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Natural Product Studies of Selected East Pacific Gorgonians

A dissertation submitted in partial satisfaction of the requirements for the degree Doctor of Philosophy in Oceanography

by

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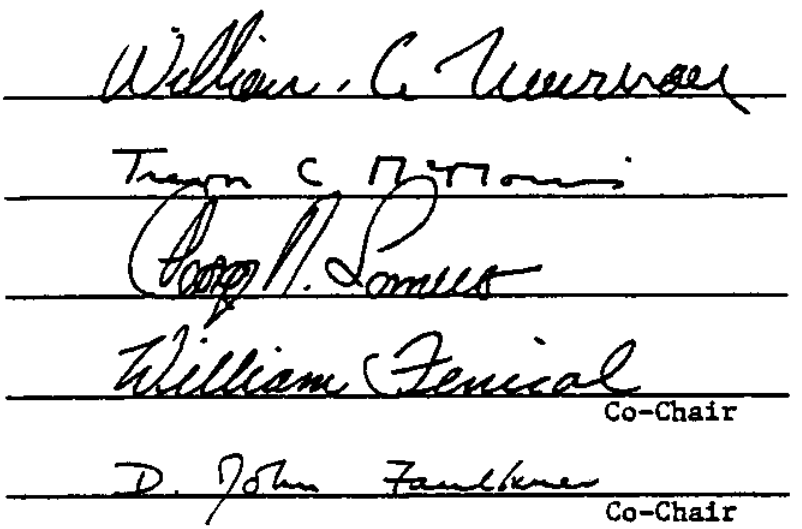

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ABSTRACT OF THE DISSERTATION

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Gorgonian corals commonly occur in great numbers and diversity in the Caribbean, east Pacific and Indo-Pacific. Previous natural product investigations of Caribbean gorgonians have yielded a plethora of structurally and biologically unique compounds. These include diterpenes, sesquiterpenes, sterols and prostaglandins. Prior to this investigation, very little was known about the natural products composition of the east Pacific Gorgonacea. This dissertation reports the isolation and structure elucidation of twenty-seven natural products from fifteen species of east Pacific gorgonians. Twenty of the compounds described are new and seven were previously known from other marine and terrestrial sources. The gorgonians studied were collected off the coast of southern California and Pacific Mexico, and in the Gulf of California.

The structures of all of the compounds were elucidated by combined chemical and spectroscopic methods.

Examination of the extracts of four Lophogorgia species resulted in the isolation of a new neuromuscular toxin, lophotoxin, and six related furanocembrenolide compounds. Lophotoxin acts specifically and irreversibly at low concentrations to block indirect nerve stimulated muscle contraction. One of the Lophogorgia species studied, L. alba, also contained three new 1,4-diketone cembrenolides.

Eugorgia forreri, collected in the Gulf of California, possessed two cembrane-diterpenes which were previously isolated from a soft coral collected in Canton Atoll.

An investigation of the natural products composition of five Pacifigorgia species yielded seven sesquiterpene-derived metabolites. Six of the seven compounds possessed familiar germacrane, cadinane and guaiane ring systems. The remaining sesquiterpene contained a novel linear carbon skeleton.

Extracts of two Mexican Muricea species, M. fungifera and M. austera, contained three known germacrane derivatives which had previously been isolated from a terrestrial plant.

A comparative natural products investigation of two local Muricea species yielded the known sterol, ergosterol peroxide, from both Muricea californica and Muricea fruticosa. In addition, only the less fouled Muricea fruticosa contained four new esterified aminosugar saponin derivatives. These compounds inhibit the growth of the marine

diatom, Phaedactylum tricornutum, at concentrations comparable to those found in the gorgonian tissue. This result may indicate possible roles for these compounds in preferentially reducing fouling on the surfaces of Muricea fruticosa.

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