

A Custom Edition for Rio Salado College

Gerard J. Tortora

Berdell R. Funke

Christine L. Case

BIO 162

MICROBIOLOGY

An Introduction

Brief Edition



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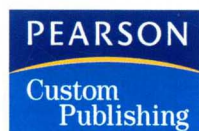
An Introduction

Brief Edition



Taken from:

Microbiology: An Introduction, Brief Edition
by Gerard J. Tortora, Berdell R. Funke, and Christine L. Case



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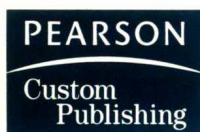
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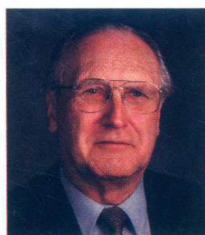


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Gerard J. Tortora Jerry Tortora is a professor of biology and teaches microbiology, human anatomy, and physiology at Bergen Community College in Paramus, New Jersey. He received his M.A. in Biology from Montclair State College in 1965. He belongs to numerous biology/microbiology organizations, such as the American Society of Microbiology (ASM), Human Anatomy and Physiology Society (HAPS), American Association for the Advancement of Science (AAAS), National Education Association (NEA), New Jersey Educational Association (NJEA), and the Metropolitan Association of College and University Biologists (MACUB). Jerry is the author of a number of biological science textbooks. In 1995, he was selected as one of the finest faculty scholars at Bergen Community College and was named Distinguished Faculty Scholar. In 1996, Jerry received a National Institute for Staff and Organizational Development (NISOD) excellence award from the University of Texas and was selected to represent Bergen Community College in a campaign to increase awareness of the contributions of community colleges to higher education.



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Preface

In recent years, more and more instructors have requested a shorter, paperback version of our hardcover textbook, *Microbiology: An Introduction* (now in its eighth edition). In response to these requests, we have developed this Brief Edition of *Microbiology: An Introduction*. The Brief Edition is essentially an alternative version of the hardcover eighth edition. The twenty chapters in this book are identical to the first twenty chapters of the hardcover edition. The key distinction is that the hardcover edition includes eight chapters focusing on microbial disease and environmental microbiology, whereas the Brief Edition omits these chapters. We made this decision after learning that some instructors do not have sufficient time to assign these chapters, or prefer covering these topics with handouts and student projects instead. The Brief Edition has been produced with the needs of these instructors and students in mind.

Like the hardcover edition, the Brief Edition provides the fundamentals of microbiology for students in allied health sciences, biotechnology technician training, and liberal arts. It is a beginning text, assuming no previous study of biology or chemistry.

During the 21 years since the publication of the first hardcover edition, hundreds of thousands of students have used *Microbiology: An Introduction* at more than 1000 colleges and universities, making it the best-selling introductory text in the world. We have been gratified to hear from instructors and students alike that the book has become a favorite among their textbooks—a learning tool that is both effective and enjoyable.

Features of the Brief Edition

The hallmark features of this text include:

- **An appropriate balance between microbiological fundamentals and applications, and between medical applications and other applied areas of microbiology.** We have provided the solid grounding in fundamental facts and principles necessary to understand and adapt to the rapid developments in





microbiology. At the same time, we have integrated applications throughout the text because we know that beginning students benefit from seeing the relevance of microbiology to their respective programs. We have made the text especially comprehensive in medically important areas of microbiology. For example, the principles and applications of immunity have been particularly emphasized. We believe this emphasis is deserved in the light of the tremendous importance of immunology, both as a basic science and as the source of many new valuable tools and techniques for microbiology and the health sciences.

- **Straightforward presentation of complex topics.** Each chapter of the text was written with the student in mind, and maintains the clarity of explanation for which *Microbiology: An Introduction* has become known.
- **Integrated learning objectives and end-of-chapter questions** help students check their understanding of key chapter concepts and learn critical problem-solving skills, needed in clinical and industrial situations.
- **Applications and discovery-oriented boxes** focus on modern, practical uses of microbiology and biotechnology and emphasize the process of scientific discovery. The application boxes show real people doing science to provide students with examples of career opportunities in microbiology.
- **An exceptional art program.** Well-developed, full-color illustrations throughout the book support and enhance the text. Key concepts and questions appear in figure legends to encourage students to think critically about illustrations. Key features of the illustration program include:

Consistent use of symbols and colors. Symbols for molecules such as phosphate groups (Ⓟ) and ATP (☀) are the same color and shape throughout the book, enabling students to progress from familiar parts of illustrated processes to unfamiliar ones with confidence.

Orientation Diagrams, miniature versions of overview illustrations with appropriate parts highlighted, help students keep the “big picture” in mind.

Step-by-step descriptions, in both the narration and illustrations, walk students through important microbiological processes and help them visualize the order of events. Color-coded numbers link text and figure legends to corresponding art.

Micrograph icons appear throughout the book to identify the types of microscopes used in the micrographs.  (scanning electron micrographs) icons and  (transmission electron micrographs) icons indicate the use of electron micrographs. The  icon indicates light micrographs. A red icon  indicates a colorized micrograph.

Scope and Sequence

The Brief Edition is divided into three parts. Part One, Fundamentals of Microbiology, consists of chapters 1–9 and covers chemistry, microscopy, cell structure and function, metabolism, microbial growth, genetics, and biotechnology. Part Two, A Survey of the Microbial World, consists of chapters 10–13 and covers classification of microorganisms as well as detailed introductions to prokaryotes, eukaryotes, and viruses. Part Three, Interaction Between Microbe and Host, consists of chapters 14–20 and covers epidemiology, pathogenicity, immunology, and antimicrobial drugs. We have organized the book in what we think is a useful fashion, while recognizing that the material might be effectively presented in a number of other sequences. For those 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 provides detailed guidelines for organizing the material in several other ways.

A Comprehensive Teaching and Learning Package

The Brief Edition is fully supported by a comprehensive suite of print and media supplements for both instructors and students.

Supplementary Materials for the Student

- **The Microbiology Place Website and CD-ROM** includes tutorials, interactive activities, flashcards of key terms, and simulations covering microbiology's toughest topics. Interactive activities cover the sulfur and phosphorous cycles, photosynthesis, serological tests, the use of PCR to identify microbes in environmental

samples, the nitrogen cycle, gene cloning practice, host and pathogen responses during infection, and virus identification. Three unique simulations enhance understanding of the effects of sewage treatment on waterways, industrial fermentation in a bioreactor, and enzyme inhibitor drugs.

- **Student Study Guide**, by Berdell Funke (0-8053-7620-8). The study guide includes concise explanations of key concepts, definitions of important terms, art labeling exercises, critical thinking problems, and a variety of self-test questions with answers. Students can master key concepts and earn better grades with the help of clear, concise writing and creative and thought-provoking exercises.
- **Microbiology: A Photographic Atlas for the Laboratory** by Steve K. Alexander and Dennis Strete (0-8053-2732-0). Tailored for the introductory microbiology laboratory, this atlas contains approximately 400 high-quality, color photographs that demonstrate the results of laboratory procedures and the morphology of important microorganisms.
- **Laboratory Experiments in Microbiology**, Seventh Edition by Ted Johnson and Christine Case (0-8053-7673-9). This text promotes good laboratory practice and thinking skills with 57 classroom-tested experiments that meet ASM recommendations for the core curriculum considered essential to teach in every introductory microbiology laboratory. These experiments reinforce lecture concepts and promote critical thinking about metabolism, growth, genetics, and immunology. A *Preparation Guide* (0-8053-7674-7) is also available for instructors to aid in the preparation of lab sessions.
- **Microbiology Coloring Book** by I. Edward Alcamo and Lawrence Elson (0-06-041925-3). This unique study tool contains 105 plates, including text and illustrations to color, which enhance understanding and comprehension of important microbiological concepts.

Supplementary Materials for the Instructor

All supplemental teaching materials are available to qualified adopting instructors. Please contact your local Benjamin Cummings sales consultant or call our Customer Service at 1-800-922-0579. Some package items may not be available to adopters outside of the United States.

- **Instructor's Art and Photo Presentation CD-ROM** Included on the CD-ROM are electronic files of art, photos, line art and tables (approximately 700 in all, including all images found in the Brief Edition text, as well as many additional images of microbial diseases).

Images are identified by figure number and are included in both jpeg and PowerPoint® format. All the images in a chapter appear as small thumbnail slides in web-browser format—a user-friendly interface that allows the instructor to quickly locate a figure or table by sight and open the file with a click.

- **Prepared PowerPoint® Lecture Slides** These prepared lecture slides, written by Christine L. Case and included with the Instructor's Art and Photo Presentation CD-ROM, outline the contents of each chapter alongside images from the text. Instructors can adapt the PowerPoint® slides to their specific course without the need to assemble presentations from scratch.
- **Instructor's Guide and Test Bank** (0-8053-7619-4). Written and revised by Christine L. Case, the Instructor's Guide contains teaching tips, alternative course outlines, ideas for using special features, and answers to test questions. The Test Bank features over 1200 multiple-choice questions with answers as well as three to five essay questions per chapter.
- **Computerized Test Bank CD** (TestGen 3.0 0-8053-7617-8). This easy-to-use testing program allows you to view and edit electronic questions from the Test Bank, create multiple tests, and print them in a variety of formats.
- **Transparency Acetates** (0-8053-7618-6). Includes approximately 350 illustrations, including all illustrations from the text, as well as many additional illustrations of microbial disease processes.
- **Course Management Systems, including WebCT, Blackboard, and eCollege** Useful for on-line course management and distance learning courses, content selected from the Microbiology Place and the entire computerized Test Bank is available in the three leading course management systems. Please contact your local Benjamin Cummings representative for more details.

Acknowledgments

In preparation for this textbook, we have benefited from the guidance and advice of a large number of microbiology instructors across the country. The reviewers and focus group participants listed on the next page provided constructive criticism and valuable suggestions at various stages of the revision. We gratefully acknowledge our debt to these individuals.

We also thank the staff at Benjamin Cummings for their dedication to excellence. Publisher Daryl Fox and executive editor Leslie Berriman supported the idea of publishing this Brief Edition, demonstrating their commitment to responding to instructors' needs. Sally Peyrefitte's careful attention to continuity and detail in her copyedit of both text and art served to keep concepts and information clear throughout. Barbara Yien, Sharon Montooth, and Wendy Earl expertly guided the text through the production process. Bradley Burch effectively managed the large art program. The photo researchers, Kathleen Olson and Maureen Spuhler, made sure we had clear and striking images throughout the book. Kathleen Cunningham created the interior design and did a wonderful job with the cover. The GTS Companies did their usual outstanding job moving this book quickly and beautifully through composition; the skilled team was led by Ruth Sakata Corley. Stacey Weinberger guided the book through the manufacturing process. Leslie Austin expertly guided the production of the supplements, with support from Ziki Dekel and Ryan Shaw.

We would all like to acknowledge our spouses and families, who have provided invaluable support throughout the writing process.

Finally, we have an enduring appreciation for our students, whose comments and suggestions provide insight and remind us of their needs. This text is for them.

Gerard J. Tortora
Berdell R. Funke
Christine L. Case

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