3 4	R G	1 2 3	Maastrichtian	B	B	F/M			T T	10YR 8/2

877A- 6R CORED 47.6 - 57.3 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
1	R P B	1	Maastrichtian	B	B	Maastrichtian A/M			T T	10YR 8/3 To 10YR 8/4

SITE 877 HOLE A CORE 7R

CORED 57.3 - 67.0 mbsf

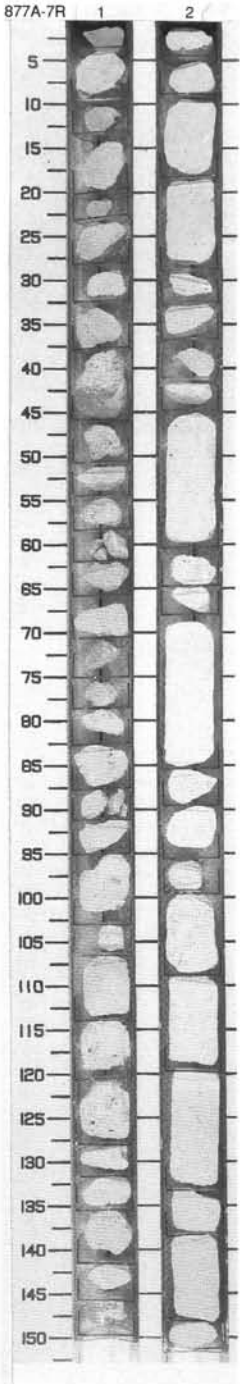


DESCRIPTION

SKELETAL GRAINSTONE and RUDIST RUDSTONE

Major Lithologies:
Section 1, 0–114 cm, is comprised of white (10YR 8/2) SKELETAL GRAINSTONE, with abundant large benthic foraminifers, many rudist fragments (especially radiolitids, at Section 1, 37–45 cm and 90–103 cm), many red algae, and rare corals. Porosity is 10%, but variable. Porosity is mostly solution enlarged interparticle and microvuggy. Calcite cement is rare, mostly finely crystalline bladed crusts (PB3C). Section 1, 114–128 cm, is comprised of white (10YR 8/2) and very pale brown (10YR 7/3), radiolitid-rich RUDIST RUDSTONE. Radiolitids are in growth position, as oriented by geopetals. Most of radiolitids are 3 cm-long and 0.5 cm-wide, some still have their upper valve. Red algae are many and corals and gastropods are rare. Porosity is 15%, mostly intraparticle and moldic. Cement is common, pore filling cements are medium crystalline bladed crusts (PB4C). Rudists are recrystallized with loss of some of the shell wall structure. Some of the rudists have been bored by bioeroders. Section 1, 128–150 cm, is comprised of white (10YR 8/2), poorly sorted SKELETAL GRAINSTONE, with abundant large benthic foraminifers, common bivalve fragments (especially caprinids), many red algae (especially squamaraceans), and a rare gastropod (1.5 cm-long by 0.5 cm-in-diameter). Porosity is 3%, mostly intraparticle. Calcite cement (many) is especially PB4C. Section 2, 0–150 cm, consists of white (10YR 8/2), poorly sorted SKELETAL GRAINSTONE-RUDSTONE. Grain size varies from coarse sand to granular. A few skeletal components are pebble size. Components include: common red algae, especially encrusters, squamariaceans, and corallinaceans (Section 2, 120–133 cm); common thin-shelled bivalves and rudists; and common large benthic foraminifers; encrusting corals and gastropods are rare. Tightly packed groupings of various skeletal allochems are encrusted by algae, especially in Section 2, 95–100 cm. Porosity is 5%, mostly intraparticle and moldic. Calcite cement is common and occurs as PB4C and PF3C. The latter cement morphology is especially common as the lining of molds.

General Description:
Cylinders: Section 1, 38–46 cm, 95–103 cm, and 107–128 cm, Section 2, 9–28 cm, 44–60 cm, 68–85 cm, 100–133 cm, and 138–148 cm; Rollers: Section 1, 3–10 cm, 13–20 cm, 23–28 cm, 32–38 cm, 66–71 cm, 83–88 cm, and 136–142 cm, Section 2, 0–9 cm, 32–36 cm, 41–44 cm, 85–95 cm, and 133–138 cm; Drilling pebbles: Section 1, 0–3 cm, 10–13 cm, 20–23 cm, 28–32 cm, 46–66 cm, 71–83 cm, 88–95 cm, 103–107 cm, 128–136 cm, and 142–150 cm, Section 2, 28–32 cm, 36–41 cm, 60–68 cm, 95–100 cm, and 148–150 cm. Thin section samples: Section 1, 66–70 cm, Section 2, 119–120 cm.



SITE 877 HOLE A CORE 8R

CORED 67.0 - 76.6 mbsf

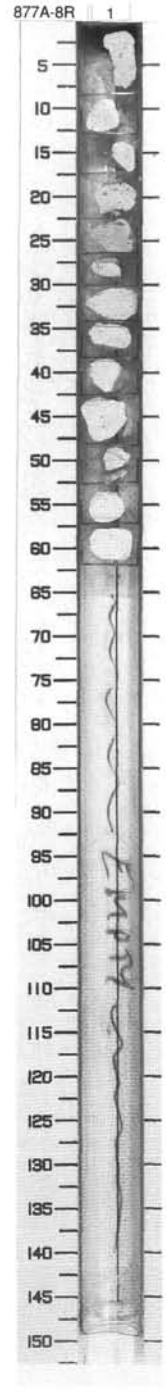
Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color
.5	G P B	1	Maastrichtian	R R			10YR 8/2

DESCRIPTION

SKELETAL ALGAL GRAINSTONE, SKELETAL PACKSTONE, and RUDIST ALGAL BOUNDSTONE

Major Lithologies:
Section 1, 0–22 cm, is comprised of white (10YR 8/2), medium- to coarse-grained SKELETAL ALGAL GRAINSTONE. *Constituents include: abundant red* algae (corallinaceans); common to abundant rudists (reworked whole and fragments of radiolitids (1 cm-long), and probable caprinid fragments); common gastropods; and common coral fragments. Porosity is moldic and vuggy with passive medium crystalline bladed crusts. Section 1, 22–26 cm, is comprised of white (10YR 8/2) SKELETAL PACKSTONE with thin, irregular red algal crusts and nodules. Overall, composition of this skeletal packstone is similar to Section 1, 0–22 cm. Section 1, 22–62 cm, is comprised of white (10YR 8/2) RUDIST ALGAL BOUNDSTONE *with small radiolitids (about 1 cm* diameter), whole and in life position, or fragmented. Abundant red algae encrust the rudists and form irregular crusts in the sediment. Individual algal crusts are thin (1–2 mm), but they are very abundant and irregular. Gastropods are rare. Matrix is a skeletal grainstone with fragments of red algae, rudists, and benthic foraminifers (especially miliolids). Section 1, 58–62 cm, is comprised of SKELETAL ALGAL GRAINSTONE without red algal crusts and rudists; similar to Section 1, 0–22 cm.

General Description:
Rollers: Section 1, 0–13 cm, 18–26 cm, 30–49 cm, and 53–62 cm; Drilling pebbles: Section 1, 13–18 cm, 26–30 cm, and 49–53 cm. Thin section samples: none.



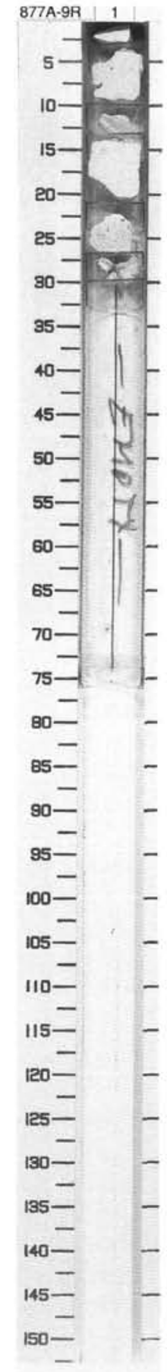
Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color
.1 .2 .3		1	Maastrichtian				10YR 8/2

DESCRIPTION

SKELETAL GRAINSTONE, ALGAL RUDIST GRAINSTONE, and RUDIST FLOATSTONE

Major Lithologies:
Section 1, 0–2 cm, consists of one drilling pebble of white (10YR 8/2) SKELETAL GRAINSTONE, very similar to the matrix of the rudist algal boundstone in Section 877A-8R-1, 22–62 cm. Section 1, 2–20 cm, is comprised of white (10YR 8/2), fine- to medium-grained ALGAL-RUDIST GRAINSTONE, with fragments of rudists (radiolitids), fragments of red algae, benthic foraminifers (miliolids), and leached fragments of bivalves and gastropods. Porosity (10%–15%) is intergranular to vuggy. Section 1, 22–26 cm, is comprised of white (10YR 8/2) RUDIST FLOATSTONE with well-sorted fragments of rudists (radiolitids and caprinids), benthic foraminifers (miliolids and few orbitoids), and red algae (fragments and thin crusts).

General Description:
Cylinders: Section 1, 13–20 cm; Rollers: Section 1, 2–10 cm and 20–26 cm; Drilling pebbles: Section 1, 0–2 cm, 10–13 cm, and 26–30 cm. Thin section samples: none.



877A-7R CORED 57.3 - 67.0 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
1		1	Maastrichtian	B	B	C/M	R		T	10YR 7/3 To 10YR 8/2
2		2							T	
3										

877A-8R CORED 67.0 - 76.6 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
.5		1	Maastrichtian				R R			10YR 8/2

877A- 9R CORED 76.6 - 86.3 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
.1		1	Maastrichtian							10YR 8/2
.2										
.3										

SITE 877 HOLE A CORE 10R CORED 86.3 - 96.0 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color
.1	GGGGG / BBBBB	1	Maastrichtian				10YR 8/2

DESCRIPTION

SKELETAL GRAINSTONE and CORAL BOUNDSTONE

Major Lithologies:
Section 1, 0–3 cm, is comprised of white (10YR 8/2), porous, fine-grained SKELETAL GRAINSTONE, that is similar to the skeletal grainstone in Section 877A-9R-1, 0–2 cm, with one small coral colony and a small radiolitid (<1 cm in diameter). Section 1, 3–13 cm, is comprised of white (10YR 8/2) SKELETAL GRAINSTONE (possible boundstone) including a coral colony with corallites about 3 mm in diameter. Rudist fragments (radiolitids and caprinids) and red algae are present. There are fragments of calcareous sponges (chaetetids) and benthic foraminifers (orbitoids) in Section 1, 10–13 cm. Section 1, 13–17 cm, is comprised of white (10YR 8/2) CORAL BOUNDSTONE with tabular coral colonies and a porous, fine-grained skeletal grainstone matrix.

General Description:
Rollers: Section 1, 13–17 cm; Drilling pebbles: Section 1, 0–13 cm. Thin section samples: none.

877A 11R NO RECOVERY

SITE 877 HOLE A CORE 12R CORED 105.7 - 115.3 mbsf

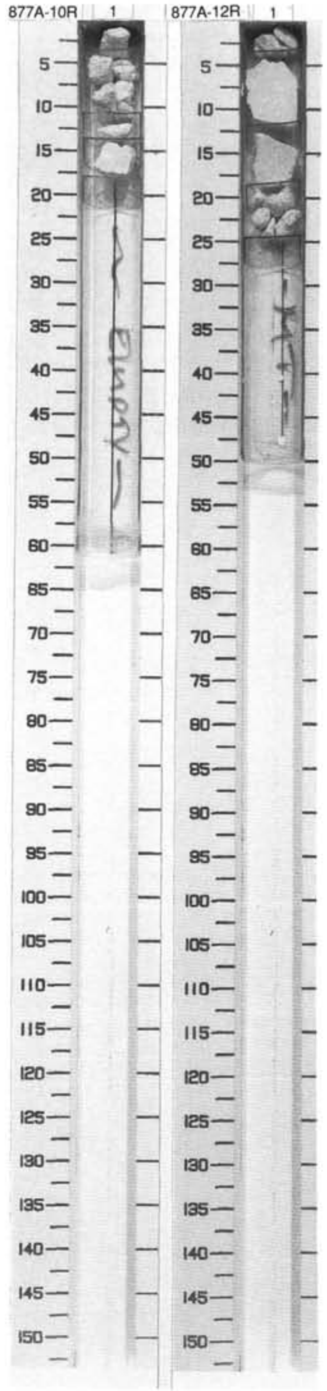
Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color
	GGGGG	1	Maastrichtian			T	10YR 8/2

DESCRIPTION

FORAMINIFER SKELETAL GRAINSTONE

Major Lithology:
White (10YR 8/2), medium sand, poorly cemented, friable, FORAMINIFER SKELETAL GRAINSTONE with many large benthic foraminifers, few identifiable bivalve shells (possible rudists), common fragments of probable red algae. Most grains are recrystallized or chalky and not identified. Some intergranular spaces are filled with white (10YR 8/1), calcite mud that makes the sample look like a packstone in places. The mud is only apparent on the cut surface, and thus, may be fine material generated by the saw (or an alteration product that is simply washed out of pores on the sides of the core); some grains (0.25–0.5 cm in size), which may be altered red algae, consist of this soft mud. There are a few lithified domains (1 cm in diameter) of packstone, that may be either lithoclasts, or evidence of bioturbation.

General Description:
Cylinders: Section 1, 3–18 cm; Drilling pebbles: Section 1, 0–3 cm and 18–24 cm. Thin section sample: Section 1, 11–17 cm.



SITE 877 HOLE A CORE 13R

CORED 115.3 - 125.0 mbsf

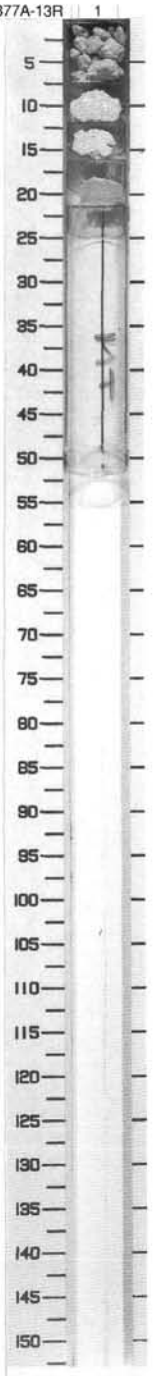
Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color
1		1	Maastrichtian	◑			10YR 8/2

DESCRIPTION

FORAMINIFER SKELETAL GRAINSTONE

Major Lithology:
White (10YR 8/2), medium sand, poorly cemented, friable, FORAMINIFER SKELETAL GRAINSTONE, with many large benthic foraminifers, few identifiable bivalve shells (possible rudists), and common fragments of probable red algae. Most grains are recrystallized or chalky and not identified. Some intergranular spaces are filled with white (10YR 8/1), calcite mud that makes the sample look like a packstone in places; the mud is most apparent on the cut surface and may be alteration product that is simply washed away on the sides of the core). Some grains (0.25–0.5 cm in size), which may possibly be altered red algae, consist of this soft mud. There are a few lithified domains (1 cm in diameter) of packstone, which may be either lithoclasts, or some kind of bioturbation.

General Description:
Rollers: Section 1, 7–21 cm; Drilling pebbles: Section 1, 0–7 cm. Thin section samples: none.



877A-10R CORED 86.3–96.0 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
.1		1	Maastrichtian							10YR 8/2

877A-11R NO RECOVERY

877A-12R CORED 105.7–115.3 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
.1		1	Maastrichtian	B	B	A/M			T	10YR 8/2

877A-13R CORED 115.3–125.0 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
		1	Maastrichtian	B	B	F/M				10YR 8/2

SITE 877 HOLE A CORE 14R — CORED 125.0 - 134.6 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color
1–2		1, 2	Maastrichtian			T	10YR 8/2

DESCRIPTION

FORAMINIFER SKELETAL GRAINSTONE

Major Lithology:
White (10YR 8/2), medium sand, poorly cemented, friable FORAMINIFER SKELETAL GRAINSTONE, with many large benthic foraminifers, few identifiable bivalve shells (possible rudists), and common fragments of probable red algae. Most grains are recrystallized or chalky and are therefore, not identified. Some intergranular spaces are filled with white (10YR 8/1) calcite mud, that makes the sample look like a packstone in places; the mud is only apparent in the cut surface and may be fine material generated by the saw. There are a few lithified domains (1 cm in diameter) of packstone that may be either lithoclasts, or some kind of bioturbation.

General Description:
Cylinders: Section 1, 0–62 cm, 67–75 cm, 85–100 cm, and 108–123 cm, Section 1, 5–12 cm, 31–47 cm, 58–84 cm, and 103–120 cm; Rollers: Section 1, 62–67 cm, 75–85 cm, 100–104 cm, and 127–136 cm, Section 2, 0–5 cm, 12–31 cm, and 90–103 cm; Drilling pebbles: Section 1, 104–108 cm, 123–127 cm, and 136–149 cm, Section 2, 47–58 cm, 84–90 cm, and 120–127 cm. Thin section samples: Section 1, 62–65 cm.

SITE 877 HOLE A CORE 15R — CORED 134.6 - 144.3 mbsf

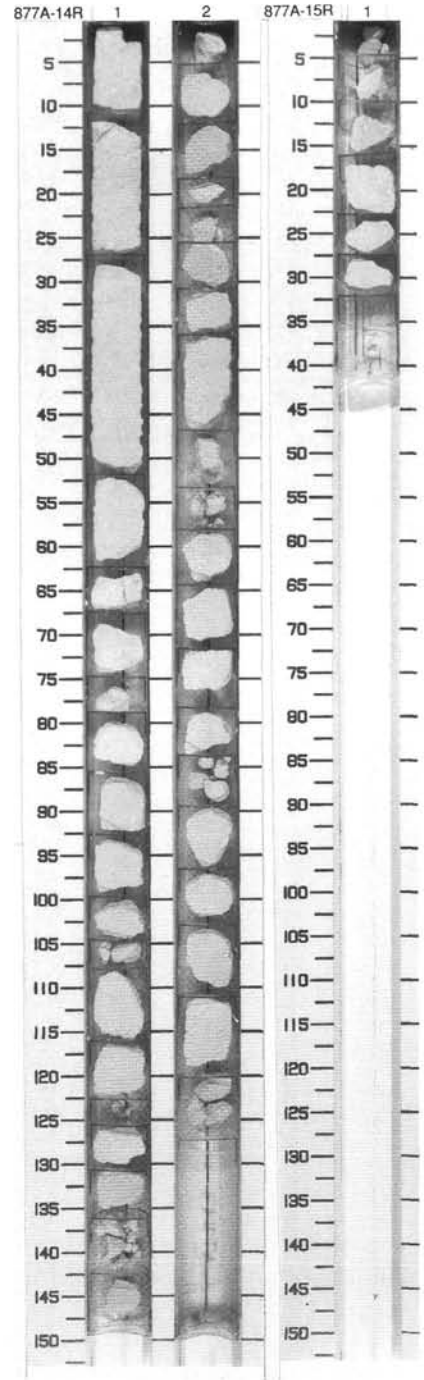
Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color
.1–.2		1	Campanian–Maastrichtian				10YR 8/2

DESCRIPTION

FORAMINIFER SKELETAL GRAINSTONE

Major Lithology:
White (10YR 8/2), medium sand, poorly cemented, friable, FORAMINIFER SKELETAL GRAINSTONE, with many large benthic foraminifers, few identifiable bivalve shells (possible rudists); probable red algae is common. Most grains are recrystallized or chalky and are therefore, not identified. Some intergranular space is filled with soft, white (10YR 8/1) calcite mud that makes the sample look like a packstone in places; the mud is only apparent in the cut surface and may be fine material generated by the saw. There are a few lithified domains of packstone that may be either lithoclasts, or bioturbation.

General Description:
Rollers: Section 1, 0–31 cm. Thin section samples: none.



SITE 877 HOLE A CORE 16R

CORED 144.3 - 153.9 mbsf

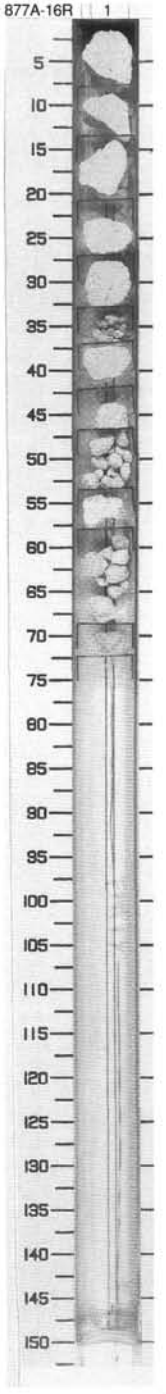
Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color
5		1	Campanian–Maastrichtian	R			10YR 8/2 2.5YR 6/6 10YR 8/2

DESCRIPTION

SKELETAL GRAINSTONE

Major Lithology:
Section 1, 0–72 cm, is comprised of white (10YR 8/2), friable, poorly cemented, well-sorted SKELETAL GRAINSTONE, with a leached fabric that prohibits the identification of most grains. Components include common red algae fragments and many bivalve fragments. Grains size is very coarse sand. Porosity (25%) is mostly solution enlarged interparticle. Section 1, 53–57 cm is better cemented and stained light red (2.5YR 6/6). Components include abundant large benthic foraminifers and red algae.

General Description:
Rollers: Section 1, 0–32 cm, 36–46 cm, and 53–57 cm; Drilling pebbles: Section 1, 32–36 cm, 46–53 cm, and 58–72 cm. Thin section samples: none.



877A-14R CORED 125.0–134.6 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
1		1	Maastrichtian	B	B	F/M			T	10YR 8/2
2		2								

877A-15R CORED 134.6–144.3 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
.1			Campanian–Maastrichtian	B	B	Campanian–Maastrichtian				10YR 8/2
.2										
.3						F/M				

877A-16R CORED 144.3–153.9 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
.5		1	Campanian–Maastrichtian	B	B	Campanian–Maastrichtian F/M	R			10YR 8/2 ← 2.5YR 6/6 10YR 8/2

SITE 877 HOLE A CORE 17R

CORED 153.9 - 163.5 mbsf

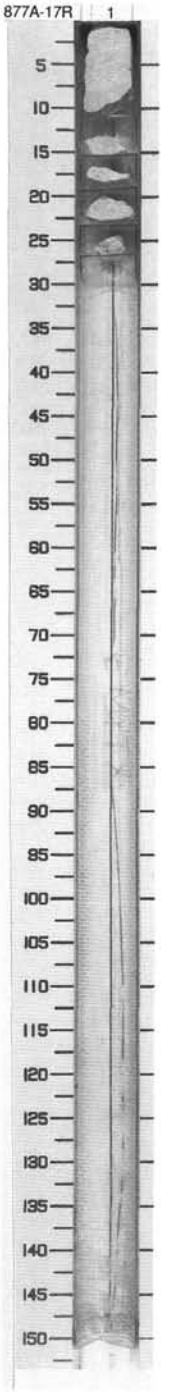
Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color
		1	Campanian–Maastrichtian	R		T	10YR 8/1 To 10YR 8/2

DESCRIPTION

SKELETAL FORAMINIFER GRAINSTONE-PACKSTONE

Major Lithology:
Section 1, 0–27 cm, is comprised of white (10YR 8/2) SKELETAL FORAMINIFER GRAINSTONE-PACKSTONE, with rounded shell fragments; it contains abundant benthic foraminifers (orbitoids and few miliolids), rudist fragments (small radiolitids and caprinids), and coral fragments (tabular colonies at the top of the core). Centimeter-thick layers in Section 1, 0–15 cm have white (10YR 8/1) micrite matrix, producing a PACKSTONE texture; fragments of corals and red algae occur in the packstone layers in Section 1, 10–15 cm. These layers are very irregular in thickness and are oblique. The contact between these micrite-rich layers and the grainstone is gradational. The porosity is low; it is primarily interparticle and vuggy.

General Description:
Cylinders: Section 1, 0–10 cm; Rollers: Section 1, 10–23 cm; Drilling pebbles: Section 1, 23–27 cm. Thin section sample: Section 1, 7–10 cm.



SITE 877 HOLE A CORE 18R CORED 163.5 - 173.2 mbsf

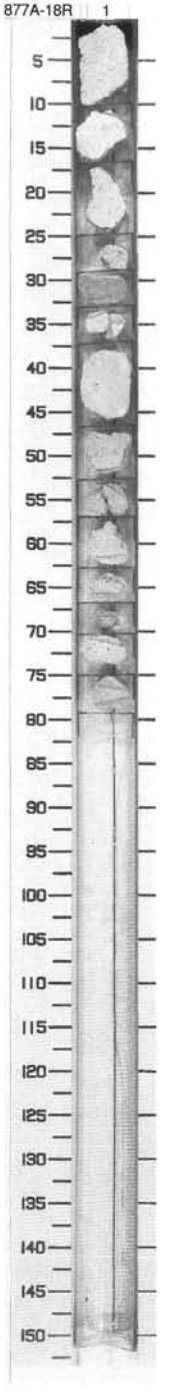
Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color
5	G	1	Campanian–Maastrichtian	R		T	10YR 8/2

DESCRIPTION

GRAINSTONE and SKELETAL GRAINSTONE

Major Lithologies:
Section 1, 0–25 cm, is comprised of white (10YR 8/2), poorly cemented, friable GRAINSTONE, with a leached fabric that renders many grains unidentifiable. Red algae fragments are common. Porosity (25%) is solution enlarged interparticle. Grain size is very coarse sand size.
Section 1, 25–79 cm, is comprised of white (10YR 8/2) and light red (2.5YR 6/6), lightly cemented SKELETAL GRAINSTONE, with abundant large benthic foraminifers, common red algae, many bivalve fragments, and rare coral fragments. Grain size is coarse to very coarse sand size, poorly to moderately sorted. Rare geopetal fill and burrows are observed. Porosity (10%–15%) is mostly solution enlarged intraparticle and moldic.

General Description:
Cylinders: Section 1, 0–10 cm and 37–46 cm; Rollers: Section 1, 10–33 cm, 46–52 cm, and 57–67 cm; Drilling pebbles: Section 1, 33–37 cm, 52–57 cm, and 67–79 cm. Thin section sample: Section 1, 25–28 cm.



SITE 877 HOLE A CORE 19R

CORED 173.2 - 182.7 mbsf

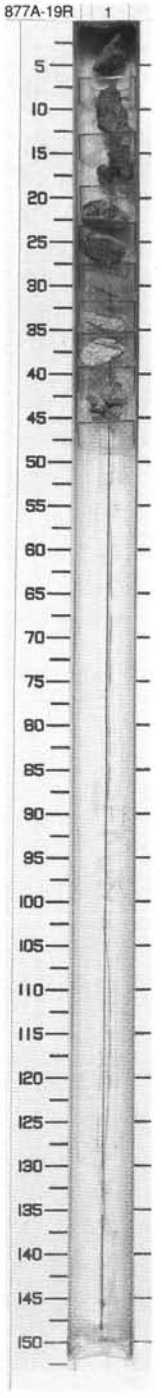
Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color
.1 .2 .3 .4	P P P P P P G G G G G G	1	Campanian–Maastrichtian	◑ ◆ ⊘ ◑		T T	10YR 6/6 10YR 7/8

DESCRIPTION

LITHOCLAST FORAMINIFER PACKSTONE and SKELETAL FORAMINIFER GRAINSTONE

Major Lithologies:
Section 1, 0–29 cm, is comprised of brownish yellow (10YR 6/6), very poorly sorted LITHOCLAST FORAMINIFER PACKSTONE, with angular to subangular lithoclasts; patches are dark gray (2.5YR N4) and dusky red (2.5YR 3/2). The packstone consists of abundant benthic foraminifers (orbitoids), fragments of rudists (radiolitids), rare echinoid spines, fragments of red algae (corallinaceans), worm tubes, and common recrystallized grains. The dusky red color is due to iron-oxides in the matrix and in cavities (causing irregular staining). The lithoclasts are red (10YR 5/6) to very dark gray (2.5YR N3) packstone with common large benthic foraminifers. There are many black grains. Porosity is interparticle and vuggy with coarse equant calcite crusts. Section 1, 29–46 cm, is comprised of brownish yellow (10YR 6/6), fine-grained, well-sorted SKELETAL FORAMINIFER GRAINSTONE with yellow stains (10YR 7/8). The grainstone contains abundant fragments of red algae, recrystallized bioclasts, and benthic foraminifers (orbitoids); unidentified black grains are common. Irregular, undulate, dusky red (2.5YR 3/2) seams coincide with the yellow stains; however, there is no apparent change in sediment. Porosity (10%) is moldic, interparticle and vuggy.

General Description:
Rollers: Section 1, 0–13 cm and 19–41 cm; Drilling pebbles: Section 1, 13–19 cm and 41–46 cm. Thin section samples: Section 1, 7–10 cm and 27–30 cm.



877A-17R CORED 153.9–163.5 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
		1	Camp.–Maastrichtian	B	B	F/M	R		T	10YR 8/1 to 10YR 8/2

877A-18R CORED 163.5–173.2 mbsf

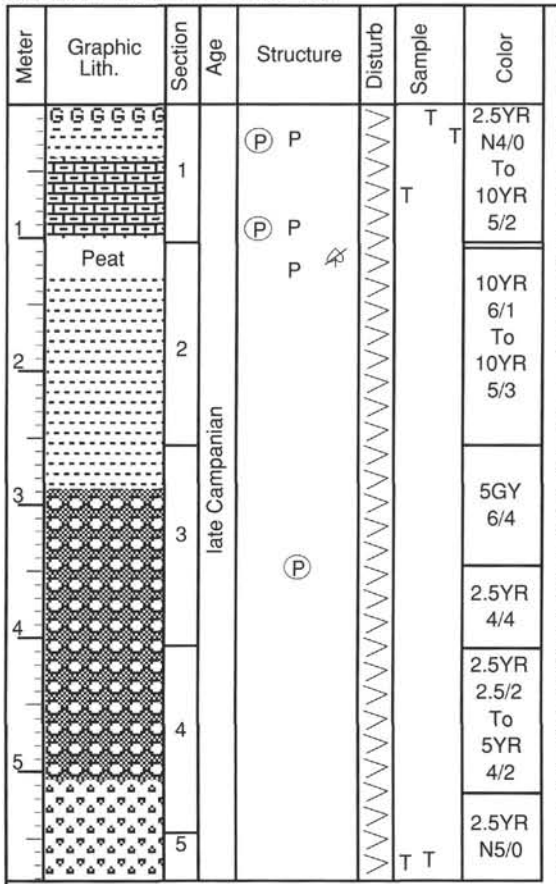
Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
.5		1	Campanian–Maastrichtian	B	B	A/M	R		T	10YR 8/2

877A- 19R CORED 173.2–182.7 mbsf

Meter	Graphic Lith.	Section	Age	Calc. nanno.	Plank. foram.	Larger foram.	Structure	Disturb.	Sample	Color
.1		1	Campanian–Maastrichtian	B	B	CM			T	10YR 6/6
.2										
.3									T	10YR 7/8
.4										

SITE 877 HOLE A CORE 20R

CORED 182.7 - 190.5 mbsf



DESCRIPTION

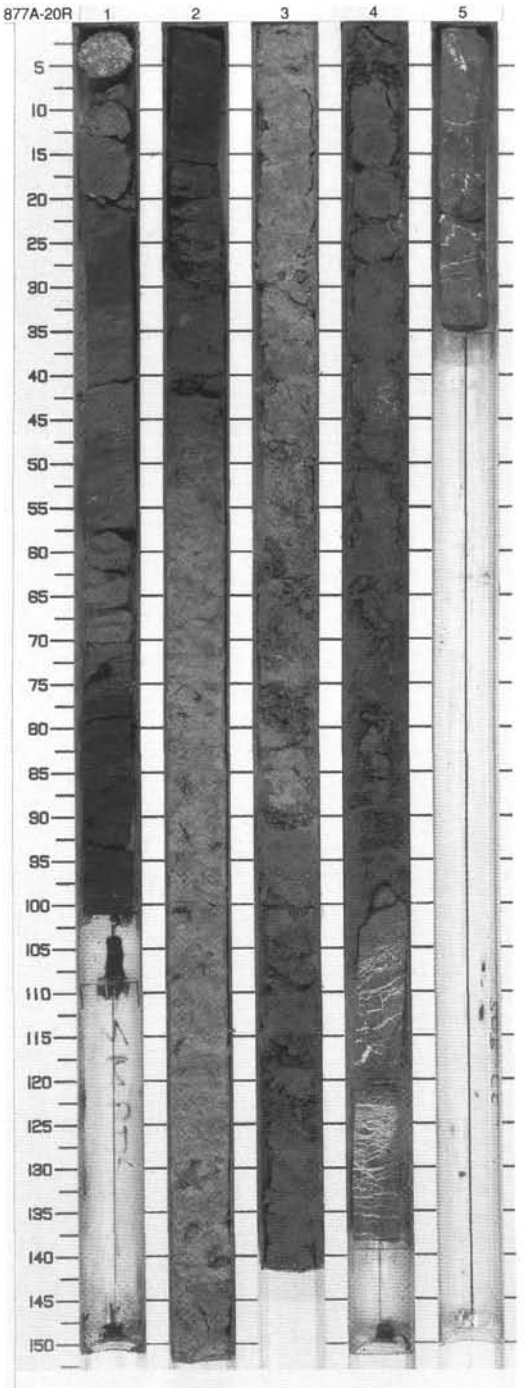
FORAMINIFER GRAINSTONE, CLAY AND CLAYSTONE, CLAYSTONE BRECCIA, and VOLCANIC BRECCIA

Major Lithologies:

Section 1, 0–7 cm, is comprised of very coarse-grained (average grain size 1.8 mm) FORAMINIFER GRAINSTONE, which is very pale brown (10YR 8/3), reddish brown (5YR 4/4) and speckled brownish yellow (10YR 6/6). Cement is sparry calcite stained by limonite. Small burrows are mostly unfilled. Vuggy porosity is 5%. The grainstone was subjected to differential leaching (?caved). Section 1, 7–20 cm, is a fine- to medium-grained (average grain size: 0.15 mm), well-sorted FORAMINIFER SKELETAL GRAINSTONE, including abundant benthic foraminifers, few mollusk debris, common red algae, and common pyrite. The matrix is a mixture of clay and carbonate; in places the cement is pyrite. Drilling contact with clay is noted at Section 1, 20 cm. Section 1, 20–32 cm, is comprised of gray (2.5YR N 4/0), CLAY, with darker wisps probably representing burrowed faces. Pyrite is common (5%–10%). Section 1, 32–57 cm, is comprised of fine-grained, CLAYEY LIMESTONE, skeletal, with argillaceous matrix. Several mollusk shell fragments (0.5 cm in length) are in Section 1, 46–56 cm. Several burrows are filled by clay. Section 1, 57–70 cm, is comprised of medium-grained SKELETAL GRAINSTONE (grains are not identifiable), with irregular (1 cm-thick) argillaceous laminae. Section 1, 70–77 cm, consists of brownish gray (10YR 5/2), fine-grained, CLAYEY LIMESTONE (packstone with argillaceous matrix). There is some intercalation of black clay laminae. A few small shells of mollusks are present. A burrow at Section 1, 75 cm, is filled by skeletal sand grains. Section 1, 77–100 cm, consists of black (7.5YR N2/0), organic-rich, CLAY, with common, small microconcretions of pyrite and vague horizontal banding. Section 2, 0–20 cm, consists of black (2.5 YR N2.5/0), PEAT with poor horizontal layering visible, as well as plant structure on bedding planes. Pyrite is common. Section 2, 20–46 cm, consists of a transitional contact of the PEAT with dark gray (2.5Y N 4/0) CLAY, containing wispy, black, coal laminae. The transitional boundary is at Section 2, 46 cm. From Section 2, 46–73 cm, the color of the CLAY is very pale brown (10YR 7/4) and then becomes gray (10YR 6/1) to Section 2, 93 cm. Burrows, flattened by compaction, are recognizable by darker gray clay fill. Subvertical and vertical roots (up to 2–3 cm long) occur; the lowest roots are reported at Section 2, 120 cm. Section 2, 93–132 cm, consists of gray (10YR 6/1) CLAY, with spots formed by dark brownish gray clay. Section 2, 132–150 cm, is comprised of dark brownish gray (10YR 5/3) to olive green (5GY 7/4) laminated CLAYSTONE. Section 3, 30–90 cm, consists of greenish gray (5GY 3/4 to 6/4) CLAYSTONE; colors delineate the breccia texture formed by alteration of basalt clasts. Clasts are sharp, mm to 2 cm in size. Small aggregates and single crystals of pyrite are very common in the clayey matrix, separating firmer claystone clasts. In Section 3, 30–90 cm, pyrite is locally up to 4%. The rest of this section is brecciated by drilling. Section 4, 0–110 cm, consists of CLAYSTONE BRECCIA. Clasts are sharp-edged (mm to 4 cm in size), very dusky red (2.5YR 2/2) and reddish brown (5YR 4/2), in a clayey matrix that is dark greenish gray (5GY 3/4). At Section 4, 40–44 cm, there is a clast of limonitic basalt. At Section 4, 100 cm, there is a drilling contact with a less altered microcrystalline basalt. Igneous breccia texture is well preserved in Section 4, 100–110 cm, even though it has been altered into a greenish gray claystone. Claystone is fractured and the fractures are filled by calcite. Section 4, 110–140 cm; gray to dark gray (2.5YR N5/0 to 4/0) BASALT BRECCIA formed by aphanitic basalt. Section 5, 0–35 cm, consists of less brecciated aphanitic basalt.

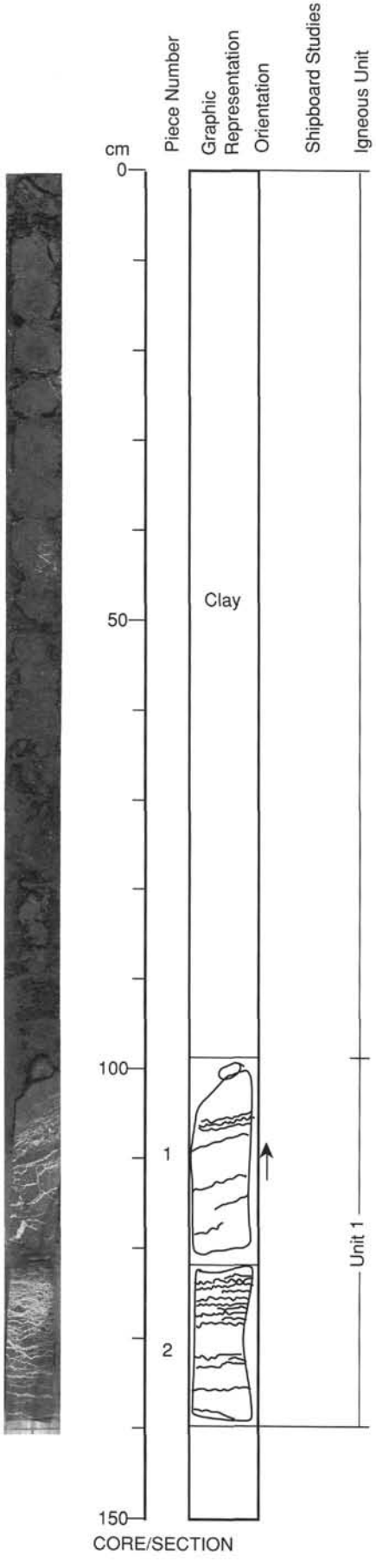
General Description:

Thin section samples: Section 1, 0–7 cm, 18–20 cm, and 61–63 cm, Section 5, 14–16 cm and 24–27 cm.



877A-20R CORED 182.7 –190.5 mbsf

144-877A-20R-4



UNIT 1: CLINOPYROXENE BASALT BRECCIA

Pieces 1–2

CONTACTS: In contact with claystone whose texture clearly shows that it is a more severely weathered portion of Unit 1. Continues into 20R-5.

PHENOCRYSTS:
Clinopyroxene - <1%; 1–4 mm; Fresh, dusky green (5G 3/2), fractured prisms.

GROUNDMASS: Clasts are difficult to distinguish but appear to be 0.5–3 cm. The matrix is comprised of volcanogenic sand and granules. The breccia is cemented with clay.

VESICLES: 10%; <3 mm; Irregular; Only in large clasts. Filled with grayish green (10GY 5/2) clay.

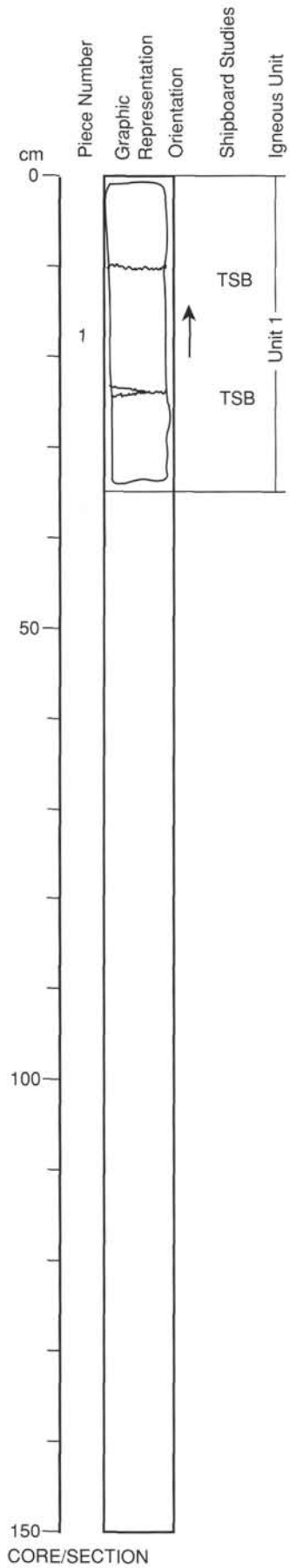
COLOR: Clay matrix is dusky green (5G 3/2). 98–110 cm, clast colors are grayish green (5G 5/2 to 10G 4/2) and dusky green (5G 3/2); 110–139 cm clast colors are dark gray (N3) to dark greenish gray (5G 4/1).

STRUCTURE: Breccia.

ALTERATION: Upper portions of the deposit have altered to soft claystone. Unit 1 is severely altered, with much dusky green (5G 3/2) clay development.

VEINS/FRACTURES: 5%–50%; 0.5–7 mm; Subhorizontal; Anastomosing calcite veins, replacing matrix.

ADDITIONAL COMMENTS: None.



144-877A-20R-5

UNIT 1: CLINOPYROXENE BASALT BRECCIA (continued)

Piece 1

CONTACTS: Continues from 20R-4.
PHENOCRYSTS:
Clinopyroxene - <1%; 1–4 mm; Fresh, dusky green (5G 3/2), fractured prisms.
GROUNDMASS: Clasts are difficult to distinguish but appear to be 0.5–3 cm. The matrix is comprised of volcanogenic sand and granules. The breccia is cemented with clay.
VESICLES: 10%; <3 mm; Irregular; Only in large clasts; Filled with grayish green (10GY 5/2) clay.
COLOR: Clay matrix is dusky green (5G 3/2). Clast colors are dark gray (N3) to dark greenish gray (5G 4/1).
STRUCTURE: Breccia.
ALTERATION: Upper portions of the deposit have altered to soft claystone. Unit 1 is severely altered, with much dusky green (5G 3/2) clay development.
VEINS/FRACTURES: <1%; 0.5–4 mm; Subhorizontal; Calcite veins and a few matrix-replacing blotches (<1 cm).
ADDITIONAL COMMENTS: None.