

Preface

ISOLATION AND SCREENING FOR SECONDARY METABOLITES

Industrial microorganisms have contributed enormously to the pharmaceutical, food, beverage, and chemical industries in the past, and are rapidly advancing in the production of renewable energy; they have been central in the development of an ever-expanding field of biotechnology.

It is hard to imagine what life would be like without the fruits of industrial microbes. Some aspects of industrial microbiology have not changed much over the years. The production of fine wines has been refined and perfected, and there is probably not much yet to be learned by studying the molecular biology of the specific yeast cultivars. Chemical mutagens still work just as they did when the first volume of *Manual of Industrial Microbiology and Biotechnology* (MIMB) was published in 1986, and they still provide powerful empirical approaches for strain improvement. However, most of the methodologies that can be applied to industrial microbes and biotechnology have advanced dramatically, even since the second volume of MIMB was published in 1998. It is because of these advances that it is now important to provide the scientific community, including academic and industrial scientists and science administrators, an updated and totally new 3rd edition of MIMB.

Many of the chapters in the first two editions continue to be relevant resources for important methods, and these have not been replicated in this edition. Rather, the 3rd edition has focused on advancements that have brought us to the current state of the art and science in 2010. As such, it contains a totally new section VI devoted to "Microbial Fuels (Biofuels) and Fine Chemicals," and a much heavier emphasis on mammalian cell culture methods. Genomic and other "omic" approaches are widely applied in the biological sciences, and these methodologies are incorporated

in many chapters of the current edition. Methods to enhance the capacity of microbes for use in bioremediation are becoming ever more critical to the maintenance of a clean environment.

Microbes continue to yield novel secondary metabolites and novel enzymes, and the current status of this field is covered in section I. Industrial strain improvement remains a very productive approach to improve the economics of microbial processes, and section III covers methods applicable to corynebacteria, *Clostridium* species, myxobacteria, *Escherichia coli*, *Saccharomyces cerevisiae*, other yeasts and filamentous fungi, and mammalian cells. Even wine yeasts can be improved! Combinatorial biosynthetic and focused genetic engineering methodologies directed at the production of novel secondary metabolites have advanced substantially in recent years, and section IV covers approaches to engineer glycosylation, polypeptide assembly, and nonribosomal peptide assembly in *Streptomyces*, myxobacteria, and *E. coli* among others. Microbial enzymes continue to be important industrial catalysts which are amenable to directed evolution and refinement, and these subjects are covered in section V. Finally, fermentation and cell culture methods and biological engineering and scale-up methodologies continue to be key elements in industrial microbiology and biotechnology, and are updated in sections II and VII.

We sincerely hope that the current edition will be of use to researchers, administrators, and students throughout the world.

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