

# 2-2 What are cells?

## INVESTIGATE



### Looking at Onion Cells

#### HANDS-ON ACTIVITY

1. Peel off a very thin layer of onion tissue with a pair of tweezers.
2. Carefully place a small piece of onion tissue on a clean slide. Try to keep the onion tissue very flat. Then, put a drop of stain on top of it.
3. Place a cover slip on the slide.
4. Place the slide on the microscope. Use the low power of the microscope to observe the onion tissue. Draw a picture of what you see.

**THINK ABOUT IT:** What part of the onion tissue does the microscope help you see?

### Objective

Explain the cell theory.

### Key Term

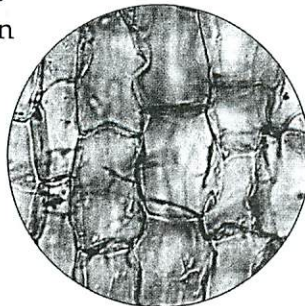
**cell:** basic unit of structure and function in living things

**Cells** A brick house is made up of many bricks. A brick is the basic unit of structure of a brick house. The basic unit of structure in living things is a **cell**. All living things are made up of one or more cells.

Cells carry out all life processes. For example, a cell takes in and breaks down food. It breaks down a simple sugar called glucose (GLOO-kohs) to produce energy. This life process is called cellular respiration.

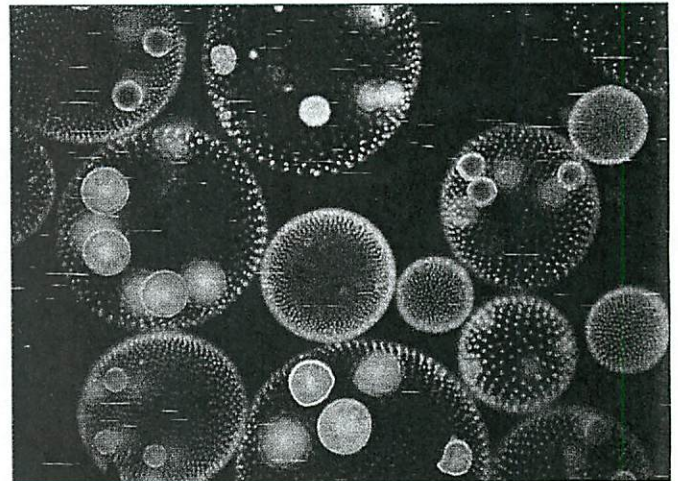
**1** DEFINE: What is a cell?

**Discovery of Cells** The first person to observe and describe cells was Robert Hooke, an English scientist. He used a light microscope to look at thin slices of cork. Cork is found in some plants. The cork seemed to be made up of many small boxes. Hooke named the structures that made up the cork "cells." In 1665, he published his drawings of cork cells in his book, *Micrographia*.



▲ **Figure 2-5** Robert Hooke saw cork cells like these.

Hooke saw only dead plant cells in the cork. Anton van Leeuwenhoek (van LAY-vuhn-huk) was the first person to observe and describe living cells. Van Leeuwenhoek was a Dutch lensmaker. In 1674, he saw single-celled organisms swimming in a drop of pond water. These living things were microscopic. They could not be seen without a microscope.



▲ **Figure 2-6** Microscopic organisms like these volvox live in pond water.

**2** NAME: Who was the first person to see cells?

**Cell Theory** By 1800, inventors were developing more advanced microscopes. These microscopes allowed scientists to see plants and animals in more detail. Scientists developed many ideas about cells.

Matthias Schleiden (SHLY-duhn) was a German botanist. Schleiden studied many plants in order to learn more about living things. In 1838, Schleiden stated that all plants are made up of cells.

Theodor Schwann (SHVAHN) was a German zoologist. He studied many animals. Schwann said the cell is the basic unit of structure in animals. Schwann published his ideas in 1839.

Rudolph Virchow (FUR-koh) was a doctor in Germany. He also studied cells. In 1855, Virchow said that new cells come from cells that already exist. In other words, he said that cells divide to create new cells.

In the mid-1800s, these ideas were put together as a theory. The ideas in a theory are supported by observations and data again and again. The theory that was developed is called the cell theory. The cell theory states that

- all living things are made up of one or more cells.
- cells are the basic units of structure in living things, and cells carry on all life processes.
- cells come only from other living cells.

**3** RESTATE: What does the cell theory state?

## ✓ CHECKING CONCEPTS

1. What is the basic unit of structure in living things?
2. What did Anton van Leeuwenhoek see in a drop of pond water?
3. Where do cells come from?
4. Whose ideas make up the cell theory?

## 💡 THINKING CRITICALLY

5. RELATE: How did improved microscopes lead to more discoveries about cells?
6. ANALYZE: Why did the cell theory include the research of Schleiden, Schwann, and Virchow?

### Web InfoSearch

**SEARCH:** Use the Internet to write a report about one of the scientists who contributed to the cell theory. Start your search at [www.conceptsandchallenges.com](http://www.conceptsandchallenges.com). Some key search words are Theodor Schwann, Matthias Schleiden, and Rudolph Virchow.



## People in Science

### CELL BIOLOGISTS

Cell biologists study how cells work, grow, and reproduce. Many cell biologists study cells to find out more about diseases. They examine healthy cells and sick cells. They hope that by studying cells, they will be able to find cures for diseases such as cancer and AIDS.

Donella Wilson is a cell biologist who studies red blood cells. Red blood cells carry oxygen to all the cells in the body. Wilson's research about red blood cells may lead to a cure for sickle cell anemia. Sickle cell anemia is an inherited blood disease that prevents red blood cells from carrying oxygen to the organs. Without oxygen, the organs cannot function properly. As a result, people with sickle cell anemia can die.

To become a cell biologist, Wilson studied chemistry and biology. She earned a degree in immunology, which is the study of how the body fights diseases. She has received many awards for her research, including the National Science Foundation Research Opportunity Award.

**Thinking Critically** Why do you think Dr. Wilson has received awards for her research?



▲ **Figure 2-7**  
Donella Wilson's research may help people with abnormal red blood cells like the one shown.