

Cell Structure and Function

Section I: The Discovery of Cells



Cells are the smallest and most basic units of life. They form the foundation of all living things. Some organisms, such as bacteria, consist of just one simple cell, while plants and animals are made of many more complex cells. For much of human history, however, cells remained unknown because they are too small to be seen with the naked eye.

The invention of the microscope changed that. Microscopes allowed scientists to observe cells and discover that they contain many specialized parts, each with important functions. One common type, the **compound microscope**, uses two or more lenses to magnify objects and is often found in biology labs. In 1665, English scientist Robert Hooke used an early compound microscope to examine a thin slice of cork. He noticed tiny boxlike structures and called them “cells.”

As technology improved, microscopes became even more powerful. The **electron microscope** uses electron beams instead of light to produce highly magnified images. A transmission electron microscope, or TEM, allows scientists to see structures inside a cell. A scanning electron microscope, or SEM, produces detailed images of a cell's surface and three-dimensional shape. Another tool, the **scanning probe microscope**, creates images by tracing a specimen's surface with a tiny probe.

These advances helped scientists better understand how living things are organized and led to the development of one of biology's most important ideas: cell theory. **Cell theory** states that all living things are made of one or more cells, cells are the basic units of structure and function in living things, and all cells come from preexisting cells.

Cell Theory



1. All living things are made of one or more cells.

2. Cells are the basic unit of structure and function in all living things.

3. All cells come from other cells.

Cell Structure and Function

Section I: The Discovery of Cells Cont.

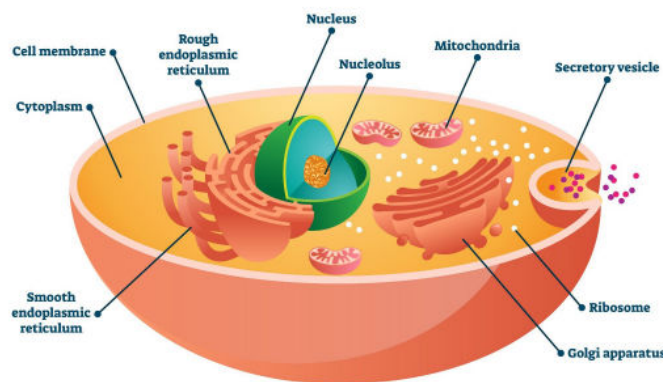
Throughout the history of scientific exploration, many scientists have made important discoveries that have shaped our understanding of cells and how they function.

Scientist	Contribution to Cell History
Hans & Zacharias Jansen – 1590	Invented the compound microscope, which allowed for the first observations of cells and their structures.
Rudolph Virchow – 1850	Proposed that cells arise only from pre-existing cells, introducing the concept of cell division and laying the groundwork for modern cell theory.
Rosalind Franklin – 1952	A chemist who used X-ray crystallography to capture the first image of DNA's structure, which was crucial to understanding DNA's double helix shape.
Walter Fleming – 1882	Discovered and described chromosomes during cell division, leading to the understanding of their role in heredity and cell reproduction.
Robert Brown – 1833	Discovered the cell nucleus in plant cells, which led to the understanding that cells contain various structures with specific functions.
Matthias Schleiden – 1838	Proposed that all plants are composed of cells, contributing to the development of the cell theory.
Anton von Leeuwenhoek – 1670	Developed powerful microscopes and was the first to observe and describe microorganisms, including bacteria and protists, as well as human blood cells.
Barbara McClintock – 1940	Discovered "jumping genes" in corn, demonstrating that genes can change position within the genome. Her work challenged the static view of the genome and contributed to understanding gene regulation and cell variability.
Theodore Schwann – 1839	Alongside Matthias Schleiden, proposed that all animals are composed of cells, contributing to the development of the cell theory.
Ernest Everett Just – 1939	Pioneered research on fertilization and cell behavior, particularly in marine invertebrates, contributing to the understanding of cellular processes and development.
Robert Hooke – 1665	Coined the term "cell" after observing cork under a microscope. His observations and drawings laid the foundation for the study of cells as basic units of life.

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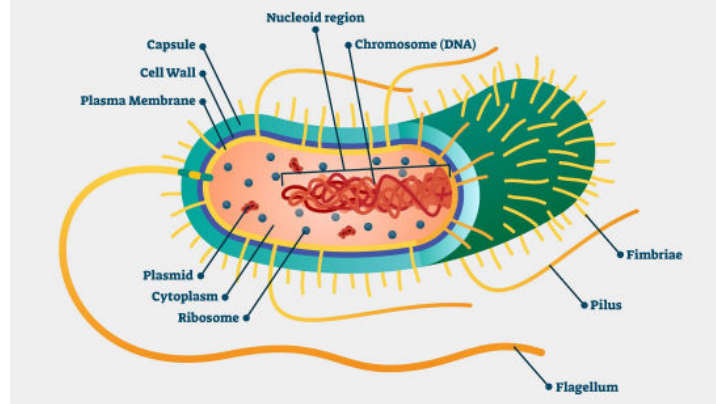
All cells contain small structures called **organelles**, each of which performs a specific function that helps the cell survive and operate. Cells are classified into two main types: prokaryotic cells and eukaryotic cells. **Prokaryotic** cells were the first to evolve and are generally smaller and simpler in structure. They do not have a true nucleus or membrane-bound organelles. Bacteria and archaea are examples of prokaryotic organisms. **Eukaryotic** cells are more complex. They have a nucleus enclosed by a membrane, as well as other membrane-bound organelles that carry out specialized tasks within the cell. Protists, fungi, plants, and animals are all made of eukaryotic cells.



EUKARYOTIC CELL

VS

PROKARYOTIC CELL



Review:

1. How did the invention of the microscope contribute to our understanding of cells?
2. What is cell theory?
3. Explain how prokaryotic and eukaryotic cells are different.