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MICRO-ARCHITECTURAL ASSESSMENT OF SKELETAL ELEMENTS IN *MONTASTRAEA FAVEOLATA*, LOOE KEY, FLORIDA, USA

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Core samples of *Montastraea faveolata* from Looe Key, Florida provide a valuable opportunity to study the structure and micro-architecture of a coral skeleton. Looe Key Reef is located within the Florida Keys reef tract and is approximately nine nautical miles southwest of Big Pine Key. The specimen used for this study is one of 24 coral cores taken along the fore reef and will be used for comparison to additional sites along the track and other coral reefs where environmental conditions may show growth variations in skeletal morphologies.

The primary focus of this study was to learn more about the influence of crystal structure and crystal relationships (micro-architecture) as seen on dissepiments, septal flanks and costal flanks (meso-architecture) of annual high and low density portions of the coral skeleton. Annual density banding has been previously studied in species of *Montastraea* and while the microarchitectural aspect was acknowledged, it was denounced as not being a significant player in the role of skeletal density. It is generally accepted that the thickness of exothecal dissepiments contributes to the most obvious increase in skeletal density, and we are in agreement with those results. However, the question is, how can one downplay the role of micro-architecture, while it is this fundamental framework that creates the meso-architectural elements that are said to have the most influence?

The coral core was slabbed, photographed, x-rayed and cut into smaller pieces for examination with the Scanning Electron Microscope (SEM). The x-radiographs were used to determine locations to cut the coral along high and low density bands in both longitudinal and transverse sections. These samples were heavily analyzed and photographed while in the SEM.

In this preliminary work, it was found that there are differences in micro-architectural character between high and low density bands. Although on a meso-architecture scale, the dense annual band exothecal dissepiments plainly stand out in longitudinal sections, the crystal structures and relationships on dissepiments show more contrast in transverse (plan view) section. The undersurfaces of dense band endothecal dissepiments generally exhibit a ropy texture of merged aragonite crystals while the lighter bands mainly display clear acicular (needle-like) aragonite crystals. The undersurfaces of exothecal dissepiments within light bands have similar characteristics to their endothecal counterparts, but within dense bands, the crystals seem increasingly „cemented" (increased crystallization). In contrast, the crystal arrangements and distinctions between low and high density annual bands are clearer in longitudinal section along septal and costal flanks.

This is the first in a long line of studies that will address, not only density banding as seen at a micro-architectural scale, but the affect of environmental changes and the identification of times of stress in a corals life as these factors are reflected within the fundamental framework of the coral skeleton.