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MIXED CARBONATE AND TERRIGENOUS MARINE ENVIRONMENT, SUGAR BAY,  
ST. CROIX.

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Sugar Bay is the western arm of the drowned Salt River estuary on the north central coast of St. Croix. Undisturbed Rhizophora mangle forms a dense thicket along the east side of Sugar Bay, on the west side, R. mangle is present but has been disrupted by road building and marina construction. The bay mouth is blocked from the open sea by a barrier reef. Wave energy is extremely low in the southern extremity of Sugar Bay, increasing northward to the barrier reefs.

Terrigenous sediments are introduced to Sugar Bay by disintegration of a few bedrock exposures along the shores and by Salt River itself, an intermittent stream. Although Salt River flows only in times of extremely high rainfall, earlier in St. Croix's recorded history it appears to have been a perennial stream (Lewisohn, 1970).

Carbonate sediments are derived from molluscs, Halimeda, Penecillus, calcareous rhodophytes, foraminifera, and a few echinoids. Relative percentages of these vary from the south end of the bay to the bay mouth.

No bedding is present in any of the 10 cores sampled (longest core = 80 cm). Numerous burrows and living infauna suggest that bioturbation has eliminated layers formed by periodic terrigenous sediment inflow. Insoluble residues range from 90% at the south end of Sugar Bay to 0% near the barrier reef. Decrease of the terrigenous component of the sediment appears to be regular from south to north, although detailed measurements have not been made.

Within Sugar Bay proper (that is, south of the estuary widening), the percent of terrigenous component increases with depth to about 25 cm., but then decreased in the lower 18 cm. of one core. These data are taken from 10 cores spaced along the east side of Sugar Bay approximately five meters out from the mangroves or shore (Fig. 1.).

Turbidity, quite high in the southern end of Sugar Bay, commonly limits visibility to only a few inches. Yet, a highly productive biota of Thalassia, Penecillus, Halimeda and burrowing molluscs is present.

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Water depths are 0 to 8 feet in this area, averaging about 4 feet. Dilution of the in situ generated carbonates by terrigenous and carbonate sediments rather than the turbidity eliminating carbonate producing organisms or being highly deleterious to their productivity, similar to the situation described by Roy and Smith (1971).

There is apparent turbidity and mechanical energy control of species diversity and numbers of the carbonate producing organisms. Biota of the open lagoon is normal, that is, grass beds and open sand communities with echinoids, a few large gastropods and some pelecypods. Foraminifera are abundant in the grass beds. Biota of the quite, turbid south end of Sugar Bay contains at least three abundant species of calcareous chlorophytes, four species of abundant gastropods (many more less common forms), six species of extremely abundant pelecypods, and well-developed Thalassia beds with many foraminifera. Preliminary investigations suggests that the quiet, turbid water appears to be more productive for carbonate producing organisms than the open clear water.

If the sedimentary sequence in Sugar Bay were preserved, the shoreline facies would be categorized as normal marine calcareous fossiliferous massive mudstone, horizontally grading northward into muddy to sandy fossiliferous wackestone, packstone and grainstone, and finally to a pure carbonate grainstone (Fig. 2.).

#### REFERENCES CITED

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- Roy, K. J., and S. V. Smith, 1971, Sedimentation and coral reef development in turbid water: Fanning Lagoon: Pacific Science, v. XXV, No. 2, p. 234-248.

CARIBBEAN SEA

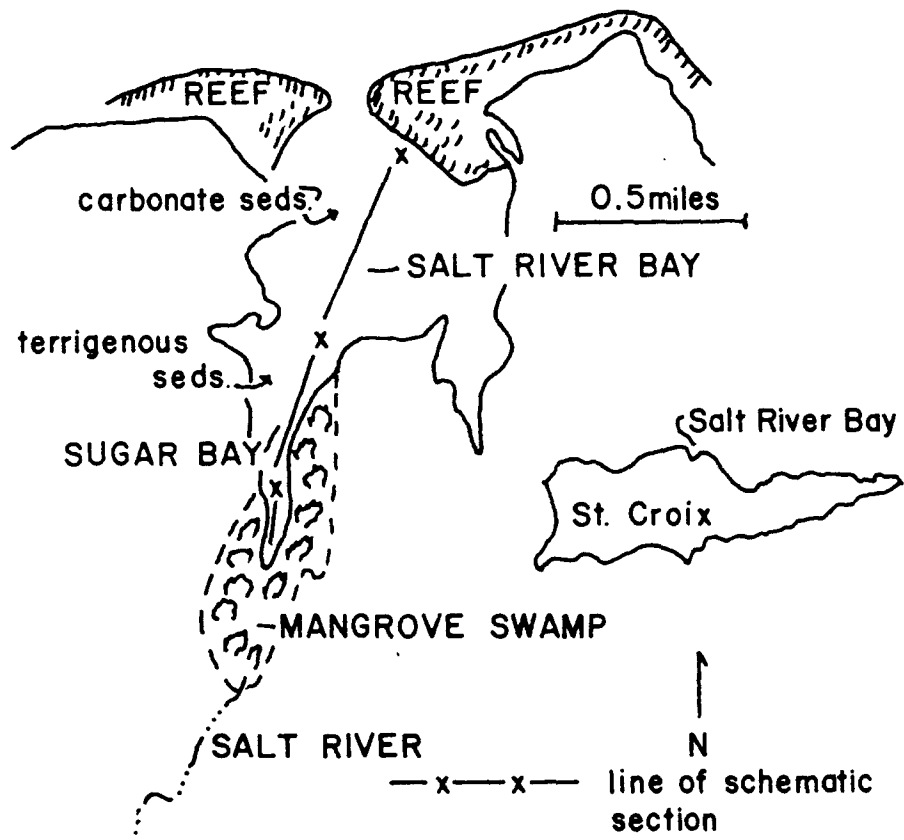


Fig. 1. Sketch map of Salt River Bay and Sugar Bay, showing position of Salt River Bay on St. Croix, line of schematic section (Fig. 2), and locations of major sediment types.

SUGAR BAY - SALT RIVER TRANSECT

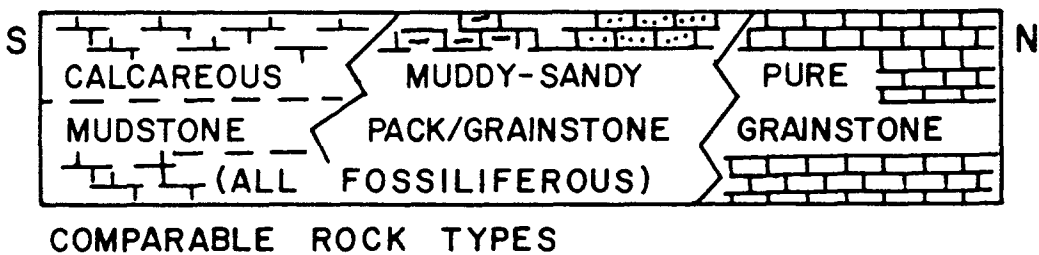
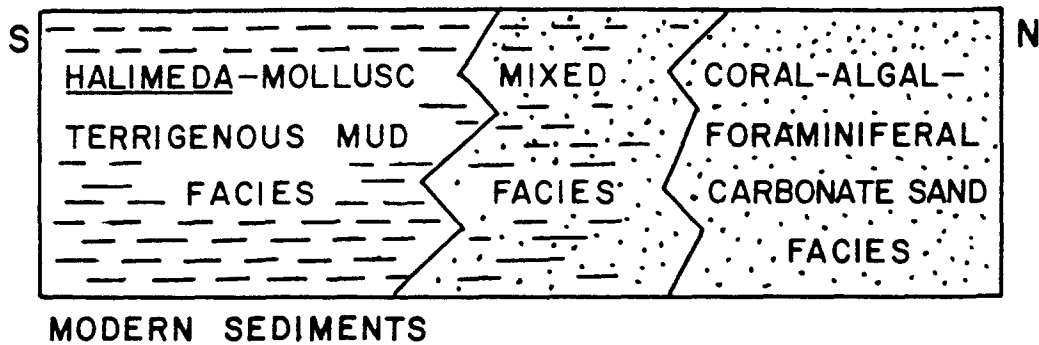


Fig. 2. Schematic sediment facies diagram from south to north through Sugar Bay and the Salt River drowned estuary, St. Croix, with theoretical model of rock facies to be developed by diagenesis of the sediments.

# **GUIDEBOOK TO THE GEOLOGY AND ECOLOGY OF SOME MARINE AND TERRESTRIAL ENVIRONMENTS, st. croix, u.s. virgin islands**

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