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2025-2026

((Cell Biology))

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**Introduction
to Cell Biology**

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The Cell

The cell (from Latin cell **meaning** small room) is the basic structural, functional and biological unit of all known organisms. A cell is the smallest unit of life. Cells are often called the building blocks of life. The study of cell is called Cell Biology, Cellular Biology or **Cytology**.

Cell biology, is the branch of biological science that studies the structure, function, and behavior of cells. Cells are the fundamental structural and functional units of all living organisms, forming the basic building blocks of life. From single-celled organisms such as bacteria to complex multicellular organisms like humans, every living being depends on the proper functioning of cells.

The study of cell biology focuses on understanding **cellular components, including the cell membrane, cytoplasm, nucleus, and various organelles**, as well as **the processes that occur within cells such as metabolism, cell division, communication, and energy production**. By examining how cells grow, reproduce, and interact with their environment, scientists gain insight into how tissues, organs, and entire systems function.

Cell biology **plays a crucial role in advancing medicine, biotechnology, genetics, and molecular biology**. Many diseases, including cancer and genetic disorders, originate from cellular dysfunction. Therefore, understanding cellular mechanisms helps in developing new treatments and medical technologies.

In 1665, the cell was discovered by **Robert Hook**. It is a small united area where all kinds of actions and reactions collectively take place. Some cells have membrane- bound organelles and some do not have. Depending upon the internal structure of the cell, two types of cells are found in an organism namely



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Eukaryotic and Prokaryotic. Organisms that are made up of single cells are known as single-celled **unicellular** organisms and from many cells are known as **multi-cellular** organisms.

The Cell Theory:

The cell theory includes four principles in modern biology:

- 1-All organisms are composed of one or more cells. While many organisms, such as the bacteria, are single-celled **unicellular**, other organisms, including humans and plants, are **multicellular** within the life processes of metabolism and heredity occur.
- 2-Cells are the smallest living things.
- 3- Addition cells are not originating at present, rather, life on earth represent a continuous line of descent from those early cells.
- 3- Cells arise only by the division of previously existing cell.

The functions of cells:

- 1- The capacity to extract energy from the environment and change it from one form to another.
- 1- The capacity to use this energy to build more organic molecules to maintain themselves and grow.
- 2- The capacity to deal with the environment selectively.
- 3- The capacity to reproduce.

In general, the smallest living microorganism on the earth is the viruses while the smallest unicellular microorganisms are the mycoplasma. But the biggest living organism is the Sequoia plant (red wood tree).

Prokaryotes and Eukaryotes



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Biologists classify cells into two broad categories the Prokaryotes and Eukaryotes. The primary difference between a prokaryotic cell and a eukaryotic cell is the presence or absence of a nucleus, a membrane-bound structure that houses the DNA. Prokaryotic cells lack a nucleus, whereas eukaryotic cells possess a nucleus. Despite their differences, both types of cells have a plasma membrane, a membrane that regulates what enters and exists a cell.

A comparison between Prokaryotic cell as in bacteria and Eukaryotic cell as a plant

Prokaryotic Cell	Eukaryotic Cell
Nucleus is absent	Nucleus is present
Membrane-bound nucleus absent.	Membrane-bound Nucleus is present.
Cell wall chemically complex	Cell wall is present in plants and fungi and chemically simpler
Mitochondria absent	Mitochondria present
One chromosome is present, but not true chromosome plastids	More than one number of chromosomes is present.
Chloroplasts absent; chlorophyll scattered in the cytoplasm	Chloroplasts present in plants
Vacuoles absent	Vacuoles present
Sexual reproduction is absent divided by binary fission	Sexual reproduction is present divided by mitosis meiosis
Golgi apparatus absent	Golgi apparatus present

