

Brief Contents

Preface xxvii

To the Student xxxiii

Part 1 THE ORGANIZATION OF LIFE 1

- 1 A View of Life 1
- 2 Atoms and Molecules: The Chemical Basis of Life 25
- 3 The Chemistry of Life: Organic Compounds 45
- 4 Organization of the Cell 73
- 5 Biological Membranes 106
- 6 Cell Communication 134

Part 2 ENERGY TRANSFER THROUGH LIVING SYSTEMS 152

- 7 Energy and Metabolism 152
- 8 How Cells Make ATP: Energy-Releasing Pathways 171
- 9 Photosynthesis: Capturing Energy 191

Part 3 THE CONTINUITY OF LIFE: GENETICS 211

- 10 Chromosomes, Mitosis, and Meiosis 211
- 11 The Basic Principles of Heredity 234
- 12 DNA: The Carrier of Genetic Information 260
- 13 Gene Expression 279

- 14 Gene Regulation 304
- 15 DNA Technology and Genomics 322
- 16 The Human Genome 346
- 17 Developmental Genetics 368

Part 4 THE CONTINUITY OF LIFE: EVOLUTION 390

- 18 Introduction to Darwinian Evolution 390
- 19 Evolutionary Change in Populations 412
- 20 Speciation and Macroevolution 428
- 21 The Origin and Evolutionary History of Life 447
- 22 The Evolution of Primates 466

Part 5 THE DIVERSITY OF LIFE 482

- 23 Understanding Diversity: Systematics 482
- 24 Viruses and Prokaryotes 500
- 25 Protists 530
- 26 Kingdom Fungi 555
- 27 The Plant Kingdom: Seedless Plants 581
- 28 The Plant Kingdom: Seed Plants 600
- 29 The Animal Kingdom: An Introduction to Animal Diversity 619
- 30 The Animal Kingdom: The Protostomes 640
- 31 The Animal Kingdom: The Deuterostomes 667

Part 6 **STRUCTURE AND LIFE PROCESSES
IN PLANTS** 698

- 32** Plant Structure, Growth, and
Differentiation 698
- 33** Leaf Structure and Function 715
- 34** Stems and Transport in Vascular Plants 731
- 35** Roots and Mineral Nutrition 748
- 36** Reproduction in Flowering Plants 767
- 37** Plant Growth and Development 789

Part 7 **STRUCTURE AND LIFE PROCESSES
IN ANIMALS** 807

- 38** Animal Structure and Function:
An Introduction 807
- 39** Protection, Support, and Movement 827
- 40** Neural Signaling 845
- 41** Neural Regulation 865
- 42** Sensory Systems 893
- 43** Internal Transport 919
- 44** The Immune System: Internal Defense 944
- 45** Gas Exchange 970
- 46** Processing Food and Nutrition 989
- 47** Osmoregulation and Disposal
of Metabolic Wastes 1011

- 48** Endocrine Regulation 1028
- 49** Reproduction 1051
- 50** Animal Development 1080
- 51** Animal Behavior 1101

Part 8 **THE INTERACTIONS OF LIFE:
ECOLOGY** 1126

- 52** Introduction to Ecology: Population
Ecology 1126
- 53** Community Ecology 1146
- 54** Ecosystems and the Biosphere 1166
- 55** Ecology and the Geography of Life 1189
- 56** Global Environmental Issues 1212

Appendix A Periodic Table of the Elements A-1

Appendix B Classification of Organisms A-2

Appendix C Understanding Biological Terms A-6

Appendix D Abbreviations A-9

Appendix E Answers to Test Your Understanding
Questions A-11

Glossary G-1

Index I-1