

MULTIPLE CHOICE

1. Chitin is a component of _____ cell walls.
 - a. fungus
 - b. plant
 - c. bacterial
 - d. all of these

ANS: A DIF: B OBJ: 8-6
2. Which of the following organisms do not have cell walls?
 - a. plants
 - b. fungi
 - c. bacteria
 - d. animals

ANS: D DIF: B OBJ: 8-6
3. Which of the following is NOT true of membranes?
 - a. Folded membranes increase surface area for efficiency.
 - b. Folded membranes do not form compartments in the cell.
 - c. Endoplasmic reticulum is made up of folded membranes.
 - d. Ribosomes are sometimes attached to folded membranes.

ANS: B DIF: B OBJ: 8-5
4. Folded membranes are an advantage to a cell because _____.
 - a. cell processes can be more efficient
 - b. the membranes provide a large surface area
 - c. the membranes form interconnected compartments
 - d. all of these

ANS: D DIF: B OBJ: 8-5
5. Who concluded that all plants are made of living cells?
 - a. Virchow
 - b. Hooke
 - c. Schwann
 - d. Schleiden

ANS: D DIF: B OBJ: 8-3
6. All living things are made up of _____.
 - a. cells
 - b. cork
 - c. wastes
 - d. cellulose

ANS: A DIF: B OBJ: 8-3

7. What do electron microscopes use to focus and magnify an image?
 - a. glass lenses
 - b. X rays
 - c. electromagnets
 - d. light

ANS: C DIF: B OBJ: 8-2

8. A major difference between a compound light microscope and a transmission microscope is that a light microscope image _____.
 - a. requires thin slices
 - b. allows you to see fine detail of organelles
 - c. can be made from living, unstained materials
 - d. uses magnet lenses

ANS: C DIF: B OBJ: 8-2

9. In a typical animal cell, the cytoplasm occupies _____.
 - a. almost all the volume
 - b. a little more than half the volume
 - c. one quarter of the volume
 - d. a small part of the volume

ANS: B DIF: B OBJ: 8-6

10. Each of the following is a main idea of the cell theory except _____.
 - a. all organisms are composed of cells
 - b. the cell is the basic unit of organization of organisms
 - c. all cells are similar in structure and function
 - d. all cells come from preexisting cells

ANS: C DIF: B OBJ: 8-3

11. The scientist who first described living cells as seen through a simple microscope was _____.
 - a. van Leeuwenhoek
 - b. Schleiden
 - c. Hooke
 - d. Schwann

ANS: A DIF: B OBJ: 8-1

12. When a cell is ready to reproduce, its DNA is packed into _____.
 - a. chromosomes
 - b. chromatin
 - c. nucleoli
 - d. nucleoids

ANS: A DIF: B OBJ: 8-4

13. One advantage of electron microscopes over light microscopes is their _____.
- size
 - higher magnification
 - two-dimensional image
 - use of live specimens
- ANS: B DIF: B OBJ: 8-2
14. If a cell contains a nucleus, it must be a(n) _____.
- plant cell
 - eukaryotic cell
 - animal cell
 - prokaryotic cell
- ANS: B DIF: B OBJ: 8-1
15. Which of the following structures is the most complex?
- cell
 - organ system
 - organ
 - tissue
- ANS: B DIF: B OBJ: 8-6
16. In a chloroplast, the stacks of membranous sacs are called _____.
- stroma
 - grana
 - plastids
 - thylakoid membrane
- ANS: B DIF: B OBJ: 8-4
17. The term least closely related to the others is _____.
- cytoskeleton
 - microfilament
 - microtubule
 - cell junction
- ANS: D DIF: B OBJ: 8-4
18. Cell walls of multicellular plants are composed mainly of _____.
- cellulose
 - chitin
 - pectin
 - vacuoles
- ANS: A DIF: B OBJ: 8-4

COMPLETION

- Cell structures that contain digestive enzymes are _____.

ANS: lysosomes DIF: B OBJ: 8-4

- In a cell, the sites of protein synthesis are the _____.

ANS: ribosomes DIF: B OBJ: 8-4

- The small, membrane-bound structures inside a cell are _____.

ANS: organelles DIF: B OBJ: 8-4

- The movement of materials into and out of the cells is controlled by the _____.

ANS: plasma membrane DIF: B OBJ: 8-4

- An organism with a cell that lacks a true nucleus is a(n) _____.

ANS: prokaryote DIF: B OBJ: 8-1

- In a cell, the breakdown of molecules in order to release energy occurs in the _____.

ANS: mitochondria DIF: B OBJ: 8-4

- Short, hairlike projections used for locomotion are _____.

ANS: cilia DIF: B OBJ: 8-4

- Cells that have the same function are organized into _____.

ANS: tissues DIF: B OBJ: 8-6

- In plants, the structures that transform light energy into chemical energy are called _____.

ANS: chloroplasts DIF: B OBJ: 8-4

- The network of tiny rods and filaments that forms a framework for the cell is called the _____.

ANS: cytoskeleton DIF: B OBJ: 8-4

- The pigment that gives plants their green color is _____.

ANS: chlorophyll DIF: B OBJ: 8-4

- The folded system of membranes that forms a network of interconnected compartments inside the cell is called the _____.

ANS: endoplasmic reticulum DIF: B OBJ: 8-4

13. In a cell, the tangles of long strands of DNA form the _____.

ANS: chromatin DIF: B OBJ: 8-4

14. The functions of a eukaryotic cell are managed by the _____.

ANS: nucleus DIF: B OBJ: 8-4

15. A structure outside the plasma membrane in some cells is the _____.

ANS: cell wall DIF: B OBJ: 8-4

SHORT ANSWER

1. Based on your study of cells, argue for or against the following statement: "Cells in unicellular organisms are more complex than cells in multicellular organisms."

ANS: In multicellular organisms, many different kinds of cells work together to perform the necessary life functions. In unicellular organisms, the one cell must carry out all of the functions necessary for life and thus can be considered to be more complex.

DIF: A OBJ: 8-1

2. In plants, cells that transport water against the force of gravity are found to contain many more mitochondria than do some other plant cells. What is the reason for this?

ANS: Mitochondria are organelles that produce energy for cell reactions; active cells usually have more mitochondria than do less active cells. It would be reasonable to conclude that the number of mitochondria is in direct relation to the amount of work done by the cells.

DIF: A OBJ: 8-4

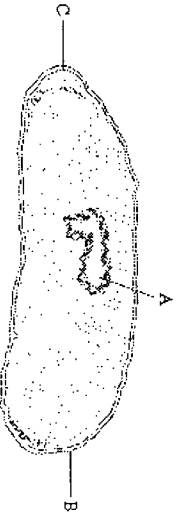


Figure 8-1

3. Figure 8-1 shows a light area with no surrounding membrane in the center of the cell. This area contains a single large DNA molecule. Would scientists classify this cell as a prokaryote or a eukaryote? Explain.

ANS: Scientists would classify this bacterium as a prokaryote because it has no membrane-bound internal structures and it does not have a distinct nucleus, even though it does contain a nucleoid with DNA.

DIF: B OBJ: 8-1

4. Identify the structures labeled A, B, and C in Figure 8-1.

ANS: A is the nucleoid; B is the cell wall; C is the plasma membrane.

DIF: B OBJ: 8-1

5. Folded membranes have important uses in the cell. Discuss at least four of these uses.

ANS: Membranes are useful for providing a surface for cell reactions. Efficiency of the cell processes is increased by folded membranes. Folded membranes can be used to make compartments. They also can be used to make canals for transport of substances.

DIF: A OBJ: 8-5

6. The inner membrane of the mitochondria is folded many times. What advantage does this folding provide?

ANS: The folds provide more surface area for cell reactions in a small space.

DIF: A OBJ: 8-5

7. At one time people believed that organisms could be formed spontaneously from nonliving matter. Evaluate this belief in light of the cell theory.

ANS: According to the cell theory, such a belief is unfounded. This is because all cells must come from preexisting cells, not from nonliving matter.

DIF: A OBJ: 8-3

8. What is the difference between an electron microscope and a compound microscope?

ANS: An electron microscope aims electrons at the specimen and uses magnets to focus the beam. A compound microscope aims light at the specimen and uses glass lenses to focus the light.

DIF: A OBJ: 8-2

9. Explain why scientists have only recently begun to understand how the cytoskeleton functions in the cell.

ANS: Until recently, the cytoskeleton could not be seen with existing microscopes. As more sophisticated microscopes were built, scientists were able to see the microtubule and microfilament structure in greater detail and determine their functions.

DIF: A OBJ: 8-1

10. Based on what you know about cells, why are microscopes important to the study of cells?

ANS: Because cells are tiny, they cannot be seen with the naked eye. Microscopes enlarge the image so that the parts of a cell can be identified.

DIF: A OBJ: 8-1

11. Between which cell types is the difference greater—plant and animal cells or prokaryotic and eukaryotic cells? Give reasons for your answer.

ANS: The difference between prokaryotic and eukaryotic cells is greater because these two types of cells differ in basic cell organization. Eukaryotic cells are characterized by membrane-bound organelles. Prokaryotic cells do not have membrane-bound organelles and must carry on all essential life processes without them. Plant and animal cells are both eukaryotic and have many organelles in common (for example, nucleus, mitochondria, ER, Golgi apparatus, lysosomes). Animal cells lack a cell wall and the plastids found in plant cells.

DIF: A OBI: 8-6

12. The stomach lining contains mucus, which helps prevent the digestion of the stomach lining. If this mechanism fails, digestive enzymes in the stomach cause the stomach to digest itself, producing an ulcer. Compare this process with the way lysosomes prevent destruction of the cell's proteins.

ANS: Lysosomes also contain digestive enzymes, but the membrane surrounding a lysosome prevents these enzymes from leaving the lysosome and destroying the cell's proteins. If the lysosome membrane should break down, the contents would digest the cell's proteins just as the stomach enzymes may digest the stomach.

DIF: A OBI: 8-4

13. Many types of animal cells have a thin, flexible cell covering outside the plasma membrane. This cell covering, called a glycocalyx, consists of complex carbohydrates bonded to the proteins and lipids in the plasma membrane. How is the glycocalyx similar to the cell wall of a green plant? How is it different?

ANS: Both the glycocalyx and the cell wall surround the plasma membrane. The cell wall is made of cellulose and is fairly thick, stiff, and rigid; the glycocalyx is a complex carbohydrate that is thin and flexible. The glycocalyx is bonded to the plasma membrane; the cell wall is not.

DIF: A OBI: 8-6

For many years, scientists thought of the nucleus as "a bag of chromatin floating in a sea of cytoplasm." Using electron microscopes, scientists saw that the nucleus was much more complex. The nuclear envelope was two layered and covered with pores.

Scientists began further research. Scientist S punched small holes in the nuclear envelope, allowing the contents to pour out. He observed that the nucleus retained its spherical shape. From this, scientist S hypothesized that the nucleus had some other structural framework, beyond the membrane itself. The next experiment performed by scientist S revealed that the nucleus indeed had a fibrous protein framework, now called the nuclear matrix.

Three other scientists repeated this experiment, but each changed one part of it. Scientist X used detergents and salt to remove the nuclear contents. Scientist Y used chemicals, and scientist Z used enzymes. All three observed that a nuclear matrix remained.

Further electron microscopy revealed that the chromatin strands were anchored to a fibrous layer that lines the inner layer of the nuclear envelope.

14. Describe a procedure to determine whether the attachment of the chromatin to the nuclear envelope is necessary for the chromatin to become chromosomes.

ANS: Answers may vary. A scientist could detach chromatin strands from the fibrous layer and observe whether or not chromosomes form when the cell is ready to reproduce.

DIF: A OBI: 8-4

15. Why did scientists X, Y, and Z use different substances to remove the nuclear contents?

ANS: to demonstrate that the nuclear matrix did not result from any chemical reactions but actually existed as an independent structure

DIF: A OBI: 8-4

16. What was the variable in the experiments by scientists X, Y, and Z?

ANS: The variable was the method and substance used to remove the contents of the nucleus. Each scientist used a different substance.

DIF: A OBI: 8-4

17. Why did scientists X, Y, and Z carry out their experiments?

ANS: to verify or disprove the presence of a nuclear matrix reported by scientist S

DIF: A OBI: 8-4

18. What observation from scientist S's second experiment supported the original hypothesis?

ANS: A fibrous protein network (nuclear matrix) was observed to be present in the nucleus.

DIF: A OBI: 8-4

19. What was the hypothesis of scientist S in his first experiment?

ANS: that the nucleus would retain its shape even when its contents were removed

DIF: A OBI: 8-4