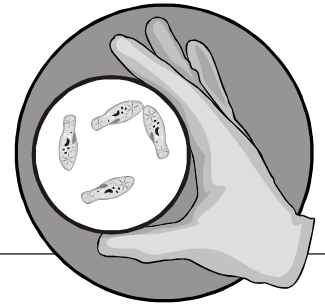


# Cell Structure and Function

## Section 5.1 Cell Theory



### Pre-View 5.1

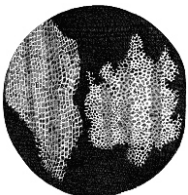
- **Cell** – the smallest unit of life
- **Robert Hooke** – first to observe cells; gave cells their name
- **Anton van Leeuwenhoek** – first to observe living cells
- **Matthias Schleiden** and **Theodor Schwann** – first to introduce the idea that all living things are made up of cells
- **Rudolf Virchow** – first to introduce the idea that cells are created from other preexisting cells
- **Cell theory** – theory that all living organisms are composed of units called cells, that cells are the basic unit of structure and function of living organisms, and that all cells come from other living cells

In Section 4, you saw that all things are made up of chemical **elements**, such as hydrogen, oxygen, carbon, nitrogen, iron, etc. The smallest particle of any element is called an **atom**. You also saw that atoms of one or more elements combine to form chemical compounds. Examples of simple chemical compounds are water, carbon dioxide, and iron oxide (rust). More complex compounds include carbohydrates, DNA, and proteins.

So if atoms of different elements make up all things, what makes the difference between living things and non-living things? The answer to that question is the organization of elements into cells. A **cell** is the smallest unit of life. Some living things, such as bacteria, are composed of only one cell. Other living things, such as a human being or an oak tree, are made up of many cells. In biology, there is a lot to know about cells, so let's start with a little history.

### Historic Discoveries

Look around you. Unless you were told, how would you know that you are made up of trillions of cells? It wasn't until the invention of microscopes that people were able to discover these "building blocks" of living things.



#### Robert Hooke

In 1665, **Robert Hooke** built a crude compound microscope and examined thin slices of cork. By using the microscope, he observed that the cork was made up of "many little boxes." He named these "little boxes" *cells*. So Robert Hooke is credited with first discovering and naming cells. What he observed was simply the cell walls of dead plant cells.

#### Anton van Leeuwenhoek

**Anton van Leeuwenhoek** was a microscope maker. In 1674, he was the first person to observe *live* cells under a microscope. He observed algae, protozoa, bacteria, red blood cells, and many other types of microscopic organisms.



## Section 5.1, continued

### Cell Theory

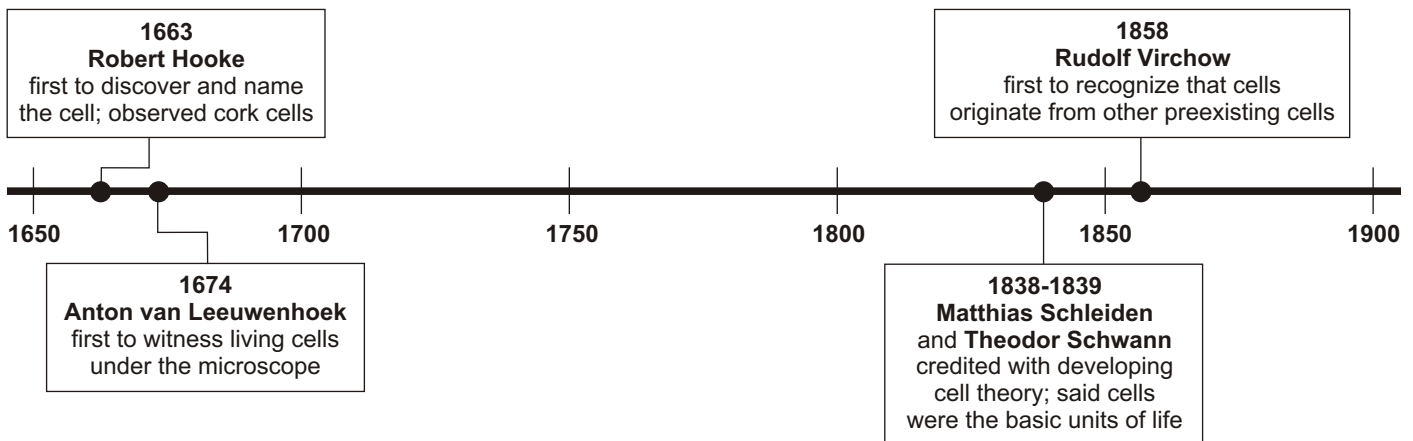
#### Matthias Schleiden and Theodor Schwann

**Matthias Schleiden** was a botanist who studied plant cells. **Theodor Schwann** was a zoologist who studied animal cells. In 1838, Schleiden concluded that all plants were made up of cells. In 1839, Schwann came to the same conclusion about animal cells. Together, these two men helped to formulate part of our modern cell theory, which states that all living things are made up of one or more cells.

**Hint:** To help you remember who studied animal cells and who studied plant cells, Schwann's name contains the letter *a* for *animal*. Or remember that *Schwann* is similar to *swan*, an animal (bird).

#### Rudolf Virchow

**Rudolf Virchow** was a physician who studied how diseases affected cells. He strongly supported Schleiden and Schwann's cell theory that all living things are made up of cells. However, in 1858 Virchow was the first to recognize that cells originate from other cells. (Before this time, it was believed that cells formed on their own.) This idea that cells are formed from other cells makes up the remainder of our modern cell theory.



### Modern Cell Theory

Hooke and Leeuwenhoek were the first to view cells. About 150 years later, Schleiden, Schwann, and Virchow were able to organize this earlier work into a theory about all cells. Each of these scientists was important to the development of our modern theory of cells, which is called the **cell theory**. It has the following three parts.

#### Cell Theory

- All living things are made up of one or more cells.
- The cell is the basic unit of structure and function in a living organism.
- All cells come from the reproduction of preexisting cells.