

sylvia s. mader

human



biology

seventh edition

Contents

Readings ix

Preface x

CHAPTER 1

A Human Perspective I

- I.1 Biologically Speaking 2
- I.2 The Process of Science 8
- I.3 Science and Social Responsibility 11

PART I

Human Organization 15

CHAPTER 2

Chemistry of Life 15

- 2.1 Elements and Atoms 16
- 2.2 Molecules and Compounds 19
- 2.3 Water and Living Things 21
- 2.4 Molecules of Life 26
- 2.5 Carbohydrates 27
- 2.6 Lipids 29
- 2.7 Proteins 31
- 2.8 Nucleic Acids 35

CHAPTER 3

Cell Structure and Function 41

- 3.1 Cell Size 42
- 3.2 Cellular Organization 44
- 3.3 Cellular Metabolism 54

CHAPTER 4

Organization and Regulation of Body Systems 61

- 4.1 Types of Tissues 62
- 4.2 Body Cavities and Body Membranes 69
- 4.3 Organ Systems 70
- 4.4 Homeostasis 74

PART II

Maintenance of the Human Body 81

CHAPTER 5

Digestive System and Nutrition 81

- 5.1 The Digestive System 82
- 5.2 Three Accessory Organs 90
- 5.3 Digestive Enzymes 92
- 5.4 Homeostasis 95
- 5.5 Nutrition 95

CHAPTER 6

Composition and Function of the Blood 109

- 6.1 The Red Blood Cells 111
- 6.2 The White Blood Cells 115
- 6.3 Blood Clotting 116
- 6.4 Plasma 118
- 6.5 Capillary Exchange 118
- 6.6 Blood Typing 120

CHAPTER 7

Cardiovascular System 125

- 7.1 The Blood Vessels 126
- 7.2 The Heart 128
- 7.3 Features of the Cardiovascular System 132
- 7.4 The Vascular Pathways 134
- 7.5 Cardiovascular Disorders 137
- 7.6 Homeostasis 139

CHAPTER 8

Lymphatic and Immune Systems 145

- 8.1 Lymphatic System 146
- 8.2 Nonspecific Defenses 148
- 8.3 Specific Defenses 150
- 8.4 Induced Immunity 156
- 8.5 Immunity Side Effects 158
- 8.6 Homeostasis 160

CHAPTER 9

Respiratory System 165

- 9.1 Respiratory Tract 166
- 9.2 Mechanism of Breathing 170
- 9.3 Gas Exchanges in the Body 174
- 9.4 Respiration and Health 177
- 9.5 Homeostasis 184

CHAPTER 10

Urinary System and Excretion 187

- 10.1 Urinary System 188
- 10.2 Kidneys 191
- 10.3 Urine Formation 195
- 10.4 Maintaining Water-Salt Balance 196
- 10.5 Maintaining Acid-Base Balance 199
- 10.6 Homeostasis 199
- 10.7 Problems with Kidney Function 200

PART III

Movement and Support in Humans 205

CHAPTER 11

Skeletal System 205

- 11.1 Tissues of the Skeletal System 206
- 11.2 Bone Growth and Repair 208
- 11.3 Bones of the Skeleton 211
- 11.4 Articulations 218
- 11.5 Homeostasis 220

CHAPTER 12

Muscular System 225

- 12.1 Skeletal Muscles 226
- 12.2 Mechanism of Muscle Fiber Contraction 231
- 12.3 Whole Muscle Contraction 234
- 12.4 Energy for Muscle Contraction 236
- 12.5 Homeostasis 240

PART IV

Integration and Coordination in Humans 245

CHAPTER 13

Nervous System 245

- 13.1 Nervous Tissue 246
- 13.2 The Central Nervous System 252
- 13.3 The Limbic System and Higher Mental Functions 257
- 13.4 The Peripheral Nervous System 260
- 13.5 Drug Abuse 264
- 13.6 Homeostasis 266

CHAPTER 14

Senses 271

- 14.1 Sensory Receptors and Sensations 272
- 14.2 Proprioceptors and Cutaneous Receptors 274
- 14.3 Chemical Senses 276
- 14.4 Sense of Vision 278
- 14.5 Sense of Hearing 284
- 14.6 Sense of Equilibrium 287

CHAPTER 15

Endocrine System 293

- 15.1 Endocrine Glands 294
- 15.2 Hypothalamus and Pituitary Gland 296
- 15.3 Thyroid and Parathyroid Glands 299
- 15.4 Adrenal Glands 301
- 15.5 Pancreas 304
- 15.6 Other Endocrine Glands 306
- 15.7 Chemical Signals 309

PART V

Reproduction in Humans 317

CHAPTER 16

Reproductive System 317

- 16.1 Male Reproductive System 318
- 16.2 Female Reproductive System 322
- 16.3 Female Hormone Levels 325
- 16.4 Control of Reproduction 329
- 16.5 Homeostasis 333

CHAPTER 17

Sexually Transmitted Diseases 339

- 17.1 Viral Infectious Diseases 340
- 17.2 Bacterial Infectious Diseases 345
- 17.3 Other Infectious Diseases 351

AIDS Supplement 355

- S.1 Origin and Scope of the AIDS Pandemic 356
- S.2 Phases of an HIV Infection 358
- S.3 Treatment for HIV 360

CHAPTER 18

Development and Aging 363

- 18.1 Fertilization 364
- 18.2 Development Before Birth 366
- 18.3 Development of Male and Female Sex Organs 374
- 18.4 Birth 376
- 18.5 Development After Birth 378

PART VI

Human Genetics 385

CHAPTER 19

Chromosomal Inheritance 385

19.1 Human Life Cycle 386

19.2 Mitosis 387

19.3 Meiosis 390

19.4 Chromosomal Inheritance 395

CHAPTER 20

Genes and Medical
Genetics 403

20.1 Genotype and Phenotype 404

20.2 Dominant/Recessive Traits 405

20.3 Beyond Simple Inheritance
Patterns 411

20.4 Sex-Linked Traits 414

CHAPTER 21

DNA and Biotechnology 421

21.1 DNA and RNA Structure and
Function 422

21.2 Gene Expression 426

21.3 Biotechnology 432

CHAPTER 22

Cancer 443

22.1 Cancer Cells 444

22.2 Origin of Cancer 446

22.3 Causes of Cancer 448

22.4 Diagnosis and Treatment 450

PART VII

Human Evolution and
Ecology 461

CHAPTER 23

Human Evolution 461

23.1 Origin of Life 462

23.2 Biological Evolution 463

23.3 Humans Are Primates 466

23.4 Evolution of Australopithecines 468

23.5 Evolution of Humans 469

CHAPTER 24

Ecosystems and Human
Interferences 477

24.1 The Nature of Ecosystems 478

24.2 Energy Flow and Chemical
Cycling 481

24.3 Global Biogeochemical Cycles 484

CHAPTER 25

Conservation of
Biodiversity 497

25.1 Conservation Biology and Biodiversity
498

25.2 Value of Biodiversity 500

25.3 Causes of Extinction 504

25.4 Conservation Techniques 508

Appendix A-1

Glossary G-1

Credits C-1

Index I-1