

THE ADEQUACY OF THE CARIBBEAN PLEISTOCENE CORAL REEF FOSSIL RECORD TO PRESERVE REEF COMMUNITY STRUCTURE: AN ANALYSIS OF LIFE, DEATH AND FOSSIL ASSEMBLAGES FROM THE BAHAMAS AND FLORIDA KEYS.

GREENSTEIN\*, Benjamin J., Department of Geology, Whittier College, 13406 East Philadelphia St., Whittier, CA 90608, U.S.A.; CURRAN, H. Allen, Department of Geology, Smith College, Northampton, MA 01063, U.S.A; PANDOLFI, John M., Smithsonian Tropical Research Institute, Unit 0948, APO AA 34002-0948, U.S.A.

Increasing concern among scientists and the general public about the "health" of the global reef system has driven many marine scientists to attempt to evaluate changes in reef community structure that have occurred over decadal time scales. However, the results of such studies are confounded by an inability to assess whether documented changes in community structure are responses to current environmental perturbations, or part of longer-term ecological cycles.

The Pleistocene fossil record exposed in the Caribbean region preserves a remarkably stable coral reef community that persisted during intervals of climate change and over time scales exceeding 100,000 years. We have compared the taxonomic structure of coral communities comprising life assemblages, death assemblages and fossil assemblages to understand the degree to which taphonomic bias might have affected perceived patterns of stability.

Living reef tract and patch reef communities were compared to their dead counterparts, and to the Pleistocene patch reefs preserved in the Key Largo Limestone (Florida), and Pleistocene reef tract and patch reef communities exposed on Great Inagua Island, Bahamas. Results of multidimensional scaling reveal that the death assemblage and life assemblages are distinctly different: branching coral growth forms predominate in the death assemblage, whereas massive coral colony growth forms predominate in the life assemblage. Regardless of this difference, the ecologic zonation between living reef tract and patch reef communities is matched exactly by the death assemblage.

Comparison of life and death assemblages to fossil assemblages reveals that the coral zonation between living reef tract and patch reef communities is preserved in the Pleistocene assemblage exposed on Great Inagua. Moreover, the coral communities preserved in the fossil assemblage are more similar in taxonomic composition to living reef coral communities than they are to modern coral death assemblages. Comparison of life and death assemblages present in patch reefs of the Florida Keys to the patch reefs preserved in the Key Largo Limestone reveals similar results: the life assemblages and fossil assemblages are virtually indistinguishable on the basis of the corals they contain.

We submit that the Pleistocene record of Caribbean coral communities provides a remarkably accurate database from which long term responses of reef coral communities to global change may be gauged.