Preface

The first edition of *Comprehensive Natural Products Chemistry* (*CONAP*) was published in 1999. Despite the fact that the nine-volume series was based on the biogenesis-based concept and classification of the late Sir Derek Barton, it was written in an era when molecular biology was only slowly penetrating the organic chemistry community. Ten years later, as in many other fields, this situation has changed drastically and has become increasingly multidisciplinary, including natural products 'chemistry'. In order to understand the overall situation, it is advantageous or essential for the average natural products chemist to become familiar with the so-called bioscience area, including molecular biology.

For *CONAP II*, Lew Mander and Hung-wen (Ben) Liu have assembled an extraordinary team of editors for the nine volumes, who in turn have brought together top natural products (NP) scientists to review the respective topics:

1. C. Townsend/Y. Ebizuka: Major NP families and biosyntheses
2. B. Moore/P. Crews: Terrestrial, marine, and prokaryotic sources of NP and genomics
3. R. Verpoorte: Traditional uses of NP and measures for bioactivity enhancements
4. K. Mori: Chemical ecology, covering pheromones, chemical defense, and toxins
5. J. Vederas: Amino acids, peptides, protein engineering, and biosyntheses
6. C.-H. Wong/G. Wang: Carbohydrates
7. T. Begley: Vitamins and enzymatic cofactors
8. C. Whitman: Enzymes and enzyme mechanisms
9. L. Mander: Contemporary methods, spectroscopic and biological

I have been working in the area of NP chemistry for many years and have witnessed again and again the continuing evolution of this field driven by new technologies. It is evident from reading the collected reviews in these volumes that the recent drive leading to the emergence of NP engineering techniques is mainly due to the progress in biosciences. Biosynthetic gene clusters of NP have been sequenced, and a growing number of enzymes encoded by these clusters have been characterized. Identification of NP gene clusters, gene cloning and expression, and isolation of enzymes responsible for key biosynthetic steps are often routine procedures. With many biosynthetic gene cluster sequences available in databases, the bioinformatics approaches to gene function prediction have become more reliable, leading to successful NP engineering studies. Here, by altering the NP structure by gene and enzymatic manipulations, unnatural combinations of genes can be expressed in a single host cell, or desired biosynthetic enzymes can be purified as catalysts for *in vitro* reactions. Such studies can be used to generate novel NP structures. Biosynthetic enzymes with relaxed substrate specificities can also be used to generate large libraries of unnatural compounds. When combined with synthetic chemistry, the potential structural outcome of bioengineering studies is almost limitless. The technological advances in the characterization and manipulation of NP biosynthesis will continue to produce new structures for drug discovery efforts.

In my case, NP research has been mainly in the area of isolation and structure determination. Biologically active NPs must fit into their receptors as the first step to exert activity. With the advances in microscale isolation and spectroscopy, it has now become possible to investigate the structural properties of ligand

(NP)/receptor (R) interactions, even in an ultrafast time-resolved manner through construction of special spectroscopic instruments.

Bioscientists and medical doctors are daily exposed to phenomena dealing with nature. On the other hand, chemists are engaged in structure determination and/or syntheses, namely 'techniques'. It is the interdisciplinary cooperation of these two groups that can clarify the phenomena in Nature. Hence, it is desirable for the forthcoming generation of chemists to adopt an interdisciplinary viewpoint and approach in NP research.

CONAP II should not be regarded merely as a reference source. Instead, one can take it from the bookshelf, flip through the pages, and go through some sections for one's entertainment and knowledge enhancement. Of course, this is easier to say than practice – especially under circumstances when most of us feel increasingly 'busy'. Despite this, I hope readers will endeavor to explore CONAP II for 'relaxation' and 'inspiration', as well as treating it as an indispensable reference source.

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