

Preface

The reemergence of whooping cough, mumps, and measles and the emergence of snail fever, spotted fever rickettsiosis, Middle East respiratory syndrome, and other diseases; the cases of strep throat, MRSA, and tuberculosis; the progress of cutting-edge research into microbial genetics; the challenge of increasingly drug-resistant pathogens; the continual discovery of microorganisms previously unknown—these are just a few examples of why exploring microbiology has never been more exciting, or more important. Welcome!

I have taught microbiology to undergraduates for over 27 years and witnessed firsthand how students struggle with the same topics and concepts year after year. To address these challenging topics, I have created 14 new Video Tutors: three in addition to those already incorporated into the first 18 chapters of the text and 11 that cover the Disease in Depth features. The Video Tutors and Disease in Depth features walk students through key concepts in microbiology, bringing the art of the textbook to life and important concepts into view. In creating this textbook, my aim was to help students see complex topics of microbiology—especially metabolism, genetics, and immunology—in a way that they can understand, while at the same time presenting a thorough and accurate overview of microbiology. I also wished to highlight the many positive effects of microorganisms on our lives, along with the medically important microorganisms that cause disease.

New to This Edition

In approaching the fifth edition, my goal was to build upon the strengths and success of the previous editions by updating it with the latest scientific and educational research and data available and by incorporating the many terrific suggestions I have received from colleagues and students alike. The feedback from instructors who adopted previous editions has been immensely gratifying and is much appreciated. The Microbe at a Glance features have been widely praised by instructors and students, so I, along with art editor Kelly Murphy, developed 11 new Disease in Depth features, most as two-page spreads, that use compelling art and photos to provide a detailed, visually unsurpassed overview of a specific disease. Each Disease in Depth feature includes an Investigate It! question with a QR code directing students to a Video Tutor that explores the topic and encourages further, independent research. These activities are assignable in MasteringMicrobiology®. Another goal for this edition was to provide additional instruction on important foundational concepts and processes. To that end, I developed and narrated three new core concept Video Tutors, accessible via QR codes in the textbook and assignable in MasteringMicrobiology.

The result is, once again, a collaborative effort of educators, students, editors, and top scientific illustrators: a textbook that, I hope, continues to improve upon conventional explanations and illustrations in substantive and effective ways.

In this new edition:

- **NEW Disease in Depth** features highlight important and representative diseases for each body system, extending the visual impact of the art program as well as the highly praised Microbe at a Glance features. Each of these 11 visual features contains infographics, provides in-depth coverage of the selected disease, and includes a QR code and Investigate It! question that directs students to a Video Tutor exploring the topic and prompting further inquiry and critical thinking.

New assignable Disease in Depth coaching activities in MasteringMicrobiology® encourage students to apply and test their understanding of key concepts.

- **NEW Video Tutors** developed and narrated by the author walk students through key concepts. New to this edition are Video Tutors on glycolysis, protein translation, and antigen processing. These Video Tutors bring the textbook art to life and help students visualize and understand tough topics and important processes. Thirty-two video tutorials are accessible via QR codes in the textbook and are accompanied by multiple-choice questions, assignable in MasteringMicrobiology®.
- **NEW Tell Me Why** critical thinking questions end every main section within each chapter. These questions strengthen the pedagogy and organization of each chapter and *consistently* provide stop-and-think opportunities for students as they read.
- **NEW Expanded coverage of helminths** is provided in new Highlight features, and an **emphasis on virulence factors** is included in the Disease in Depth features.
- **The genetics chapters (Chapters 7–8)** have been reviewed and revised by genetics specialists. These now reflect the most current understanding of this rapidly evolving field, including new discussion of next-generation DNA sequencing.
- **Over 330 NEW and revised micrographs, photos, and figures** enhance student understanding of the text and boxed features.
- **NEW and EXPANDED MasteringMicrobiology** includes new Interactive Microbiology animations and tutorials; new MicroBooster remedial video tutorials; new Disease in Depth coaching activities; new Video Tutors with assessments; new MicroCareers and Clinical Case Study coaching activities; and a plethora of microbiology lab resources. **NEW Interactive Microbiology** is a dynamic suite of interactive tutorials and animations that teach key concepts in the context of a clinical setting. Students actively engage with each topic and learn from manipulating variables, predicting outcomes, and answering formative and summative assessments. Topics include Operons; Complement; Biofilms and Quorum Sensing; Antibiotic Resistance, Mechanisms; Antibiotic Resistance, Selection; Aerobic Respiration in Prokaryotes; and Human Microbiota. **NEW MicroBoosters** are a suite of brief video tutorials that cover key concepts that students often need to review, including Study Skills, Math, Basic Chemistry, Cell Biology, Basic Biology and more! The Micro Lab resources include MicroLab Tutors, which use lab technique videos, 3-D molecular animations, and step-by-step tutorials to help students make connections between lecture and lab; Lab Technique Videos and pre-lab quizzes to ensure that students come prepared for lab time; and Lab Practical and post-lab quizzes to reinforce what students have learned.

MasteringMicrobiology offers students access to Dynamic Study Modules to help them acquire, retain, and recall information faster and more efficiently than ever before with textbook-specific explanations and art. Dynamic Study Modules are available for use as a self-study tool or as assignments. Instructors also now have the option to give Adaptive Follow-Up assignments that provide student-specific additional coaching and practice. These question sets continuously adapt to each student's needs, making efficient use of homework time.

MasteringMicrobiology also includes Learning Catalytics—a “bring your own device” student engagement, assessment, and classroom intelligence system. With Learning Catalytics, instructors can assess students in real time using open-ended tasks to probe student understanding using Pearson's library of questions or designing their own.

The following section provides a detailed outline of this edition's chapter-by-chapter revisions.