

Preface

It seems appropriate to emphasize the topic of natural products at a time when new compounds are desperately needed to combat the current problems of antibiotic resistance, emergence of new diseases, continued presence of old, unconquered diseases, and the toxicity of certain present-day medical products. Despite such needs, today's output from the pharmaceutical industry has decreased markedly as a result of mega-mergers among the large pharmaceutical companies, and the downgrading of natural-product discovery efforts in favor of high throughput screening of synthetic compounds made by combinatorial chemistry. The latter may appear surprising because at least half of the antibiotics and antitumor agents approved by the FDA have been natural products, derivatives of natural products, or synthetic compounds inspired by natural product chemistry. However, it is a matter of economics. The extremely high costs to the large companies of purchasing or developing genomics, proteomics, and bioinformatics have left little funding available for the more tedious screening of natural products. Even so, there is some hope. The continuing success of biopharmaceutical products from the biotechnology industry points to the ever-increasing success of natural compounds, albeit that of large molecules. Some of these smaller companies are directing part of their efforts toward small-molecule natural-product screening. A few are emphasizing biodiversity by either harnessing environmental DNA in the metagenomic effort or discovering means of growing the uncultured microbes of the past and learning how to induce secondary metabolism in these organisms. Other companies are emphasizing combinatorial biosynthesis to yield new derivatives or DNA shuffling to rapidly increase the levels of production. Future success is not a matter of the old vs the new; it is dependent on learning how to apply the exciting methodologies of genomics, proteomics, combinatorial chemistry, DNA shuffling, combinatorial biosynthesis, biodiversity, bioinformatics, and high-throughput screening to rapidly evaluate the activities in extracts as well as purified components derived from microbes, plants, and marine organisms.

There have been concomitant advances and an explosion of information in the field of natural products and it is therefore timely to review both basic and applied aspects. *Natural Products: Drug Discovery and Therapeutic Medicine* addresses historical aspects of natural products and the integration of approaches to their discovery, microbial diversity, specific groups of products (Chinese herbal drugs, antitumor drugs from microbes and plants, terpenoids, and arsenic compounds), specific sources (the sea, rainforest endophytes, and Ecuadorian biodiversity), and methodology (high-performance liquid chromatography profiling, combinatorial biosynthesis, genomics, bioinformatics, and strain improvement by modern genetic manipulations). We consider past successes, the excitement of the present, and our thoughts on the future. We hope that this book will inspire industrial and academic researchers, practitioners, and developers, as well as administrators, to look again at Nature for the future gifts that will solve unmet medical needs and make the world a safer place in which to live.

Lixin Zhang, PhD
Arnold L. Demain, PhD

Natural Products

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Zhang, L.; Demain, A.L. (Eds.)

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