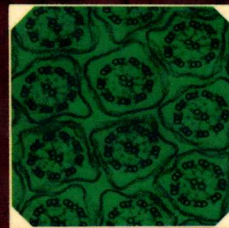
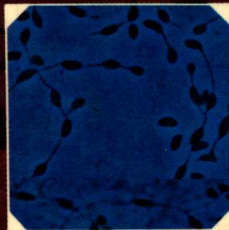
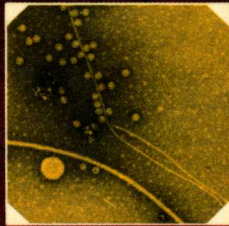
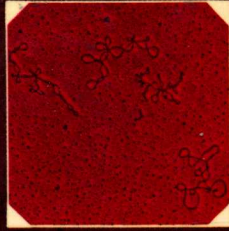


# MICROBIOLOGY

CONCEPTS AND APPLICATIONS

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PAUL A. KETCHUM

# MICROBIOLOGY

## CONCEPTS AND APPLICATIONS

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**PAUL A. KETCHUM**  
*Oakland University*



JOHN WILEY AND SONS

NEW YORK • CHICHESTER • BRISBANE • TORONTO • SINGAPORE



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# MICROBIOLOGY

CONCEPTS AND APPLICATIONS

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NEW YORK CHICHESTER BRISBANE TORONTO SINGAPORE



*Microbiology: Concepts and Applications* presents a balanced coverage of microbiology for students in a wide variety of programs, including biological sciences, health sciences, agricultural sciences, natural resources, food sciences, home economics, and liberal arts. The book was written with the knowledge that some students have had no previous course in biology or chemistry. Therefore the basic principles of biology and chemistry are introduced in the early chapters. Subjects requiring chemical explanations are presented with enough detail to demonstrate the importance of chemistry to microbiology without overpowering the course.

## ORGANIZATION

Some basic concepts and the importance of microbiology are introduced through a discussion of its history. This discussion naturally leads to presentations of the basic principles, concepts, and terms needed to describe and understand the biology of microorganisms. Applications of microbiology to everyday life are integrated into the text to enliven the factual material and to facilitate learning. Additional historical developments are described where the text occasions their introduction. They provide students with a perspective on how microbiology has matured into a major scientific discipline. Short essays, both current and historic, and reports from the Centers for Disease Control are highlighted in boxes throughout the text. The topics treated have been specifically selected to stimulate student interest and convey the current impact of microbiology on our modern world.

## FEATURES

My goal was to write a book that is both a pleasure to read and an effective learning tool. A number of fea-

tures help to enliven the material and to assist the learning process.

1. **Outlines** begin each chapter so that the reader can see at a glance the organization of the material.
2. **Focus of This Chapter** captures the flavor of the topics and principles covered.
3. Pronunciations of scientific terms are given where a term first appears in the text. *Bergey's Manual* and *Dorland's Illustrated Medical Dictionary* were the references used for pronunciations.
4. **Key Points** appear throughout the text to focus the reader's attention on important concepts.
5. **Summary Outlines** at the end of each chapter aid review.
6. **Questions and Topics for Study and Discussion**, which follow Summary Outlines, focus attention on important concepts.
7. **Further Readings** are annotated to motivate students to read more about the topics discussed.

Reference material is included in the appendixes of the book. **Units of Measure and Mathematical Expressions** (Appendix 1) contains conversion factors and a description of how logarithms are used in microbiology. The **Classification of Bacteria** according to *Bergey's Manual of Systematic Bacteriology* is outlined in Appendix 2. **Common Word Roots Used in Scientific Terminology** (Appendix 3) will help students learn the meaning of words through their derivations. The appendixes are followed by a **Glossary** containing definitions of all the important terms used in the text.

## CHAPTER SEQUENCE

The organization of the book has evolved from my own experience in teaching microbiology for over 15

years and from the suggestions of reviewers. Each chapter is written as an independent unit to accommodate instructors who may wish to present the material in other sequences or to combine chapters. For example, Control of Microorganisms (Chapter 8) can be presented with Antimicrobial Agents and Chemotherapy (Chapter 21). The discussion on bacterial diversity was purposefully divided into two chapters so that instructors can emphasize Bacteria of Ecological, Industrial, and General Significance (Chapter 14) or Bacteria of Medical Importance (Chapter 15). Or some instructors may want to select topics from both chapters. The body-system approach to infectious diseases used in Part 4 readily lends itself to selective coverage and reorganization. Within each chapter on infectious diseases, the responsible bacteria, viruses, fungi, and helminths are presented sequentially.

#### SUPPLEMENTARY MATERIALS

A *Study Guide* to accompany *Microbiology: Concepts and Applications* has been written by Dr. Josephine Smith to act as a tutorial, review, and study aid. The *Study Guide* is available from the publisher. An *Instructor's Manual* authored by Dr. Josephine Smith and a package of 100 acetate transparencies selected from the book's two-color line drawings are available to instructors upon written request.

#### ACKNOWLEDGMENTS

Illustrations are extremely valuable for introducing the concepts of microbiology to introductory students, and I am grateful to all the scientists who kindly permitted me to use their illustrations and micrographs. Other scientists have contributed their knowledge, talents, and energy to bring this project to its final form, and I am deeply indebted to them. Selected chapters were read and critiqued by my colleagues at Oakland University, Professors Robert Douglas Hunter, Charles Lindemann, and Satish Walia.

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Production of a modern science textbook requires the expertise of many talented people. I am indebted to Priscilla Todd for editing the manuscript, Pamela Pelton for supervising production, Carolyn Joseph for the design of the book and its cover, John Balbalis for coordinating the illustration program, and the Wiley Photo Research Department for gathering many of the photographs. I especially want to thank Bernice Heller who was the consulting development editor. Her considerable expertise in publishing and her interest in microbiology had a profound impact on the pedagogy and development of the text.

PAUL A. KETCHUM  
Rochester, Michigan

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