PART I. METABOLITES FROM THE POHNPEI SPONGE *STYLISSA MASSA*
PART II. IDENTIFICATION OF ILLUDIN S AS THE SOLE ANTIVIRAL COMPOUND IN THE FRUITING BODIES OF *OMPHALOTUS ILLUDENS*
PART III. STRUCTURE ELUCIDATION OF OSCILLACIDINS A AND B FROM A HOMER LAKE *OSCILLATORIA* SP.

BY

VIRGINIA KATHERINE BOWDEN LEHMANN

B.S., Valparaiso University, 1995

THESIS

Submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy in Chemistry
in the Graduate College of the
University of Illinois at Urbana-Champaign, 2002

Urbana, Illinois

PART I. METABOLITES FROM THE POHNPEI SPONGE *STYLISSA MASSA*
PART II. IDENTIFICATION OF ILLUDIN S AS THE SOLE ANTIVIRAL COMPOUND IN THE FRUITING BODIES OF *OMPHALOTUS ILLUDENS*
PART III. STRUCTURE ELUCIDATION OF OSCILLACIDINS A AND B FROM A HOMER LAKE *OSCILLATORIA* SP.

Virginia Katherine Bowden Lehmann
Department of Chemistry
University of Illinois at Urbana-Champaign, 2002
Kenneth L. Rinehart, Adviser

In our continuing efforts to discover new potential antineoplastic compounds, the Pohnpei sponge *Stylissa massa* (family Axinellidae) was examined. Four known bromoalkaloids debromohymenialdisine, hymenialdisine, oroidin, and sceptrin were found, which were first reported as metabolites from *Stylissa massa* during our work on the sponge. Also found in *Stylissa massa* were four known cyclic peptides: axinastatin 1, hyemiamide C, phakellistatin 1, and tentatively axinastatin 5/hymenamide G. This is the first report of hyemiamide C and axinastatin 5/hymenamide G being isolated from *Stylissa massa*. In addition, one new cyclic peptide, Compound 918, was discovered and partially characterized.

In our continuing search for new antiviral compounds, we turned from marine to terrestrial sources to examine the fungus *Omphalotus illudens*. Our investigation of mature fruiting bodies of *Omphalotus illudens* found the known compound illudin S to be sole antiviral component present.

From a local bloom of an *Oscillatoria* spp. we collected in hopes of isolating new microcystins, two new nonmicrocystin peptides, oscillacidins A and B, were isolated which contain the rare β-amino acid 3-amino-2,5,7,8-tetrahydroxy-10-methylundecanoic acid (Aound). In efforts to support the proposed structure of these two new peptides, the two unusual amino acids, *N*-Ac-*N*-MeLeu and Aound were isolated, in addition to 2D NMR work and partial acid hydrolysis performed on the whole molecule.

Acknowledgements

I would not be writing this page if it were not for the support of so many people. First, I would like to thank my adviser, Kenneth L. Rinehart, for his support throughout my doctoral work, without which I certainly could not have completed this degree. He is truly a great researcher and a wonderful person, and I am honored to have worked with him and indebted to him for the understanding shown to me. I would also like to thank the members of my committee both past and present: Professors John Katzenellenbogen, Robert Coates, David Seigler, Peter Petillo, and William Pirkle. I would especially like to thank Dr. K. for the helpful comments on the drafts of this thesis. I want to thank the members of the Rinehart Research Group for both their support and friendship as well as the many friends in the department. Special thanks goes to Heather Sings and Jose Morales for sharing the secrets of isolation work with me and to Dr. George Wilson for performing the L1210 and antiviral bioassays. The support staffs of both the mass spec and NMR labs deserve many thanks for their assistance in these projects. I would also like to thank Professor Alejandro Mayer of Midwestern University, who collaborated with us on the oscillacidin project.

I am very thankful to the University of Illinois at Urbana-Champaign, the California Sea Grant Traineeship Program and the National Institute of General Medical Sciences for their generous financial support of this research.

And finally, I my heartfelt thanks to my husband and the rest of my family for their love, support, and patience through this long process.