

Preface

Phenazines, a large class of nitrogen-containing redox-active heterocyclomers of biological and chemical origin, have attracted scientific interest since historical times because of their colorful pigmentation. More than 6,000 phenazine derivatives with wide-ranging bioactivities are now known, of which the hundred or so produced by bacteria currently are the most studied because of their importance in interactions not only with other microorganisms, but also with plants and animals. In this work we have attempted to bring together several major aspects of phenazine research with the hope that these chapters will lead to further advances in our knowledge of the biological origins and activities of these fascinating and versatile molecules as well their future employment in applications ranging from agriculture to human health.

In this volume, authors from all over the world have shared insights on phenazine biosynthesis, biochemistry, and physiological properties, the ecological distribution and antibiotic activity of these compounds, and their current and emerging agricultural and medicinal applications. Chapters highlight the long-sought pathway underpinning the synthesis of the phenazine tricycle, the diversity and complexity of the genetic regulatory mechanisms controlling expression of the biosynthetic genes, and the physiological consequences of phenazine gene expression that extend well beyond the producing bacteria to other organisms in the immediate environment. The involvement of phenazines in such fundamental biological processes as quorum sensing and biofilm formation is recognized, as is the emerging picture of the widespread distribution in nature and the wealth of structural variation and biological activity among these intriguing natural products. Several chapters review the roots of phenazine research in biological control, culminating in description of the commercial production of phenazine-1-carboxylic acid as a natural pesticide for the control of a variety of plant pathogens. Commercialization of a natural product, whether for agricultural or medicinal application, requires scale-up and purification, and these topics, as well as emerging research on the use of phenazines to treat cancer, also are presented.

The editors are much indebted to all of the authors for their contributions to this book. We are greatly obliged to Dr. Jutta Lindenborn of Springer, Heidelberg, Germany for making this volume possible, and for her support and patience during its preparation. Sudhir Chincholkar is particularly grateful to his former Vice Chancellor, Dr. K. B. Patil, and his present Vice Chancellor, Dr. S. U. Meshram,

for their continuous encouragement. He also acknowledges Mr. Prashant Dane and his research colleagues, who helped to correct and format chapters from time to time. Finally, his thanks are especially due to his wife Vashudha and sons Aditya and Rahul. Linda Thomashow is grateful to her colleagues and research associates, particularly David Weller and Dmitri Mavrodi, who assumed a portion of her share of the work within the Research Unit during the preparation of this volume.

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Microbial Phenazines

Biosynthesis, Agriculture and Health

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2013, VIII, 248 p. 129 illus., 20 illus. in color., Hardcover

ISBN: 978-3-642-40572-3