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Studies in Natural Products Chemistry

Volume 9

Structure and Chemistry (Part B)

Edited by

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Atta-ur-
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(Editor)

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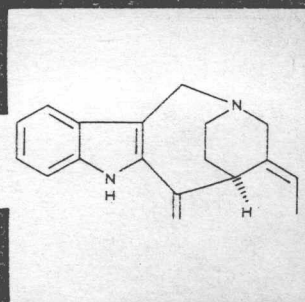
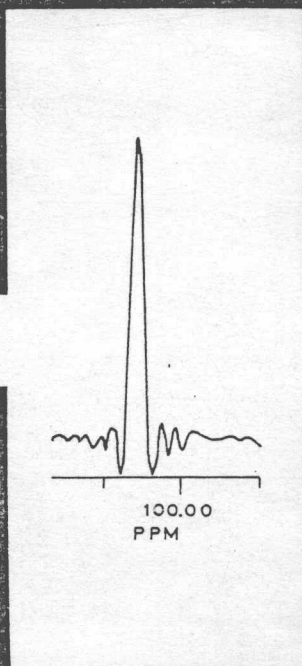
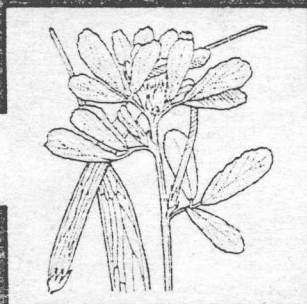
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Atta-ur-Rahman/Editor



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Studies in Natural Products Chemistry
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- Vol. 1 Stereoselective Synthesis (Part A)
- Vol. 2 Structure Elucidation (Part A)
- Vol. 3 Stereoselective Synthesis (Part B)
- Vol. 4 Stereoselective Synthesis (Part C)
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- Vol. 6 Stereoselective Synthesis (Part D)
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PREFACE

"What is a weed? A plant whose virtues have not yet been discovered"

Ralph Waldo Emerson (1803-1882)

"Renaissance" is defined as "A period of vigorous intellectual activity" by Webster's New Collegiate Dictionary. Natural product chemistry is experiencing such a dramatic evolution at the present time, due to the confluence of several recent philosophical and technological factors: a developing realization that, increasingly, a percentage of new medicinal agents, insecticides, herbicides and other biological agents will undoubtedly come from natural sources; the advent of sophisticated chromatographic, high-field nmr and mass spectrometric techniques, coupled with molecular force-field calculations, which have markedly enhanced the isolation and structure elucidation of substantially more complex and diverse natural products; the biological and robotic advances that are occurring in the methodologies to evaluate the biological activity of crude mixtures as well as purified compounds, from natural product sources. These, as well as many other factors, have led to an enhanced interest in the isolation of biologically active natural products in both academia and the pharmaceutical industry.

There is perhaps an underappreciation that many of the medicinal and biological agents used on a world-wide basis are either natural products themselves, are derivatives of them, or are modified templates of natural products. While the efforts to find potential new medicinal agents from natural sources have been ongoing for over 185 years, it is only in the past few years, for the reasons mentioned above, that the level of intellectual activity has burgeoned. This activity comes at a time when there are global concerns about the rain forests, not only from environmental and climatic perspectives, but additionally from the aspects of the loss of biological diversity and ethnomedical tradition that occur as these forests disappear never to be replaced.

Sages who contemplate the contributions of this science to the future health and welfare of mankind are increasingly concerned as to the origin of the drugs of the 21st century. Can we afford to rely on non-renewable resources for these drugs? Are there new medicinal and biological agents to be discovered from renewable resources? What is the time frame for such discoveries to be made in order to have an effect on how we optimize our relationship with the environment 25, 50 and 100 years from now? In this respect, Emerson's comment can of course be applied to all sources of natural products, not only terrestrial plants. We have a window of opportunity. How we focus, rather than dissipate, our efforts in this relatively brief time period is likely to

have a dramatic effect on the health and welfare of future generations; something for which our generation may be ultimately held responsible.

This volume in the series edited by Professor Atta-ur-Rahman, comprises twenty-five chapters contributed by a series of outstanding experts at the forefront of their respective fields, describing various aspects of the structure elucidation, synthesis, biosynthesis and biological properties of natural products from diverse marine, fungal, bacterial, amphibian and insect sources, as well as lower and higher plants. Physical techniques such as nmr and mass spectral methods, are appropriately emphasized, and advances on enzyme-substrate interactions are also featured. The breadth of information encountered in these chapters provides ample testimony to the enormous potential for the future development of natural products from the marine and terrestrial environments to provide the key biological agents for the future benefit of mankind from renewable resources.

Geoffrey A. Cordell
University of Illinois at Chicago

Foreword

Nature manifests its glory in many wondrous ways. The wide diversity of natural products found in living organisms is illustrative of the array of enzymes involved in the synthesis of a fascinating variety of structures from terrestrial and marine sources. The advent of modern spectroscopic techniques, including multi-dimensional NMR spectroscopy and new ionization procedures in mass spectroscopy, has provided phytochemists with new powerful methods for the structural elucidation of complex natural products.

The present volume, the ninth of this series, provides accounts of investigations of the chemistry and structure of many interesting natural products conducted by some of the leading scientists in this field. Some of the articles have been chosen from presentations at the 4th International Symposium on Natural Product Chemistry organised by us recently. The articles include those on terpenes from marine organisms, alkaloids, chalcogens, amphibious venoms, corticoid hormones, antibiotics, peptide siderophores and biosynthesis. Accounts of how the "detective" work of structure elucidation was conducted employing the latest spectroscopic techniques should provide the readers with a stimulating description of recent developments in this exciting area. It is hoped that these contributions from a galaxy of eminent scientists would be of wide interest to many workers in this field.

I would like to thank Mr. Zahir Shah, Dr. (Miss) Khurshid Zaman and Mr. Ejaz Ahmed Soofi for their assistance in index preparation and checking of the manuscripts, Mr. Habib Alam, Mr. Kamran Faisal Khan, Mr. Asif Mehmood Raja, Mr. Mohammad Rais Hussain for the typing work and Mr. Mahmood Alam for the secretarial help.

I wish to dedicate this volume to Prof. Carl Djerassi, who has been one of the leading scientists in this exciting field, and who has contributed a fascinating account of the structure and biosynthesis of marine sterols to this volume.

February 1991

Atta-ur-Rahman, Editor.

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