UNIVERISTY OF CALIFORNIA, SAN DIEGO

Acid soluble peptides from the hemocytes of the ascidians: Characterization and antimicrobial activity.

A dissertation submitted in partial satisfaction of the requirements for the degree

Doctor of Philosophy

in

Marine Biology

by

John Andrew Tincu

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Committee in charge:

Victor D. Vacquier, Chair
Kathy Barbeau
William Fenical
Robert Lehrer
William Loomis
Steven Taylor

ABSTRACT OF THE DISSERTATION

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The goal of this research is to investigate the biochemistry of solitary ascidians, with particular focus on the hemocytes (blood cells). *Styela plicata* and *Ciona intestinalis* have a high local abundance and their hemocytes are easily isolated, making them an appropriate model for histochemical studies. Because ascidian hemocytes mediate host defense reactions and accumulate specific metals, they are a potential source of novel antimicrobial and metal binding agents. Acid soluble peptides from ascidian hemocytes were investigated to determine their antimicrobial properties. Chapter II of this thesis presents a comprehensive review of marine invertebrate antimicrobial peptides. Chapter III describes the characterization of plicatamide, a modified octapeptide from hemocytes of the ascidian *S. plicata.* Chapter IV investigates the molecular origins of plicatamide and Chapter V describes

attempts to generate a polyclonal antibody to plicatamide. Chapter VI presents, in detail, the antimicrobial properties of plicatamide. Chapter VII describes two novel, partially characterized, antimicrobial peptides from the ascidian *C. intestinalis*. Chapter VIII introduces a novel, potential metal binding agent from the acid extracts of *S. plicata* hemocytes. Appendix A reviews natural peptide antibiotics from tunicates and appendix B presents the unusual gas-phase intramolecular rearrangement of tunichrome *Sp-1* presented in Chapter VIII.

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