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VISUALIZING MICROBIOLOGY: A HEALTHY PERSPECTIVE

Rodney Anderson, Ph.D.
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Ohio Northern University
Why Visualizing Microbiology?

Microbiology is a fascinating discipline. Not only do microorganisms affect every aspect of health, they also play a foundational role in every ecosystem on Earth. Whether a student is learning microbiology to become a medical care provider working to improve patient health, a businessperson manufacturing healthy food products, or an environmental scientist striving to maintain a healthy planet, understanding the role of microorganisms is critical.

Visualizing Microbiology is intended to meet the unique needs of students taking their first course in general microbiology. Its emphasis on the relationship of microorganisms to health makes it of particular interest to courses that primarily serve students planning for a career in the allied health sciences. Visualizing Microbiology will cultivate in the reader an appreciation for the complexity, scope, and dynamic nature of the science of microbiology.

The pedagogy and organization of Visualizing Microbiology is based on decades of research into the effective use of visuals in learning. The animations, videos, figures, and photos are designed to explain, present, and organize new information in a way that promotes greater retention and stimulates critical thinking. This is especially important in a course about microorganisms, which are too small to see and for which students have no context. All visuals are tightly integrated with accompanying text to create a highly engaging learning experience that encourages students to develop rich mental images of the microbial world.

Visualizing Microbiology seeks to optimize learning outcomes with distinctive features that inspire students to step beyond basic memorization to attain a mastery that helps them visualize how such small organisms can have such a great influence on health and the environment. Our integration of engaging images, straightforward text, and emphasis on practical applications helps students understand the vast diversity of microorganisms and then learn how they will apply these concepts when they become practicing professionals. Real-life Case Studies are told as engaging stories that enhance understanding and application of concepts in a clinical context. The Microbiologist’s Toolbox highlights key laboratory diagnostic techniques, What a Microbiologist Sees puts microorganisms into an everyday perspective (see photo and graph), and Clinical Applications introduces the latest research into microbiology applications in health care. Every chapter is rich with critical thinking opportunities, as students are prompted to answer questions along with each visual. All of these features facilitate student engagement and are especially useful to those planning careers as medical professionals.

Section 10.2 highlights the first-line defenses of your immune system, including fever. Because students typically see fever as a medical problem, the What a Microbiologist Sees feature clearly connects increasing body temperature with declining pathogen growth. Additionally, the required data analysis in this feature provides students with a guided opportunity to practice their critical thinking skills.

![Correlation of oral body temperature in adults and bacterial growth rate](image)
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What do students receive with WileyPLUS Learning Space?

- A digital version of the complete textbook with integrated media and quizzes.
- The ORION personalized practice adaptive learning module that maximizes study time.
- Interactive Case Studies are available in every chapter to augment critical thinking. Students are presented with a patient experiencing a collection of symptoms and then embark on a diagnostic process through a series of decisions to confirm the responsible pathogen and course of treatment.
- Chapter Opening Videos draw in the student and highlight why the upcoming chapter material is relevant to their course of study and future careers. The subjects of the videos – nursing professors, nursing students, recent graduates, and practicing nurses and health care providers – briefly introduce the chapter content and provide context and relevance for why the material presented is important, with a personal touch.

In the text, a feature box called The Microbiologist’s Toolbox puts additional clinical focus on diagnostic tools and laboratory techniques. An online video accompanies this feature in every chapter. The video introduces students to important and relevant laboratory techniques.

- NCLEX Practice Exams offer 30 multiple-choice questions that allow students to prepare for the NCLEX exam in relation to the chapter content.
- Glossary and Flashcards include key term flashcards with definitions for self-study as well as multiple-choice quizzes.
- Web Resources offer links to additional online resources for further research and discovery.

What do instructors receive with WileyPLUS Learning Space?

Pre-created teaching materials and assessments help instructors optimize their time:

- Every chapter contains a Lecture PowerPoint Presentation, prepared by Lara Kingeter, Tarrant County College, with a combination of key concepts, figures and tables, and examples from the textbook.
- The Test Bank, prepared by Jacqueline Spencer, Thomas Nelson Community College, is available in a Word document format or through Respondus. The questions are available to instructors to create and print multiple versions of the same test by scrambling the order of all questions found in the Word version of the test bank. This allows users to customize exams to fit their unique classroom by altering or adding new problems. The test bank has over 100 multiple choice, true-false, text entry, and essay questions per chapter. Each question has been linked to a specific, student learning outcome, and the correct answer provided with section references to its source in the text.

Gradebook: WileyPLUS provides instant access to reports on trends in class performance, student use of course materials, and progress toward learning objectives.
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We also appreciate the expertise provided by our ONU colleagues who developed the various video vignettes. Dr. Kami Fox (DNP, CNP Pediatric Nurse Practitioner, Associate Professor, Director and Chair of Nursing) was responsible for crafting the chapter opener videos. Professor Lisa Walden (MEd, MLS(ASCP)CM, Director of the West Central Ohio Medical Laboratory Science Program at Ohio Northern University) created the toolbox videos, demonstrated the clinical techniques, and provided cultures and media for photos. The directing, filming, and editing of the Visualizing videos were skillfully performed by Daniel Combs (BA Broadcast Communications; Multimedia Specialist and Social Media Manager). Thank you all for your contributions to this important component of Visualizing Microbiology.

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Rodney P. Anderson received his Ph.D. in Biological Sciences from the University of Iowa in 1989. His doctoral work centered on protein synthesis mechanisms in *E. coli*. After graduate school, he began his academic career at Ohio Northern University where he continues to teach and conduct research with undergraduates in the Department of Biological and Allied Health Sciences. He teaches microbiology for majors and allied health students as well as courses in general biology, genetics, and epidemiology.

Dr. Anderson has been actively involved in microbiology education. He has been a past President of ASM’s Conference on Undergraduate Education, which developed the core curriculum for undergraduate microbiology courses, and has organized and spoken at a number of education division symposia at ASM’s General Meeting. Outreach activities have included Microbial Discovery Workshops for High School science instructors and doing discovery science activities at local elementary schools. He is an author of two books published by ASM press: *Outbreak* and *The Invisible ABCs*.

Linda M. Young

Linda M. Young earned her Ph.D. in Botany at The Ohio State University in 1988. Her research focusing on signal transduction in root gravitropism was supported by NASA. She continued these studies with undergraduate assistance when she joined the faculty of Ohio Northern University, a student-centered institution that emphasizes effective instruction as a faculty member’s principal responsibility. She enjoys teaching both freshman and advanced-level biology courses. Dr. Young served 7 years as the Assistant Dean of the Getty College of Arts and Sciences, which allowed her the opportunity to implement several programs to assist students in academic difficulty, ease freshman transition into college, and support the endeavors of high-achieving students.

Although initially educated as a plant/cell physiologist, changing departmental needs led to her retraining. Consequently, Dr. Young now also teaches Microbiology for Allied Health Sciences (nursing) and Introduction to Microbiology (majors). Her research has also changed and now targets infection control issues and the ethnobotanical basis of antibiosis. Drs. Young and Anderson have previously coauthored *Case Studies in Microbiology: A Personal Approach* published by John Wiley & Sons, Inc. She has also coauthored the laboratory manual used for general botany at ONU.
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