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STORM-GENERATED MOLLUSCAN THANATOCOENOSIS ALONG A CARBONATE PALEOSHORELINE: SOUTHERN ELEUTHERA ISLAND, THE BAHAMAS

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Introduction: Concentrations of large mollusc shells in coastal deposits provide important information about the local malacofauna and potential transport agents, including extreme events [1-4]. Such accumulations are common in the rock record [5,6], with Quaternary examples serving as good time-averaged examples by combining aspects of both the modern biocoenoses and the fossil record.

Death assemblages of local organisms (thanatocoenosis) and their preserved record (taphocoenosis) in carbonate settings, where granulometric spectrum may be very limited (e.g., oolitic sand), can serve as important paleo-environmental indicators, especially when considered in combination with primary sedimentary structures (in outcrops or geophysical images) and in situ biogenic structures (trace fossils)[7]. Along prograded beach/dune ridge complexes (strandplains) [8], extensive accumulations of large nearshore mollusc
shells are likely related to extreme events, such as intense storms [1].

This study reports on an anomalous accumulation of mostly juvenile conch shells (*Aliger* sp.) along one of the oldest (landwardmost) paleoshorelines of the Plum Creek Beach in Freetown, southern Eleuthera Island, The Bahamas (Fig. 1). Shell preservation is assessed using semi-quantitative taphonomic grades.

![Figure 1. The study site within a Holocene strandplain along the southern Eleuthera Island, The Bahamas (see arrow in the inset for location within the archipelago).](image)

**Methodology:** This study was part of field research in May 2013 at several sites on Eleuthera Island. Geophysical surveys collected using a digital 800 MHz MALÅ GPR system (Fig. 1) are not discussed in this paper, but provide a subsurface context for paleoshorelines.

Topographic profiles, GPS-aided geolocation, and field photographs (Fig 2) were used to assess the general distribution and preservation of the shells. Taphonomic grades from poorest (1) to best (4) preservation [9,10] were analyzed for 36 gastropod specimens (Fig. 3).
Results and Summary: Thousand of shells of juvenile Queen’s conch (*Aliger gigas*, Linnaeus, 1758) occur along paleoshoreline I (“Conch Beach”, Fig. 1), mostly along its seaward (windward) side (Fig. 2A). Many specimens are well preserved below the semi-lithified sediment surface, whereas the exposed part is weathered and gray (Fig. 1B), similar to the surrounding sediment surface. These shells show a spectrum of breakage patterns (Fig. 2C), from fully preserved shells to columellas (Fig. 2D). Extensive sponge borings (*Entobia isp.*) on some specimens (Fig. 2E) suggest that the host shell spent some time in a low-energy subaqueous setting before being transported onto the supratidal berm elevation.

Taphonomic analysis of 36 specimens, most of which (78%) were collected along the windward side of the ridge, shows a general increase in preservation grade with size (grade 1 – 10.54 cm to grade 4 – 14.25 cm; Fig. 3). Some alteration and diagenesis may have occurred following event deposition, with fracturing and fragmentation likely related to an intense cyclonic event (hurricane).
Figure 3. Taphonomy: nearly half (39%) of specimens show poor preservation (grade 1), with a general improvement with specimen size.

Our study indicates that some paleoshorelines in the Bahamian archipelago, in addition to serving as geoindicators of past sea-level dynamics [11-13] and paleo-environmental framework [14-17], offer unique paleotempestological information. Although similar concentrations may be buried beneath younger Freedom Beach ridge sets (Fig. 1), the dataset described here is the only presently exposed occurrence. Further analysis of Quaternary Bahamian malacofaunas may provide diagnostic features for differentiating between ecological (salinity, temperature, zoonotic disease), cyclonic, tsunamigenic, lag-condensation, or other origins of coastal thanatocoenoses.

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REFERENCES


