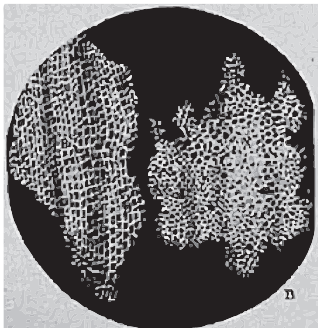


17—Cells

A ¹The **cell** is the basic unit of structure and function of all living things. ²Cells work together to keep organisms alive. ³Some organisms, like bacteria, are only as big as a single cell. ⁴Other organisms, animals, and humans are made up of many different kinds of cells. ⁵Most cells, both plant and animal, range in size between 1 and 100 micrometers and are visible only with a microscope.

B ⁶Robert Hooke, an English scientist, was the first to see actual cells. ⁷In 1665, Hooke invented a microscope that helped him view and sketch the cells that made up a thinly sliced piece of cork. ⁸The cork seemed to be made of little boxes, so he called them cells.

C ⁹In 1673, another scientist, Anton van Leeuwenhoek, began studying single-celled living organisms. ¹⁰Leeuwenhoek was the first to observe living single-celled bacteria and paramecia in great detail.



Cork cells as seen through a microscope.

D ¹¹By the 1800s, better microscopes were being made, and scientists were able to combine their studies of cells. ¹²Their ideas were put together into a **theory**, which is an idea that is supported by data. ¹³Two German scientists, Matthias Schleiden and Theodor Schwann, can be credited for The Cell Theory. ¹⁴Together, they recognized and stated that all living things are made of cells.

E ¹⁵About 15 years later, German scientist Rudolf Virchow concluded that cells didn't form on their own. ¹⁶Scientists had thought that cells formed from air or nothing! ¹⁷Virchow believed that cells divided from an existing cell to form new cells. ¹⁸Discoveries and observations by many

histologists (scientists who study cells) led to one of the major theories in science – **The Cell Theory**.

The Cell Theory states that:

- ¹⁹All living things are made of one or more cells.
- ²⁰Cells are the basic units of living things.
- ²¹All cells come from other cells.

F ²²All cells fall into one of two major classifications: prokaryotes and eukaryotes. ²³**Prokaryotes** were on Earth first and for billions of years were the only form of life. ²⁴They are single-celled organisms with no defined **nucleus** that can live on their own. ²⁵The nucleus is the largest, most visible part of a cell and is the control center of the cell's activities. ²⁶Bacteria and pond scum make up most of the prokaryotes classification.

G ²⁷**Eukaryotes** are more advanced than prokaryotes because each of their cells has a true nucleus inside a membrane. ²⁸In eukaryotic organisms, the nucleus is the largest, most visible part of the cell and is the control center of the cell's activities. ²⁹The **membrane** gives the cell its shape and helps control water and other substances that move in and out of the cell. ³⁰Eukaryotic organisms are usually multi-cellular organisms. ³¹Plant and animal cells fall into this classification.

H ³²Although plant and animal cells are similar inside, there are major differences. ³³Plant cells can make their own food, but animal cells cannot. ³⁴Plants use a process called photosynthesis, which converts sunlight, water, and carbon dioxide into food energy (sugars and starches), oxygen, and water.

I ³⁵Another major difference is that while many animals have skeletal structures to provide support for their shape, plants rely only on cell walls for their form. ³⁶A cell wall is a nonliving, stiff outer covering that gives plant cells support and structure. ³⁷Without cell walls, flowers, plants, bushes, and trees would just flop over in a spongy mess!

1. For each statement, circle T for true and F for false. If the statement is false, replace the **bold word(s)** to make the statement true. Then write the number of the sentence(s) that best supports your answer.

a. T F **Cells** are the basic unit of life.

b. T F Anton Van Leeuwenhoek was the first to observe **one-celled** living organisms. _____

c. T F **Prokaryotes** are one-celled organisms with no defined nucleus.

d. T F Plant cells have a stiff **cell wall** while animal cells do not. _____

2. What is the function of a cell's nucleus?
- a. converts sunlight, water, and carbon dioxide into food energy
 - b. provides structure for the organism
 - c. controls cell activity
 - d. gives the cell its shape

Write the number of the sentence that best supports your answer. _____

3. What is the most likely meaning of the word **defined** as it appears in paragraph F?
- a. explained
 - b. specified
 - c. exact meaning
 - d. show the form or outline

4. According to the lesson, Robert Hooke invented a microscope to view cells. What other scientific information helped with developing The Cell Theory?

5. Refer to the lesson to explain the statement, "all cells are not created equal."

Write the numbers of the three sentences that best support your answer.

_____, _____, _____

6. Refer to paragraph E, which states The Cell Theory. Select one statement from The Cell Theory and explain it in your own words.

In 1665, Robert Hooke observed cork cells through a microscope that he built. By 1838, Matthias Schleiden determined that every plant is made up of cells. In 1839, Theodor Schwann concluded that animals are also made up of cells. Since then, scientists have classified millions of plants and animals and, as different as they all are, every one of them is made of cells. Organisms that have many cells usually have many different kinds of cells within their structure. Each of these different cells has a different function.

7. Why do you think cells were not observed before the 1600s?

Lesson 17, Cells

1. a. T (1); b. T (10); c. T (24); d. T (35)
2. c (25)
3. d
4. Anton van Leeuwenhoek was the first to observe living single-celled bacteria and paramecia. By the 1800s, better microscopes helped scientists combine their studies of cells into a theory. Schleiden and Schwann stated that all living things are made of cells. Rudolf Virchow also contributed to The Cell Theory because he concluded that cells don't form on their own.
5. Prokaryotes were on Earth first and, for billions of years, were the only form of life. They are single-celled organisms with no defined nucleus that can live on their own. Eukaryotes are more advanced than prokaryotes because each of their cells has a true nucleus inside a membrane. (23,24,27)
6. Answers will vary.
7. Cells were not observed before the 1600s because microscopes weren't invented until 1665.
8. Blood cells are different from skin cells because they have different functions to perform.
9. – 10. 1665-Robert Hooke invented the microscope.
1673-Anton van Leeuwenhoek observed living single-celled bacteria and paramecia.
1800s-Matthias Schleiden and Theodor Schwann stated that all living things are made of cells.
1815(aprox.)-Rudolf Virchow concluded that cells don't form on their own.