

PREFACE

Since the publication of the first edition nearly 30 years ago, well over one million students have used *Microbiology: An Introduction* at colleges and universities around the world, making it the leading textbook for non-majors microbiology. The eleventh edition continues to be a comprehensive beginning text, assuming no previous study of biology or chemistry. The text is appropriate for students in a wide variety of programs, including the allied health sciences, biological science, environmental science, animal science, forestry, agriculture, home economics, and the liberal arts.

The eleventh edition has retained the features that have made this book so popular:

- **An appropriate balance between microbiological fundamentals and applications, and between medical applications and other applied areas of microbiology.** Basic microbiological principles are given greater emphasis than are applications, and health-related applications are featured.
- **Straightforward presentation of complex topics.** Each section of the text is written with the student in mind.
- **Clear, accurate, and pedagogically effective illustrations and photos.** Step-by-step diagrams that closely coordinate with narrative descriptions aid student comprehension of concepts.
- **Flexible organization.** We have organized the book in what we think is a useful fashion while recognizing that the material might be effectively presented in other sequences. For instructors who wish to use a different order, we have made each chapter as independent as possible and have included numerous cross-references. The Instructor's Guide, written by Christine Case, provides detailed guidelines for organizing the material in several other ways.
- **Cutting-edge media integration.** MasteringMicrobiology (www.masteringmicrobiology.com) provides unprecedented cutting-edge assessment resources for instructors as well as self-study tools for students. The 3-D MicroFlix and Microbiology Animations allow students to visualize key concepts; new Foundation Figure questions allow students to master the foundational material; new Case Studies stress real-world applications; and Lab Technique videos partner with the lab manual to prepare students so that they get the most out of lab time.
- **New Clinical Cases that relate the study of microbiology to real-world applications.** The Clinical Cases allow students to apply what they have learned to real-life scenarios. As the student reads the chapter they can follow along with the Clinical Case and answer critical thinking questions that directly relate to the material that they have just read.
- **Illustrations and photos that enhance student understanding.** The Foundation Figures and Life Cycle figures have been stunningly revised to foster student comprehension. The Foundation Figures, which integrate text and visuals to help students master the core concepts of microbiology, now include a bulleted list of Key Concepts. All stepwise figures (including Foundation Figures and Life Cycle figures) have been made to be entirely self-explanatory so that the student doesn't have to rely on lengthy captions to follow them. The new edition also includes over 100 new electron and light micrographs of quality unmatched in the market.
- **Addition of a Name It! activity to the Study Questions at the end of each chapter.** This question provides clues about the physical and biochemical nature of a microbe, signs and symptoms of the disease the microbe causes, information about treatment, etc., and then asks students to use their critical thinking skills to identify the microbe.

NEW TO THE ELEVENTH EDITION

The visual introduction at the beginning of the book contains more details on the eleventh edition.

The eleventh edition meets all students at their respective levels of skill and understanding while addressing the biggest challenges that instructors face. Updates to the new eleventh edition enhance the book's consistent pedagogy and clear explanations. Some of the highlights of the eleventh edition follow:

CHAPTER-BY-CHAPTER REVISIONS

Every chapter in this edition has been thoroughly revised, and data in the text, tables, Clinical Focus boxes, and figures have been updated through February 2011. The main changes to each chapter are summarized below.

Chapter 1

- A new section on H1N1 influenza (swine flu) has been added.
- A new section on multi-drug-resistant tuberculosis has been added.
- Figure 1.3 is now a Foundation Figure.

Chapter 2

- A new table on chemical bonds has been added.
- A new table compares DNA and RNA.

Chapter 5

- The discussion of photophosphorylation has been revised.

Chapter 6

- A new Applications of Microbiology box addresses life in extreme environments.

Chapter 8

- MicroRNA and epigenetic control are now included.

Chapter 9

- The discussions of gene silencing and forensic microbiology have been revised.
- Examples of veterinary uses of rDNA technology and nanotechnology are included.
- The Minimal Genome Project is introduced.

Chapter 10

- The tree of life has been revised to include new information on horizontal gene transfer between lineages.
- A molecular clock is introduced.
- Nucleic acid amplification tests are explained.

Chapter 11

- The section on the nonproteobacteria gram-negative bacteria has been reorganized.
- The material on purple and green photosynthetic bacteria has been extensively revised. A discussion of the deinococci has been added.

Chapter 12

- Newest changes to fungal and protozoan taxonomy are included.
- The chapter now includes discussion of microsporidia, emerging opportunistic pathogens.

Chapter 13

- Discussions on influenza epidemics and crossing the species barrier have been updated.

Chapter 14

- Data in the epidemiology graphs have been updated through 2010.
- A new section on the Human Microbiome Project has been added.
- A new section on health care-associated infections has been included.

Chapter 15

- A new Applications of Microbiology box addresses streptokinase.

Chapter 16

- The section on inflammation has been revised.
- The table on innate immunity responses has been revised.

Chapter 17

- A discussion of T_H17 T cells and the ineffectiveness of T cells to deal with certain infections has been greatly expanded.

Chapter 18

- The discussion of the various types of vaccines has been extensively updated and revised.
- The discussion of adjuvants has been thoroughly updated and revised.
- A discussion of needle-free vaccines has been added.
- The significance of spelling of the names of monoclonal antibodies is now explained.

Chapter 19

- The discussion of HIV/AIDS has been extensively updated and revised.

Chapter 20

- Discussion of some of the newer antibiotics and antimetabolites, such as the pleuromutilins, has been added.
- A discussion of artemisinin-based malarial treatments has been included.
- The discussion of antibiotic-resistant superbugs has been expanded.
- An essay on the future of chemotherapeutic agents has been added.

Chapter 21

- An outbreak of *Pseudomonas* dermatitis is described in the Clinical Case.

Chapter 22

- The discussion of the meningococcal diseases and vaccine for polio has been extensively revised.
- Maps, graphs, and other art have been updated and revised.

Chapter 23

- The first case of dengue fever acquired in the United States is described in the Clinical Case.

Chapter 24

- The discussion of the etiology and symptoms of the common cold has been expanded.
- The diagnosis of tuberculosis has been updated and revised.
- The discussion of influenza has been considerably updated and revised.

Chapter 25

- The discussions of traveler's diarrhea (*E. coli* gastroenteritis) and hepatitis B infections have been revised extensively.
- Discussion of *Clostridium difficile*-associated diarrhea has been included.

Chapter 26

- The discussion of the gonococcus now describes Opa proteins.
- The discussion of neonatal herpes and genital warts has been updated and revised.

Chapter 27

- The figure depicting the sulfur cycle has been revised.

Chapter 28

- Quality assurance microbiology is demonstrated in the Clinical Case.