ANSWERS

Matching

I. 1. h 2. c 3. a 4. d 5. e 6 .f 7. j
II. 1. a 2. a 3. b 4. a 5. b 6. a 7. b
III. 1. i 2. g 3. d 4. c 5. a 6. f 7. k
IV. 1. a 2. j 3. g 4. h 5. f 6. c 7. k 8. l
V. 1. f 2. g 3. e 4. d 5. b 6. c 7. j 8. h 9. k
VI. 1. d 2. a 3. c
VII. 1. b 2. a 3. d 4. c 5. e
VIII. 1. a 2. d 3. b 4. e 5. f 6. d
IX. 1. c 2. a 3. e

Fill in the Blanks

1. polysaccharide 2. phagocytosis 3. cisterns 4. Golgi 5. hypotonic 6. simple diffusion; osmosis; facilitated diffusion 7. flagellin 8. histones

Critical Thinking

1. The glycocalyx is a sticky, viscous, gelatinous polymer that surrounds some bacterial cells. It may be composed of polysaccharide, polypeptide, or a combination of these two substances. Depending on how the material is arranged and attached to the cell, it may be referred to as a slime layer or a capsule. The glycocalyx is associated with bacterial virulence because it helps protect the bacterium from phagocytosis by white blood cells and helps the bacterium to adhere to and colonize a host.

2. Substances that dissolve easily in lipids can most easily cross the plasma membrane. These include oxygen, carbon dioxide, and nonpolar organic molecules. Also, small molecules such as water are able to cross the plasma membrane easily.

3. There will be no change in a bacterial cell in an isotonic solution; water leaves and enters the cell at the same rate.

   A bacterial cell placed in a hypotonic solution will undergo osmotic lysis because more water will enter the cell than the cell wall can contain.

   A hypertonic solution will cause a bacterial cell to undergo plasmolysis, the osmotic loss of water due to increased solutes outside of the cell.

4. Peptidoglycan is a substance that is found in varying quantities in most prokaryotic cells. Peptidoglycan is unique to prokaryotic cells and is never found in eukaryotic cells. Antibiotics such as the penicillins and the cephalosporins act specifically against peptidoglycan and therefore have low toxicity in humans. These drugs prevent the formation of the peptide cross-bridges of peptidoglycan, preventing synthesis of a functional cell wall.

5. The endosymbiont hypothesis addresses the evolution of eukaryotic cells, specifically the origin of their mitochondria and chloroplasts. This hypothesis proposes that eukaryotic cells evolved from symbiotic relationships between prokaryotic cells having different metabolic abilities. Evidence supporting the endosymbiont theory is seen in mitochondria and chloroplasts. Both organelles have 70S ribosomes, the type seen in prokaryotic cells, rather than the typical 80S eukaryotic ribosomes. Also, mitochondria and chloroplasts multiply and grow within eukaryotic cells.