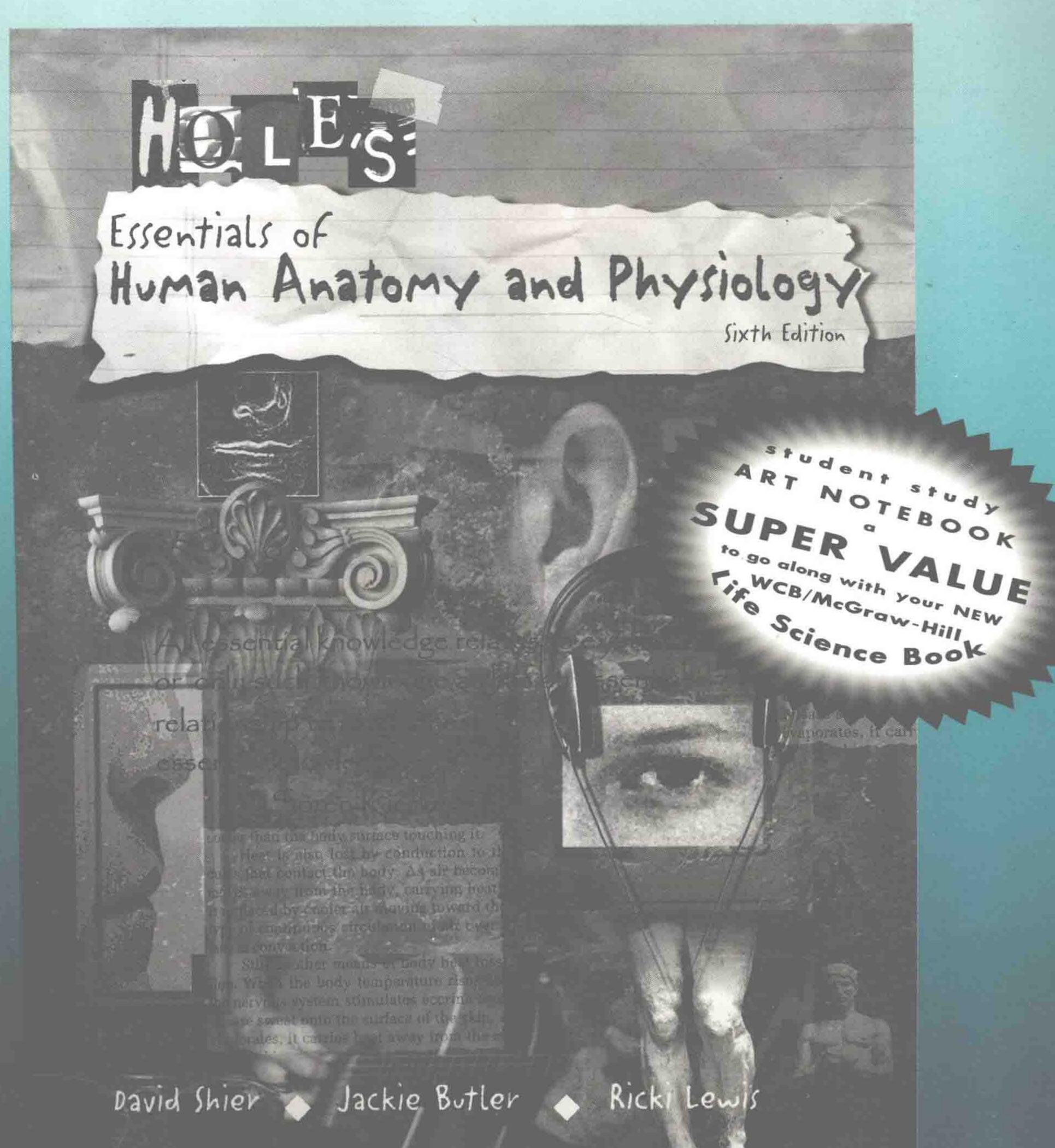
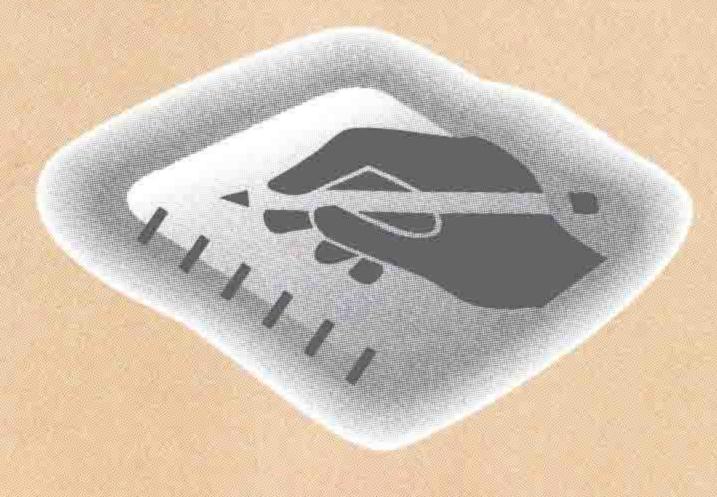
student study ART NOTEBOOK



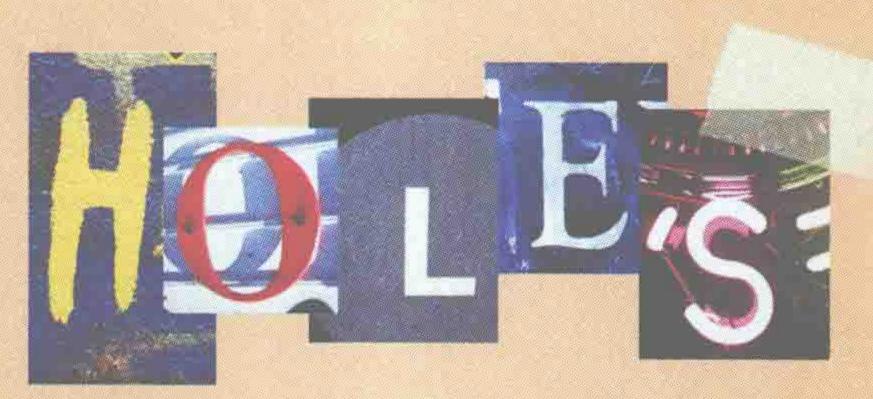


WCB McGraw-Hill

ART NOTEBOOK



to accompany



Essentials of Human Anatomy and Physiology Sixth Edition

David Shier

Jackie Butler

Ricki Lewis



WCB/McGraw-Hill

A Division of The McGraw-Hill Companies

The McGraw-Hill Companies Higher Education Group A Division of The McGraw-Hill Companies

Student Study Art Notebook to accompany Shier et al, Hole's Essentials of Human Anatomy and Physiology, 6e.

Copyright © 1998 by The McGraw-Hill Companies, Inc. All rights reserved.

Printed in the United States of America.

No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the publisher.

This book is printed on recycled paper.

34567890QPDQPD9098

ISBN 0-697-32919-4

TO THE STUDENT

The Student Study Art Notebook is designed to help you in your study of human anatomy and physiology. The notebook contains art reproduced from the textbook. Each figure also corresponds to one of the 250 overhead transparencies; thus you can take notes during lectures, or jot down comments as you are reading through the chapters.

The notebook is perforated and 3-hole punched, so if you wish, you can remove sheets and put them in a binder with other study or lecture notes. Any blank pages at the end of this notebook can be used for additional notes or drawings.

We hope this notebook, used along with your text, helps to make the study of the human body easier for you.

DIRECTORY OF NOTEBOOK FIGURES

TO ACCOMPANY

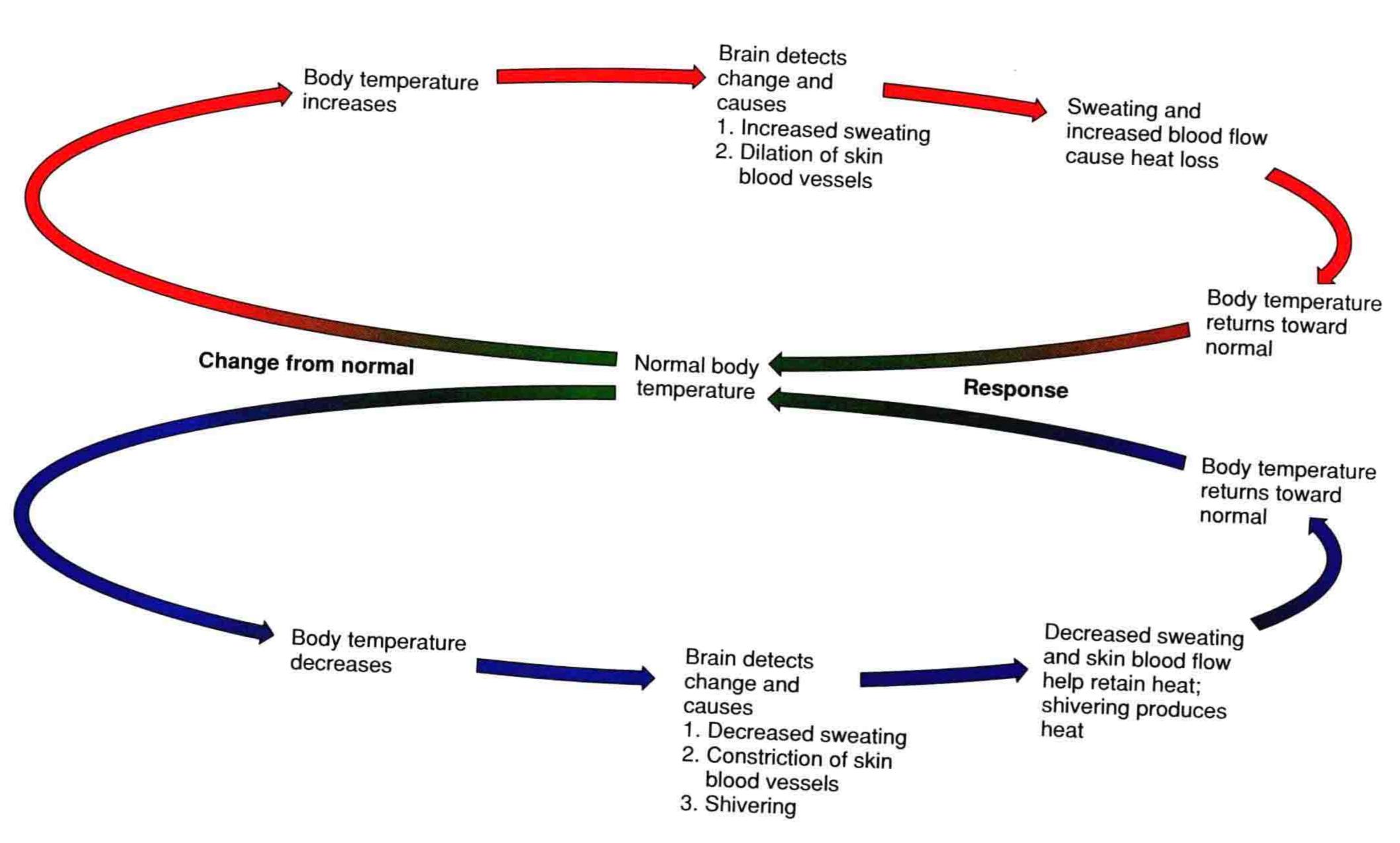
SHIER/BUTLER/LEWIS

HOLE'S ESSENTIALS OF HUMAN ANATOMY AND PHYSIOLOGY, 6E.

Chapter 1		Chapter 5	
Homeostatic Mechanism Figure 1.4	1	Types of Exocrine Glands Figure 5.7	24
Hierarchy of Organization Figure 1.5	2	Chapter 6	
Body Cavities (Interal) Figure 1.6a	3	Skin Section Figure 6.1	24
Body Cavities (frontal) Figure 1.6b Body Planes Figure 1.10	4	A Melanocyte Figure 6.3	25
Body Regions Figure 1.13	5	Hair Follicle Figure 6.4a	25
	_	Integumentary System	
Chapter 2	•	ORGANIZATION Chapter 6	26
Organization of an Atom Figure 2.1	6	Chapter 7	
Ionic Bond Figure 2.4 Covalent Bond Figure 2.5	6 7	Structure Of A Long Bone Figure 7.1	27
pH Values of Common Substances	,	Compact Bone Figure 7.3	28
Figure 2.10	7	Development of an Endochondral Bone	
Structure of Glucose Figure 2.11	8	Figure 7.5	29
Structure of a Triglyceride Figure 2.13	8	Fracture Repair Box 7A	30
Structure of an Amino Acid Figure 2.14	9	Limb and Lever Figure 7.6 Human Skeleton, Anterior and Posterior	31
Secondary Structure of a Protein	0	Figure 7.7	32
Figure 2.16a Tertiary Structure of a Protein Figure 2.17	a	Human Skull, Anterior View Figure 7.8	33
	3	Human Skull, Lateral View Figure 7.10	34
Chapter 3		Human Skull, Inferior View Figure 7.11	35
Composite Cell Figure 3.2	10	Floor of Cranial Cavity Figure 7.12	36
Cell Membrane Figure 3.3	11	Human Skull, Sagittal Section Figure 7.13	37
Cellular Secretion Figure 3.5 Facilitated Diffusion Figure 3.13	12	Infantile Skull Figure 7.14 Vertebral Column Figure 7.15	38 39
Osmosis Figure 3.14	12	Types of Vertebrae Figure 7.16	40
Active Transport Figure 3.16	13	Atlas and Axis Figure 7.17	41
Phagocytosis Figure 3.17	13	Thoracic Cage Figure 7.19	42
Mitosis Figure 3.18	14	Pectoral Girdle Figure 7.20	43
Cellular Differentiation Figure 3.20	15	Humerus, Posterior and Anterior	4.4
Chapter 4		Figure 7.23 Forearm Bones Figure 7.24	44 45
Dehydration Synthesis Forms Disaccharide		Hand Figure 7.25	46
Figure 4.1	16	Pelvic Girdle, Female and Male	
Dehydration Synthesis Forms Fat Figure 4.2	16	Figure 7.26	47
Dehydration Synthesis Forms Dipeptide	10	Thigh Figure 7.29	48
Figure 4.3 Enzyme-Substrate Interaction Figure 4.4	16 17	Leg Bones Figure 7.30	49
Overview of Cellular Metabolism Figure 4.5	17	Foot Figure 7.32	50
ATP Figure 4.6	18	Synovial Joint Figure 7.34 Knee Joint Figure 7.35	50 51
Aerobic Respiration Figure 4.8	18	Shoulder Joint Figure 7.36	51
Base-Pairing of DNA Bases Figure 4.12	19	Hip Joint Figure 7.37	52
Portion of a DNA Double Helix Figure 4.13	19	Elbow Joint Figure 7.38	52
Base-Pairing of DNA and RNA Bases	20	Joint Movements Figure 7.39	53
Figure 4.15 Transcription and Translation Figure 4.17	20 21	Joint Movements II Figure 7.40	54
Protein Synthesis Figure 4.18	22	Joint Movements III Figure 7.41	55
DNA Replication Figure 4.19	23	Chapter 8	
		Skeletal Muscle Structure Figure 8.1	56

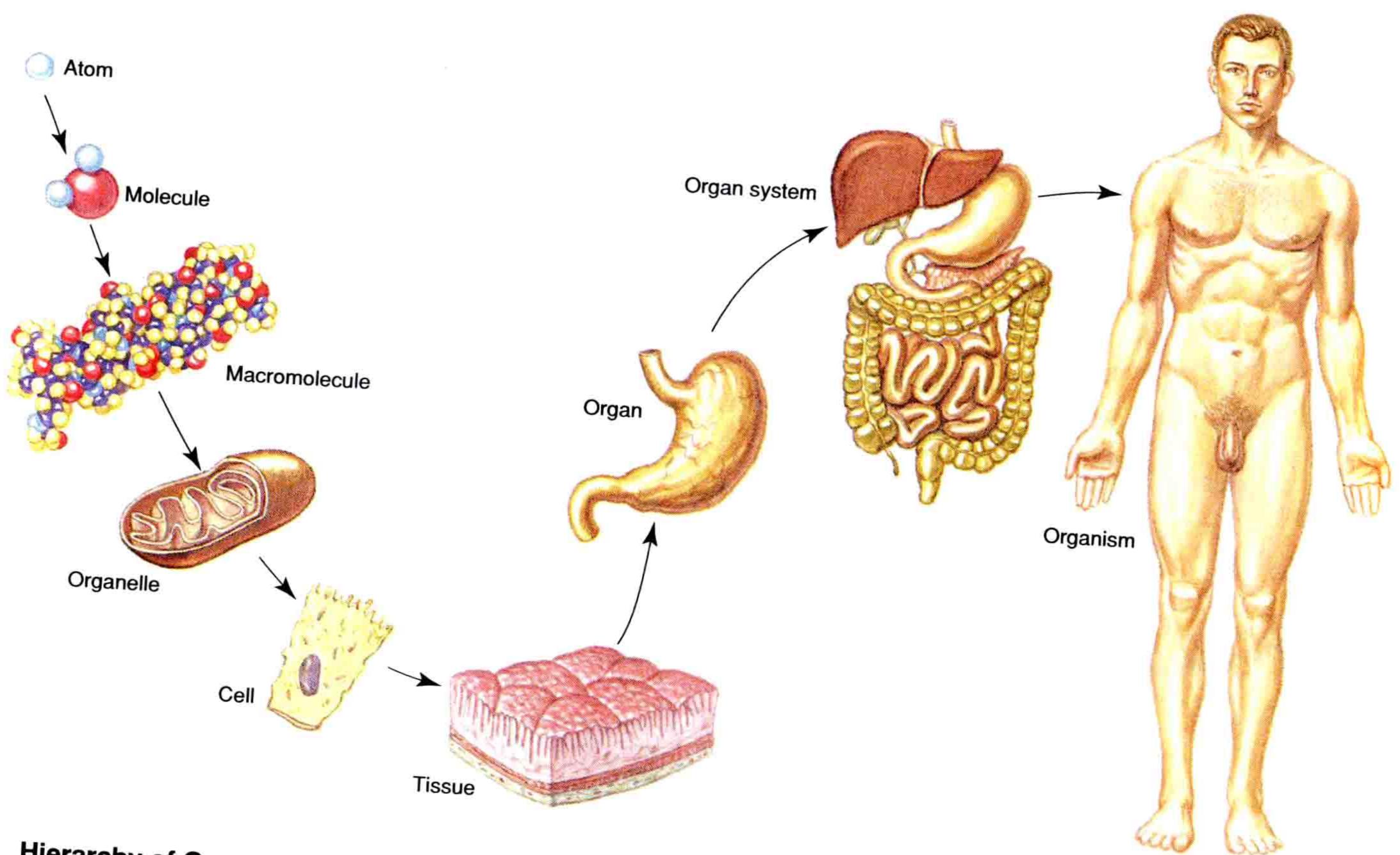
Skeletal Muscle Fiber I Figure 8.2 Skeletal Muscle Fiber II Figure 8.4 Neuromuscular Junction Figure 8.5 Sliding Filament Theory Figure 8.7 Contraction of a Sarcomere Figure 8.8 Muscle Metabolism Figure 8.10 Muscle Fiber Contraction Figure 8.12 Origin and Insertion Figure 8.13	57 58 59 60 61 61 62	Somatic and Autonomic Nerve Pathways Figure 9.32 Sympathetic Nervous System Figure 9.33 Parasympathetic Nervous System Figure 9.34 Nervous System ORGANIZATION Chapter 9 Chapter 10	93 94 95
Skeletal Muscles Anterior Figure 8.14 Skeletal Muscles Posterior Figure 8.15 Muscles of Expression, Mastication and Head Movements Figure 8.16a,b Muscles of the Posterior Shoulder Figure 8.17 Muscles of the Anterior Chest and Abdominal Wall Figure 8.18 Muscles of the Scapula and Arm Figure 8.19 Muscles of the Anterior Shoulder and Arm Figure 8.20 Muscles of the Anterior Forearm	62 64 65 66 67	Referred Pain Pathway Figure 10.3 Olfactory Receptors Figure 10.4 Taste Receptors Figure 10.5 Major Parts of the Ear Figure 10.7 Inner Ear Structure Figure 10.9 Organ of Corti Figure 10.10 Static Equilibrium Figure 10.12 Dynamic Equilibrium Figure 10.14 Extrinsic Muscles of the Eye Figure 10.17 Eye, Transverse Section Figure 10.18 Retina Figure 10.22	97 99 100 101 102 103 104 106 107
Figure 8.21 Muscles of the Posterior Forearm Figure 8.22 Muscles of the Pelvic Outlet Figure 8.23 Muscles of the Anterior Thigh Figure 8.24 Muscles of the Lateral Thigh Figure 8.25 Muscles of the Posterior Thigh Figure 8.26 Muscles of the Anterior Leg Figure 8.27 Muscles of the Lateral Leg Figure 8.28 Muscles of the Posterior Leg Figure 8.29 Muscles of the Posterior Leg Figure 8.29 Muscular System ORGANIZATION Chapter 8	68 69 70 70 71 71 72	Chapter 11 Major Endocrine Glands Figure 11.1 Mechanism of Steroid Hormone Action Figure 11.2 Mechanism of Non-Steroid Hormone Action Figure 11.3 Anterior and Posterior Pituitary Glands Figure 11.4 Control of Thyroid Hormone Figure 11.8 Control of Insulin and Glucagon Figure 11.16 Endocrine System ORGANIZATION Chapter 11	108 109 110 111 112
Chapter 9 A Common Neuron Figure 9.2 Schwann Cell Figure 9.3 Types of Neurons Figure 9.4 Neuroglial Cells Figure 9.5 Establishment of the Resting Potential Figure 9.7 Action Potential Figure 9.8 Impulse Conduction Figure 9.9 Synaptic Knob and Synaptic Cleft Figure 9.11	74 75 75 76 77 78 79	Chapter 12 Stimulation of Red Blood Cell Production Figure 12.3 Blood Cell Development Figure 12.4 Life Cycle of Red Blood Cell Figure 12.5 Platelet Plug Formation Figure 12.12 Hemostasis Figure 12.15 ABO Blood Types Figure 12.16 ABO Blood Reactions Figure 12.17 Rh Factor Figure 12.18	114 115 116 117 118 119
Knee-Jerk Reflex Figure 9.15 Withdrawal Reflex Figure 9.16 Meninges I Figure 9.17 Meninges II Figure 9.18 Ascending Tracts Figure 9.21 Descending Tracts Figure 9.22 The Brain Figure 9.23 Sensory, Motor and Association Areas Figure 9.24 Ventricles of the Brain Figure 9.26 Cerebrospinal Fluid Circulation Figure 9.27 Cranial Nerves Figure 9.30 Spinal Nerves Figure 9.31	81 82 83 84 85 86 87 88 89 90 91 92	Chapter 13 The Heart Figure 13.2 Wall of the Heart Figure 13.3 The Heart, Coronal Sections Figure 13.4 Blood Flow to and from the Heart Figure 13.7 The Heart and Coronary Vessels Figure 13.9 Atrial Systole and Diastole Figure 13.10 Graph of Cardiac Cycle, Left Ventricle Changes Figure 13.11 Cardiac Conduction System Figure 13.12 Normal ECG Pattern Figure 13.15a,b	120 121 121 122 123 124 125 125

	Autonomic Nerve Impulses to the Heart Figure 13.17 Vessel Wall, Artery and Vein Figure 13.18 Capillary Exchanges Figure 13.22 Branches of the Aorta Figure 13.26 Arteries, Head and Neck Figure 13.27 Cerebral Arteries Figure 13.28 Arteries, Shoulder and Upper Limb Figure 13.29 Major Arteries Figure 13.31 Veins, Head and Neck Figure 13.32 Veins, Shoulder and Upper Limb Figure 13.33 Thoracic Veins Figure 13.34 Abdominal Veins Figure 13.35 Major Veins Figure 13.36	126 127 128 129 130 131 132 133 134 135 136	Carbon Dioxide Transport I Figure 16.21 Carbon Dioxide Transport II Figure 16.22 Respiratory System ORGANIZATION Chapter 16 Chapter 17 Urinary System Figure 17.1 Kidney Structure Figure 17.2 Nephron Structure Figure 17.6 Juxtaglomerular Apparatus Figure 17.7 Glomerular Filtration Figure 17.8 Tubular Reabsorption Figure 17.10 Tubular Secretion Figure 17.12 Urinary Bladder Figure 17.15 Urinary System ORGANIZATION Chapter 17	162 163 164 165 169 169 170 170
	Chapter 14		Chapter 18	
	Lymph Transport Figure 14.1 Lymph Capillaries Figure 14.2 Lymph Drainage Figure 14.4 Lymph Node Figure 14.6 Lymph Node Locations Figure 14.8 The Thymus Figure 14.9a The Spleen Figure 14.10a	137 137 138 139 140 141	Fluid Compartments Figure 18.1 Fluid Movement Figure 18.3 Metabolic Sources of Hydrogen Ions Figure 18.7 Increased Carbon Dioxide Figure 18.8 Buffers, Chemical and Physiological Figure 18.9	172 172 173 173
	B cell and T cell Origins Figure 14.11	142	Chapter 19	
	B cell Activation Figure 14.13 The Complement System Figure 14.14 B cell and T cell Interaction Figure 14.15	143 144 144	Male Reproductive System, Sagittal Figure 19.1	174
	Plasma and Memory Cells Figure 14.16	145	Testis and Seminiferous Tubule Figure 19.2	175
	Chapter 15		Spermatogonia Figure 19.4b	176
	Digestive System Figure 15.1	146 147	Spermatogenesis Figure 19.5 Male Sexual Development Figure 19.6	177 178
	Wall of the Alimentary Canal Figure 15.3 The Mouth Figure 15.5	147	Female Reproductive System, Sagittal	
	Mouth, Nasal Cavity, and Pharynx	4.40	Figure 19.7	179 180
	Figure 15.6 The Teeth Figure 15.8	149 150	Oogenesis Figure 19.8 Ovarian Cycle Figure 19.9	180
	Tooth Section Figure 15.9	150	Female Reproductive System, Frontal	
	The Salivary Glands Figure 15.10	151	Figure 19.11 Menstrual Cycle Figure 19.13	181 182
	The Stomach Figure 15.11 Gastric Juice Secretion Figure 15.14	152 153	The Breast Figure 19.14	183
	The Pancreas Figure 15.15	153	Vasectomy And Tubal Ligation Figure 19.16	184
	Pancreatic Juice Secretion Figure 15.16 The Liver Figure 15.17	154 154	Chapter 20	
	Bile Release Figure 15.21	155	Fertilization Figure 20.2 Early Human Development Figure 20.3	185 186
	Intestinal Villus Figure 15.25 Fatty Acid Absorption Figure 15.27	156 156	Blastocyst Implantation Figure 20.5	187
	The Large Intestine Figure 15.28	157	Hormone Concentration During Pregnancy	407
	Chapter 16		Figure 20.6 Primary Germ Layer Formation Figure 20.7	187 188
	Respiratory System Figure 16.1	158	Embryonic Disk Figure 20.8	188
	Larynx Figure 16.4	158	Chorionic Villi Figure 20.11 The Placenta Figure 20.12	189 189
	Bronchial Tree Figure 16.7 Respiratory Tubes and Alveoli Figure 16.8	159 160	Umbilical Cord Formation Figure 20.13	190
	Lung Volumes Figure 16.14	160	Position of a Full Term Fetus Figure 20.15	190
j	Respiratory Membrane Figure 16.18	161	Fetal Circulation Figure 20.16 Milk Ejection Figure 20.18	191 192
	Alveolar Gas Exchange Figure 16.19 Oxyhemoglobin Figure 16.20	161 162	Changes in Newborn's Circulation	132
			Figure 20.19	192

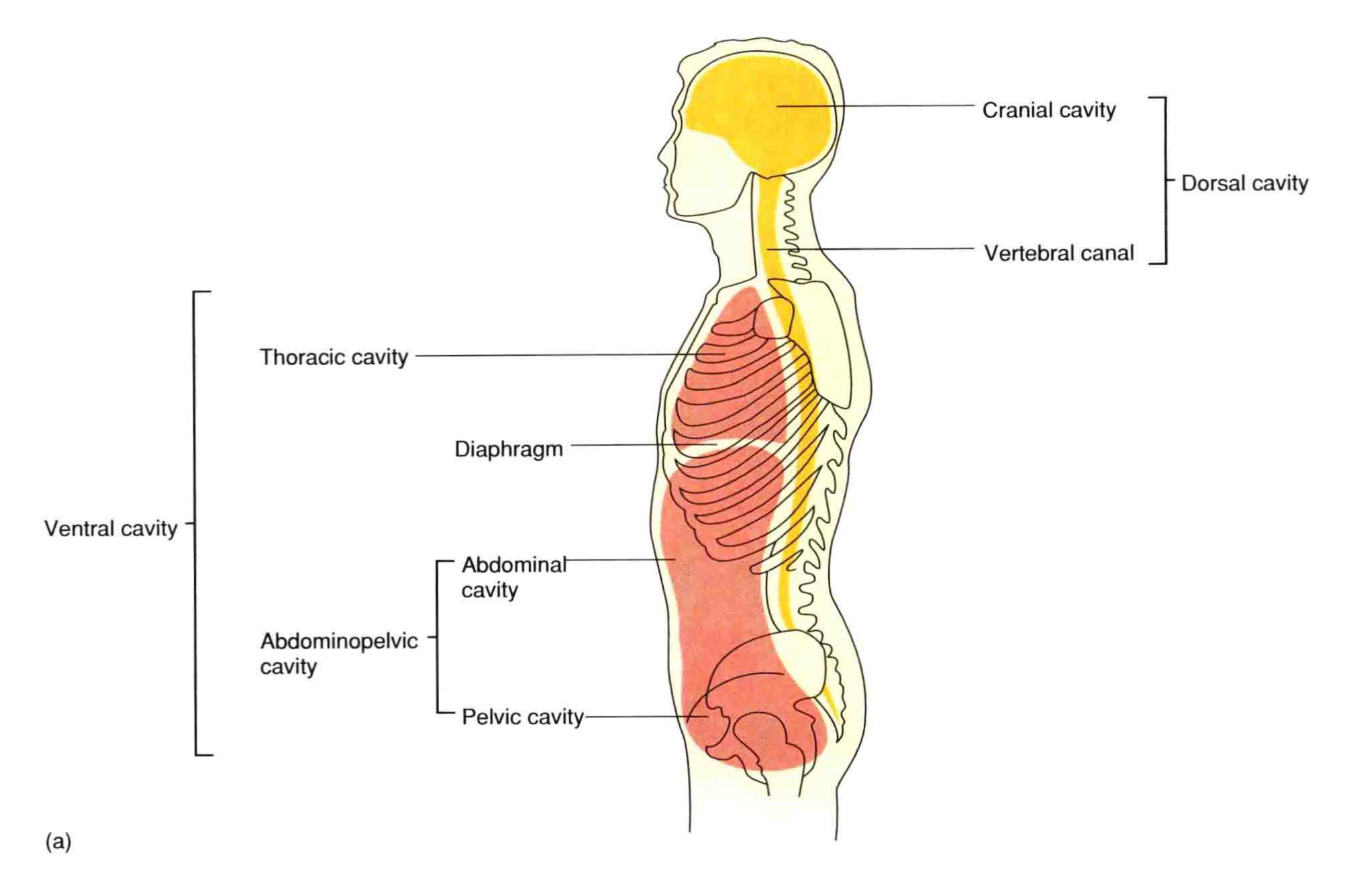


Homeostatic Mechanism

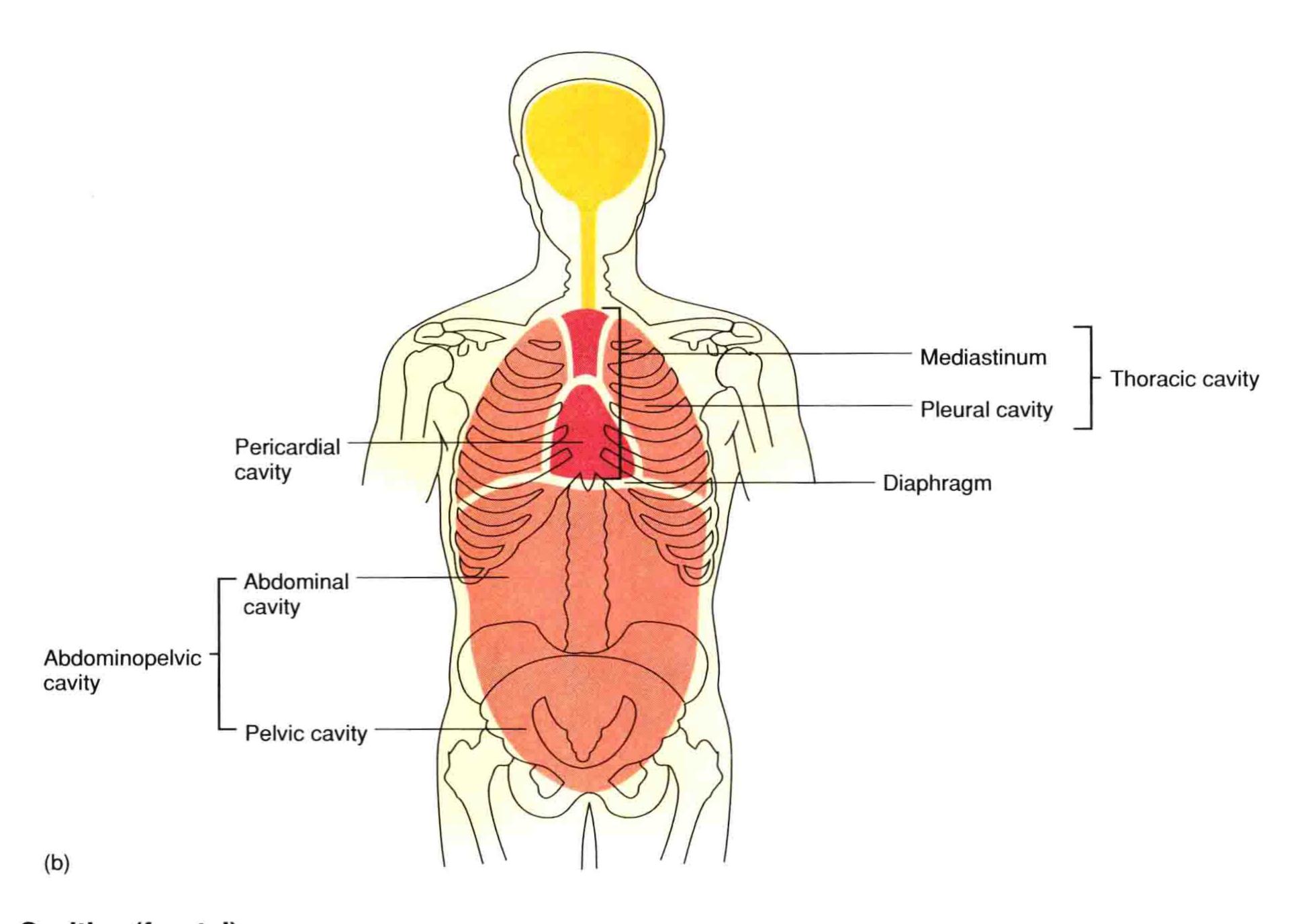
Figure 1.4



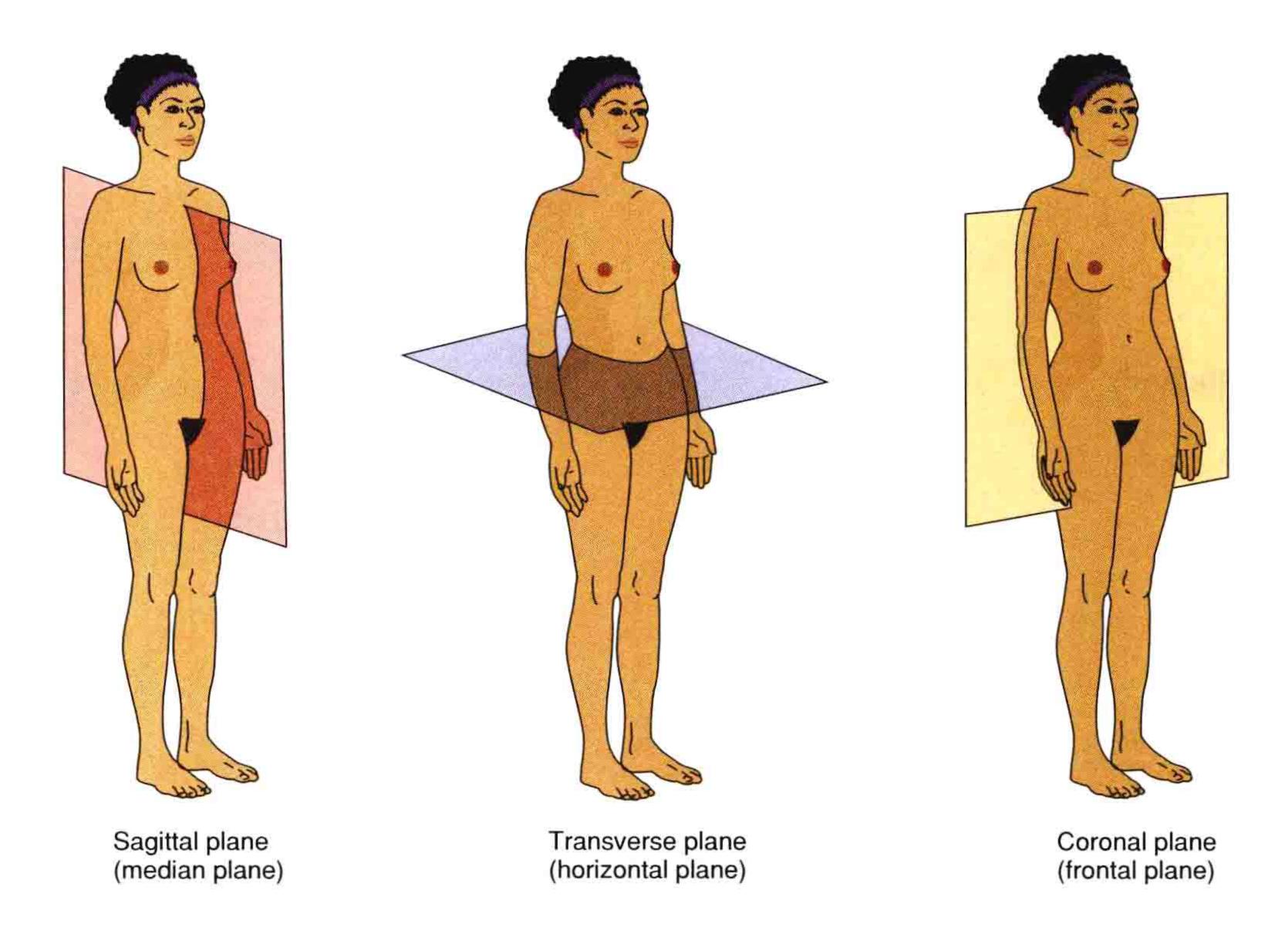
Hierarchy of Organization Figure 1.5



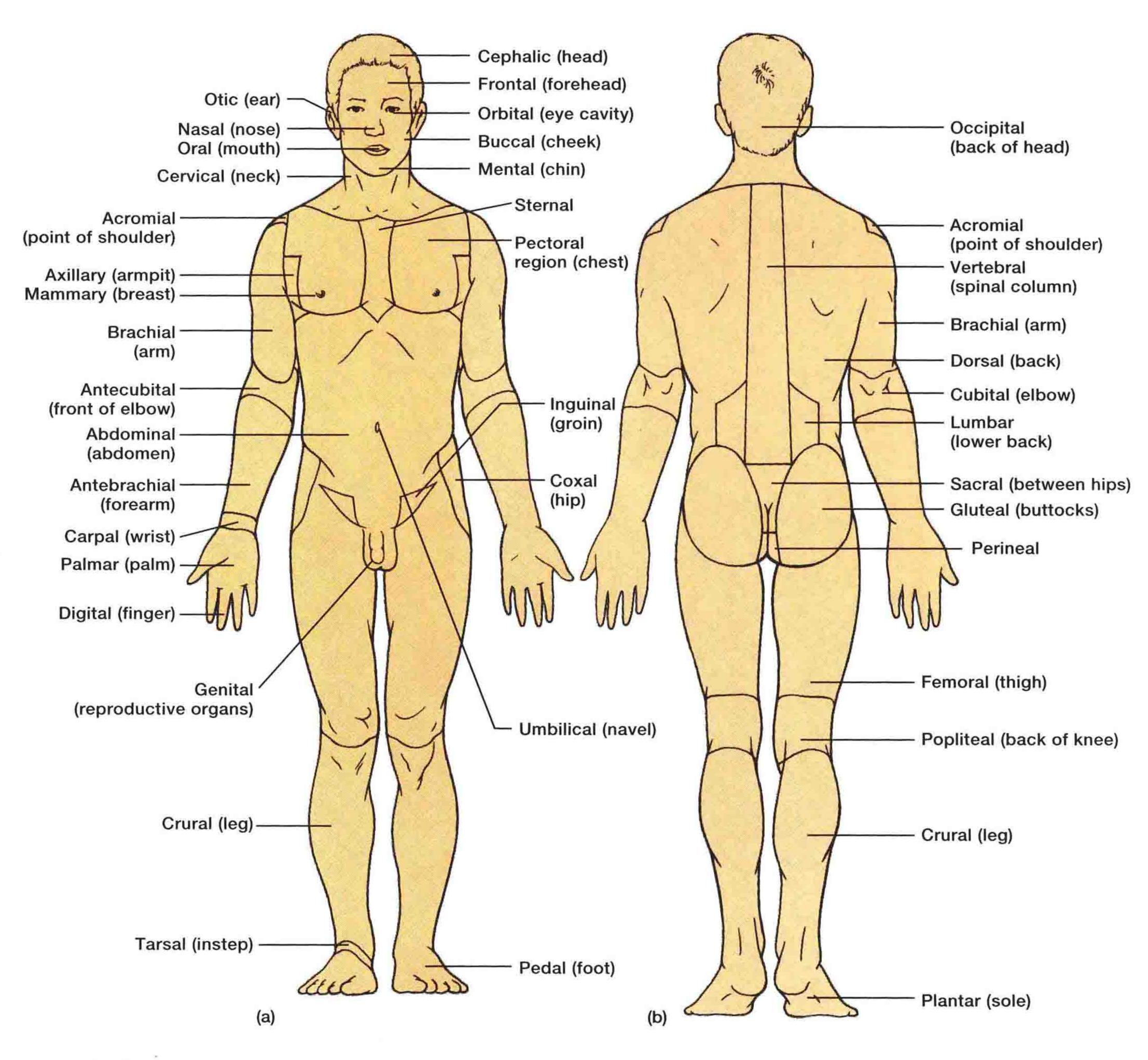
Body Cavities (lateral) Figure 1.6a



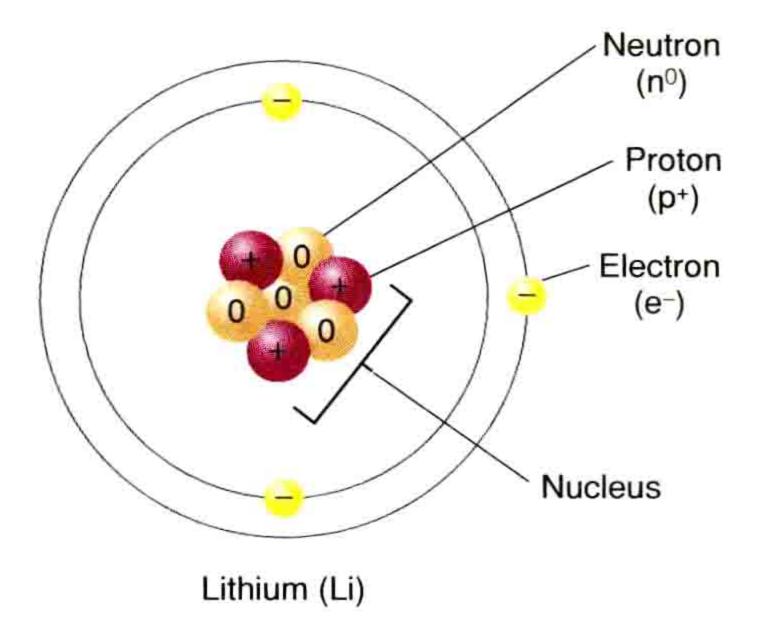
Body Cavities (frontal) Figure 1.6b



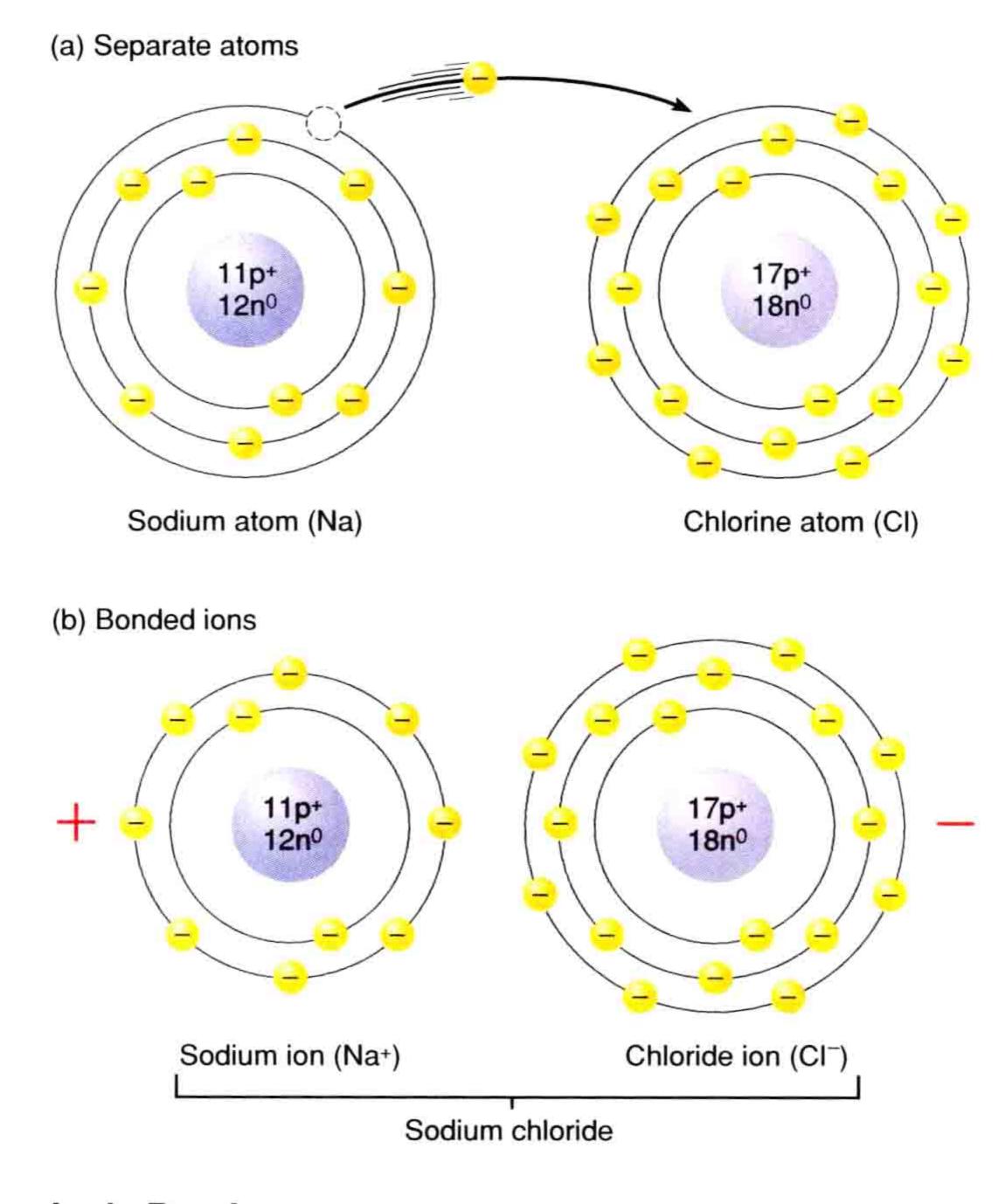
Body Planes Figure 1.10



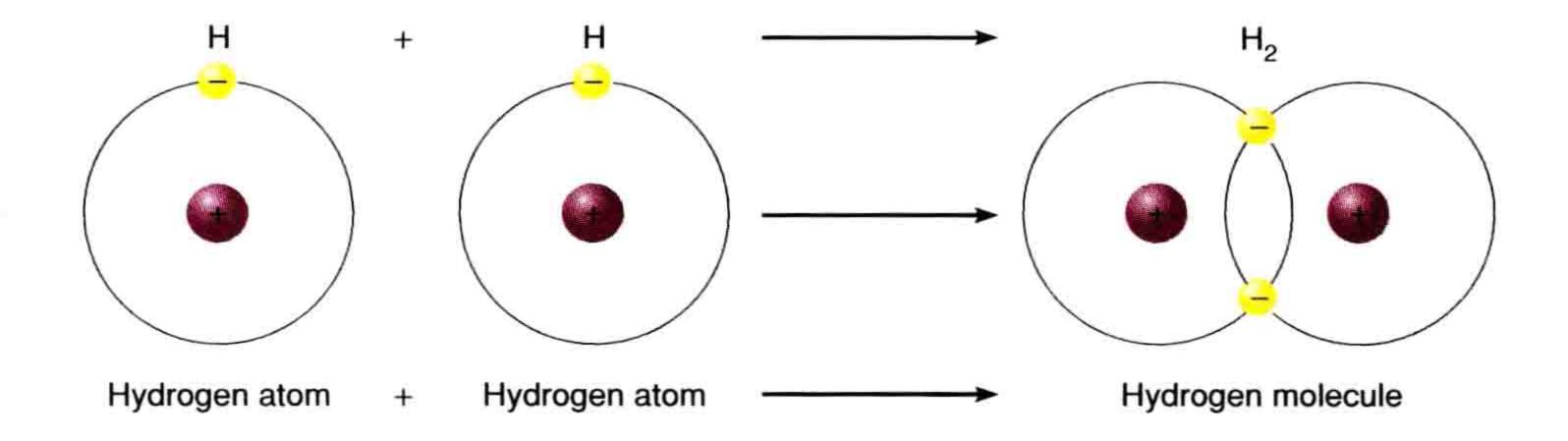
Body Regions Figure 1.13



Organization of an Atom Figure 2.1

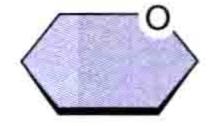


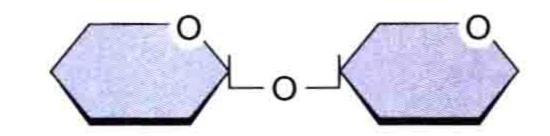
lonic Bond Figure 2.4



Covalent Bond Figure 2.5

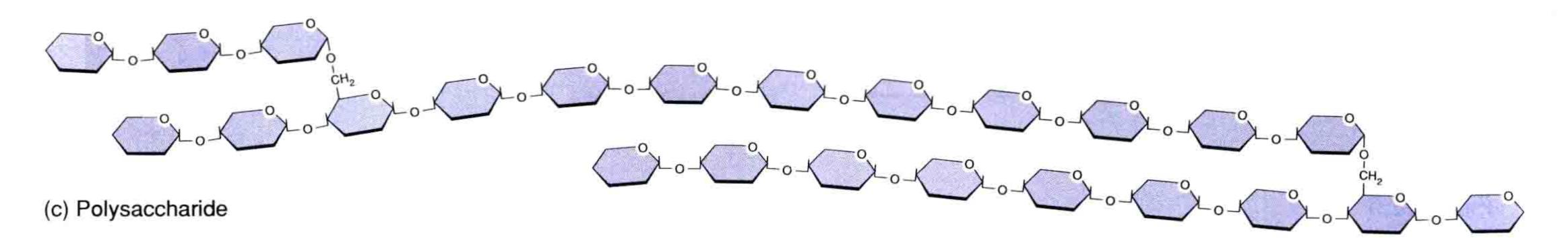
pH Values of Common Substances Figure 2.10





(a) Monosaccharide

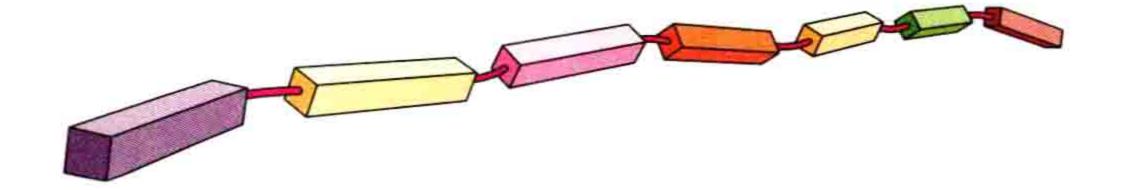
(b) Disaccharide



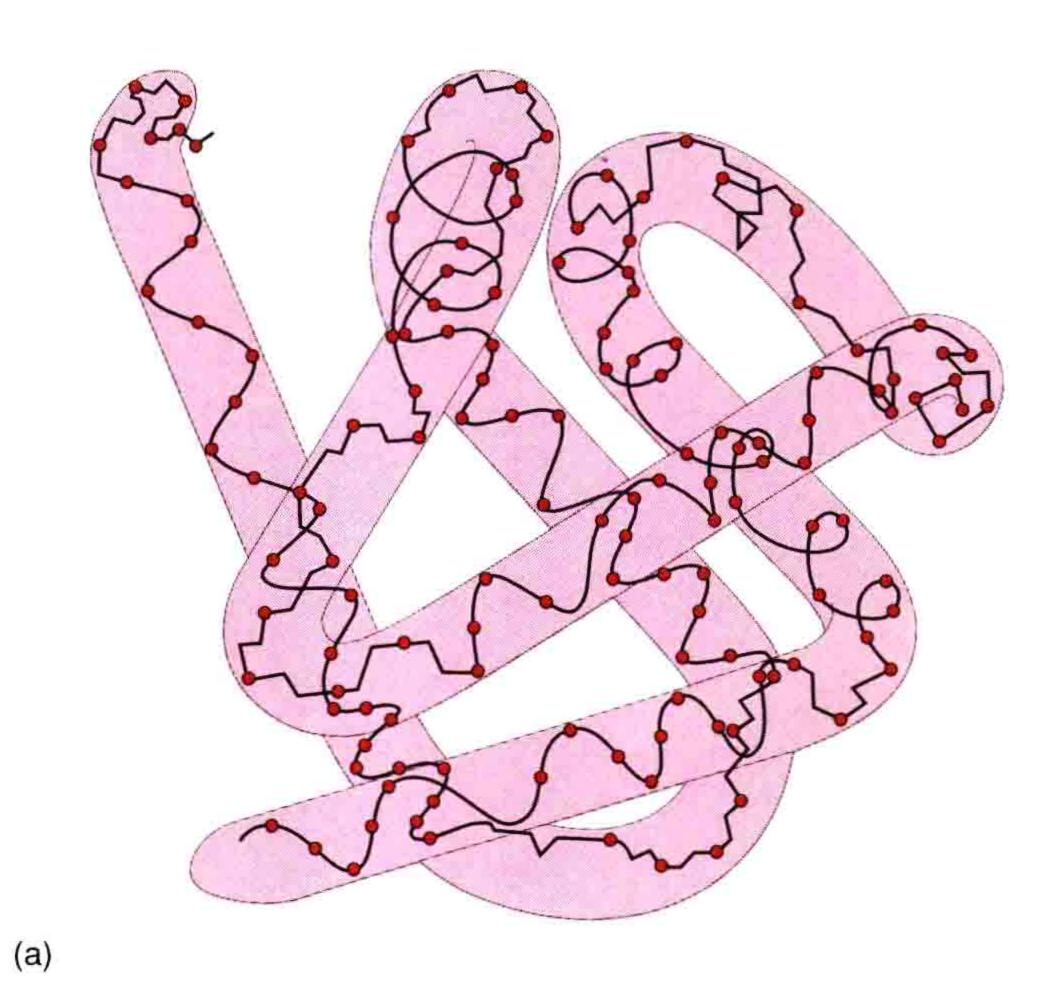
Structure of Glucose Figure 2.11

Amino acid	Structural formula
Alanine	Amino group Carboxyl group H-N-C-H H-N-C-H
Valine	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
Cysteine	$ \begin{array}{ccccc} H & H & O & O \\ H & C & C & OH \\ H & C & H & SH \end{array} $

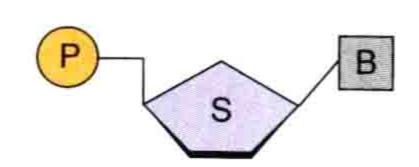
Structure of a Triglyceride Figure 2.13



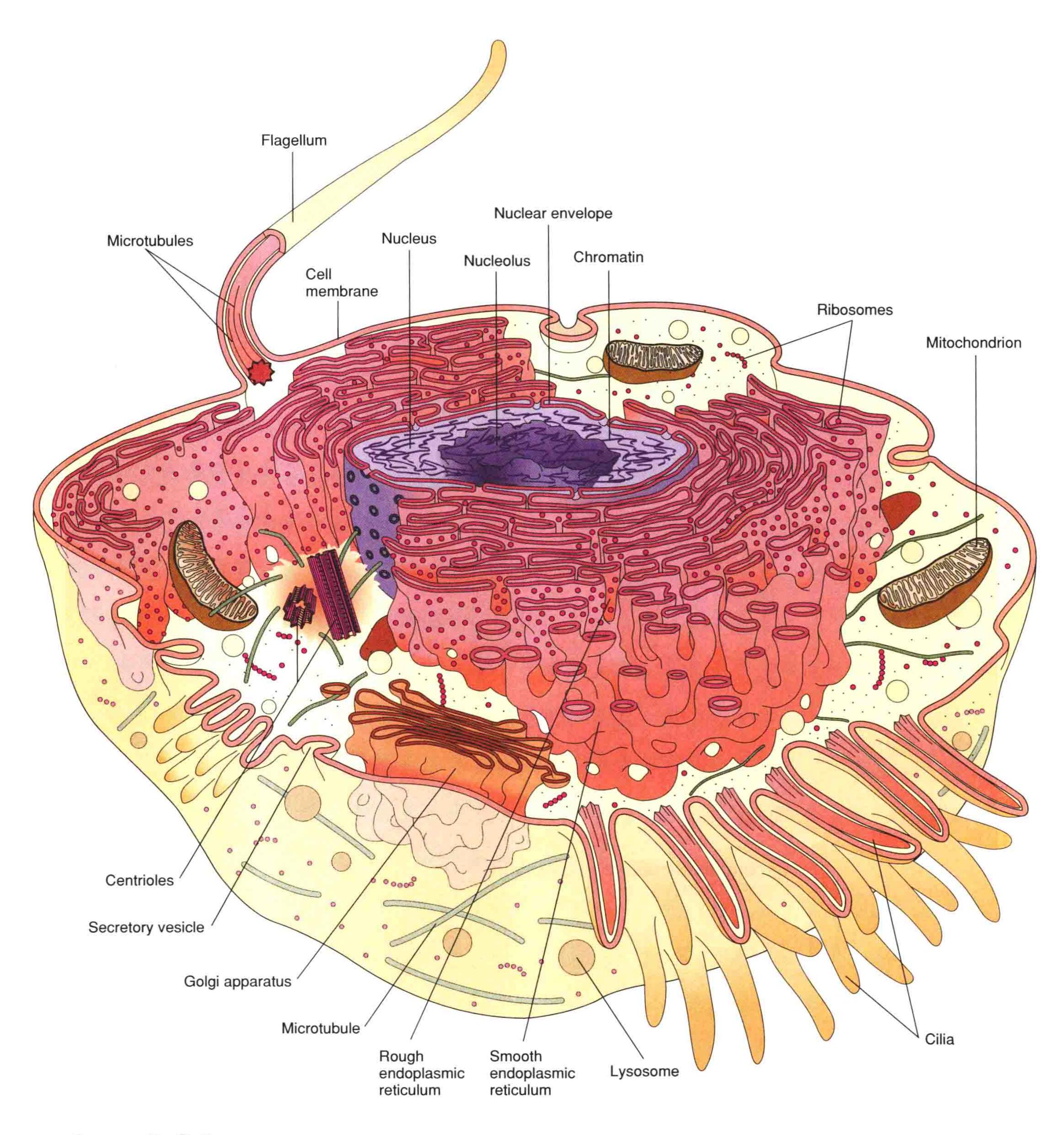
Structure of an Amino Acid Figure 2.14



Secondary Structure of a Protein Figure 2.16a



Tertiary Structure of a Protein Figure 2.17



Composite Cell Figure 3.2