

***Microbiology with Diseases by Body System, 3e (Bauman)***  
**Chapter 3 Cell Structure and Function**

**3.1 Multiple-Choice Questions**

1) Using a microscope, you observe an amoeba moving toward a food source. This is an example of

- A) reproduction.
- B) cellular structure.
- C) metabolism.
- D) growth.
- E) responsiveness.

Answer: E

Bloom's Rank: Comprehension

Section: Processes of Life

2) Which of the following is NOT a component of bacterial flagella?

- A) flagellin
- B) basal body
- C) tubulin
- D) filament
- E) hook

Answer: C

Bloom's Rank: Comprehension

Section: External Structures of Bacterial Cells

3) Which of the following statements concerning the characteristics of life is FALSE?

- A) Reproduction is defined as an increase in the size of an organism.
- B) Viruses have some, but not all, of the characteristics of living things.
- C) Organisms may not exhibit all of the characteristics of life at all times.
- D) Reproduction can occur asexually or sexually in living things.
- E) Living things store metabolic energy in the form of chemicals such as ATP.

Answer: A

Bloom's Rank: Comprehension

Section: Processes of Life

4) Bacterial pili can be described as

- A) composed of tubulin.
- B) solid, rigid protein structures.
- C) composed of peptidoglycan.
- D) specialized fimbriae.
- E) a means of locomotion.

Answer: D

Bloom's Rank: Knowledge

Section: External Structures of Bacterial Cells

5) Which of the following bacterial cell structures plays an important role in the creation of biofilms?

- A) glycocalyxes
- B) flagella
- C) fimbriae
- D) pili
- E) both fimbriae and glycocalyxes

Answer: E

Bloom's Rank: Comprehension

Section: External Structures of Bacterial Cells

6) Short, hairlike structures used only by eukaryotic cells for movement are called

- A) pili.
- B) flagella.
- C) fimbriae.
- D) pseudopodia.
- E) cilia.

Answer: E

Bloom's Rank: Knowledge

Section: Cytoplasm of Eukaryotes

7) A bacterial cell moving toward light would be an example of

- A) tumbles.
- B) positive phototaxis.
- C) negative phototaxis.
- D) positive chemotaxis.
- E) negative chemotaxis.

Answer: B

Bloom's Rank: Comprehension

Section: External Structures of Bacterial Cells

8) Which of the following statements concerning prokaryotic flagella is FALSE?

- A) Prokaryotic flagella can rotate 360 degrees.
- B) A "run" results from counterclockwise movement of the flagellum.
- C) Prokaryotic flagella are composed of tubulin.
- D) Treponema is an example of a bacterium that has an endoflagellum.
- E) Prokaryotic flagella are anchored to the cell wall by means of the basal body.

Answer: C

Bloom's Rank: Comprehension

Section: External Structures of Bacterial Cells

9) Which of the following statements concerning pili is FALSE?

- A) Pili are longer than fimbriae and flagella.
- B) Pili facilitate the transfer of DNA among bacterial cells.
- C) Pili are long, hollow tubules.
- D) Not all bacteria have pili.
- E) A bacterial cell will usually have only one or two pili.

Answer: A

Bloom's Rank: Comprehension

Section: External Structures of Bacterial Cells

10) Which of the following is NOT a component of bacterial cell walls?

- A) peptidoglycan
- B) lipoteichoic acids
- C) mycolic acid
- D) tetrapeptide
- E) tubulin

Answer: E

Bloom's Rank: Comprehension

Section: Bacterial Cell Walls

11) Bacterial cell walls that are resistant to drying contain

- A) carbohydrates.
- B) amino acids.
- C) lipopolysaccharide.
- D) tubulin.
- E) waxes.

Answer: E

Bloom's Rank: Comprehension

Section: Bacterial Cell Walls

12) Lipid A is also known as

- A) endotoxin.
- B) teichoic acid.
- C) tetrapeptide.
- D) mycolic acid.
- E) lipopolysaccharide.

Answer: A

Bloom's Rank: Knowledge

Section: Bacterial Cell Walls

13) Bacteria of the genus *Mycoplasma* are distinguished from other bacterial cells by

- A) unique ribosomes.
- B) the presence of mycolic acid in their cell walls.
- C) the absence of a cell wall.
- D) cell walls composed solely of amino acids.
- E) the absence of a cytoplasmic membrane.

Answer: C

Bloom's Rank: Comprehension

Section: Bacterial Cell Walls

14) Lipid-soluble molecules would be expected to cross the cytoplasmic membrane by which of the following processes?

- A) osmosis
- B) facilitated diffusion
- C) diffusion
- D) active transport
- E) group translocation

Answer: C

Bloom's Rank: Knowledge

Section: Bacterial Cytoplasmic Membranes

15) ATP is expended in which of the following processes?

- A) facilitated diffusion
- B) diffusion
- C) group translocation
- D) active transport
- E) both active transport and group translocation

Answer: E

Bloom's Rank: Comprehension

Section: Bacterial Cytoplasmic Membranes

16) Which of the following statements concerning osmosis is FALSE?

- A) Osmosis requires a selectively permeable membrane.
- B) During osmosis, water crosses to the side of the membrane with a lower solute concentration.
- C) Cells placed in hypotonic solutions will gain water.
- D) Crenation results when cells are placed in a hypertonic solution.
- E) Osmosis stops when the system reaches equilibrium.

Answer: B

Bloom's Rank: Application

Section: Bacterial Cytoplasmic Membranes

17) Endospores survive a variety of harsh conditions in part because of the presence of

- A) mycolic acid.
- B) lipopolysaccharide.
- C) hopanoids.
- D) dipicolinic acid.
- E) glycoproteins.

Answer: D

Bloom's Rank: Application

Section: Cytoplasm of Bacteria

18) The glycocalyx of a eukaryotic cell performs all of the following functions EXCEPT

- A) protection against dehydration.
- B) anchoring cells to each other.
- C) cellular recognition and communication.
- D) transfer of genetic material between cells.
- E) strengthening the cell surface.

Answer: D

Bloom's Rank: Application

Section: External Structures of Eukaryotic Cells

19) Which of the following is unique to archaea?

- A) LPS
- B) peptidoglycan
- C) hami
- D) fimbriae
- E) pili

Answer: C

Bloom's Rank: Knowledge

Section: External Structures of Archaea

20) When cells are placed in a hypertonic solution, they lose water and shrivel. This process is called

- A) crenation.
- B) endocytosis.
- C) passive transport.
- D) periplasm.
- E) plasmalemma.

Answer: A

Bloom's Rank: Knowledge

Section: Bacterial Cytoplasmic Membranes

21) Which of the following statements concerning endocytosis and exocytosis is CORRECT?

- A) These processes occur in both prokaryotes and eukaryotes.
- B) Phagocytosis is a type of endocytosis in which liquids are brought into the cell.
- C) Endocytosis produces a structure called a food vesicle.
- D) Waste products and secretions are exported from the cell during endocytosis.
- E) Endocytosis is a form of passive transport, whereas exocytosis is a form of active transport.

Answer: C

Bloom's Rank: Comprehension

Section: Eukaryotic Cell Walls and Cytoplasmic Membranes

22) One lipid found in eukaryotes but NOT in prokaryotes is

- A) hopanoid.
- B) lipopolysaccharide.
- C) phospholipid.
- D) fatty acid.
- E) steroid.

Answer: E

Bloom's Rank: Comprehension

Section: Eukaryotic Cell Walls and Cytoplasmic Membranes

23) Which of the following statements concerning centrioles is FALSE?

- A) The structure of centrioles is similar to that of eukaryotic flagella and cilia.
- B) Centrioles are believed to play a role in cellular processes such as mitosis and cytokinesis.
- C) Centrioles are found in a region of the cell called the centrosome.
- D) Centrioles are found in all organisms except prokaryotes.
- E) Centrioles are composed of microtubules.

Answer: D

Bloom's Rank: Comprehension

Section: Cytoplasm of Eukaryotes

24) Which of the following is classified as a membranous organelle of eukaryotic cells?

- A) endoplasmic reticulum
- B) ribosome
- C) cytoskeleton
- D) centriole
- E) both ribosomes and centrioles

Answer: A

Bloom's Rank: Comprehension

Section: Cytoplasm of Eukaryotes

25) Which of the following is NOT associated with the nucleus of a eukaryotic cell?

- A) chromatin
- B) cristae
- C) histones
- D) nucleoplasm
- E) nucleolus

Answer: B

Bloom's Rank: Knowledge

Section: Cytoplasm of Eukaryotes

26) Which of the following statements about the endoplasmic reticulum (ER) is CORRECT?

- A) The rough ER is the site of lipid synthesis.
- B) The smooth ER has ribosomes associated with it.
- C) The ER is a lipid storage organelle.
- D) The ER is a transport system within the cytoplasm.
- E) The smooth ER is a site of ATP synthesis.

Answer: D

Bloom's Rank: Application

Section: Cytoplasm of Eukaryotes

27) Which of the following organelles is responsible for producing most of the ATP in a eukaryotic cell?

- A) lysosome
- B) Golgi body
- C) mitochondrion
- D) smooth endoplasmic reticulum
- E) nucleus

Answer: C

Bloom's Rank: Knowledge

Section: Cytoplasm of Eukaryotes

28) Chloroplasts differ from mitochondria in that they have

- A) DNA.
- B) two lipid bilayers.
- C) 70S ribosomes.
- D) light-harvesting pigments.
- E) cristae.

Answer: D

Bloom's Rank: Application

Section: Cytoplasm of Eukaryotes

29) Which of the following is paired INCORRECTLY?

- A) plants: cellulose cell wall
- B) algae: glycocalyx present
- C) bacteria: peptidoglycan cell wall
- D) fungi: cellulose, chitin, and/or glucomannan cell wall
- E) archaea: polysaccharide cell wall

Answer: B

Bloom's Rank: Comprehension

Section: Eukaryotic Cell Walls and Cytoplasmic Membranes

30) Which of the following statements concerning the endosymbiotic theory is FALSE?

- A) Eukaryotes were formed from the union of small anaerobic cells by larger aerobic cells.
- B) Mitochondria and chloroplasts can divide independently of the cell.
- C) Mitochondria and chloroplasts have their own DNA and ribosomes.
- D) The cristae of mitochondria evolved from the cytoplasmic membrane of prokaryotes.
- E) The endosymbiotic theory is not universally accepted.

Answer: A

Bloom's Rank: Application

Section: Endosymbiotic Theory

31) Which of the following is NOT a function of the eukaryotic cytoskeleton?

- A) anchors organelles
- B) gives shape to the cell
- C) packages cellular secretions
- D) performs endocytosis
- E) aids in contraction of the cell

Answer: C

Bloom's Rank: Comprehension

Section: Cytoplasm of Eukaryotes

32) The accumulation of glucose 6-phosphate inside a bacterial cell via phosphorylation of glucose is an example of

- A) facilitated diffusion.
- B) group translocation.
- C) osmosis.
- D) plasmolysis.
- E) diffusion.

Answer: B

Bloom's Rank: Knowledge

Section: Bacterial Cytoplasmic Membranes



33) Which of the following molecules would be expected to cross the cytoplasmic membrane rapidly and without the use of transport proteins?

- A) large molecules
- B) ions
- C) small hydrophobic molecules
- D) small hydrophilic molecules
- E) both ions and hydrophilic molecules

Answer: C

Bloom's Rank: Application

Section: Bacterial Cytoplasmic Membranes

34) Which of the following processes requires a carrier protein?

- A) diffusion
- B) facilitated diffusion
- C) active transport
- D) endocytosis
- E) both facilitated diffusion and active transport

Answer: E

Bloom's Rank: Comprehension

Section: Eukaryotic Cell Walls and Cytoplasmic Membranes

35) Which of the following chemical substances contributes to the unique characteristics of acid-fast bacteria?

- A) N-acetylglucosamine
- B) peptidoglycan
- C) lipoteichoic acid
- D) endotoxin
- E) mycolic acid

Answer: E

Bloom's Rank: Application

Section: Bacterial Cell Walls

36) The cytoplasmic membranes of \_\_\_\_\_ contain phospholipids and proteins.

- A) archaeal cells
- B) bacterial cells
- C) eukaryotic cells
- D) both bacterial and eukaryotic cells
- E) archaeal, bacterial, and eukaryotic cells

Answer: D

Bloom's Rank: Comprehension

Section: Cell Walls and Cytoplasmic Membranes

37) Membrane rafts are found in the cytoplasmic membranes of

- A) archaea.
- B) bacteria.
- C) eukaryotes.
- D) both archaea and bacteria.
- E) both archaea and eukaryotes.

Answer: C

Bloom's Rank: Comprehension

Section: Eukaryotic Cell Walls and Cytoplasmic Membranes

38) Endocytosis and exocytosis are means of transport used by

- A) bacteria.
- B) eukaryotes.
- C) archaea.
- D) all prokaryotes.
- E) No cells use both processes.

Answer: B

Bloom's Rank: Comprehension

Section: Eukaryotic Cell Walls and Cytoplasmic Membranes

39) Some \_\_\_\_\_ use group translocation as a means of transport.

- A) eukaryotes
- B) bacteria
- C) archaea
- D) prokaryotes
- E) eukaryotes and prokaryotes

Answer: B

Bloom's Rank: Comprehension

Section: Bacterial Cytoplasmic Membranes

40) Hopanoids are found in \_\_\_\_\_ cytoplasmic membranes.

- A) eukaryotic
- B) bacterial
- C) archaeal
- D) prokaryotic
- E) no

Answer: B

Bloom's Rank: Comprehension

Section: Bacterial Cytoplasmic Membranes

41) The cell walls of \_\_\_\_\_ contain peptidoglycan.

- A) archaea
- B) bacteria
- C) eukaryotes
- D) prokaryotes
- E) bacteria and eukaryotes

Answer: B

Bloom's Rank: Comprehension

Section: Eukaryotic Cell Walls and Cytoplasmic Membranes

42) Cytoplasmic membranes of \_\_\_\_\_ are composed of phospholipids.

- A) bacteria
- B) eukaryotes
- C) archaea
- D) prokaryotes
- E) both bacteria and eukaryotes

Answer: E

Bloom's Rank: Knowledge

Section: Eukaryotic Cell Walls and Cytoplasmic Membranes

43) Some members of \_\_\_\_\_ have hami.

- A) archaea
- B) bacteria
- C) eukaryotes
- D) both archaea and bacteria
- E) both bacteria and eukaryotes

Answer: A

Bloom's Rank: Knowledge

Section: External Structures of Eukaryotes

44) \_\_\_\_\_ may have pili.

- A) Eukaryotes
- B) Archaea
- C) Bacteria
- D) Prokaryotes
- E) Eukaryotes and bacteria

Answer: C

Bloom's Rank: Knowledge

Section: External Structures of Eukaryotes

45) \_\_\_\_\_ may have flagella.

- A) Archaea
- B) Bacteria
- C) Eukaryotes
- D) Prokaryotes
- E) Archaea, bacteria, and eukaryotes

Answer: E

Bloom's Rank: Knowledge

Section: External Structures of Eukaryotes

46) Which of the following may have cell walls containing teichoic acids?

- A) Gram-negative bacteria
- B) Gram-positive bacteria
- C) archaea
- D) both Gram-positive and Gram-negative bacteria
- E) all prokaryotes

Answer: B

Bloom's Rank: Comprehension

Section: Archaeal Cell Walls and Cytoplasmic Membranes

47) The cell walls of \_\_\_\_\_ contain tetrapeptides.

- A) Gram-negative bacteria
- B) Gram-positive bacteria
- C) both Gram-positive and Gram-negative bacteria
- D) archaea
- E) all prokaryotes

Answer: C

Bloom's Rank: Comprehension

Section: Archaeal Cell Walls and Cytoplasmic Membranes

48) Which of the following have external structures containing a periplasmic space?

- A) Gram-negative bacteria
- B) Gram-positive bacteria
- C) both Gram-positive and Gram-negative bacteria
- D) archaea
- E) eukaryotes

Answer: A

Bloom's Rank: Knowledge

Section: Eukaryotic Cell Walls and Cytoplasmic Membranes

49) Which of the following prokaryotic cells contain an outer membrane?

- A) Gram-negative bacteria
- B) Gram-positive bacteria
- C) both Gram-positive and Gram-negative bacteria
- D) archaea
- E) all prokaryotes

Answer: A

Bloom's Rank: Comprehension

Section: Archaeal Cell Walls and Cytoplasmic Membranes

50) The cytoplasmic membranes of \_\_\_\_\_ contain lipids.

- A) Gram-negative bacteria
- B) Gram-positive bacteria
- C) both Gram-positive and Gram-negative bacteria
- D) archaea
- E) all prokaryotes

Answer: E

Bloom's Rank: Knowledge

Section: Archaeal Cell Walls and Cytoplasmic Membranes

### 3.2 True/False Questions

1) Chloroplasts use light energy to produce ATP and carbohydrates.

Answer: TRUE

Bloom's Rank: Knowledge

Section: Cytoplasm of Eukaryotes

2) Peroxisomes contain enzymes used to digest nutrients that have been brought into the cell through phagocytosis.

Answer: FALSE

Bloom's Rank: Comprehension

Section: Cytoplasm of Eukaryotes

3) Bacterial protein synthesis can begin before the reading of the gene is complete.

Answer: TRUE

Bloom's Rank: Knowledge

Section: Prokaryotic and Eukaryotic Cells: An Overview

4) All cell membranes contain phospholipids and a wide variety of proteins.

Answer: FALSE

Bloom's Rank: Application

Section: Archaeal Cell Walls and Cytoplasmic Membranes

5) The process of facilitated diffusion requires an input of energy.

Answer: FALSE

Bloom's Rank: Comprehension

Section: Bacterial Cytoplasmic Membranes

6) Eukaryotic ribosomes are composed of 60S and 40S subunits.

Answer: TRUE

Bloom's Rank: Comprehension

Section: Cytoplasm of Eukaryotes

7) Lysosomes result from the endocytosis of food particles by eukaryotic cells.

Answer: FALSE

Bloom's Rank: Comprehension

Section: Cytoplasm of Eukaryotes

8) Formation of a biofilm may contribute to bacteria's ability to cause disease.

Answer: TRUE

Bloom's Rank: Comprehension

Section: Cytoplasm of Bacteria

9) Chromatin is composed of DNA and special packaging proteins called hopanoids.

Answer: TRUE

Bloom's Rank: Comprehension

Section: Cytoplasm of Eukaryotes

10) The Golgi body prepares cellular products for export.

Answer: TRUE

Bloom's Rank: Comprehension

Section: Cytoplasm of Eukaryotes

### 3.3 Short Answer Questions

1) In a(n) \_\_\_\_\_ solution, an animal cell can gain so much water that it may burst.

Answer: hypotonic

Bloom's Rank: Comprehension

Section: Bacterial Cytoplasmic Membranes

2) The presence of a cell \_\_\_\_\_ enables bacterial and plant cells to resist the effects of hypotonic solutions.

Answer: wall

Bloom's Rank: Comprehension

Section: Bacterial Cytoplasmic Membranes

3) A higher concentration of solutes corresponds to a \_\_\_\_\_ (higher/lower) concentration of water in a given solution.

Answer: lower

Bloom's Rank: Knowledge

Section: Bacterial Cytoplasmic Membranes

4) A(n) \_\_\_\_\_ is a carrier protein that transports two substances in the same direction across a membrane.

Answer: symport

Bloom's Rank: Knowledge

Section: Bacterial Cytoplasmic Membranes

5) The \_\_\_\_\_ body anchors the bacterial flagellum in the cell wall.

Answer: basal

Bloom's Rank: Knowledge

Section: External Structures of Bacterial Cells

6) The reserve deposits of starch or other compounds found in many prokaryotic cells are called \_\_\_\_\_.

Answer: inclusions

Bloom's Rank: Comprehension

Section: Cytoplasm of Bacteria

7) Eukaryotic cells use a process known as \_\_\_\_\_ to obtain liquids from their environment.

Answer: pinocytosis

Bloom's Rank: Comprehension

Section: Eukaryotic Cell Walls and Cytoplasmic Membranes

8) Lipid \_\_\_\_\_ is a part of the Gram-negative cell wall that can produce fever, inflammation, and shock when it is released into the bloodstream. (Be sure to use capital letters.)

Answer: A

Bloom's Rank: Comprehension

Section: Bacterial Cell Walls

9) Paired structures composed of tubulin that play a role in eukaryotic mitosis are known as \_\_\_\_\_.

Answer: centrioles

Bloom's Rank: Comprehension

Section: Cytoplasm of Eukaryotes

10) Fibrous structures some archaea use for attachment to surfaces are \_\_\_\_\_.

Answer: hami

Bloom's Rank: Knowledge

Section: External Structures of Archaea

11) A(n) \_\_\_\_\_ is a type of glycocalyx that is firmly attached to the cell.

Answer: capsule

Bloom's Rank: Comprehension

Section: External Structures of Bacterial Cells

12) The type of organelles found only in eukaryotic cells are described as \_\_\_\_\_.

Answer: membranous

Bloom's Rank: Comprehension

Section: Cytoplasm of Eukaryotes

13) The semiliquid matrix of the nucleus is called the \_\_\_\_\_.

Answer: nucleoplasm

Bloom's Rank: Comprehension

Section: Cytoplasm of Eukaryotes

14) A structural molecule found in eukaryotic cytoskeletons, flagella, cilia, and centrioles is \_\_\_\_\_.

Answer: tubulin

Bloom's Rank: Application

Section: Cytoplasm of Eukaryotes

15) Another name for a channel protein in the cell membrane is \_\_\_\_\_.

Answer: permease

Bloom's Rank: Application

Section: Bacterial Cytoplasmic Membranes

### 3.4 Essay Questions

1) Compare and contrast the characteristics of prokaryotic and eukaryotic cells.

Answer: Prokaryotic cells have a nucleoid, a region within the cytoplasm where the DNA is found, but this region is not surrounded by a membrane. Eukaryotic cells, however, have a true nucleus that is surrounded by a nuclear membrane. Additionally, eukaryotic cells have a variety of membranous compartments known as organelles within the cell, whereas prokaryotes do not have membranous organelles. Prokaryotic cells tend to be smaller and less structurally complex in general than eukaryotic cells. Even though the two types of cells may have various structures in common, such as cell walls and flagella, these structures can vary widely in their molecular composition.

Bloom's Rank: Application

Section: Prokaryotic and Eukaryotic Cells: An Overview

2) Compare and contrast archaea and bacteria, with particular attention to the features that lead to their placement in separate taxa.

Answer: Bacterial cell walls are composed of peptidoglycan, whereas archaeal cell walls are composed of a variety of carbohydrate forms but never peptidoglycan. The flagella of the two groups of prokaryotes have several differences, including size, manner of assembly, and function. Although both have fimbriae, archaea have a distinctive attachment structure called a hamus that is somewhat like a barbed grappling hook. Archaeal cytoplasmic membranes lack phospholipid, a membrane lipid found in both bacteria and eukaryotes. The ribosomes of archaea and bacteria are of similar size, but some ribosomal components of archaea are more like those of eukaryotic ribosomes than those of bacteria. RNA metabolism in the two prokaryotic groups differs, and the archaeal genetic code is more like that of eukaryotes than that of bacteria.

Bloom's Rank: Analysis

Section: Cytoplasm of Archaea



3) Most antibacterial drugs disrupt or destroy bacterial cellular characteristics that are different from those of eukaryotic cells or that may not even be present in eukaryotic cells. List and describe at least three cellular features of bacteria that could be targeted to inhibit or kill a bacterial pathogen.

Answer:

1) Cell wall: The cell wall of almost all bacteria contains peptidoglycan, a molecule absent in eukaryotic cell walls. Gram-negative cell walls contain unique molecules such as lipopolysaccharide and structures such as porins, which are not present in eukaryotic cells. Additionally, human cells do not have a cell wall at all.

2) Ribosomes: Bacterial ribosomes have a 70S structure, whereas eukaryotic ribosomes have an 80S structure. This difference is enough to allow some drugs to preferentially affect bacterial ribosomes while leaving eukaryotic ribosomes unharmed.

3) Cellular appendages: Although both prokaryotic and eukaryotic cells can have flagella, the two types of cells use structurally different types of flagella. Furthermore, many bacteria have fimbriae and pili, which are not found on eukaryotic cells.

4) Cell membrane: Most cells use a phospholipid bilayer with inserted proteins as a cell membrane; however, bacterial cell membranes may contain hopanoids, which are absent in eukaryotic cell membranes.

Bloom's Rank: Analysis

Section: Cytoplasm of Eukaryotes

4) Describe the similarities and differences between mitochondria and chloroplasts.

Answer: Similarities: Both of these are eukaryotic organelles that are thought to have arisen from formerly free-living prokaryotic cells. They both contain 70S ribosomes and their own DNA that exists as a single, circular molecule. Both mitochondria and chloroplasts can produce ATP. They both have two phospholipid bilayer membranes. Both of these organelles use inner membranes to increase the surface area needed for their chemical reactions.

Differences: Chloroplasts are capable of gathering light energy and using it to create ATP and sugars in a process called photosynthesis, whereas mitochondria do not use light energy in the production of ATP.

Bloom's Rank: Application

Section: Cytoplasm of Eukaryotes

5) Describe how the structure of the bacterial cytoplasmic membrane relates to its function of selective permeability.

Answer: The structure and function of the cytoplasmic membrane are explained in the fluid mosaic model. The cytoplasmic membranes of bacterial cells are composed of phospholipids, which create a semipermeable barrier to the cell's outer environment. The only molecules that can easily cross the membrane are small, lipid soluble molecules. Other types of molecules must use the wide variety of transport proteins embedded in the phospholipid bilayer to cross the membrane. In this way, the cell can control the concentration of both its nutrients and its waste products. The cytoplasmic membrane can also be used for energy production and for photosynthesis in prokaryotic cells.

Bloom's Rank: Application

Section: Bacterial Cytoplasmic Membranes