

HAZARDOUS MARINE ALGAL TOXINS: TRAINING, OVERVIEW, AND
EXPERIMENTAL WORK

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ABSTRACT

This GES thesis project consisted of three facets. The first was the development and application of practical skills to isolate dinoflagellates from nature, and subsequently bring them into *in vitro* culture. As a prelude, an educational component came in the form of attendance at the GEOHAB Benthic Hazardous Algal Bloom conference and subsequent workshop that were held in Honolulu, Hawaii in June, 2010. This training was followed by repeated isolation of benthic dinoflagellates, principally *Gambierdiscus spp.*, from Hawaiian coastal waters and their subsequent establishment in culture. This required demonstrating clinical proficiency in the collection, separation, isolation, and cleaning techniques as well as media preparation, sterilization, and culture monitoring.

The second facet involved assembling a summary of nine naturally-occurring marine toxins of algal origin. Ciguatoxin, one of a number of natural marine toxins produced by dinoflagellates and poorly understood generally, is a principle focus of research at the Pacific Research Center for Marine Biomedicine (SOEST, University of Hawaii). This effort required proficiency in electronic literature searches, reference management (e.g., EndNote, Zotero), and formatting of collected information into a succinct document. The marine toxins addressed included azaspiracids, BMAA, brevetoxin, ciguatoxin, *Cochlodinium polykrikoides*, domoic acid, palytoxin, saxitoxin, and yessotoxin. For each of these toxins, information was assembled regarding the causative organism(s), morphology/taxonomy, size, and cyst production capability of putative organism(s), toxin structure, mode(s) of pharmacological activity, geographic range of incidence, marine food web impact, economic impacts, and human health impacts.

The third component was an experimental effort designed to determine if *Gambierdiscus* cells could survive the exposure to the ballast water of shipping vessels and remain viable; this has obvious implications for possibility for such cells to be transferred between geographic locals. *Gambierdiscus* cells were placed in recently collected ballast water at various