PROCEEDINGS OF THE 10^{TH} SYMPOSIUM ON THE GEOLOGY OF THE BAHAMAS AND OTHER CARBONATE REGIONS

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Front Cover: The reef crest indicator species, *Acropora palmata*, on Gaulin's Reef, San Salvador Island. Gaulin's Reef is a classic bank-barrier reef that has shown remarkable resilience following two significant disturbances: El Niño-induced warming of the sea surface in 1998 and Hurricane Floyd in September, 1999 (see Peckol et al., this volume). Photo by Janet Lauroesch.

Back Cover: The oolite shoals of Joulter's Cay, north of Andros Island, Bahamas, site of the pre-meeting field trip. Photo by Ben Greenstein.

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DESCRIPTION AND DEPOSITIONAL HISTORY OF AN OPEN CARBONATE LAGOON: RICE BAY, SAN SALVADOR, BAHAMAS

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ABSTRACT

Rice Bay is an open, windward, sandy, carbonate lagoon, approximately 1 km x 1 km in area, located on the northeast corner of San Salvador Island in the Bahamas. It is separated from other lagoons and the open Atlantic Ocean by North Point, Cut Cay, and Man Head Cay, all consisting of lithified eolianites. There are beaches on the mainland and on Man Head Cay. The subtidal surface of Rice Bay consists of a mosaic of subenvironments: barren carbonate sand and mud, *Thalassia* and *Syringodium* (seagrass) meadows, areas of calcareous green and red algae, subtidal beachrock, and patch reefs.

Forty-six intertidal and subtidal sediment samples were collected from the sea floor of Rice Bay along a 450 m long transect between the two beaches (Transect A). This transect passes through all of the subenvironments except a patch reef. Three sediment cores were taken from Rice Bay: two close to Rice Bay beach and one from near the center of Transect A. Sediment thicknesses in the complete cores range from 3.58 m to 4.51 m. Eight supratidal rock samples were collected from the southwestern side of Man Head Cay.

Results of a petrographic analysis indicate that the subtidal sediment of Rice Bay consists of 40% mollusks, 24% intraclasts, 14% algae, 7% peloids, 6% foraminifera, 6% other skeletal grains, 2% ooids, and 1% oolitic clasts. The core sediment has a similar composition to that of the surface transect, but shows an increase in ooid content with depth. Samples from Man Head Cay have high porosity (26%) and consists of 33% intraclasts, 23% mollusks, 19% algae, 10% foraminifera, 9% peloids, and 6% other skeletal grains, with no mud, ooids, or oolitic clasts.

Three facies have been recognized in the sediment cores. One (A) is poorly sorted lagoon deposits, one (B) is a moderately sorted beach deposit underneath the lagoon deposits, and the last (C) is peat at the base of the complete cores. This peat has been radiocarbon dated to 6300 BP.

The depositional history of Rice Bay begins in the Late Pleistocene, with the formation of Man Head Cay at the end of the Oxygen Isotope Substage 5e highstand (~119 ka).

A paleosol developed on San Salvador during the following lowstand. The Holocene history may be divided into three phases. *Early Transgression* (7-6 ka): platform edges were flooded and peat accumulated in the restricted lagoon. *Middle Transgression* (6-5 ka): continuing sea level rise allowed open exchange of seawater and sediment production allowed formation of North Point dunes; ooids were generated. *Late Transgression* (5-0 ka): Rice Bay continues to be filled with sand as North Point erodes.

INTRODUCTION

The main goal of this study is to develop a description and depositional history of Rice Bay, a small lagoon on the northeastern end of San Salvador Island in the eastern Bahamas. Other lagoons have been described on this island (Colby and Boardman, 1989; Andersen, 1988), and it seemed reasonable to bring Rice Bay to a similar level of description.

The depositional history of the lagoon is related to glacio-eustatic sea-level changes. Several sea-level highstands occurred in Middle, Late Pleistocene and Holocene time. Periods of highstand are characterized by deposition of sediment on the platforms of the Bahamas (Carew and Mylroie, 1995). No less important are periods of lowstand, when erosion dominates (Carew and Mylroie, 1995). Subtidal, tidal, and supratidal unconsolidated sediments were and are being generated during the Holocene Epoch in Rice Bay, as the current marine transgression proceeds toward a highstand. Lithified sediments in the vicinity of Rice Bay were deposited in late Pleistocene and Holocene time (Carew and Mylroie, 1995).

This study will attempt to establish a chronology of erosion, deposition, and lithification events and to tie that chronology to absolute time using ^{14}C dates. A petrographic analysis of sediments and rocks from Rice Bay was used to search for clues to establish this chronology.

DESCRIPTION OF RICE BAY

Rice Bay is an open, high-energy, sandy lagoon, approximately 1 km x 1 km in area, located on the northeast corner of San Salvador (Figure 1). The maximum depth recorded in the bay is about 4.1 m. Figure 1 is an aerial photograph and geologic map of Rice Bay.

Rice Bay is separated from other lagoons and from the open Atlantic Ocean by several small islands and peninsulas. North Point and Cut Cay, a peninsula and island consisting of lithified eolianites, bound Rice Bay to the west and separate it from Grahams Harbour. The eolianites and ichnofossils present at North Point have been described in detail by White and Curran (1985, 1988). Corals are living on wave-cut benches carved into the eolianites on the eastern side of North Point (Carew and Mylroie, 1995). ^{14}C dating of 4 bulk rock samples from North Point indicate that North Point is between 5250 and 6340 years in age (Colby and Boardman, 1989). Crossbedding at North Point drops below sea level, indicating that it was deposited when sea level was lower (Carew and Mylroie, 1995).

Man Head Cay, a small (450 m long) island consisting of lithified eolianites with high-angle crossbedding (up to 30° or 40°), is at the platform margin and bounds Rice Bay to the northeast. A paleosol caps the eolianites. This paleosol is extensively penetrated by lithified root casts, or vegemorphs. There is also a resistant layer (protosol) on the southeastern side of the island, 0-2 m below the paleosol. The location of the protosol is shown in Figure 1C.

There is a small beach on Man Head Cay and one on the mainland, which is known as Coast Guard Beach. Beachrock is present on Coast Guard Beach and on Northeast Point

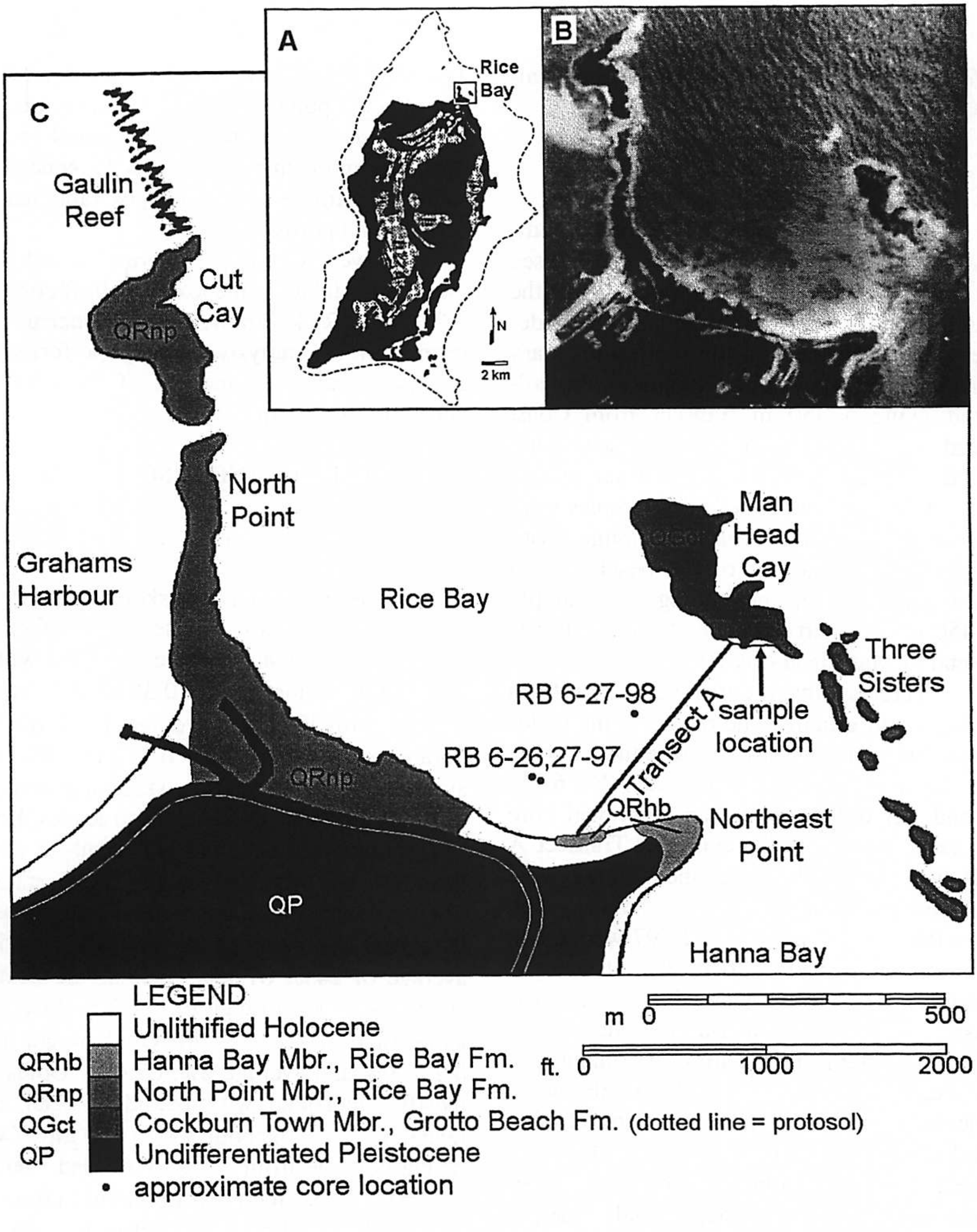

Figure 1. A) Map of San Salvador Island, showing location of Rice Bay; B) Aerial photograph of Rice Bay, c. 1970; C) Geologic map of Rice Bay, showing the location of Transect A, the approximate core locations, and the sample location on Man Head Cay. Geologic contacts on the mainland are approximate. Geology is based on a smaller scale geologic map in Carew and Mylroie (1995).

to the east of this beach.

The subtidal surface of Rice Bay consists of a mosaic of subenvironments. These include barren sand, callianassid shrimp mounds, subtidal beachrock, patch reefs, and varying densities of seagrass (*Syringodium* *filiforme* and *Thalassia testudinum*) and calcareous green algae.

METHODS

Forty-six intertidal and subtidal sediment samples were collected from the sea floor of Rice Bay to establish the nature of the present depositional environment and to delineate possible laterally adjacent sedimentary facies (see Figure 1). The samples were collected along a 450 m transect from Coast Guard beach to Man Head Cay beach, using SCUBA equipment. This set of samples is referred to as "Transect A." The samples were collected at 10 m intervals, beginning with sample 98-0 at the top of the beachface on Coast Guard beach and ending with sample 98-450 in the intertidal zone at the southeastern end of Man Head Cay beach.

Three sediment cores were taken from the lagoon to establish the nature of the Holocene depositional record. Two sediment cores were taken close to Rice Bay beach (RB 6-26-97 and RB 6-27-97), and an additional core was taken from near the center of Transect A (RB 6-27-98). These sediment cores were collected using the vibracore technique. The cores RB 6-26-97 and RB 6-27-97 were taken from a seagrass bed in about 3 m of water at mid-tide. RB 6-27-98 was taken from a seagrass bed in 3.6 m of water at mid-tide.

To establish the nature of eolianites in the area, eight supratidal rock samples were collected from the southwestern side of Man Head Cay near the beach. No samples were collected from North Point (also eolianite) because its nature is well documented. The petrography has been examined by Thompson (1996), the age is known from work by Colby and Boardman (1989), and the sedimentary structures and ichnofossils have been studied by White and Curran (1985, 1988) and Curran and White (1999).

Thin sections were prepared from some unconsolidated sediment samples of Transect A, all samples from Man Head Cay, and selected points in all three sediment cores. All thin sections were point counted to 300 points or more in this analysis to generate a statistical sample of grain types (allochems), cement, and porosity.

Seventeen samples were removed from the unconsolidated, unepoxied half of core RB 6-27-98 by Rick Zimmerman in order to perform a sieve analysis. Stuby performed a graphical grain-size analysis of the data obtained by Zimmerman.

RESULTS AND DISCUSSION

Transect A

The most abundant skeletal grain type is mollusks, which compose 26% to 62% of the samples and an average of 40%, with a standard deviation (σ) of 10.3%. Algae range from 2% to 27% and average 14%, σ7.1%. Foraminifera range from 0.3% to 10% and average 6%, σ3.1%. Other skeletal grains (including echinoderms, corals, ostracodes, bryozoa, sponge spicules, and worm tubes) range from 2% to 11% and average 6%, σ2.5%. The most abundant non-skeletal grain type is intraclasts, with a range of 11% to 33% and an average of 24%, σ7.1%. Peloids are next in abundance with a range of 0.7% to 19%, and an average of 7%, σ4.8%. Ooids range from 0% to 9% and average 2%, σ2.4%. Ooids are mostly superficial with peloidal nuclei, and range in size from about 200 to 400 µm. Oolitic clasts range from 0.3% to 3% and average 1%, σ0.7%. No mud was observed in thinsections. The results for the entire transect are shown in Figure 2.

The composition of sediment in this lagoon is similar to the composition of sediment found in Grahams Harbour (Colby and Boardman, 1989), and probably for modern, open carbonate lagoons in general.

Sediment Cores

Cores RB 6-27-97 and RB 6-27-98 penetrated deposits of black to dark brown organic matter (peat) at their bases. This peat has been designated facies C. ^{14}C dates were obtained from each peat deposit. The depth of water at the core location plus the depth of the peat within the core is the depth of the peat below current sea level. The rate of sedimentation at each core location was calculated by dividing the thickness of sediment above the peat (in cm) by the date from the peat (in thousands of years BP). Results are shown in Table 1.

	RB 6-27-97	RB 6-27-98
Water depth (m)	3.0±0.4	3.6±0.4
Peat depth in core (m)	4.48	3.56
Total	7.48±0.4	7.16±0.4
Measured ^{14}C age	6340±70 BP	6320±70 BP
$^{13}C/^{12}C$ ratio	-27.4‰	-27.1‰
Conventional ^{14}C date	6300±70 BP	6290±70 BP
Sedimentation rate (cm/1000yr)	69.8±0.4	55.8±0.4

Table 1. Depths of peat deposits, results of ^{14}C dating, and rates of sedimentation in cores RB 6-27-97 and RB 6-27-98. ^{14}C dates by Beta Analytic Inc., Radiocarbon Dating Services, returned April 20, 1999. Dates obtained by radiometric counting after acid/alkalai/acid pretreatment.

The cores were logged for grain type, grain size, grain sorting, facies changes, and presence of clasts, roots, and peat. Three facies (A, B, and C) were delineated based on these characteristics, and are shown in the core logs in Figure 3. Peat samples from the bases of cores RB 6-27-97 and RB 6-27-98 were removed for radiocarbon (^{14}C) dating.

Composition logs for each of the cores are shown in Figure 3. All three logs reveal an increase in ooid content with depth. In addition, the logs of RB 6-27-97 and RB 6-27-98 show a decrease in algal content with depth. Mollusk content increases in RB 6-27-98. Foraminifera, peloid, and clast content fluctuate but no clear trend with depth is evident. A notable exception is the clast content at 4.09 m in RB 6-27-97, caused by a large (~9 cm) oolitic clast.

Changes in grain types with depth provide some clues into the depositional history of Rice Bay. First of all, ooid content increases with depth in all of the cores. This increase was also observed by Thompson (1996) in cores from Grahams Harbour. Ooids form in high-energy environments with slightly elevated salinity (Bathurst, 1975; Cayeux, 1935). An ooid-forming event may have occurred just after the platform was flooded about 6000 years ago. Another explanation is that the ooids were eroded from some source (perhaps an oolitic eolianite that is now subtidal or even buried under Holocene sediment) near Rice Bay and Grahams Harbour.

Peat, at the bases of cores RB 6-27-97 and RB 6-27-98, is assumed to have been generated by mangroves. Mangroves survive best in the intertidal zone where wave energy is not great (Wanless, 1984), such as saline lakes, tidal flats, or restricted lagoons. Rice Bay must then have been a restricted lagoon at the time when this peat was deposited about 6300 years ago. Perhaps it was a shallow inlet of the ocean silled by the Pleistocene rocks of Man Head Cay and analogous deposits which are now subtidal. Colby and Boardman (1989) have suggested a similar situation in neighboring Grahams Harbour.

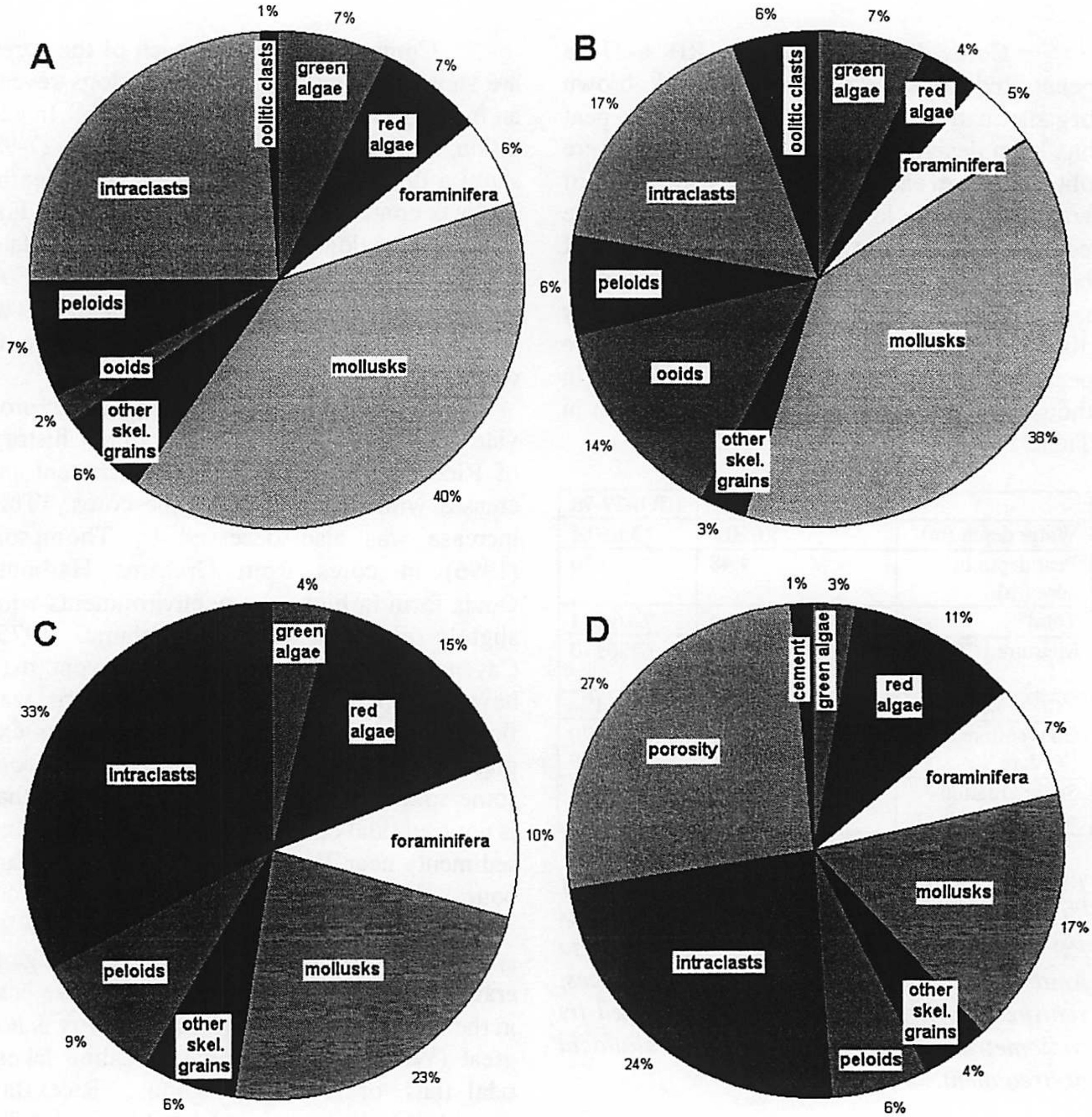

Figure 2. Changes in grain-type distribution in Rice Bay from the Late Pleistocene to the present. A) Grain-type distribution of sediment samples of Transect A (the current grain-type distribution), n=5278. B) Grain-type distribution of sediment within 50 cm of peat deposits from cores RB 6-27-97 and RB 6-27-98 (Early Holocene grain-type distribution), n=1775. C) Grain-type distribution of Man Head Cay, (Latest Pleistocene grain-type distribution), n=1743. D) Composition of Man Head Cay "by volume" (including porosity and cement), n=2400.

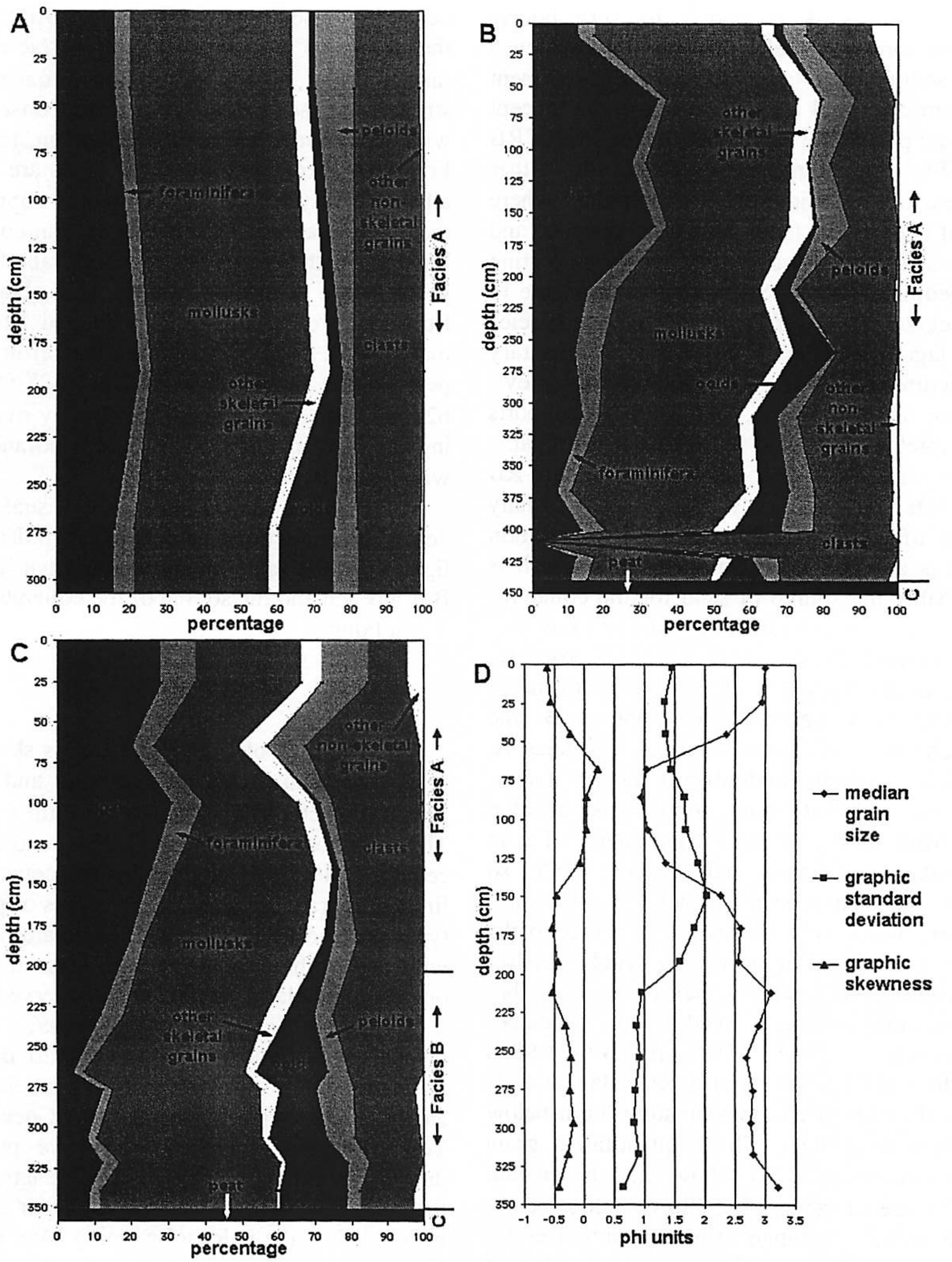

Figure 3. Logs of sediment cores from Rice Bay. A) Composition log of RB 6-26-97. B) Composition log of RB 6-27-97. C) Composition log of RB 6-27-98. D) Grain-size log of RB 6-27-98.

Facies A is poorly to very poorly sorted sand and shell gravel with no evidence of sedimentary structures. All sediment within cores RB 6-26-97 and 6-27-97 (except for the peat at the base), and the top half of RB 6-27-98 are interpreted as Facies A. Other types of depositional environments where sand is common (such as rivers, beaches, and dunes) usually have at least moderate sorting (Friedman, 1961). So it seems reasonable to conclude that all of these poorly sorted facies are lagoonal facies. The lack of sedimentary structures and preservation of burrows is evidence of bioturbation, which further supports interpretation of these sediments as lagoonal.

Facies B, in the lower half of core RB 6-27-98, is moderately sorted sand. Many lines of evidence point to the interpretation that is a beach facies, and that this beach is probably the source of sand for the eolianites of North Point. First, from Walther's Law, we can predict that beach facies (as opposed to, say, eolian facies) will have a conformable contact with lagoon facies. Facies B (the beach) is conformably overlain by facies A, which is almost undoubtedly lagoon facies. Second, carbonate dunes almost never develop far from the beach that is their source of sand (Bretz, 1960; Carew and Mylroie, 1985), so there must have been a beach close to North Point, most likely windward of it (i.e, to the east, the source of prevailing winds). Also, this beach must now be below sea level, because crossbedding at North Point extends below current sea level. The core RB 6-27-98 is to the east of North Point in Rice Bay, and the top of facies B is approximately 5.6m below current sea level. Third, quantitative grain size data (Figure 3D) show that the *median* grain size of facies B (2.68ϕ to 3.20ϕ) nearly falls within the range of *mean* grain sizes for ocean beaches given by Friedman (1961) of 0.2ϕ to 3.15ϕ; graphic standard deviation (sorting) in facies B (0.65ϕ to 0.97ϕ) overlaps with the range of sorting from 0.3ϕ to 0.72ϕ of ocean beach sediments (Friedman, 1961); and the skewness of the sediment in facies B ranges from -0.19ϕ to -0.53ϕ (coarse to strongly coarse skewed), which is consistent with ocean beach sediments (Friedman, 1961). Friedman also stated that dune sands are usually positively (fine) skewed, which supports the interpretation of facies B as non-eolian. Finally, North Point is between 6340 and 5250 years in age according to ^{14}C dates obtained from bulk rock samples (Colby and Boardman, 1989). The ^{14}C date obtained from the peat at the base of core RB 6-27-98 is 6290±70 BP. So any deposit directly overlying the peat in this core is contemporaneous with North Point dunes.

Figure 4 shows additional, visual evidence (thin sections under plane polarized light, all at the same magnification) that facies B is a beach and the source of the eolianites of North Point.

Man Head Cay

The rock of Man Head Cay is skeletal grainstone with grains between 100 and 500 µm in diameter (very fine to medium sand). The rock has high porosity (26%), and little cement (1.4%). Blocky freshwater cement is limited to grain contacts. Percentages of grain types are shown in Figure 2, calculated both with and without porosity and cement. No ooids, oolitic clasts, or mud were observed.

Carew and Mylroie (1995) have mapped Man Head Cay as the Grotto Beach Formation due to the presence of a single paleosol on its surface, and as the Cockburn Town Member (highstand/regressive phase) due to the extensive vegemorphs penetrating the eolianites. There is a resistant layer a few meters below the paleosol capping Man Head Cay which may be a protosol. It outcrops on the northeastern side of the south end of the island (see Figure 1). Protosols are defined in

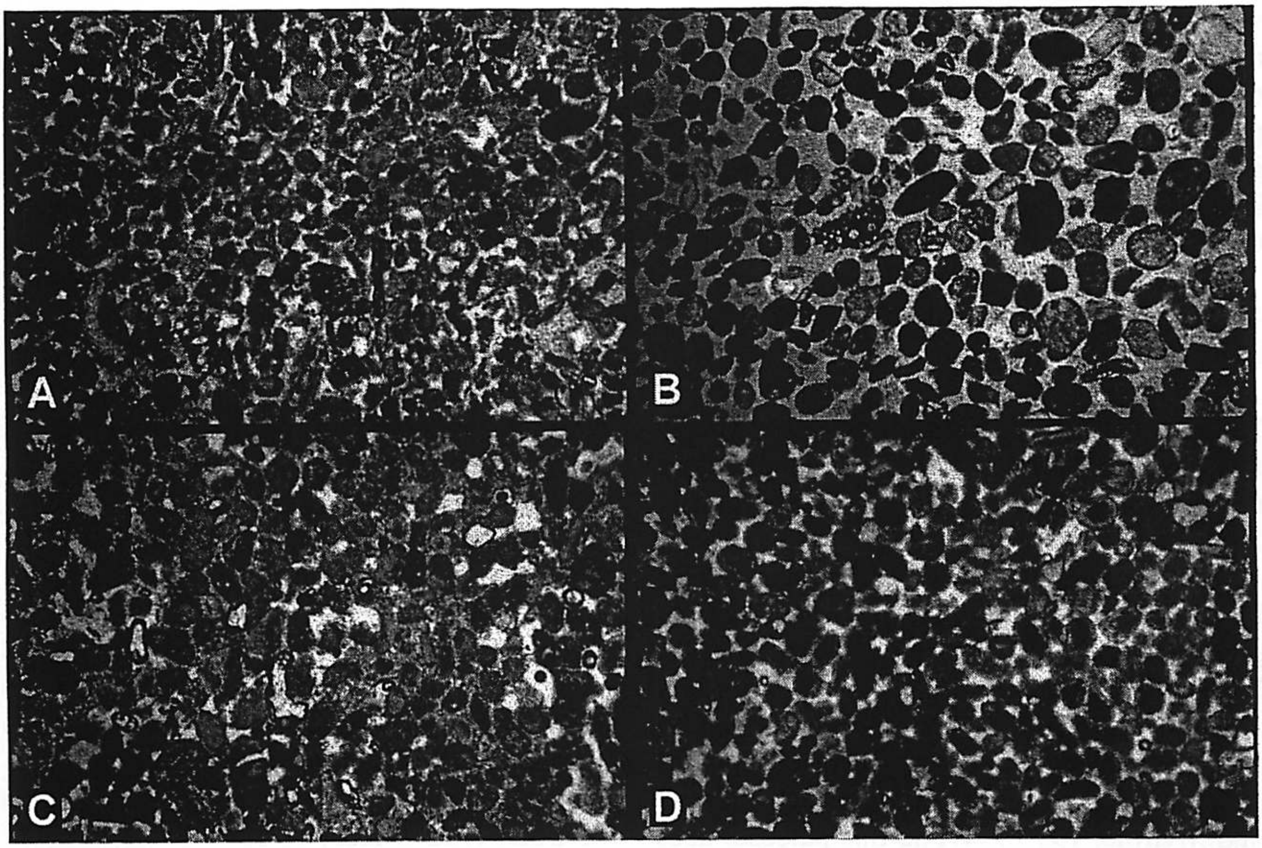

Figure 4. A comparison of thin sections in plane polarized light from (A) unconsolidated, compacted sand from facies B at 3.40 m in core RB 6-27-98, (B) unconsolidated, uncompacted sand from Coast Guard beach (C) cemented eolian sand from North Point, and (D) cemented sand from oolitic clast at 4.09 m in core RB 6-27-97. All are shown at the same magnification (field is 3.2 mm across in each). Note: 1) similarity in grain size and sorting between Facies B and beach sand, which is evidence that facies B could be a beach, 2) similarity in grain size and sorting between facies B and North Point rock, which is evidence that facies B could be the source of North Point dunes, and 3) similarity of grain size, sorting, and cementation between North Point rock and an oolitic clast, which is evidence that North Point is the source of oolitic clasts in Rice Bay.

Harmon et al. (1983), and discussed in Carew and Mylroie (1991). This protosol represents a period of exposure or non-deposition. Carew (personal communication) believes that it was simply a short hiatus between parts of the regressive phase of the Oxygen Isotope Substage 5e highstand.

Stuby (2000) interpreted the rocks below the protosol to be from the transgressive phase of the 5e highstand because there are few vegemorphs below it (presence of extensive vegemorphs is a criterion by which transgressive and regressive eolianites are distinguished in Carew and Mylroie, 1995.), and because the protosol is probably high enough on the island to have been exposed during the 5e highstand (when sea level was 6-8 m higher than it is today), without marine deposits draping it. The rocks below the protosol were then mapped as the French Bay Member of the Grotto Beach Formation, rather than rocks of the Cockburn Town Member. Additional field reconnaissance during 2000 showed that the protosol is in fact penetrated by extensive vegemorphs in some places, that there are no marine deposits above it or below it, and that the protosol pinches out with the overlying paleosol. These observations support Carew and Mylroies' 1995 placement of the entire island into the Cockburn Town Member of the Grotto Beach Formation.

DEPOSITIONAL HISTORY

A general depositional history of San Salvador Island has been proposed by Carew and Mylroie (1995). This section discusses the specific sequence of depositional events in Rice Bay.

Based on the rocks outcropping in Rice Bay in the present, the history of the bay begins in the late Pleistocene, during the sea level lowstand that ended approximately 130,000 years ago. A paleosol developed on the subaerially exposed platform during this lowstand (overlying Owl's Hole rocks; Carew and Mylroie, 1995). While this paleosol does not outcrop in Rice Bay, later deposits must overlie it or an equivalent erosion surface.

Sea level rose enough to begin flooding the platform of San Salvador about 132,000 years ago (the beginning of the Oxygen Isotope Substage 5e highstand; Carew and Mylroie, 1999), and the transgression allowed sands to accumulate on the platform margin in lagoons and beaches (Carew and Mylroie, 1995).

The transgression proceeded to highstand by about 125,000 years ago. Sea level rose to 6 to 8 meters above its present level and ooid production was widespread in the interior of San Salvador (Carew and Mylroie, 1995). Subtidal deposits (reefs, lagoon deposits, and ooid shoals) found above current sea level on San Salvador are all from this highstand and are called the Cockburn Town Member of the Grotto Beach Formation (Carew and Mylroie, 1995). Apparently nearly all of what is now Rice Bay was under water at this time.

The regression following this highstand lasted until about 119,000 years ago (Carew and Mylroie, 1999). Lagoonal sands were reactivated and blown into beaches and dunes at some point early in the regression. Some of these dunes accumulated near the eastern platform margin, and lithified. Roots penetrated the dunes, leading to the formation of vegemorphs. The remnants of these eolianites are now Man Head Cay, Crab Cay, Almgreen Cay, etc. These regressive phase eolianites are also part of the Cockburn Town Member of the Grotto Beach Formation (Carew and Mylroie, 1995).

The paleosol capping Man Head Cay and all other rocks of the Grotto Beach Formation developed during the lowstand period from about 119,000 years ago to about 7000 years ago, which includes Oxygen Isotope Substages 5d through 2. All rocks below this paleosol are Pleistocene in age, and all above this paleosol are Holocene in age (Carew and Mylroie, 1995). Isostatic subsidence of about 1 m occurred during this lowstand as well (Carew and Mylroie, 1995).

The platform of San Salvador began to be flooded about 7000 years ago, when sea level was about 8 m below its present level (Boardman et al., 1988). Evidence supporting this comes from ^{14}C dating of peat deposits found at the bottom of sediment cores in many locations in the Bahamas, including Rice Bay (this study) and neighboring Grahams Harbour (Colby and Boardman, 1989).

Rice Bay at this time was probably a restricted lagoon, because mangroves, which generated the peat at the bottom of the two complete cores, thrive in conditions of low wave energy (Wanless, 1984). This low-energy lagoon was sheltered from the open ocean by the regressive phase eolianites of Man Head Cay and the Three Sisters, and perhaps a topographic high or sill proposed to have existed underneath what is now North Point (Colby and Boardman, 1989). The lagoon may have been similar in general form to

	O.I.S.	Date (BP)	SL (m)	Events
I	6	>132,000	~-80	Lowstand. Exposed platform. Development of paleosol overlying Owl's Hole Formation.
II	5e	~132,000 to ~125,000	~-8 to +7	Transgression. Flooding of platform and production of carbonate sand. Sand accumulates in beaches and is blown into dunes, which lithify into eolianites of the French Bay Member of Grotto Beach Formation. (Some French Bay rocks may be exposed on northeastern Man Head Cay.)
III	5e	~125,000	+7 to +8	Highstand. Ooid production in interior of San Salvador, as well as development of Cockburn Town Reef. Many eolianites of the French Bay Member are submerged.
IV	5e	~125,000 to ~119,000	+7 to ~-8	Regression. Lagoon sands reactivated and some are deposited as eolianites of the Cockburn Town Member of the Grotto Beach Formation along the eastern coast of San Salvador, including Man Head Cay. Minor hiatus in dune formation (pause in regression?) leads to development of protosol on Man Head Cay. Extensive penetration of vegemorphs occurs as lithification of the eolianites proceeds.
V	5d to 5a	~119,000 to ~75,000	~-8 to ~-15	Minor highstands and lowstands that probably do not flood platform.
VI	4 to 2	~75,000 to ~15,000	~-30 to ~-60	Major lowstands (O.I.S. 2 and 4) and minor highstand (O.I.S. 3). (Wisconsin Glacial Period). Exposed platform. Isostatic subsidence of ~1 m. Development of paleosol overlying Grotto Beach Formation. End of Pleistocene.
VII	1	~7000 to 6000	-8 to -5	Early transgression. Platform edges are flooded. Man Head Cay and other rocks form a sill for restricted lagoon (Rice Bay) in which mangroves thrive. The mangroves are preserved as peat.
VIII	1	~6000 to 5000	-5 to -3	Middle Transgression. Sill is breached and more open exchange of sea water is possible in Rice Bay. Ooid-forming event. Sand accumulates in Rice Bay, and beaches prograde over some peat deposits, providing a sediment source for dunes of North Point (North Point Member of Rice Bay Formation), which quickly lithify. Lagoonal sands accumulate in other parts of Rice Bay.
IX	1	5000 to present	-3 to 0	Late Transgression. Rice Bay continues to be filled with lagoonal sands. Waves cut a platform into the eolianites of North Point, and corals grow on the platform. Oolitic clasts from North Point are deposited in Rice Bay and Grahams Harbour. Beachrock (Hanna Bay Member of Rice Bay Formation) develops along the mainland as sea level rises, especially at Northeast Point.

Table 2. Late Quaternary depositional history of San Salvador, with emphasis on events in Rice Bay. Roman numerals establish an ordinal sequence of events, and nothing more. O.I.S. = Oxygen Isotope Substage. SL = sea level relative to present, in meters. Primary sources of data and interpretations are Stuby, 2000; Carew and Mylroie, 1995 (especially Fig. 3) and 1999; and Boardman et al., 1988.

Pigeon Creek, a restricted lagoon in southeastern San Salvador, with a tidal inlet to the north (between present day Cut Cay and Man Head Cay).

The transgression proceeded, and the sill was breached, allowing more open circulation of sea water in Rice Bay. Oolitic carbonate sand was produced in great abundance at this time, and a beach prograded over some of the peat deposits, as evidenced by facies B in the core RB 6-27-98. The beach was probably the source of sand for the dunes of North Point, which formed at this time. North Point quickly lithified and began eroding, and oolitic clasts were deposited in Rice Bay and Grahams Harbour. North Point and Cut Cay are transgressive phase eolianites, and are mapped as the North Point Member of the Rice Bay Formation (Carew and Mylroie, 1995).

The transgression proceeds to the present day, although the sea-level curve in Boardman et al. (1988) indicates that it has nearly stopped and that the present time is essentially a highstand period. Waves continue to erode North Point, forming a wide, shallow platform on which corals grow in Rice Bay

(Carew and Mylroie, 1995). Beachrock is forming in relatively short periods of time along Coast Guard beach and many other beaches of modern San Salvador. Beachrock is mapped as the Hanna Bay Member of the Rice Bay Formation (Carew and Mylroie, 1995).

This depositional history of Rice Bay is summarized in Table 2.

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