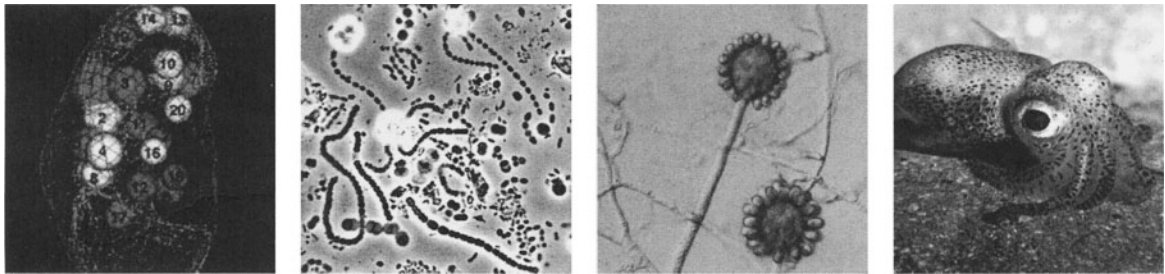


Methods for General and Molecular Microbiology

3rd Edition



C. A. Reddy, *Editor in Chief*

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and L. R. Snyder, *Editors*



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PREFACE

Methods in General and Molecular Microbiology (MGMM) is a substantially revised, updated, and expanded version of its successful predecessor, *Methods in General and Molecular Bacteriology* (MGMB), published by ASM Press in 1994, with my colleague Philipp Gerhardt serving as the Editor-in-Chief. The objective of MGMM is to provide a comprehensive yet moderately priced book that will serve as a first source for traditional methods of microbiology as well as modern molecular biological methods commonly used with microbial cells. Both previous editions of this manual, MGMB and *Methods for General Bacteriology* (MGB, 1991), were popular not only in North America, but also in many other developed and developing countries worldwide. It is hoped that the audience for this edition will be even wider and will include not only “card-carrying” microbiologists, but also scientists in allied disciplines working with microbes as experimental models or as tools for various biotechnological applications. It is hoped that this manual will be on the bookshelf of every serious practitioner of microbiology in academic, industrial, governmental, and clinical laboratories and that it will serve as a rich resource of methods for the seasoned professional as well as for undergraduate and graduate students and postdoctorals.

The primary stimulus for launching this new edition of the manual (MGMM) came from the fact that over a decade had elapsed since publication of the previous edition (MGMB) and during this time not only new methods but also new areas of microbiology (such as community and genomic analysis) had emerged. Considering the fact that MGMB and its predecessors had been used widely around the globe, it was also felt that a new section on general methods in mycology would make this edition even more useful to its worldwide readership. Owing to this increased scope and the need to accommodate additional methodologies, this edition contains 47 total chapters (as compared to 31 chapters in MGMB). The section on systematics from the previous edition has been dropped: much of the still-relevant material in that section has been incorporated into other sections, whereas outdated material from that original section was omitted altogether. Inasmuch as this edition covers methods for microbes representing all the three domains of life, i.e., Bacteria, Archaea, and Eukarya, the title has been broadened from

MGMB (Bacteriology) to MGMM (Microbiology). MGMM is intended as a laboratory manual of methods to complement traditional microbiology textbooks and systematic treatises of general microbiology. However, aside from a chapter on bacteriophages, this manual does not cover viruses, algae, or protozoa.

MGMM is organized into sections corresponding to key subject areas of general bacterial and archaeal biology (microscopy, growth, metabolism, and molecular genetics), including a new section, Community and Genomic Analysis. This is followed by the new section on mycology and appendices on laboratory safety and culture preservation. Each section is divided into chapters, and each chapter has a table of contents to help the reader see the organization of the chapter and easily locate a specific topic of interest. A decimal numbering system is used throughout the manual to facilitate quick identification, cross referencing, and indexing. A comprehensive list of references is provided at the end of each chapter.

The editors refrained from imposing a single, rigid format on the authors other than requesting them to use MGMB as a guide in preparing their manuscripts. The editors also did not delineate in detail the topic assigned to an individual author(s). In spite of this, the chapters turned out to be remarkably consistent in their format and scope. For many of the chapter topics covered in this manual, the state of the art has so developed that entire books dedicated to the topic covered by a single chapter are currently available. Therefore, in many instances, the chapter authors have primarily described reliable methods that are widely applicable to basic studies on the topic covered. Each chapter presents sufficient background principles to understand the how and why of a given method, followed by a step-by-step description of the procedure. Common problems, precautions, and pitfalls of the methods are presented as appropriate. In many cases, commercial sources for equipment and materials are given. These suggestions, however, are not meant either to endorse or to exclude a particular product. Many of the commercial sources for products are also readily ascertained from catalogues published by various commercial firms, from annual buyer's guides of various journals, and from extensive information available on the Internet.

As mentioned above, two sections appear in this edition for the first time. Rapid advances in genomics and genome-based approaches have warranted the creation of the new section, Community and Genomic Analysis. The ability to determine complete genome sequences and metagenomes from microbial communities has revolutionized this field and has extended our ability to obtain valuable information on microbes that are yet to be cultured. Our rapidly expanding knowledge in this area has been put together in seven excellent chapters authored by leading researchers in this area.

The new section on Mycology includes a comprehensive chapter on general methods and three excellent chapters on filamentous fungi, focusing on their physiology, metabolism, and genetic methods and on the principles and practice of DNA microarray technology. Again, each chapter is written by authorities in their respective areas of specialization.

In each of the sections retained from MGMB, existing chapters have been revised (quite extensively in many cases) and a number of new chapters have been added. New authors, revising existing chapters from the previous edition, have provided a fresh perspective, but in most cases the original authors of the analogous former chapter are credited.

Notable new chapters in MGMM, added to sections from the previous edition, include "Laser Scanning Microscopy," "Computational Image Analysis and Reconstruction from

Transmission Electron Micrographs," and "Atomic Force Microscopy" in the section Morphology and Ultrastructure; "Energetics, Stoichiometry, and Kinetics of Microbial Growth" and "General Methods To Investigate Microbial Symbioses" in the Growth section; "Bacterial Respiration," "Carbohydrate Fermentations," "Metabolism of Aromatic Compounds," and two chapters on plant polymer-degrading enzymes ("Cellulases, Hemicellulases, and Pectinases" and "Lignin and Lignin-Modifying Enzymes") in the section on Metabolism; and "Measuring Spontaneous Mutation Rates," "Genetics of Archaea," and "Genetic Manipulations Using Phages" in the section on Molecular Genetics.

It goes without saying that a project of this size could not have been successfully completed without the excellent cooperation and enormous effort on the part of the section editors and especially on the part of the authors, many of whom have revised their chapters more than once; the external referees, who provided rigorous and constructive critiques; and the dedicated publications staff of the ASM Press. Any corrections and constructive suggestions for improvement from the users of this new edition are welcome.

C. A. REDDY
Editor-in-Chief

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