# ECTOPROCTS AS ASSOCIATES OF CORAL REEFS: ST. CROIX, U.S. VIRGIN ISLANDS

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## SUMMARY

Cheilostome ectoprocts occur abundantly on fore-reef but not on back-reef debris. A large shallow area exists between the shore and the fringing reef. Calcareous mud is produced there, and it appears to "smother" encrusting animals which feed by filtering sea water. Twenty-nine species are cited in this first report of ectoprocts from St. Croix. This is approximately 11 percent of the tropical West Atlantic cheilostome fauna.

## I. INTRODUCTION

In the tropical West Atlantic, there are approximately 275 species of the Phylum Ectoprocta (often referred to as bryozoans), Order Cheilostomata (faunal check-list in Schopf, in press). Part of the paleontological lore of tropical regions, (reviewed by Cuffey, 1972) is that ectoprocts do not occur in reef areas, and thus this high diversity raises the question as to where the ectoprocts are living. The present note reports the diversity of ectoprocts along a transect extending from the shoreline to the seaward side of a fringing coral reef.

Ectoprocts appear not to have been previously reported from St. Croix, although they are known from other Virgin Islands and from Porto Rico (Osburn, 1940).

## II. DISTRIBUTION

From 20 to 26 January, 1972, samples of substrata considered suitable for ectoprocts were collected by free-diving at St. Croix (approximately 18 deg. N). The area extending seaward from the West Indies Laboratory of Fairleigh Dickinson University across Tague Bay to the reef (Fig. 1) was particularly searched. The tidal range is about 0.3 m, and sediments inside the reef tract are chiefly calcareous muds and sands derived from locally growing green algae including *Halimeda, Penicillus, Rhepicephalus, Udotea,* (and possibly the dasycladacean *Chalmassia),* and the red alga *Melobesia.*

Despite an approximately equivalent sampling effort inshore, immediately back-reef, and immediately fore-reef, only in the talus of the fore-reef were ectoprocts abundant (Fig. 1). Near-shore (-0.1 to -2 m) species were found only on the vertical sides of pilings, and in another area eastward along the coast at Salt River in an ecological equivalent of pilings, viz. the roots of black mangroves. In the shallow fore-reef area (-2 to -4 m), 19 species occurred on the undersides of dead pieces of coral (especially *Millepora),* and other debris. A single piece of talus from 18 m depth was contributed by divers. It contained 4 species which indicates that further sampling in deeper, off-reef water would yield a diverse fauna.

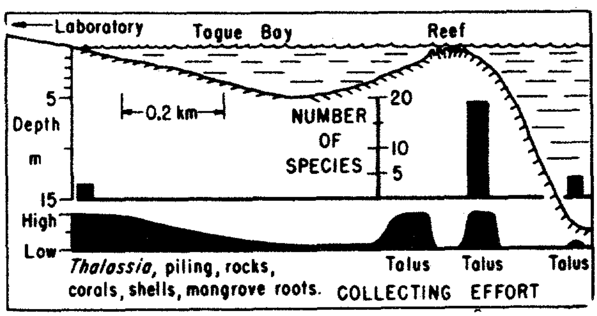


**Figure 1:** Bathymetry, number of ectoproct species, collecting effort, and substrata sampled in a transect from the West Indies Laboratory, Fairleigh Dickinson University, to the bounding barrier reef, St. Croix. Note the paucity of the back-reef fauna and the abundance of the fore-reef fauna.

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Near-shore areas at the West Indies Laboratory dock and in the Salt River mangrove area are alike in that visibility in the water was less than 0.3 m. On many mangrove roots, similar to the situation observed elsewhere on pilings, there existed a diverse fauna of colonizers, including oysters, many sponges, and tunicates, and a noteable scarcity of calcareous algae.

Also near-shore, the marine grass *Thalassia* was extremely abundant in the area in front of the Laboratory. Neither *Thalassia*, the much rarer cup corals, nor the echinoids and small rocks also in shallow water (0 to -2 m) yielded any ectoprocts. Instead, *Thalassia* was nearly covered with the calcareous alga *Melobesia*, so that when the grass was worked into windrows along the beach, it shone in the sun. Elsewhere, in the Bahama Islands (Hoffmeister, *et. al.* 1967), and northward along the coast of southern New England, *Thalassia* and other sea grasses provide substrata for many ectoprocts, most notably *Schizoporella floridana* and related forms. Perhaps the reason for the absence of ectoprocts at this locality in St. Croix is the large amount of fine material which colors the waters very nearshore a milky white, and on settling gives a dusty appearance to even the erect-growing grasses.

The areas immediately in back of, and in front of the reef tract have broken coral and other reef talus. The upper side of back-reef talus had a white, dusty appearance; abundant calcareous red algae (*Lithothamnion* spp.), and some encrusting animals grew on the bottom sides. In contrast, fore-reef talus appeared much less covered with sediment. On the undersides of the fore-reef talus, encrusting animals including worms, sponges, tunicates, ectoprocts and even coral were much more abundant, and calcareous algae less abundant, than in the back-reef talus.

No caves or other "cryptic" reef habitats were sampled. Such places have been found to contain a diverse ectoproct fauna, often together with coralline sponges and brachiopods (Harmelin, 1969; Jackson *et al.*, 1971; Cuffey, 1971a, 1971b, 1972), and would be expected to contribute to an indigenous reef ectoproct fauna.

## III. INTERPRETATION

The observed distribution of ectoprocts at St. Croix is explained in the following manner. Ectoprocts may grow in very shallow water on vertical substrates in currents strong enough to prevent extensive settlement of suspended matter. If depositing sediment prevents ectoprocts from filter feeding by covering colonies, or by clogging the filtering tentacle crown, then ectoprocts appear to be excluded. In the back-reef area, the contribution of calcareous algae to the production of lime mud is very high, and the reef forms a partial natural barrier to distributing this material elsewhere. Back-reef talus is covered lightly with a white "dust". In contrast, on the fore-reef side, the area for the production of lime mud is reduced, and the water is very turbulent as the reef forms the natural barrier against which the waves break. Hence much less fine material settles from the water on the fore-reef side, and substrata are more easily lived upon by phytoplankton feeders.

For the fossil record, these observations of a particular physical setting of a coral reef and its ectoproct associates would appear to apply with one adjustment. In the area examined, ectoprocts commonly occur on floating and attached algae. Such algae sometimes accumulate in the tide rack. As the algae rot, the calcareous skeletons of ectoprocts would be contributed to the fine-fraction of the beach deposit. Presumably a strand-line accumulation of recognizable ectoprocts could occur in the fossil record if buried very rapidly, as in storms.

## IV. RECORDS

The species collected are set out in Table I.

Samples of those marked with an asterisk (*) are housed at the West Indies Laboratory of Fairleigh Dickinson University, St. Croix, together with duplicate material. The remaining rare species are in the author's comparative collection. For reasons of easy access to the pertinent literature, the nomenclature given is the same as that used in the reference cited. There are 29 cheilostomes and 3 cyclostomes.

## ACKNOWLEDGMENTS

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**Table I.** List of Ectoprocts collected from St. Croix

| Substratum | Species | Notes | Reference to a figured specimen |
|---|---|---|---|
| **Pilings** | *Schizoporella unicornis* * | Common; perhaps the same as *S. floridana* and *S. errata* of the literature. | Marcus, 1937:118 |
| **Mangrove roots** | *Watersipora cucullata* * | Common | Marcus, 1937:83 |
| | *Schizoporella unicornis* * | Abundant. Massive, encrusting growth; extensive frontal budding. Nomenclature as above. | Marcus, 1937:83 |
| | *Holoporella* sp.* | Common. In general aspect like *H. mordax* (see Marcus, 1937, fig. 85, and Shier, 1964, figs. 12-13), but without spines and with a different type of vicarious avicularium. | |
| **Talus from the fore-reef (-2 to -4 m)** | *Hipporporina porcellana** | Abundant. | Marcus, 1937:96. |
| | *Stylopoma informata** | Common. | Marcus, 1937:91. |
| | *Parellisina latirostris** | Common. | Osburn, 1940:361. |
| | *Smittina trispinosa** | Common. | Marcus, 1937:102. |
| | *Cribrilina innominata** | Common. | Smitt, 1837:22. |
| | *Holoporella mordax?** | Common. See Marcus, 1937:123; specimens at hand apparently lack pigmentation, and have a slightly different aspect to their large, secondary avicularia. | |
| | *Rhynchozoon verruculatum** | Common. | Marcus, 1939:153. |
| | *Disporella* sp.* | Common; a Cyclostome. | |
| | *Discopora albirostris* | Rare. | Smitt, 1973:70. |
| | *Cellularia pusilla* | Rare. | Smitt, 1872:13. |
| | *Steganoporella magnilabris* | Rare. | Marcus, 1953:284. |
| | *Lichenopora* sp. | Rare; a Cyclostome. | |
| | *Rhynchozoon phrynoglossum* | Rare. | Marcus, 1937:115. |
| | *Adeona bipartita* | Rare. | Marcus, 1949:25. |
| | *Parasmittina spathulata* | Rare. | Cheetham and Sandberg, 1964:1037. |
| | *Hippoporidra* sp.A | Rare. Orifice shape, avicularia size and shape, and frontal like *H janthina* (see Cheetham and Sandberg, 1964:1033.) However, orifice collar well developed with curious asymetric indentation on side with avicularium. | |
| | *Hippoporidra?* sp. B | Rare. Orifice shape, and procellaneous frontal like *H. irregularis* (see Osburn, 1940:414). However, pair of oval avicularia facing inward on lateral walls of an ill-defined orificial collar; prominent suboral mucro. | |
| | Ascophoran, unidentified | Rare. Orifice oval in anterior-posterior elongation, porous frontal, 6 spines distal to orifice, prominent mucro, and oval avicularia on pedistels at boundaries between individuals. | |
| **Talus from the fore-reef (-18 m)** | *Steganoporella magnilabris* * | Common. | Marcus, 1953:284. |
| | *Hippopodina feegeensis* * | Common. | Osburn, 1940:412. |
| | *Holoporella mordax* | Rare. | Marcus, 1937:123. |
| | *Scrupocellaria bertholletti* | Rare. | Marcus, 1938:24. |
| **Small red alga** | *Scrupocellaria regularis* * | Common. | Osburn, 1940:384. |
| | *Catenicella contei* * | Common. | Marcus, 1938:31. |
| | cf. *Porellina ciliata* * | Common. No avicularia in colonies at hand. | See, Smitt, 1873:26; or Osburn, 1940:432. |
| | *Aeta* sp. * | Common. | |
| | cf. *Steginoporella rozierii* * | Common. | Smitt, 1893:16. |
| | *Holoporella schubarti* * | Common. | Marcus, 1939:159. |
| | *Membranipora Tuberculata* | Rare. | Marcus, 1939:125. |
| | *Hippothoa divaricata* | Common; linear growth form. | Marcus, 1939:134. |
| | *Tubulipora* sp. | Rare; a Cyclostome. | |

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