## ESSENTIAL third edition CELL BIOLOGY

Alberts Bray Hopkin Johnson Lewis Raff Roberts Walter



## **Contents and Special Features**

Chapter 1	Introduction to Cells	1
Panel 1–1	Microscopy	8–9
Panel 1–2	Cell architecture	25
How We Kno	ow: Life's common mechanisms	30–31
Chapter 2	Chemical Components of Cells	39
How We Kno	ow: What are macromolecules?	60–61
Panel 2–1	Chemical bonds and groups	6465
Panel 2–2	The chemical properties of water	66–67
Panel 2–3	An outline of some of the types of sugar	68–69
Panel 2–4	Fatty acids and other lipids	70–71
Panel 2–5	The 20 amino acids found in proteins	72-73
Panel 2–6	A survey of the nucleotides	74–75
Panel 2–7	The principal types of weak noncovalent bonds	76–77
Chapter 3	Energy, Catalysis, and Biosynthesis	81
Panel 3–1	Free energy and biological reactions	94–95
How We Kno	w: Using kinetics to model and manipulate metabolic pathways	101–103
Chapter 4	Protein Structure and Function	119
Panel 4–1	A few examples of some general proteins	120
Panel 4–2	Four different ways of depicting a small protein	128-129
Panel 4-3	Making and using antibodies	144–145
How We Kno	ow: Probing protein structure	158–160
Panel 4-4	Cell breakage and initial fractionation of cell extracts	164–165
Panel 4–5	Protein separation by chromatography	166
Panel 4–6	Protein separation by electrophoresis	167
Chapter 5	DNA and Chromosomes	171
How We Kno	ow: Genes are made of DNA	174–176
Chapter 6	DNA Replication, Repair, and Recombination	197
How We Kno	200–202	
Chapter 7	From DNA to Protein: How Cells Read the Genome	231
How We Kno	ow: Cracking the genetic code	248–249
Chapter 8	Control of Gene Expression	269
How We Kno	w: Gene regulation—the story of Eve	282–284

Chapter 9	How Genes and Genomes Evolve	297
•	v: Counting genes	318–319
Chapter 10	Analyzing Genes and Genomes	327
How We Know	v: Sequencing the human genome	348–349
Chapter 11	Membrane Structure	363
How We Know	v: Measuring membrane flow	382–380
Chapter 12	Membrane Transport	387
How We Know	v: Squid reveal secrets of membrane excitability	412–41
Chapter 13	How Cells Obtain Energy from Food	42!
Panel 13-1	Details of the 10 steps of glycolysis	430–43
How We Know	v: Unraveling the citric acid cycle	440–44
Panel 13–2	The complete citric acid cycle	442–44
Chapter 14	s 45	
How We Know	w: How chemiosmotic coupling drives ATP synthesis	468–46
Panel 14–1	Redox potentials	47
Chapter 15	Intracellular Compartments and Transport	49
How We Know	w: Tracking protein and vesicle transport	520–52
Chapter 16	Cell Communication	53
•	w: Untangling cell signaling pathways	560-5
Chapter 17	Cytoskeleton	57
Panel 17–1	The three major types of protein filaments	5
How We Know	w: Pursuing motor proteins	586–5
Chapter 18	The Cell Division Cycle	61
How We Know	w: Discovery of cyclins and Cdks	615–€
Panel 18–1	The principal stages of M phase in an animal cell	626–6
Chapter 19	Sex and Genetics	6
Panel 19-1	Some essentials of classical genetics	(
How We Know	w: Reading genetic linkage maps	680⊸
Chapter 20	Cellular Communities: Tissues, Stem Cells, and Cand	cer 6
How We Know	w: Making sense of the genes that are critical for cancer	725–
Answers to	Questions	1
Glossary		(
Index		

·	
Chapter 9 How Genes and Genomes Evolve How We Know: Counting genes	<b>297</b> 318–319
Chapter 10 Analyzing Genes and Genomes  How We Know: Sequencing the human genome	<b>327</b> 348–349
Chapter 11 Membrane Structure  How We Know: Measuring membrane flow	<b>363</b> 382–383
Chapter 12 Membrane Transport  How We Know: Squid reveal secrets of membrane excitability	<b>387</b> 412–413
Chapter 13 How Cells Obtain Energy from Food Panel 13–1 Details of the 10 steps of glycolysis How We Know: Unraveling the citric acid cycle Panel 13–2 The complete citric acid cycle	<b>425</b> 430–431 440–441 442–443
Chapter 14 Energy Generation in Mitochondria and Chloroplasts  How We Know: How chemiosmotic coupling drives ATP synthesis  Panel 14–1 Redox potentials	<b>453</b> 468–469 471
Chapter 15 Intracellular Compartments and Transport  How We Know: Tracking protein and vesicle transport	<b>495</b> 520–521
Chapter 16 Cell Communication  How We Know: Untangling cell signaling pathways	<b>531</b> 560–562
Chapter 17 Cytoskeleton  Panel 17–1 The three major types of protein filaments  How We Know: Pursuing motor proteins	<b>571</b> 573 586–588
Chapter 18 The Cell Division Cycle  How We Know: Discovery of cyclins and Cdks  Panel 18–1 The principal stages of M phase in an animal cell	<b>609</b> 615–616 626–627
Chapter 19 Sex and Genetics  Panel 19–1 Some essentials of classical genetics  How We Know: Reading genetic linkage maps	<b>651</b> 674 680–681
Chapter 20 Cellular Communities: Tissues, Stem Cells, and Cancer How We Know: Making sense of the genes that are critical for cancer	<b>689</b> 725–726
Answers to Questions	A:1
Glossary	G:1
Index	I:1