

# Distribution and density of the rock-boring urchin (*Echinometra lucunter lucunter*) along the northeastern coast of Trinidad, West Indies

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## Context

- The Caribbean is considered a unique biogeographic region that is among the top five hotspots for marine and terrestrial biodiversity (Rivera-Monroy et al., 2004).
- During the 1970s, sea urchin research mostly focused on *Diadema antillarum* (Ogden et al., 1973).
- Hendler et al. (1995) published important work on 144 echinoderm species.
- Currently there is no research done on the Rock-boring urchin (*Echinometra lucunter lucunter*) in terms of distribution.
- E. lucunter* distribution, density, and abundance is likely under-represented due to undersampling (Alvarado, 2011).

## Main Objectives

- (1) To assess sea urchin distribution in surf zones, which we defined as (a) open verses (b) protected from wave action.
- (2) To measure the test diameter and weight of individuals at sites displaying both sea urchin color morphotypes (red and black) with respect to open verses rocky surf zones.

## Project Background

- Preliminary reef distribution data (Belford & Phillip, 2011) does not include sea urchin distribution.
- Reefs in the Caribbean Sea are subjected to annual hurricane disturbances. The resulting increased fresh water runoff from rivers decrease salinity within reef ecosystems, thus causing coral mortality (Hoegh-Guldberg, 1999).
- The map (below) shows L'Anse, Toco Bay and Pequelle Bay, Trinidad (located between 10°50.097'N, 60°55.208'W and 10°50.097'N, 60°54.975'W).



## Sea urchin color morphotypes along the north coasts of Trinidad



## Methods



Using the Quadrat Method to identify and count individual sea urchin in rocky habitat

Counting urchins in the open habitat

Sea urchins accessible to measure during low tide

- Random Toss Quadrat Method (1 m<sup>2</sup>).
- Count every urchin within the quadrat (Red vs Black colormorph).
- Measure and weigh random individuals.
- Record benthic component, such as algae, rock, coral.
- We used a flattened metal rod to gently pry each sea urchin attached to its hard substrate.
- We measured the test diameter (as described in McPherson, 1969) of randomly selected sea urchins from each quadrat using Vernier calipers (CaliMax, Model: Wiha 41103, Carbide Processors Inc.).
- Urchins were weighed with digital scales (Model: PS 121, Ohaus Corporation).
- An underwater digital camera was used to document color morphotype structure at both sites.

## Results

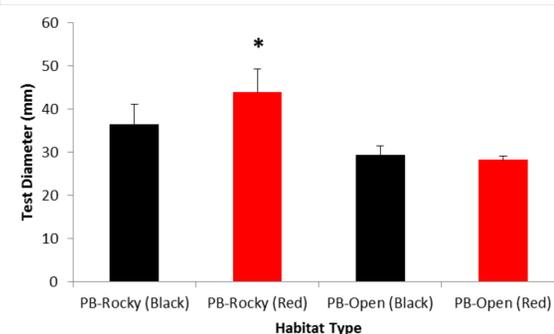


Fig. 1. Illustration of *E. lucunter lucunter* habitat types at Pequelle Bay, Toco as protected rocky versus open area for black and red color morphotypes for test diameter. \*  $t = 4.4108$ , ( $P < 0.05$ )

## Results

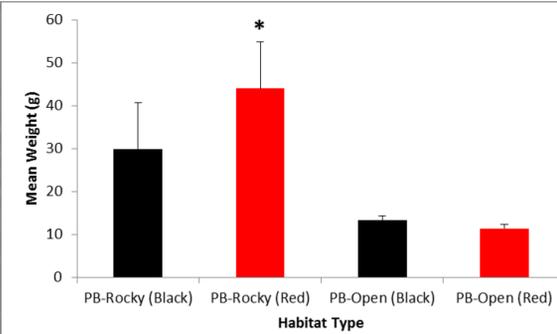
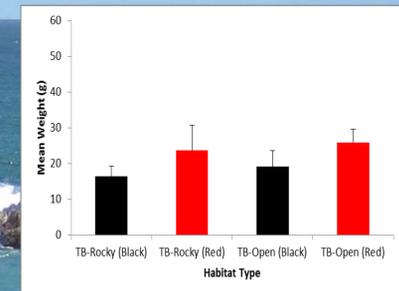
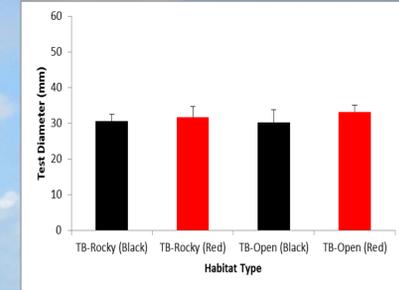


Fig. 2. Illustration of *E. lucunter lucunter* habitat types at Pequelle Bay as protected rocky versus open area for black and red color morphotypes for mean weight. \*  $t = 4.9716$ , ( $P < 0.05$ )



## Results

- There was a significant difference in sea urchin mean test diameter ( $t = 4.411$ ,  $p < 0.05$ ) and weight ( $t = 4.972$ ,  $p < 0.05$ ) between rocky and open habitat for the red color morphotype at Pequelle Bay.
- There was no significant difference for sea urchin test diameter and weight between sites.
- Urchins counted within 1 m<sup>2</sup> quadrats ( $N = 31$ ) were 18.4 and 33.0 per quadrat at PB and SB respectively.

## Conclusions

- Although the intertidal zones at PB and TB were dominated by soft corals, and the black color morphotype in open areas, more data is required to determine why rocky areas had larger red color morph sea urchin.

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