

VARIATION IN DINOFLAGELLATE ABUNDANCE  
BETWEEN TWO REEF SITES WITH VARYING DEGREES  
OF ANTHROPOGENIC IMPACT  
IN RELATION TO CIGUATERA FISH POISONING

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## ABSTRACT

Ciguatera literature contains anecdotal suggestions for a linkage between disturbances to reef environments and the incidence of ciguatera fish poisoning. Ciguatera is caused by dinoflagellates (*Gambierdiscus spp.*) that are consumed by herbivorous reef fish and subsequently by carnivores, including humans. It has been speculated that differences in dinoflagellate composition and/or abundance may result in disturbed reef environments and in turn subsequently influence the ciguatoxic status of fish. My investigation involves the comparison of dinoflagellate composition and abundance between two reef sites with varying degrees of anthropogenic impact.

During May 2009 and August 2009, fifty-eight macroalgae samples were collected from two reefs on Maui, a location considered to be non-distressed (Olowalu) and a location considered distressed (Ka'anapali). Data on the frequency of ciguateric fish exists for these locations. The macroalgae samples were preserved using glutaraldehyde solution to quantify epiphytic dinoflagellate composition in the two locations. Compositional analysis quantified three groups of dinoflagellates, i.e. (1) *Gambierdiscus spp.* and *Ostreopsis spp.*, 2) *Prorocentrum spp.*, and 3) other dinoflagellates). Aliquots of some samples were also taken for isolation and culture and are to be used by others to identify dinoflagellate characteristics to better understand ciguatera poisoning.

The epiphytic dinoflagellate of the genera *Gambierdiscus spp.* and *Ostreopsis spp.* dominated the numerical abundance, ranging between 73%-85% of the total dinoflagellates, in all samples. Significant differences in dinoflagellate variability or

abundance were not apparent between the non-distressed Olowalu reef site and the distressed Ka'anapali reef site ( $p < 0.05$ ). Comparing dinoflagellate abundances in May 2009 and August 2009 did not show significant temporal differences in dinoflagellate variability or abundance ( $p < 0.05$ ). *Melanamansia sp.* was the genus of macroalgae that was most frequently represented in the collections (37.9% of samples), and it supported a mean abundance of 29.9 *Gambierdiscus spp.* and *Ostreopsis spp.* cells per g wet wt macroalgae. *Tubinaria ornata* (representing 5.2% of the samples) was the macroalgae species that supported highest mean abundance of 90.9 *Gambierdiscus spp.* and *Ostreopsis spp.* cells per g wet wt macroalgae. The presence of toxic dinoflagellates genera in Hawai'i deserves future study on possible impacts of dinoflagellates on the coastal ecosystem and human health.