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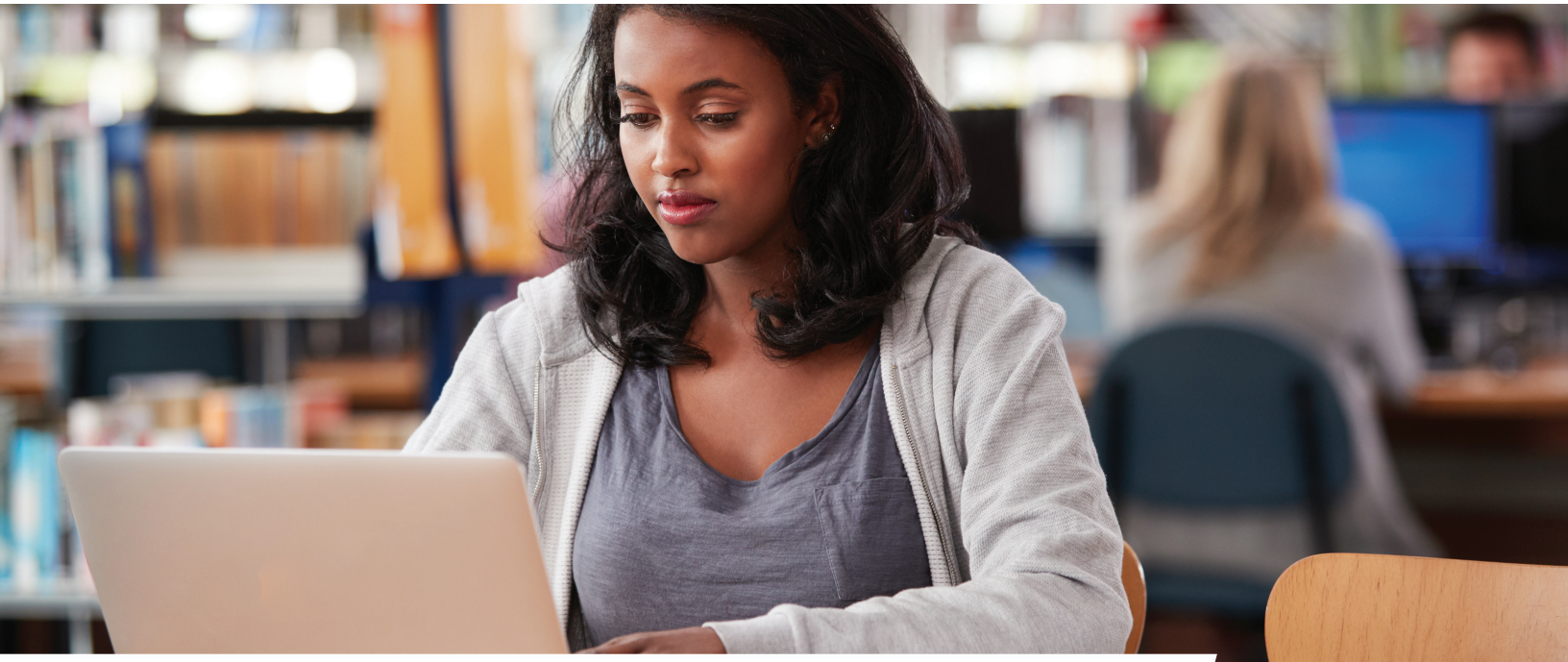

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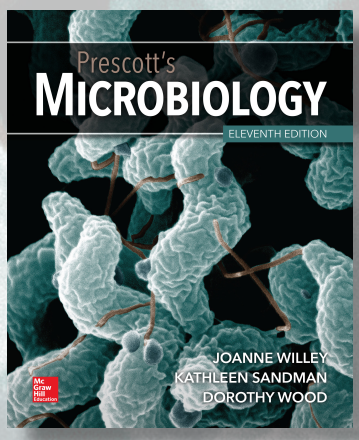
New Features You'll See in *Prescott's Microbiology*, 11e



Title: Prescott's Microbiology, 11e

Authors: Joanne Willey, Kathleen Sandman, and Dorothy Wood

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New to This Edition —

Part One —

1. **Chapter 1**—Evolution is the driving force of all biological systems; this is made clear by introducing essential concepts of microbial evolution first. Advances in the discipline of microbiology and the increasing contributions of genomics and metagenomics are discussed.

2. **Chapter 2**—Microscopy was and is critical to the study of microorganisms and this chapter considers the most commonly used methods, including expanded coverage of phase-contrast microscopy.

3. **Chapter 3**—Coverage of bacterial cellular structure and function. New material includes a discussion of membrane microdomains, and the effect of macromolecular crowding in the cytoplasm.

4. **Chapter 4**—Discussion of archaea has been updated to include recent discoveries, including expanded taxonomy, polyploidy, and the role of nucleoid-associated proteins. Comparisons to bacteria are made throughout the chapter.

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5 **Chapter 5**—An introduction to eukaryotic cell structure and function, with emphasis on eukaryotic microbes. More detailed information on protist and fungal cells is presented in chapters 24 (Protists) and 25 (*Fungi*), which also focus on the diversity of these microbes. The current understanding of the evolution of mitochondria and mitochondria-like organelles is considered. Comparisons between bacteria, archaea, and eukaryotes are included throughout the chapter.

6 **Chapter 6**—This chapter surveys essential morphological, physiological, and genetic elements of viruses as well as viroids, satellites, and prions. Images and descriptions of archaeal viruses have been incorporated. This chapter completes our four-chapter introduction to microbial life.

Part Two —

7 **Chapter 7**—Discussion of the growth of microbes has been updated to include new information about chromosome partitioning and the archaeal cell cycle.

8 **Chapter 8**—A new chapter-opening story and updated tables reflect the challenges associated with controlling prions. A new Microbial Diversity & Ecology box describes the conditions required in NASA spacecraft assembly facilities.

9 **Chapter 9**—Content focuses on the mechanism of action of each class of antimicrobial agents and introduces mechanisms of drug resistance.

Part Three —

10 **Chapter 10**—This introduction to metabolism includes a section outlining the nature of biochemical pathways. The concept of metabolic flux is presented by discussing the interconnected biochemical pathways used by cells.

11 **Chapter 11**—An introduction to metabolic diversity and nutritional types is followed by an exploration of the energy-conserving process of each nutritional type. An introduction to flavin-based electron bifurcation has been added.

12 **Chapter 12**—New comparison of pathways used to synthesize lipids in bacteria and archaea.

Part Four —

13 **Chapter 13**—A revised section now covers posttranslational modifications, protein folding, and secretion systems. Membrane vesicles are introduced.

14 **Chapter 14**—The regulation of bacterial cellular processes, with updated coverage of regulation by messengers like c-di-GMP. A new section on responses to viral infection includes a discussion of restriction-modification and CRISPR.

15 **Chapter 15**—Recent developments in archaeal replication, gene regulation, and protein secretion have been included.

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16 **Chapter 16**—Covers mutation, repair, and recombination in the context of processes that introduce genetic variation into populations. Updated coverage of integrative conjugative elements and mobilizable genomic islands.

17 **Chapter 17**—This chapter has been completely reorganized to update the content on gene cloning and heterologous gene expression. Cas9 genome engineering methodologies are described.

18 **Chapter 18**—Next-generation nucleotide sequencing and singlecell genome sequencing are covered in the context of metagenomics as it relates to the microbial ecology of natural systems, including the human microbiome.

Part Five —

19 **Chapter 19**—This overview of microbial evolution has been updated to include whole genome comparison and related computational techniques in determining relatedness.

20 **Chapter 20**—The discussion of archaeal taxonomy has been revised and updated to reflect the new diversity uncovered by metagenomics. The methanogenesis discussion has been updated to include the mechanism of flavin-based electron bifurcation.

21 **Chapter 21**—In addition to the ecology and physiology of photosynthetic bacteria, the recently described *Planctomycetes, Verrucomicrobia, Chlamydia* (PVC) superphylum is introduced with an updated review of each of these genera. New information about the Deinococcus radiation response is included.

22 **Chapter 22**—This chapter's coverage includes a discussion of the proteobacterial origin of mitochondria.

23 **Chapter 23**—This overview of Gram-positive bacteria includes firmicutes and actinobacteria. The discussion of the evolutionary aspects of diderm firmicutes is expanded.

24 **Chapter 24**—This chapter introduces protist morphology and diversity, with an emphasis on physiological adaptation and ecology.

25 **Chapter 25**—Fungal diversity is presented within a phylogenetic framework. Morphology, ecology, and reproductive strategies are stressed.

26 **Chapter 26**—Updated discussion of the molecular mechanisms in the bacteriophage T4 life cycle.

27 **Chapter 27**—Important model systems for the exploration of microbial symbioses are presented. Updated discussion of *Wolbachia*-infected insects.

Part Six —

28 **Chapter 28**—The description of each nutrient cycle is accompanied by a "student-friendly" figure that distinguishes between reductive and oxidative reactions. Updated coverage of the role of biogeochemical cycling in global climate change.

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29 **Chapter 29**—This chapter continues to emphasize culture-based techniques as the "gold standard" and reviews culture-independent approaches such as mass spectrometry in the identification of microbial taxa as well as metatranscriptomics and metaproteomics in the study of community activity.

30 **Chapter 30**—Updated discussion of the role of marine microbes in the global carbon budget as well as an update on subsurface microbes.

31 **Chapter 31**—New coverage of the microbial ecology of the phyllosphere, rhizoplane, and rhizosphere. Expanded discussion of fungal plant pathogens.

Part Seven —

32 **Chapter 32**—Streamlined and updated, this chapter on innate host resistance provides in-depth coverage of physical and chemical components of the nonspecific host response, followed by an overview of cells, tissues, and organs of the immune system. The chapter concludes with an overview of the molecular mechanisms that drive phagocytosis and inflammation.

33 **Chapter 33**—Updated to enhance linkages between innate and adaptive immune activities. Discussions integrate concepts of cell biology, physiology, and genetics to present the immune system as a unified response having various components. Implications of dysfunctional immune actions are also discussed.

34 **Chapter 34**—This new chapter introduces the establishment of a human microbiome as a developmental process from infancy through adulthood. The importance of the microbiome to host homeostasis is emphasized by discussion of its role in metabolism, immune function, and the gut-brain axis as well as an introduction to the consequences of dysbiosis.

35 **Chapter 35**—This chapter has been reorganized to delineate the development of disease from microbial transmission to host cell damage. Emphasis is placed on the overlap between microbial molecules that facilitate survival and those that act as virulence factors. This chapter is placed after the immunology chapters to stress that the host-parasite relationship is dynamic, with adaptations and responses offered by both host and parasite.

Part Eight —

36 **Chapter 36**—This chapter presents the development of modern epidemiology as an investigative science, emphasizing its role in preventative medicine. The latest epidemiological data from the Centers for Disease Control and Prevention are reported.

37 **Chapter 37**—This chapter has been updated to reflect the technological advances in the modern clinical laboratory. Emphasis is on modern diagnostic testing to identify infectious disease.

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38 **Chapter 38**—Updated and expanded coverage includes viral pathogenesis, common viral infections, and prion-mediated diseases.

39 **Chapter 39**—Updated coverage of bacterial organisms and the ways in which they commonly lead to human disease.

40 **Chapter 40**—Updated and expanded coverage of fungal and protozoal diseases.

Part Nine —

41 **Chapter 41**—The essentials of both food safety and microbial processes involved in food production have been updated.

42 **Chapter 42**—Includes updated coverage of biofuel production (first introduced in chapter 21) and an introduction to synthetic biology.

43 **Chapter 43**—This chapter complements our 21st-century approach to microbiology by emphasizing the importance of clean water and the power of microbial environmental remediation.