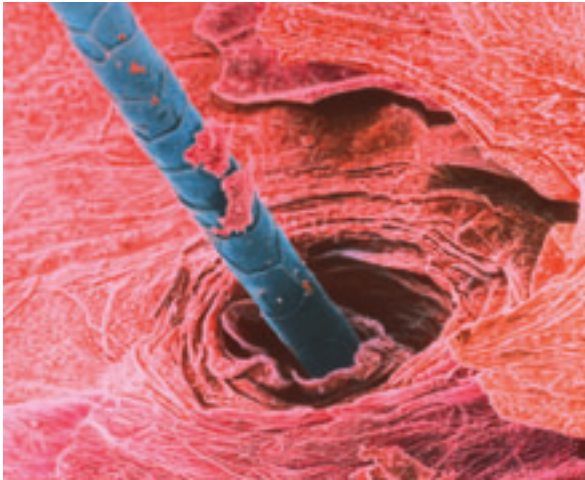


Contents

PART ONE

Organization of the Body



Chapter 1

Major Themes of Anatomy and Physiology 1

- 1.1 The Scope of Anatomy and Physiology 2
 - 1.2 The Origins of Biomedical Science 3
 - 1.3 Scientific Method 7
 - 1.4 Human Origins and Adaptations 9
 - 1.5 Human Structure 12
 - 1.6 Human Function 14
 - 1.7 The Language of Medicine 20
 - 1.8 Review of Major Themes 22
- Chapter Review 25*

Atlas A

General Orientation to Human Anatomy 28

- A.1 General Anatomical Terminology 29
- A.2 Body Regions 31

- A.3 Body Cavities and Membranes 34
 - A.4 Organ Systems 37
 - A.5 A Visual Survey of the Body 37
- Atlas Review 49*

Chapter 2

The Chemistry of Life 51

- 2.1 Atoms, Ions, and Molecules 52
 - 2.2 Water and Mixtures 59
 - 2.3 Energy and Chemical Reactions 65
 - 2.4 Organic Compounds 68
- Chapter Review 84*

Chapter 3

Cellular Form and Function 87

- 3.1 Concepts of Cellular Structure 88
 - 3.2 The Cell Surface 91
 - 3.3 Membrane Transport 100
 - 3.4 The Cell Interior 110
- Chapter Review 120*

Chapter 4

Genetics and Cellular Function 123

- 4.1 DNA and RNA—The Nucleic Acids 124
 - 4.2 Genes and Their Action 129
 - 4.3 DNA Replication and the Cell Cycle 138
 - 4.4 Chromosomes and Heredity 142
- Chapter Review 148*

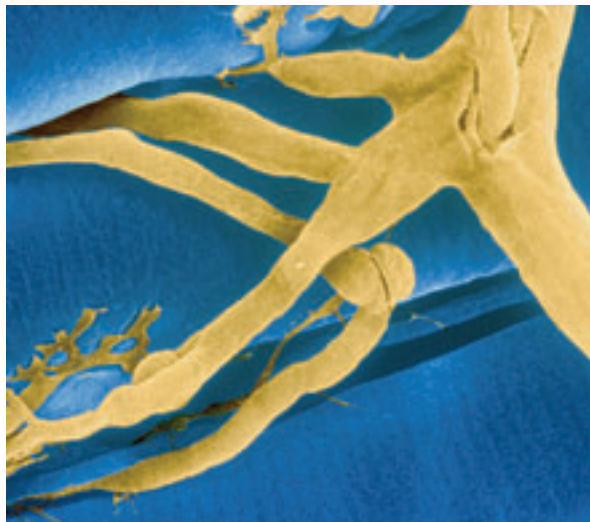
Chapter 5

Histology 151

- 5.1 The Study of Tissues 152
 - 5.2 Epithelial Tissue 154
 - 5.3 Connective Tissue 160
 - 5.4 Nervous and Muscular Tissues—Excitable Tissues 170
 - 5.5 Intercellular Junctions, Glands, and Membranes 173
 - 5.6 Tissue Growth, Development, Repair, and Death 178
- Chapter Review 184*

PART TWO

Support and Movement



Chapter 6

The Integumentary System 187

- 6.1 The Skin and Subcutaneous Tissue 188
- 6.2 Hair and Nails 197

- 6.3 Cutaneous Glands 202
 - 6.4 Skin Disorders 204
- Connective Issues 209*
Chapter Review 210

Chapter 7

Bone Tissue 213

- 7.1 Tissues and Organs of the Skeletal System 214
 - 7.2 Histology of Osseous Tissue 217
 - 7.3 Bone Development 221
 - 7.4 Physiology of Osseous Tissue 227
 - 7.5 Bone Disorders 233
- Connective Issues 237*
Chapter Review 238

Chapter 8

The Skeletal System 241

- 8.1 Overview of the Skeleton 242
 - 8.2 The Skull 244
 - 8.3 The Vertebral Column and Thoracic Cage 258
 - 8.4 The Pectoral Girdle and Upper Limb 267
 - 8.5 The Pelvic Girdle and Lower Limb 273
- Chapter Review 283*

Chapter 9

Joints 285

- 9.1 Joints and Their Classification 286
 - 9.2 Synovial Joints 290
 - 9.3 Anatomy of Selected Diarthroses 305
- Chapter Review 316*

Chapter 10

The Muscular System 319

- 10.1 The Structural and Functional Organization of Muscles 320
- 10.2 Muscles of the Head and Neck 328
- 10.3 Muscles of the Trunk 339
- 10.4 Muscles Acting on the Shoulder and Upper Limb 349
- 10.5 Muscles Acting on the Hip and Lower Limb 366
 - Connective Issues* 382
 - Chapter Review* 383

Atlas B

Surface Anatomy 387

- B.1 The Importance of External Anatomy 388
- B.2 Head and Neck 389
- B.3 Trunk 390
- B.4 Upper Limb 394
- B.5 Lower Limb 396
- B.6 Muscle Test 402

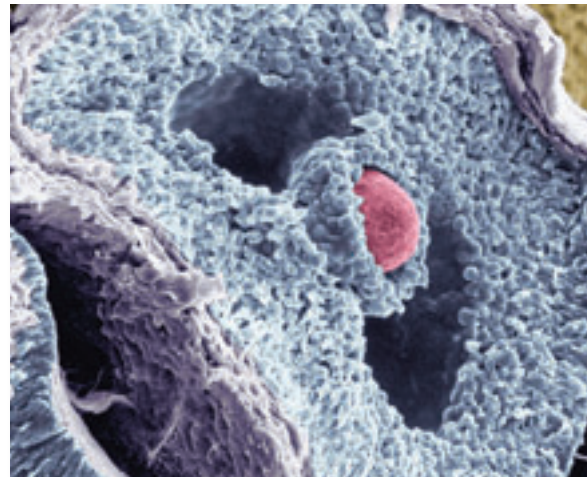
Chapter 11

Muscular Tissue 403

- 11.1 Types and Characteristics of Muscular Tissue 404
- 11.2 Microscopic Anatomy of Skeletal Muscle 405
- 11.3 The Nerve–Muscle Relationship 410
- 11.4 Behavior of Skeletal Muscle Fibers 414
- 11.5 Behavior of Whole Muscles 420
- 11.6 Muscle Metabolism 425
- 11.7 Cardiac and Smooth Muscle 430
 - Chapter Review* 437

PART THREE

Integration and Control



Chapter 12

Nervous Tissue 441

- 12.1 Overview of the Nervous System 442
- 12.2 Properties of Neurons 443
- 12.3 Supportive Cells (Neuroglia) 448
- 12.4 Electrophysiology of Neurons 453
- 12.5 Synapses 462
- 12.6 Neural Integration 467
 - Connective Issues* 476
 - Chapter Review* 477

Chapter 13

The Spinal Cord, Spinal Nerves, and Somatic Reflexes 481

- 13.1 The Spinal Cord 482
- 13.2 The Spinal Nerves 490

- 13.3 Somatic Reflexes 503
Chapter Review 511

Chapter 14

The Brain and Cranial Nerves 514

- 14.1 Overview of the Brain 515
14.2 Meninges, Ventricles, Cerebrospinal Fluid, and Blood Supply 520
14.3 The Hindbrain and Midbrain 524
14.4 The Forebrain 531
14.5 Integrative Functions of the Brain 538
14.6 The Cranial Nerves 549
Chapter Review 561

Chapter 15

The Autonomic Nervous System and Visceral Reflexes 565

- 15.1 General Properties of the Autonomic Nervous System 566
15.2 Anatomy of the Autonomic Nervous System 569
15.3 Autonomic Effects on Target Organs 576
15.4 Central Control of Autonomic Function 581
Chapter Review 583

Chapter 16

Sense Organs 586

- 16.1 Properties and Types of Sensory Receptors 587
16.2 The General Senses 589
16.3 The Chemical Senses 595
16.4 Hearing and Equilibrium 600
16.5 Vision 614
Chapter Review 633

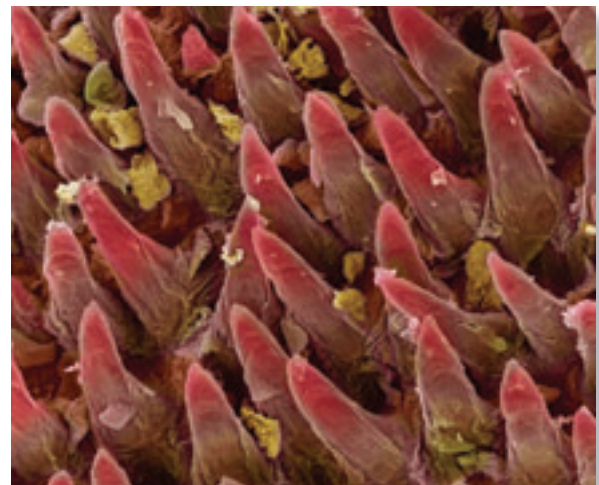
Chapter 17

The Endocrine System 637

- 17.1 Overview of the Endocrine System 638
17.2 The Hypothalamus and Pituitary Gland 641
17.3 Other Endocrine Glands 649
17.4 Hormones and Their Actions 659
17.5 Stress and Adaptation 669
17.6 Eicosanoids and Paracrine Signaling 670
17.7 Endocrine Disorders 671
Connective Issues 678
Chapter Review 679

PART FOUR

Regulation and Maintenance



Chapter 18

The Circulatory System: Blood 683

- 18.1 Introduction 684
18.2 Erythrocytes 689
18.3 Blood Types 696

- 18.4 Leukocytes 700
- 18.5 Platelets and Hemostasis—The Control of Bleeding 707
- Chapter Review 716*

Chapter 19

The Circulatory System: The Heart 719

- 19.1 Overview of the Cardiovascular System 720
- 19.2 Gross Anatomy of the Heart 722
- 19.3 Cardiac Muscle and the Cardiac Conduction System 730
- 19.4 Electrical and Contractile Activity of the Heart 733
- 19.5 Blood Flow, Heart Sounds, and the Cardiac Cycle 739
- 19.6 Cardiac Output 745
- Chapter Review 751*

Chapter 20

The Circulatory System: Blood Vessels and Circulation 755

- 20.1 General Anatomy of the Blood Vessels 756
- 20.2 Blood Pressure, Resistance, and Flow 764
- 20.3 Capillary Exchange 771
- 20.4 Venous Return and Circulatory Shock 774
- 20.5 Special Circulatory Routes 777
- 20.6 Anatomy of the Pulmonary Circuit 778
- 20.7 Systemic Vessels of the Axial Region 779
- 20.8 Systemic Vessels of the Appendicular Region 798
- Connective Issues 809*
- Chapter Review 810*

Chapter 21

The Lymphatic and Immune Systems 815

- 21.1 The Lymphatic System 816
- 21.2 Nonspecific Resistance 829

- 21.3 General Aspects of Specific Immunity 837
- 21.4 Cellular Immunity 841
- 21.5 Humoral Immunity 844
- 21.6 Immune System Disorders 850
- Connective Issues 857*
- Chapter Review 858*

Chapter 22

The Respiratory System 863

- 22.1 Anatomy of the Respiratory System 864
- 22.2 Pulmonary Ventilation 875
- 22.3 Gas Exchange and Transport 886
- 22.4 Respiratory Disorders 896
- Connective Issues 900*
- Chapter Review 901*

Chapter 23

The Urinary System 905

- 23.1 Functions of the Urinary System 906
- 23.2 Anatomy of the Kidney 908
- 23.3 Urine Formation I: Glomerular Filtration 914
- 23.4 Urine Formation II: Tubular Reabsorption and Secretion 920
- 23.5 Urine Formation III: Water Conservation 925
- 23.6 Urine and Renal Function Tests 928
- 23.7 Urine Storage and Elimination 931
- Connective Issues 937*
- Chapter Review 938*

Chapter 24

Water, Electrolyte, and Acid-Base Balance 942

- 24.1 Water Balance 943
- 24.2 Electrolyte Balance 949
- 24.3 Acid-Base Balance 954
- Chapter Review 962*

Chapter 25

The Digestive System 965

- 25.1 General Anatomy and Digestive Processes 966
- 25.2 The Mouth Through Esophagus 970
- 25.3 The Stomach 977
- 25.4 The Liver, Gallbladder, and Pancreas 986
- 25.5 The Small Intestine 992
- 25.6 Chemical Digestion and Absorption 996
- 25.7 The Large Intestine 1002
 - Connective Issues 1008*
 - Chapter Review 1009*

Chapter 26

Nutrition and Metabolism 1013

- 26.1 Nutrition 1014
- 26.2 Carbohydrate Metabolism 1025
- 26.3 Lipid and Protein Metabolism 1033
- 26.4 Metabolic States and Metabolic Rate 1036
- 26.5 Body Heat and Thermoregulation 1038
 - Chapter Review 1043*

PART FIVE

Reproduction and Development



Chapter 27

The Male Reproductive System 1047

- 27.1 Sexual Reproduction and Development 1048
- 27.2 Male Reproductive Anatomy 1053
- 27.3 Puberty and Climacteric 1060
- 27.4 Sperm and Semen 1063
- 27.5 Male Sexual Response 1068
 - Chapter Review 1073*

Chapter 28

The Female Reproductive System 1077

- 28.1 Reproductive Anatomy 1078
- 28.2 Puberty and Menopause 1088
- 28.3 Oogenesis and the Sexual Cycle 1089
- 28.4 Female Sexual Response 1097
- 28.5 Pregnancy and Childbirth 1099
- 28.6 Lactation 1106
 - Connective Issues 1111*
 - Chapter Review 1112*

Chapter 29

Human Development 1117

- 29.1 Fertilization and the Preembryonic Stage 1118
- 29.2 The Embryonic and Fetal Stages 1124
- 29.3 The Neonate 1134
- 29.4 Aging and Senescence 1139
 - Chapter Review 1149*

Appendix A: Changes in Terminology in the Fifth Edition A-1

Appendix B: Answer Keys A-2

Appendix C: Periodic Table of the Elements A-11

Appendix D: Symbols, Weights, and Measures A-12

Appendix E: Biomedical Abbreviations A-13

Glossary G-1

Credits C-1

Index I-1