

## SECTION 1-1

## SECTION SUMMARY

## Discovering Cells

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Guide for  
Reading

- ◆ How did the invention of the microscope contribute to scientists' understanding of living things?
- ◆ What is the cell theory?
- ◆ How does a lens magnify an object?

**C**ells are the basic units of structure and function in living things. Most cells are too small to be seen with the naked eye. **The invention of the microscope made it possible for people to discover and learn about cells.**

A **microscope** is an instrument that makes small objects look larger. Some microscopes do this by using lenses to focus light. A simple light microscope contains only one lens. A light microscope that has more than one lens is called a **compound microscope**.

One of the first people to observe cells was Robert Hooke. In 1663, Hooke observed the structure of a thin slice of cork using a compound microscope he had built himself. At about the same time, Anton van Leeuwenhoek began to construct microscopes and use them to observe tiny objects. Leeuwenhoek was the first person to see the single-celled organisms that are now called bacteria.

In 1838 Matthias Schleiden concluded that all plants are made up of cells. The next year, Theodor Schwann concluded that all animals are also made up of cells. In 1855 Rudolf Virchow proposed that new cells are formed only from existing cells. The observations and conclusions of Hooke, Leeuwenhoek, Schleiden, Schwann, Virchow, and others led to the development of the **cell theory**. **The cell theory states: all living things are composed of cells; cells are the basic unit of structure and function in living things; all cells are produced from other cells.**

For a microscope to be useful, it must combine two important properties—magnification and resolution. **Magnification** is the ability to make things look larger than they are. **The lens or lenses in a light microscope magnify an object by bending the light that passes through them.** A lens that magnifies is thicker in the center than at the edges and is called a **convex lens**. Because a compound microscope uses more than one lens, it can magnify an object more than a simple microscope. The total magnification of a compound microscope is equal to the magnifications of the two lenses multiplied together. The ability to clearly distinguish the individual parts of an object is called **resolution**. Resolution is another term for the sharpness of an image.

Since the 1930s, scientists have developed different types of electron microscopes, which use a beam of electrons instead of light to examine a specimen. Because they use tiny electrons to produce images, the resolution of electron microscopes is much better than the resolution of light microscopes.