

# Chemical and genomic approaches for understanding marine natural product structures and functions

Amy L. Lane, Ph.D.

Scripps Institution of Oceanography, University of California-San Diego

Center for Marine Biotechnology and Biomedicine

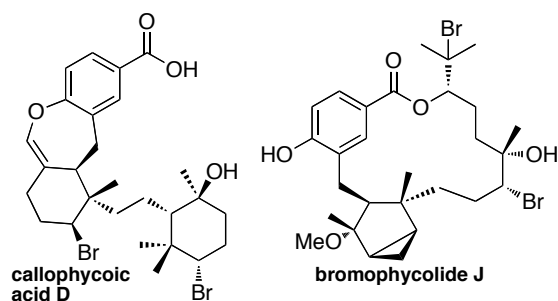
La Jolla, CA 92093

Email: AmyLane[at]ucsd[dot]edu

---

## Abstract

Natural products from terrestrial organisms have historically played a critical role in drug discovery. The world's oceans harbor even more biodiversity than land, and this marine biodiversity may translate to immense chemical diversity. In this presentation, I will discuss my explorations of marine organisms as a source of new drugs and improved understanding of the roles natural products play in influencing interactions between organisms. As one example, bromophycolides and callophycoic acids (Fig. 1) represent novel natural product classes discovered from the red alga *Callophycus serratus*. These metabolites exhibited promising pharmacological activities and were shown to function as chemical defenses against pathogens algae encounter in nature. Further, desorption electrospray ionization mass spectrometry (DESI-MS) imaging revealed these molecules were heterogeneously presented on algal surfaces, potentially as a highly targeted chemical defense. I will also discuss my recent efforts at the interface of chemistry and genomics toward discovery of DNA-targeting natural products that may be useful as cancer therapeutics. Using bioinformatics to analyze the ~5-Mbp genome of the marine bacterium *Salinispora tropica*, three gene clusters predicted to yield DNA-binding natural products were identified. Inactivation of key genes within these candidate gene clusters allowed linkage of experimentally observed DNA-interfering activity to a gene cluster predicted to encode a glycosylated polyketide natural product, the identification of which is currently underway. Together, these studies highlight the potential of the marine environment as a source of novel chemistry and insights into the genetic basis for production of natural products.



**Fig. 1** A representative bromophycolide and callophycoic acid, novel natural products for which both biomedical promise and ecological function have been demonstrated.