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Studies of Biologically Active Natural Products
from Marine Invertebrates

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

by

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ABSTRACT OF THE DISSERTATION

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Marine invertebrates are prolific producers of bioactive metabolites. As part of a continuing program to discover new potential drugs against cancer and other diseases, a chemical investigation of several specimens of marine sponges, tunicates and gorgonians was undertaken.

Two novel tricyclic polypeptides, aciculitamides A (14) and B (15), were isolated from the Philippine sponge *Actculites orientalis*. The structures were determined on the basis of interpretation of spectral data, particularly the two-dimensional NMR correlations.

A specimen of the sponge *Latrunculia* sp. (87-146) from Jervis Bay, Australia, contained three new norsesterterpene peroxides, trunculin C methyl ester (39), trunculin D methyl ester (40), and trunculin E (41). Trunculin C methyl ester (39) and trunculin D methyl ester (40) have a novel carbon skeleton. A second specimen of the sponge *Latrunculia* sp. (88-356) from the same area contained trunculins A (37) and B (38), together with five minor metabolites trunculins F (43), G (42), H (44), I (45) and J (46),

which are either stereoisomers or oxidation products of trunculin B (38). The antifungal activities of these compounds and several derivatives were compared.

Renieramycins E (65) and F (66) are two very unstable alkaloids from the sponge *Reniera* sp. collected in Palau. The structure and stereochemistry of renieramycins E (65) and F (66) were established by interpretation of spectral data. The stereochemistry of renieramycin F (66) is the same as that of the saframycins and there is good evidence to support reassignment of the stereochemistry of all renieramycins.

The known compound dercitamide was isolated as a genotoxic component from a purple tunicate that was collected in Pohnpei, Micronesia. Based on a comparison of the long range ^1H - ^{13}C coupling constants of the thiazole ring in dercitamide with those in thiazole and benzothiazole, the structure of dercitamide was revised from 94 to 100. Studies of the metal binding properties of kuanoniamine B (103), a close analogue of dercitamide (100), indicated that kuanoniamine B can bind with several divalent metal ions to form 2:1 complexes. The binding constants for $\text{Cu}(\text{OAc})_2$ and CoCl_2 were determined by a titration method and both are greater than 10^{10} M^{-2} .

The known compound ascididemin (106) and two novel octacyclic aromatic alkaloids eudistones A (108) and B (109), were isolated from a Seychelles tunicate *Eudistoma* sp. The structures of eudistones A and B, which possess a unique carbon skeleton, were elucidated by extensive NMR analysis and chemical interconversion.

