

Section 7.1

The Discovery of Cells



SC.H.1.4.5 The student understands that new ideas in science are limited by the context in which they are conceived, are often rejected by the scientific establishment, sometimes spring from unexpected findings, and usually grow slowly from many contributors.

► Before You Read

This section introduces cells. Skim the reading below and find two important facts about cells. Write those two facts in the space below.

► Read to Learn

STUDY COACH

Mark the Text

Identify

Scientists Underline each scientist's name introduced in this section. Say the name aloud. Then highlight the sentence that explains the main contribution the person made to biology.

The History of the Cell Theory

The invention of microscopes made it possible for scientists to view and study cells. **Cells** are the basic units of living organisms. In the 1600s, Anton van Leeuwenhoek (LAY vun hook) used a single lens microscope to view bacteria, which until then could not be seen. Later, **compound light microscopes** used several lenses and could magnify objects up to 1500 times their original size.

The scientist Robert Hooke looked at thin slices of cork under a compound microscope. Thinking the small shapes he saw looked like small rooms, he called them cells.

By the 1800s, microscopes had been improved, allowing scientists to make other important observations. First, Robert Brown, a Scottish scientist, discovered that cells had an important inner compartment, the **nucleus** (NEW klee us). Then, Rudolf Virchow figured out that the nucleus controls the cell's activities. Later, two German biologists, Matthias Schleiden and Theodor Schwann, did their own experiments and learned that all living things are made of one or more cells.

Section

7.1

The Discovery of Cells, *continued***What is cell theory?**

The experiments of Schleiden, Schwann, and other scientists led to the development of what is called the **cell theory**. It is one of the fundamental ideas of the science of biology. The three main parts of the cell theory are summarized below:

1. All living things are made of one or more cells.
2. Cells are the basic units of structure and function in living things.
3. All cells come from other cells. ✓

How do microscopes help scientists learn about cells?

In the 1930s and 1940s, microscopes were improved. **Electron microscopes** allowed scientists to magnify an object up to 500 000 times using a beam of electrons instead of a beam of light. A scanning electron microscope (SEM) lets scientists see a cell's three-dimensional shape. A transmission electron microscope (TEM) lets scientists see the structures inside a cell.

Microscopes are continually being improved so scientists can gather more information about cells.

Two Basic Cell Types

Using microscopes, scientists saw that all cells contain small structures called **organelles**. Each organelle has a specific function in the cell. Some cell organelles are held together by a membrane, but others are not.

Scientists group cells into two categories—cells that have membrane-bound organelles and cells that do not. Cells that do not contain membrane-bound organelles are called **prokaryotes** (pro kar ee AWTs). Unicellular organisms, such as bacteria, are prokaryotes.

If the cell has organelles that are held together by a membrane, the cell is called a **eukaryote** (yew kar ee AWT). Most cells you can think of are eukaryotic. These include most of the multicellular organisms you know. Having membrane-bound organelles is an advantage for eukaryotic cells because chemical reactions in different parts of the cell can happen at the same time.

Eukaryotic cells have a central organelle called a nucleus that controls all of the cell's activities. Prokaryotes do not have an organized nucleus. Instead, they have loose strands of DNA. ✓

 Reading Check

1. What are the three main ideas of cell theory?

 **Think it Over**

2. **Compare** Which cells are more complex? (Circle your choice.)
- a. prokaryotic
 - b. eukaryotic

 Reading Check

3. What does a nucleus do?

Section

7.1

The Discovery of Cells, *continued*

► After You Read

Mini Glossary

cell: the basic unit of all living things

cell theory: theory that states all organisms are made of one or more cells; the cell is the basic unit of organisms; and all cells come from preexisting cells

compound light microscope: microscope using a series of light and lenses to magnify objects

electron microscope: microscope using a beam of electrons instead of lenses to magnify objects

eukaryote (yew kar ee AWT): unicellular or multicellular organisms (like yeast, plants, and animals) that contain a nucleus and membrane-bound organelles

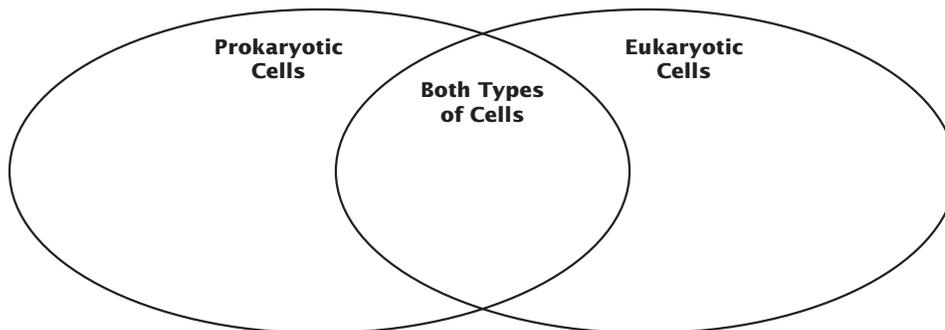
nucleus (NEW klee us): the cell organelle that controls the cell's activities and contains DNA

organelle: membrane-bound structures with particular functions within some cells

prokaryote (pro kar ee AWT): unicellular organisms (like bacteria) that lack membrane-bound organelles

1. Circle two terms from the Mini Glossary above that are related to each other. On the lines below, tell how these terms are related.

2. Use the Venn diagram below to help you review what you have read. List what makes prokaryotic and eukaryotic cells different. Then list their common characteristics in the middle.



3. Write the three main ideas of the cell theory in the spaces below.

The Cell Theory

--	--	--



Visit the Glencoe Science Web site at science.glencoe.com to find your biology book and learn more about the discovery of cells.