

Preface

Our objective in putting together this *Manual of Industrial Microbiology and Biotechnology* was to bring together in one place the biological and engineering methodology required to develop a successful industrial process from the isolation of the culture to the isolation of the product. The structure of the manual indeed resembles the development of a commercial biological process and product.

The first section focuses on the culture: its isolation and preservation, inoculum development, nutritional improvement of its performance, and screening new isolates for new products. Section II emphasizes the process, e.g., shake-flask fermentations, solid-state fermentations, anaerobic processes, continuous fermentations, and substrates for large-scale fermentations. In Section III, emphasis is placed on improving the culture by mutation, screening and selection, protoplast fusion, and cloning. Genetic mapping and its importance are also discussed. The main biological facts in Section III are streptomycetes and yeast. The fourth section features some areas of recent biotechnological interest, i.e., cell and enzyme immobilization and plant and animal cell culture. In Section V, biochemical engineering is highlighted. The very important aspects of scale-up, instrumentation, computerization, large-scale sterilization, and cost estimation are comprehensively covered, as is the construction of a general-purpose pilot plant. In Section VI, special topics such as product recovery, assays, toxicity, and legal protection round out the overall treatment of industrial microbiology and biotechnology.

We are fortunate to have been able to enlist a broad range of experts for this effort, including microbial ecologists, physiologists, geneticists, biochemists, molecular biologists, and biochemical engineers, plus a trademark expert and a patent lawyer. Some of our authors have had years of experience in the fermentation plant and pilot plant, and most have carried out distinguished research and development in the laboratory. They hail from the chemical and pharmaceutical industries as well as from biotechnology compa-

nies and academia. Our section editors also come from these industries, with long experience in practical matters and well-known contributions to the microbiological literature. They were given a list of topics and the freedom to choose the contributors. Many of the contributors had a difficult time with the assignment of writing a "how-to" chapter, as opposed to a review. With sufficient harassment by us and the section editors, however, most came through with useful chapters to guide the users of this manual through successful development of organisms and processes. However, only time will tell whether we have been successful.

To make the manual a more valuable resource, some of our authors have provided lists of commercial sources of supplies, equipment, and expertise. Of course, our intention and that of the American Society for Microbiology (ASM) is not to endorse or exclude individual companies, but only to provide the reader with some examples of commercial outlets. We apologize in advance to those companies that we have not mentioned.

And now, to the audience. We feel that this manual should be useful to advanced undergraduate, graduate, and postgraduate students, to technicians in both academia and industry, and to scientists and engineers in industrial companies, both large and small. All of you will find omissions, but we request that you refer to the *ASM Manual of Methods for General Bacteriology* before you discard our manual in frustration. You will see that certain omitted topics are covered very well in the earlier manual, e.g., genetics of unicellular bacteria.

At this point, after a long effort, we are pleased to thank Helen Whiteley, Walter Peter, Jim Tiedje, and David Schlessinger for their development of the concept of this manual, their insistence that we take on the task, and their advice and encouragement. We are pleased to work with Ellie Tupper and Susan Birch from the ASM Publications Department, who showed us how an efficient operation should be run. Finally, to our authors and section editors, thank you all.

ARNOLD L. DEMAİN
NADINE A. SOLOMON