Chapter 1: The Dynamic Cell

Apoptosis *video*
Life Cycle of a Cell (Figures 1-9, 1-10) *overview animation*
Mitosis *video*

Chapter 2: Chemical Foundations

Biological Energy Interconversions (Figure 2-25) *overview animation*
Chemical Bonds and Protein Structure *molecular tutorial*

Chapter 3: Protein Structure and Function

Amino Acid Structures *molecular tutorial*
Chaperone-Mediated Folding (Figure 3-15) *focus animation*
Chemical Bonds and Protein Structure *molecular tutorial*
E. coli Porins: OMPF and Maltoporin (LamB) *molecular tutorial*
Immunoblotting (Figure 3-44) *technique animation*
Life Cycle of a Protein (Figure 3-18) *overview animation*
SDS Gel Electrophoresis (Figure 3-41) *technique animation*

Chapter 4: Nucleic Acids, the Genetic Code, and the Synthesis of Macromolecules

Basic Transcriptional Mechanism (Figure 4-15) *focus animation*
Cracking the Genetic Code *classic experiment*
Life Cycle of an mRNA (Figures 4-19, 4-42) *overview animation*
Protein Synthesis (Figure 4-39) *focus animation*
Topoisomerase I (E. coli) *molecular tutorial*

Chapter 5: Biomembranes and the Subcellular Organization of Eukaryotic Cells

Membrane Protein Dynamics in and around the Trans Golgi Network *video*
Nuclear Envelope Dynamics during Mitosis *video*
Protein Secretion (Figure 5-48) *overview animation*
Reporter Constructs (Figure 5-7) *technique animation*

Chapter 6: Manipulating Cells and Viruses in Culture

The Discovery of Reverse Transcriptase *classic experiment*
HhaI DNA Methylase *molecular tutorial*
HIV Reverse Transcriptase *molecular tutorial*
HIV-1 Integrase *molecular tutorial*
Life Cycle of a Retrovirus (Figure 6-22) *overview animation*
Preparing Monoclonal Antibodies (Figure 6-10) *technique animation*
Retroviral Gene Expression *focus animation*
Retroviral Genome Integration *focus animation*
T7 DNA Replication Complex *molecular tutorial*

Chapter 7: Recombinant DNA and Genomics

Demonstrating Sequence-Specific Cleavage by a Restriction Enzyme *classic experiment*

Dideoxy Sequencing of DNA (Figure 7-29) *technique animation*

Plasmid Cloning (Figures 7-3, 7-4) *technique animation*

Polymerase Chain Reaction (Figure 7-38) *technique animation*

Screening an Oligonucleotide Array for Patterns of Gene Expression *technique animation*

Synthesizing an Oligonucleotide Array *technique animation*

Unleashing the Power of Exponential Growth: The Polymerase Chain Reaction *classic experiment*

Chapter 8: Genetic Analysis in Cell Biology

Creating a Transgenic Mouse (Figure 8-36) *technique animation*

In Vitro Mutagenesis of Cloned Genes (Figure 8-29) *technique animation*

Meiosis *focus animation*

Chapter 9: Molecular Structure of Genes and Chromosomes

Retroviral Reverse Transcription (Figure 9-16) *focus animation*

Three-Dimensional Packing of Nuclear Chromosomes (Figure 9-35) *focus animation*

Two Genes Become One: Somatic Rearrangement of Immunoglobin Genes *classic experiment*

Chapter 10: Regulation of Transcription Initiation

Combinatorial Control of Transcription (Figure 10-61) *focus animation*

I^- *lac* Repressor Mutations *focus animation*

Regulation of the *lac* Operon *focus animation*

Chapter 11: RNA Processing, Nuclear Transport, and Post-Transcriptional Control

Catalysis without Proteins: The Discovery of Self-Splicing RNA *classic experiment*

Life Cycle of an mRNA (Figure 11-7) *overview animation*

mRNA Splicing (Figures 11-17, 11-19) *focus animation*

Chapter 12: DNA Replication, Repair, and Recombination

Subunit of *E. coli* DNA Polymerase III *molecular tutorial*

Bidirectional Replication of DNA (Figures 12-2, 12-9) *focus animation*

Coordination of Leading- and Lagging-Strand Synthesis (Figure 12-11) *focus animation*

Hin Recombinase *molecular tutorial*

Nucleotide Polymerization by DNA Polymerase (Figure 12-10) *focus animation*

Proving That DNA Replication Is Semiconservative *classic experiment*

RecA *(E. coli) molecular tutorial*

Telomere Replication (Figure 12-13) *focus animation*

Topoisomerase I *(E. coli) molecular tutorial*

Chapter 13: Regulation of the Eukaryotic Cell Cycle

Cell Cycle Control (Figure 13-2) *overview animation*

Nuclear Envelope Dynamics during Mitosis *video*

Chapter 14: Gene Control in Development

Gene Control in Embryonic Development (Figures 14-25, 14-32) *overview animation*

Chapter 15: Transport across Cell Membranes

Biological Energy Interconversions (Figures 15-9, 15-13, 15-19) *overview animation*

Stumbling upon Active Transport *classic experiment*

Chapter 16: Cellular Energetics: Glycolysis, Aerobic Oxidation, and Photosynthesis

ATP Synthesis (Figures 16-28, 16-30) *focus animation*

Electron Transport (Figure 16-19) *focus animation*

Photosynthesis (Figure 16-38) *focus animation*

Chapter 17: Protein Sorting: Organelle Biogenesis and Protein Secretion

ER Dynamics in an Interphase PtK_2 Cell *video*

ER Extension *video*

Following a Protein out of the Cell *classic experiment*

Golgi Membrane Protein Dynamics *video*

(continued overleaf)

Dynamics of a Golgi Membrane Protein after Redistribution into the ER *video*

Protein Secretion (Figure 17-13) *overview animation*

Protein Sorting (Figure 17-1) *overview animation*

Synthesis of Secreted and Membrane-Bound Proteins (Figures 17-16, 17-23) *focus animation*

Membrane Protein Dynamics in and around the Trans Golgi Network *video*

Chapter 18: Cell Motility and Shape I: Microfilaments

Actin Dynamics in Migrating Cells *video*

Actin in Lamellipodia Movement *video*

Actin Polymerization (Figure 18-11) *focus animation*

Cell Motility (Figure18-41) *overview animation*

In Vitro Motility Assay (Figure 18-22) *technique animation*

Mechanics of Epidermal Migration *video*

Myosin Crossbridge Cycle (Figure 18-25) *focus animation*

Chapter 19: Cell Motility and Shape II: Microtubules and Intermediate Filaments

Fast Axonal Transport *video*

In Vitro Motility Assay: Kinesin *video*

Microtubule Dynamics (Figures 19-39, 19-41, 19-45) *focus animation*

Microtubule Networks in Cells *video*

Mitosis (Figures 19-34, 19-35) *focus animation*

Mitosis *video*

Mitotic Spindles in the Early Drosophila Embryo *video*

Movement of Transport Carriers along Microtubule Tracks *video*

Organelle Movement along Microtubules in a Squid Axon *video*

Chapter 20: Cell-to-Cell Signaling: Hormones and Receptors

Extracellular Signaling (Figures 20-5, 20-16, 20-48) *overview animation*

Expression Cloning of Receptors (Figure 20-9) *technique animation*

The Infancy of Signal Transduction: GTP Stimulation of cAMP Synthesis *classic experiment*

Second Messengers in Signaling Pathways (Figures 20-4, 20-39) *focus animation*

Yeast Two-Hybrid System (Figure 20-29) *technique animation*

Chapter 21: Nerve Cells

Biological Energy Interconversions (Figure 21-9) *overview animation*

Sending a Signal through a Gas *classic experiment*

Chapter 22: Integrating Cells into Tissues

Cell-Cell Adhesion in Leukocyte Extravasation (Figure 22-4) *focus animation*

Chapter 23: Cell Interactions in Development

Apoptosis (Figures 23-45, 23-50) *focus animation*

Apoptosis *video*

TGFβ Signaling Pathway (Figure 23-3) *focus animation*

Chapter 24: Cancer

Cell Cycle Control (Figure 24-19) *overview animation*

HIV Reverse Transcriptase *molecular tutorial*

TGFβ Signaling Pathway (Figure 24-20) *focus animation*