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Preface

Harnessing the biosynthetic capacity of marine-derived organisms

The quest to understand the organic chemistry of Oceana and its biota has now been ongoing for several decades. Largely through the pioneering work of US-based academic groups, the first generation research on this subject was conceptualized and it focused on the isolation and structure elucidation of new compounds from marine macro-organisms. Moreover, it was these early chemical discoveries that provided the foundation for the ever expanding quantity of investigations that followed. However, it has taken decades to refine and fully implement the findings and promise articulated in provocative meetings entitled *Food and Drugs from the Sea*, sponsored in the 1960's by the Marine Technological Society. The intent of this Symposium-in-Print is to: (a) outline some historical milestones, (b) highlight selected current discoveries, and (c) offer a glimpse into future research opportunities.

Overall, the discovery rate of new organic compounds continues to be on an upward trajectory and contributions from marine biota represent an important element. Our annual tracking of CAS (Chemical Abstract Service) entries shows that worldwide, more than 200 new compounds are discovered per hour! Yet the greatest structural diversity is often observed from the slower-paced study of naturally occurring small molecules. Consider the following interesting developments that occurred 3 years ago. Firstly, the 40 millionth chemical substance was archived in 2008 by Chemical Abstract Service (CAS). Secondly, as a rather surprising outcome, also published in 2008, a CAS team (lead by A.H. Lipkus), analyzed the frameworks cataloged by CAS and concluded that 'half of the compounds can be described by only 143 framework shapes'. Many of the outliers were undoubtedly natural products.

Currently there are more than 22,000 substances known from either macro- or micro-organisms derived from the marine environment. Today, research on marine natural products has evolved into a multidisciplinary venture involving collaborative efforts by scientists from wide-ranging fields. Some examples include: pharmacology, chemical ecology, biosynthesis, molecular biology, chemical genomics, metabolomics, and chemical biology. We believe that consortia among such groups of scientists will greatly expand the current accumulated knowledge base.

A wide range of biosynthetic classes are discussed in the 17 papers and three reviews in this issue. Some of the molecular structures presented are stunning in their complexity. The accounts herein are divided into six general areas as follows: (a) biologically active metabolites – new structures and re-investigations, (b) understanding the biosynthetic capacity of symbiotic relationships, (c) synthesis and SAR of complex scaffolds, (d) genomic approaches to new molecule discovery, (e) novel approaches in the analysis – characterization of complex molecules, and (f) assessment of and commentary on past seminal discoveries.

We are confident that the research articles and reviews presented in this Symposium-in-Print will provide inspiration for further ventures. Extending knowledge and the scope of structural chemical diversity of marine-derived molecules represents one fertile area for new opportunities. The study of marine organisms from extreme environments or the investigation of new classes of microorganisms should be rewarding. Gaining an understanding of the role of microorganism communities (especially those present in sponges) in producing novel marine natural products represents a dynamic subject, which requires much future study. The cloning of biosynthetic gene clusters that guide the production of complex marine natural products is evolving but remains quite challenging. The use of chemical tools as the next step to interrogate phenomena responsible for intra- and inter-specific interactions among marine organisms represents yet another opportunity. Of vital importance for the betterment of society are efforts that probe the mode of action mechanisms and molecular targets of bioactive marine natural products.

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