

CONTENTS

PREVIEW

Foundations for Success 1

- P.1 Introduction 2
- P.2 Strategies for Your Success 2



UNIT 1 LEVELS OF ORGANIZATION

1 Introduction to Human Anatomy and Physiology 9

- 1.1 Introduction 10
- 1.2 Anatomy and Physiology 11
- 1.3 Levels of Organization 12
- 1.4 Characteristics of Life 13
- 1.5 Maintenance of Life 13
- 1.6 Organization of the Human Body 16
- 1.7 Anatomical Terminology 23

REFERENCE PLATES
THE HUMAN ORGANISM 31

2 Chemical Basis of Life 39

- 2.1 Introduction 40
- 2.2 Structure of Matter 40
- 2.3 Chemical Constituents of Cells 49

3 Cells 60

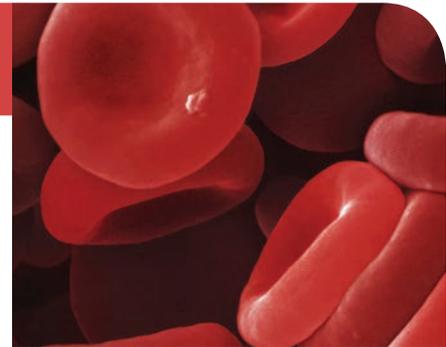
- 3.1 Introduction 61
- 3.2 Composite Cell 61
- 3.3 Movements Through Cell Membranes 70
- 3.4 The Cell Cycle 77

4 Cellular Metabolism 86

- 4.1 Introduction 87
- 4.2 Metabolic Reactions 87
- 4.3 Control of Metabolic Reactions 88
- 4.4 Energy for Metabolic Reactions 90
- 4.5 DNA (Deoxyribonucleic Acid) 94
- 4.6 Protein Synthesis 96

5 Tissues 104

- 5.1 Introduction 105
- 5.2 Epithelial Tissues 105
- 5.3 Connective Tissues 113
- 5.4 Types of Membranes 119
- 5.5 Muscle Tissues 121
- 5.6 Nervous Tissues 122



UNIT 2 SUPPORT AND MOVEMENT

6 Integumentary System 127

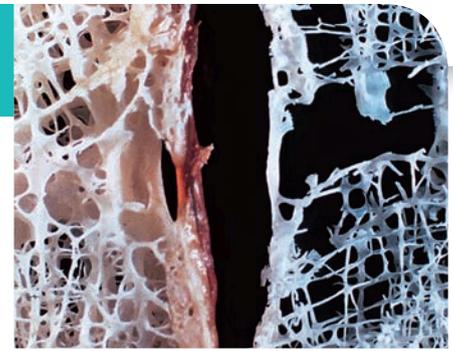
- 6.1 Introduction 128
- 6.2 Skin and Its Tissues 128
- 6.3 Accessory Structures of the Skin 133
- 6.4 Regulation of Body Temperature 135
- 6.5 Healing of Wounds 136

7 Skeletal System 143

- 7.1 Introduction 144
- 7.2 Bone Structure 144

- 7.3 Bone Development and Growth 146
- 7.4 Bone Function 148
- 7.5 Skeletal Organization 153
- 7.6 Skull 155
- 7.7 Vertebral Column 160
- 7.8 Thoracic Cage 164
- 7.9 Pectoral Girdle 164
- 7.10 Upper Limb 166
- 7.11 Pelvic Girdle 168
- 7.12 Lower Limb 172
- 7.13 Joints 174

REFERENCE PLATES
HUMAN SKULL 185



8 Muscular System 188

- 8.1 Introduction 189
- 8.2 Structure of a Skeletal Muscle 189
- 8.3 Skeletal Muscle Contraction 193
- 8.4 Muscular Responses 198
- 8.5 Smooth Muscle 201
- 8.6 Cardiac Muscle 201
- 8.7 Skeletal Muscle Actions 202
- 8.8 Major Skeletal Muscles 204

UNIT 3 INTEGRATION AND COORDINATION

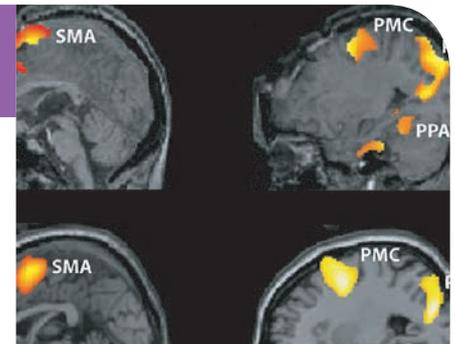
9 Nervous System 223

- 9.1 Introduction 224
- 9.2 General Functions of the Nervous System 225
- 9.3 Neuroglia 226
- 9.4 Neurons 228
- 9.5 The Synapse 232
- 9.6 Cell Membrane Potential 232
- 9.7 Impulse Conduction 236
- 9.8 Synaptic Transmission 239
- 9.9 Impulse Processing 240
- 9.10 Types of Nerves 241
- 9.11 Nerve Pathways 242
- 9.12 Meninges 243
- 9.13 Spinal Cord 245

- 9.14 Brain 247
- 9.15 Peripheral Nervous System 257
- 9.16 Autonomic Nervous System 262

10 The Senses 273

- 10.1 Introduction 274
- 10.2 Receptors, Sensations, and Perception 274
- 10.3 General Senses 275
- 10.4 Special Senses 278
- 10.5 Sense of Smell 278
- 10.6 Sense of Taste 280
- 10.7 Sense of Hearing 282
- 10.8 Sense of Equilibrium 286
- 10.9 Sense of Sight 289



11 Endocrine System 301

- 11.1 Introduction 302
- 11.2 General Characteristics of the Endocrine System 302
- 11.3 Hormone Action 303
- 11.4 Control of Hormonal Secretions 306
- 11.5 Pituitary Gland 307
- 11.6 Thyroid Gland 310
- 11.7 Parathyroid Glands 312
- 11.8 Adrenal Glands 314
- 11.9 Pancreas 317
- 11.10 Other Endocrine Glands 320
- 11.11 Stress and Health 321

UNIT 4 TRANSPORT

12 | Blood 327

- 12.1 Introduction 328
- 12.2 Blood Cells 328
- 12.3 Blood Plasma 336
- 12.4 Hemostasis 339
- 12.5 Blood Groups and Transfusions 342

13 | Cardiovascular System 349

- 13.1 Introduction 350
- 13.2 Structure of the Heart 350

- 13.3 Heart Actions 357
- 13.4 Blood Vessels 363
- 13.5 Blood Pressure 369
- 13.6 Paths of Circulation 373
- 13.7 Arterial System 373
- 13.8 Venous System 377

14 | Lymphatic System and Immunity 386

- 14.1 Introduction 387
- 14.2 Lymphatic Pathways 388
- 14.3 Tissue Fluid and Lymph 389
- 14.4 Lymph Movement 390



- 14.5 Lymphatic Tissues and Lymphatic Organs 391
- 14.6 Body Defenses Against Infection 394
- 14.7 Innate (Nonspecific) Defenses 394
- 14.8 Adaptive (Specific) Defenses, or Immunity 396

UNIT 5 ABSORPTION AND EXCRETION

15 | Digestive System and Nutrition 410

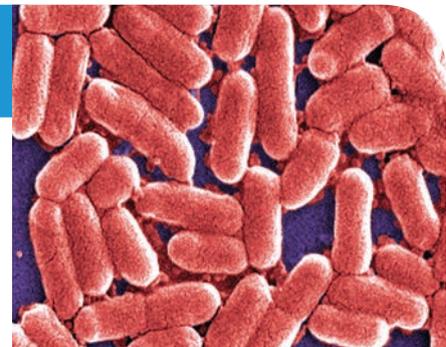
- 15.1 Introduction 411
- 15.2 General Characteristics of the Alimentary Canal 411
- 15.3 Mouth 413
- 15.4 Salivary Glands 418
- 15.5 Pharynx and Esophagus 418
- 15.6 Stomach 420
- 15.7 Pancreas 423
- 15.8 Liver 424
- 15.9 Small Intestine 430
- 15.10 Large Intestine 434
- 15.11 Nutrition and Nutrients 438

16 | Respiratory System 453

- 16.1 Introduction 454
- 16.2 Organs and Associated Structures of the Respiratory System 454
- 16.3 Breathing Mechanism 460
- 16.4 Control of Breathing 468
- 16.5 Alveolar Gas Exchanges 470
- 16.6 Gas Transport 472

17 | Urinary System 479

- 17.1 Introduction 480
- 17.2 Kidneys 480
- 17.3 Urine Formation 485
- 17.4 Urine Elimination 495



18 | Water, Electrolyte, and Acid-Base Balance 502

- 18.1 Introduction 503
- 18.2 Distribution of Body Fluids 503
- 18.3 Water Balance 505
- 18.4 Electrolyte Balance 508
- 18.5 Acid-Base Balance 509
- 18.6 Acid-Base Imbalances 512

UNIT 6

THE HUMAN LIFE CYCLE

19 Reproductive Systems 518

- 19.1 Introduction 519
- 19.2 Organs of the Male Reproductive System 519
- 19.3 Hormonal Control of Male Reproductive Functions 526
- 19.4 Organs of the Female Reproductive System 528
- 19.5 Hormonal Control of Female Reproductive Functions 534
- 19.6 Mammary Glands 538
- 19.7 Birth Control 538
- 19.8 Sexually Transmitted Infections 543

20 Pregnancy, Growth, Development, and Genetics 549

- 20.1 Introduction 550
- 20.2 Fertilization 550
- 20.3 Pregnancy and the Prenatal Period 551
- 20.4 Postnatal Period 566
- 20.5 Aging 567
- 20.6 Genetics 569



- APPENDIX A** Aids to Understanding Words 577
- APPENDIX B** Scientific Method 578
- APPENDIX C** Metric Measurement System and Conversions 579
- APPENDIX D** Periodic Table of Elements 580
- APPENDIX E** Changes During the Cardiac Cycle 581
- APPENDIX F** Figure Question Answers 582
- Glossary 583
- Credits 598
- Application Index 600
- Subject Index 602