# CHAPTER 5 The Working Cell

OBJECTIVES

**Energy and the Cell**

**Introduction**
**Describe the basic mechanism of light production in fireflies.**
5.1 Define and compare kinetic energy, potential energy, chemical energy, and heat.
5.2 Define the first and second laws of thermodynamics. Explain how the nature of energy transformations is guided by these laws of thermodynamics.
5.3 Define and compare endergonic and exergonic reactions. Explain how cells use these reactions to survive.
5.4 Explain how ATP functions as an energy shuttle.

**How Enzymes Work**
5.5 Explain how enzymes speed up chemical reactions.
5.6 Describe the structure of an enzyme-substrate interaction.
5.7 Explain how the cellular environment affects enzyme activity.
5.8 Explain how competitive and noncompetitive inhibitors alter an enzyme's activity.
5.9 Explain how certain pesticides and antibiotics work by inhibiting enzymes.

**Membrane Structure and Function**
5.10 Explain how membranes help organize the chemical activities of a cell.
5.11 Relate the structure of phospholipid molecules to the structure and properties of cell membranes.
5.12 Describe the fluid mosaic structure of cell membranes.
5.13 Describe the diverse functions of membrane proteins.
5.14-5.15 Describe the process of passive transport. Explain why osmosis is the passive transport of water.
5.15 Distinguish between hypertonic, hypotonic, and isotonic solutions.
5.16 Explain how plant and animal cells change when placed into a hypertonic or hypotonic solution.
5.17-5.18 Compare the processes of facilitated diffusion and active transport.
5.19 Distinguish between exocytosis, endocytosis, phagocytosis, pinocytosis, and receptor-mediated endocytosis.
5.20 Describe the cause of hypercholesterolemia.
5.21 Describe the central role of chloroplasts and mitochondria in harvesting energy and making it available for cellular work.