

Brief Contents

1 Biology: The Study of Life 1

Bioskills 20

UNIT 1 THE MOLECULAR ORIGIN AND EVOLUTION OF LIFE 58

- 2 Water and Carbon: The Chemical Basis of Life 58
- 3 Protein Structure and Function 80
- 4 Nucleic Acids and an RNA World 95
- 5 An Introduction to Carbohydrates 109
- 6 Lipids, Membranes, and the First Cells 121

UNIT 2 CELL STRUCTURE AND FUNCTION 146

- 7 Inside the Cell 146
- 8 Energy and Enzymes: An Introduction to Metabolism 175
- 9 Cellular Respiration and Fermentation 193
- 10 Photosynthesis 214
- 11 Cell-Cell Interactions 238
- 12 The Cell Cycle 257

UNIT 3 GENE STRUCTURE AND EXPRESSION 278

- 13 Meiosis 278
- 14 Mendel and the Gene 295
- 15 DNA and the Gene: Synthesis and Repair 322
- 16 How Genes Work 341
- 17 Transcription, RNA Processing, and Translation 354
- 18 Control of Gene Expression in Bacteria 373
- 19 Control of Gene Expression in Eukaryotes 385
- 20 The Molecular Revolution: Biotechnology, Genomics, and New Frontiers 406
- 21 Genes, Development, and Evolution 428

UNIT 4 EVOLUTIONARY PATTERNS AND PROCESSES 448

- 22 Evolution by Natural Selection 448
- 23 Evolutionary Processes 469
- 24 Speciation 493
- 25 Phylogenies and the History of Life 510

UNIT 5 THE DIVERSIFICATION OF LIFE 534

- 26 Bacteria and Archaea 534
- 27 Diversification of Eukaryotes 555
- 28 Green Algae and Land Plants 577
- 29 Fungi 606
- 30 An Introduction to Animals 629
- 31 Protostome Animals 650
- 32 Deuterostome Animals 672
- 33 Viruses 699

UNIT 6 HOW PLANTS WORK 724

- 34 Plant Form and Function 724
- 35 Water and Sugar Transport in Plants 747
- 36 Plant Nutrition 767
- 37 Plant Sensory Systems, Signals, and Responses 785
- 38 Flowering Plant Reproduction and Development 813

UNIT 7 HOW ANIMALS WORK 840

- 39 Animal Form and Function 840
- 40 Water and Electrolyte Balance in Animals 858
- 41 Animal Nutrition 877
- 42 Gas Exchange and Circulation 896
- 43 Animal Nervous Systems 921
- 44 Animal Sensory Systems 944
- 45 Animal Movement 964
- 46 Chemical Signals in Animals 983
- 47 Animal Reproduction and Development 1003
- 48 The Immune System in Animals 1030

UNIT 8 ECOLOGY 1054

- 49 An Introduction to Ecology 1054
- 50 Behavioral Ecology 1076
- 51 Population Ecology 1095
- 52 Community Ecology 1117
- 53 Ecosystems and Global Ecology 1141
- 54 Biodiversity and Conservation Biology 1165