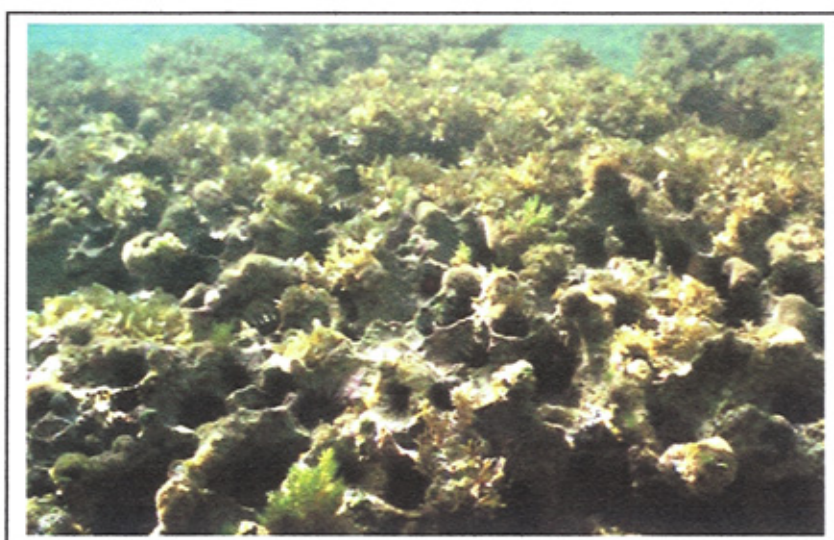


***The Beachrock Habitat at
Southgate Barrier Beach***



***With a Comparison to Other Beachrock Habitats
On the East End of St. Croix***

THE COAST & HARBOR INSTITUTE
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**THE BEACHROCK HABITAT AT
SOUTHGATE BARRIER BEACH:**

With a comparison to other beachrock habitats
On the East End of St. Croix

by

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Beachrock as a rich habitat

One easily accessible habitat to visitors to the Southgate Coastal Reserve is the beachrock lying just offshore. When sea conditions permit, which is common, this provides an excellent introduction to the diverse tropical marine flora and fauna to be found locally. It can be observed by walking carefully along its surface during low tide (with appropriate footwear), and it also makes a good snorkeling transect along the seaward side. Entering or leaving the water is best done at the extreme east or west ends of the barrier beach, rather than across the beachrock itself which can be hazardous.

Shallow beach rock ridges such as those we surveyed at Southgate Beach on 8 January 2003 (Tables I and II) characteristically have:

1. Rich and diverse algal communities (Table I), and a diverse fauna (Table II) including:
2. Extensive and dense populations of the 'rock-boring' sea urchin, *Echinometra lucunter*, which erodes pits in the rock surface in which it dwells, catching drift algae for food. Usually (as here at Southgate) the dense urchin population demarks a conspicuous zone on the beachrock.
3. At the seaward edge or in a broader band there may be a zone of corals, dominated by *Diploria strigosa*, *D. clivosa* and perhaps other species. The zone here at Southgate is quite well developed with many well-formed sub-spherical heads of *D. strigosa* up to 50 cm across.
4. Typically at the seaward edge, the rock ridge ends abruptly, sometimes with a small vertical drop or even overhang, onto sand or grassbed. At Southgate the zone ends rather abruptly, but without much of a vertical drop. This outer zone has more small-scale topographic diversity than the inner zones as well as greater water depth; bottom depth beyond the seaward ridge is about 1.5 m (5 ft.). It supports somewhat of a coral reef community including a variety of juvenile fishes, invertebrates, and algal species not found further shoreward.

The beachrock surface at Southgate emerges from the sandy barrier beach near the low tide line on the seaward side. It occurs along the central stretch of the beach. Distinct bedding is evident (at least three strata) about 6 inches thick and sloping seaward. The origin of this lithified material has not been entirely explained; it is believed to form from calcareous sand within the beach, near where the fresh lens of rain-derived groundwater lies against the underlying saltier water (Hanor, 1978). However, it does not appear to form continuously or everywhere. Gaines and Moore (personal communication) did not encounter beachrock in soil borings a few feet landward up the beach face, adjacent to where prominent beachrock occurred at the water's edge.

Summary of beachrock zones on the East End of St. Croix

Beachrock zones can be observed off most of the east end (St. Croix) beaches. Some of them (e.g., Isaac's, Coakley, Buck Island) are subjected to strong seasonal sand

movements or other factors which prevent the development of the relatively complex marine community seen at Southgate Beach. Some other St. Croix beaches with communities similar to Southgate, however, include Smuggler's Cove (Knight Bay), Boiler Bay (or Brown's Bay; east of Cottongarden Point) and East End Bay (or Windward Bay, south and east of Point Udall). Each of these beachrock zones is subject to a different suite of environmental conditions, including pools of species available for recruitment. Despite such differences, these communities have characteristics in common as well; for example, high algal species diversity, a dense *Echinometra lucunter* population, and a coral zone at the outer edge (more- or less-developed depending on local conditions).

Because of their location along the shoreline, such environments are thus ideal subjects for comparative study, especially during low tides and calm seas. Among the rich algal communities found in the beachrock zone, there are a number of species common to all (e.g., *Padina*, *Sargassum*, *Derbesia*, *Gelidiella*, *Halimeda*), and there are other species unique to each (e.g., the three species of *Gracilaria* found at Southgate), while the other species fall in between these extremes.

Other than *E. lucunter*, the animal communities are quite different: Southgate is rich in corals; Smuggler's in small mobile crustaceans; Boiler Bay is relatively depauperate in invertebrates; and, East End has a rich general invertebrate fauna.

The environmental variables responsible for many of these differences in the beach rock communities include:

- a) Water depth profile;
- b) Wave action;
- c) Topography (at different scales);
- d) Adjacent sand deposits;
- e) Adjacent grass beds, etc.

These environmental variables, when operating in conjunction, influence:

- a) the movement of sediments over the beach rock;
- b) oxygenation of seawater;
- c) physical habitat attachment sites and shelter for organisms; and
- d) the proximity and access by predatory species, especially fishes and birds.

Table I. "Plants" of the Southgate Beachrock Zone

GROUP/species	DIVISION/abundance and distribution
Blue green algae	(CYANOBACTERIA, formerly Cyanophyta)
G + sp?	dark green small filamentous masses on top of ridge
Green algae	CHLOROPHYTA
<i>Caulerpa microphysa</i>	Rather uncommon, scattered, lower urchin zone
<i>C. sertularioides</i>	Fairly common, urchin zone; many dead, bleached ones towards West
<i>C. prolifera</i>	Rare, coral zone
<i>Halimeda incrassata</i>	Uncommon, urchin zone
<i>H. tuna</i>	Uncommon, coral zone
<i>Penicillus capitatus</i>	Rare, coral zone
<i>Udotea flabellum</i>	Rare, coral zone
(<i>Avrainvillea</i> sp.)	Washed onto beach
<i>Ventricaria ventricosa</i>	Uncommon, coral zone
<i>Dictyosphaeria cavernosa</i>	Common, algal zone
<i>Cladophora</i> sp.	Common, upper urchin and algal zone
<i>Derbesia</i> sp? Gen&sp undeter.	Fine filamentous tufts landward side of ridge
Brown algae	PHAEOPHYTA
<i>Padina sanctae-crucis</i>	Abundant, algal zone and upper urchin zone
<i>Sargassum polyceratum</i>	Common, scattered upper urchin zone
(<i>Turbinaria turbinata</i>)	Washed onto beach
<i>Dictyota dichotoma</i>	Urchin zone
<i>D. cervicornis</i>	Widespread and common, urchin zone
Red algae	RHODOPHYTA
<i>Hypnea musciformis</i>	Uncommon, algal zone
<i>H. cervicornis</i>	Uncommon, algal zone
<i>Gelidiella</i> sp.	Very common, algal zone
<i>Acanthophora spicifera</i>	Very common, algal zone
<i>Bryothamnion triquetum</i>	Uncommon, algal zone
<i>Galaxaura oblongata</i> (/)	Common, urchin zone
<i>Liagora pinnata</i>	Uncommon, urchin zone
<i>L. farinosa</i>	Uncommon, urchin zone
<i>Laurencia microcladia</i>	Common, algal zone
<i>L. papillosa</i>	Common, algal zone
<i>Ceramium</i> sp. (<i>nitens</i> ?)	Uncommon, algal zone
<i>Amphiroa fragilissima</i>	Uncommon, coral zone in topographic lows
<i>Gracilaria dominguisensis</i>	Rare, algal zone rare
<i>G. mammillaris</i> (?)	Common towards W end flats of urchin zone with sparse urchins
<i>G.</i> sp.	Rare, algal zone, upper urchin zone
<i>Dasya</i> sp. (?)	Uncommon, algal zone
<i>Digena simplex</i> ?	...but sparser, coarser lateral branches
Flowering (vascular) plants	TRACHEOPHYTA
<i>Thalassia testudinum</i>	Patches in depressions coral zone
(<i>Syringodium filiforme</i>)	Grows in mixed patches with <i>Thalassia</i> . up to outer edge of beach rock

Table II. Animals of the Southgate Beachrock Zone

PHYLUM/species	Abundance and Distribution
PORIFERA (sponges)	
Chondrilla nucula	Abundant, small encrusting sponges in coral zone
Ircinia felix	Medium size fleshy sponges coral zone
CNIDARIA	
corals	
Diploria strigosa	Abundant in coral zones forming many large heads
D. clivosa	Abundant in coral zone forming many elevated shield-like colonies
Porites astreoides	Common in coral zone forming many small heads
P. furcata	Uncommon, colonies with a few branches
Siderastrea radians	Uncommon, forming tiny patches
Favia fragum	Uncommon, forming tiny heads
Acropora palmata	one colony seen, 30 cm, elevated seaward edge, can become dominant in such an environment
firecoral	
(Millepora)	a few small patches
sea anemones	
Bunodosoma granulifera	Uncommon, landward side of elevated algal zone ridge
Condylactis gigantea	Fairly common, large, in crevices coral zone and seaward edge
ECHINODERMS	
sea urchins	
Echinometra lucunter	Abundant, dominates mid-zone
Tripneustes ventricosus	Medium sized individuals scattered on shallow ridge
Diadema antillarum	Uncommon, crevices, fairly common coral zone
ANNELIDS	
tube worms	
Pomatostegus sp.	Uncommon, scattered
Sabellastarte magnifica	Rare
MOLLUSCA	
keyhole limpets	
Fissurella sp	
Diadora sp	

Table II (cont). Animals of the Southgate Beachrock zone**PHYLUM/species****CHORDATA****fishes**

Four-eyed butterflyfish	
Banded butterflyfish	
French angelfish	
Sparisoma spp. (parrotfish)	
Slippery Dick	Common
Clown wrasse	Common
Black-eared wrasse	
White grunt	Abundant in mixed schools of med individuals in outer coral zones
Caesar grunt	Abundant in mixed schools of med individuals in outer coral zones
French grunt	Abundant in mixed schools of med individuals in outer coral zones
Yellow-tailed snapper	
Schoolmaster snapper	
Mahoghany snapper	
Barracuda	
Beaugregory	and other damsel fishes; common, territorial
Common squirrelfish	
Reef squirrelfish	
Blue tang	Common; medium sized individuals
Ocean surgeon	Common; medium sized individuals

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