

Brief Contents

About the Authors iii

Preface iv

Part One Introduction to Microbiology

- 1 The Evolution of Microorganisms and Microbiology 1
- 2 Microscopy 22
- 3 Bacterial Cell Structure 42
- 4 Archaeal Cell Structure 82
- 5 Eukaryotic Cell Structure 92
- 6 Viruses and Other Acellular Infectious Agents 112

Part Two Microbial Nutrition, Growth, and Control

- 7 Microbial Growth 133
- 8 Control of Microorganisms in the Environment 172
- 9 Antimicrobial Chemotherapy 189

Part Three Microbial Metabolism

- 10 Introduction to Metabolism 210
- 11 Catabolism: Energy Release and Conservation 230
- 12 Anabolism: The Use of Energy in Biosynthesis 266

Part Four Microbial Molecular Biology and Genetics

- 13 Bacterial Genome Replication and Expression 287
- 14 Regulation of Bacterial Cellular Processes 325
- 15 Eukaryotic and Archaeal Genome Replication and Expression 353
- 16 Mechanisms of Genetic Variation 372
- 17 Recombinant DNA Technology 404
- 18 Microbial Genomics 424

Part Five The Diversity of the Microbial World

- 19 Microbial Taxonomy and the Evolution of Diversity 447
- 20 The *Archaea* 469
- 21 The Deinococci, Mollicutes, and Nonproteobacterial Gram-Negative Bacteria 489
- 22 The Proteobacteria 509
- 23 Firmicutes: The Low G + C Gram-Positive Bacteria 542

24 Actinobacteria: The High G + C Gram-Positive Bacteria 555

25 The Protists 568

26 The *Fungi* (*Eumycota*) 588

27 Viruses 604

Part Six Ecology and Symbiosis

- 28 Biogeochemical Cycling and Global Climate Change 632
- 29 Methods in Microbial Ecology 646
- 30 Microorganisms in Marine and Freshwater Ecosystems 660
- 31 Microorganisms in Terrestrial Ecosystems 679
- 32 Microbial Interactions 699

Part Seven Pathogenicity and Host Response

- 33 Innate Host Resistance 723
- 34 Adaptive Immunity 753
- 35 Pathogenicity and Infection 789

Part Eight Microbial Diseases, Detection, and Their Control

- 36 Clinical Microbiology and Immunology 808
- 37 Epidemiology and Public Health Microbiology 830
- 38 Human Diseases Caused by Viruses and Prions 854
- 39 Human Diseases Caused by Bacteria 888
- 40 Human Diseases Caused by Fungi and Protists 932

Part Nine Applied Microbiology

- 41 Microbiology of Food 958
- 42 Biotechnology and Industrial Microbiology 979
- 43 Applied Environmental Microbiology 996

Appendix 1 A Review of the Chemistry of Biological Molecules A-1

Appendix 2 Common Metabolic Pathways A-9

Glossary G-1

Credits C-1

Index I-1