

Cells are the basic, fundamental unit of life. So, if we were to break apart an organism to the cellular level, the smallest independent component that we would find would be the cell.

Explore the cell notes to know what is a cell, cell definition, cell structure, types, and functions of cells. These notes have an in-depth description of all the concepts related to cells.

Cell Definition *A cell is defined as the smallest, basic unit of life that is responsible for all of life's processes.*

Cells are the structural, functional, and biological units of all living beings. A cell can replicate itself independently. Hence, they are known as the building blocks of life.

Each cell contains a fluid called the cytoplasm, which is enclosed by a membrane. Also present in the cytoplasm are several biomolecules like proteins, nucleic acids and lipids. Moreover, cellular structures called cell organelles are suspended in the cytoplasm.

What is a Cell?

A cell is the structural and fundamental unit of life. The study of cells from its basic structure to the functions of every cell organelle is called Cell Biology. Robert Hooke was the first Biologist who discovered cells.

All organisms are made up of cells. They may be made up of a single cell (unicellular), or many cells (multicellular). Mycoplasmas are the smallest known cells. Cells are the building blocks of all living beings. They provide structure to the body and convert the nutrients taken from the food into energy.

Cells are complex, and their components perform various functions in an organism. They are of different shapes and sizes, pretty much like bricks of the buildings. Our body is made up of cells of different shapes and sizes.

Cells are the lowest level of organisation in every life form. From organism to organism, the count of cells may vary. Humans have the number of cells compared to that of [bacteria](#).

Cells comprise several cell organelles that perform specialised functions to carry out life processes. Every organelle has a specific structure. The hereditary material of the organisms is also present in the cells.

Discovery of Cells Discovery of cells is one of the remarkable advancements in the field of science. It helped us know that all the organisms are made up of cells, and these cells help in carrying out various life processes. The structure and functions of cells helped us to understand life in a better way.

Who discovered cells?

Robert Hooke discovered the cell in 1665. Robert Hooke observed a piece of bottle cork under a compound microscope and noticed minuscule structures that reminded him of small rooms. Consequently, he named these “rooms” as cells. However, his compound microscope had limited magnification, and hence, he could not see any details in the structure. Because of this limitation, Hooke concluded that these were non-living entities.

Later Anton Van Leeuwenhoek observed cells under another compound microscope with higher magnification. This time, he had noted that the cells exhibited some form of movement (motility). As a result, Leeuwenhoek concluded that these microscopic entities were “alive.” Eventually, after a host of other observations, these entities were named as animalcules.

In 1883, Robert Brown, a Scottish botanist, provided the very first insights into the cell structure. He was able to describe the nucleus present in the cells of orchids.

Characteristics of Cells

Following are the various essential characteristics of cells:

- Cells provide structure and support to the body of an organism.
- The cell interior is organised into different individual organelles surrounded by a separate membrane.
- The nucleus(major organelle) holds genetic information necessary for reproduction and cell growth.
- Every cell has one nucleus and membrane-bound organelles in the cytoplasm.

- Mitochondria, a double membrane-bound organelle is mainly responsible for the energy transactions vital for the survival of the cell.
- Lysosomes digest unwanted materials in the cell.
- Endoplasmic reticulum plays a significant role in the internal organisation of the cell by synthesizing.

Types of Cells

Cells are similar to factories with different labourers and departments that work towards a common objective. Various types of cells perform different functions. Based on cellular structure, there are two types of cells:

- Prokaryotes
- Eukaryotes

Prokaryotic Cells

1. Prokaryotic cells have no nucleus. Instead, some prokaryotes such as bacteria have a region within the cell where the genetic material is freely suspended. This region is called the nucleoid.
2. They all are single-celled microorganisms. Examples include archaea, bacteria, and cyanobacteria.
3. The cell size ranges from 0.1 to 0.5 μm in diameter.
4. The hereditary material can either be DNA or RNA.
5. Prokaryotes reproduce by binary fission, a form of sexual reproduction.

Eukaryotic Cells

1. Eukaryotic cells are characterised by a true nucleus.
2. The size of the cells ranges between 10–100 μm in diameter.
3. This broad category involves plants, fungi, protozoans, and animals.
4. The plasma membrane is responsible for monitoring the transport of nutrients and electrolytes in and out of the cells. It is also responsible for cell to cell communication.
5. They reproduce sexually as well as asexually.

6. There are some contrasting features between plant and animal cells. For eg., the [plant cell](#) contains chloroplast, central vacuoles, and other plastids, whereas the animal cells do not.

Cell Theory

Cell Theory was proposed by the German scientists, Theodor Schwann, Matthias Schleiden, and Rudolf Virchow. The cell theory states that:

- All living species on Earth are composed of cells.
- A cell is the basic unit of life.
- All cells arise from pre-existing cells.

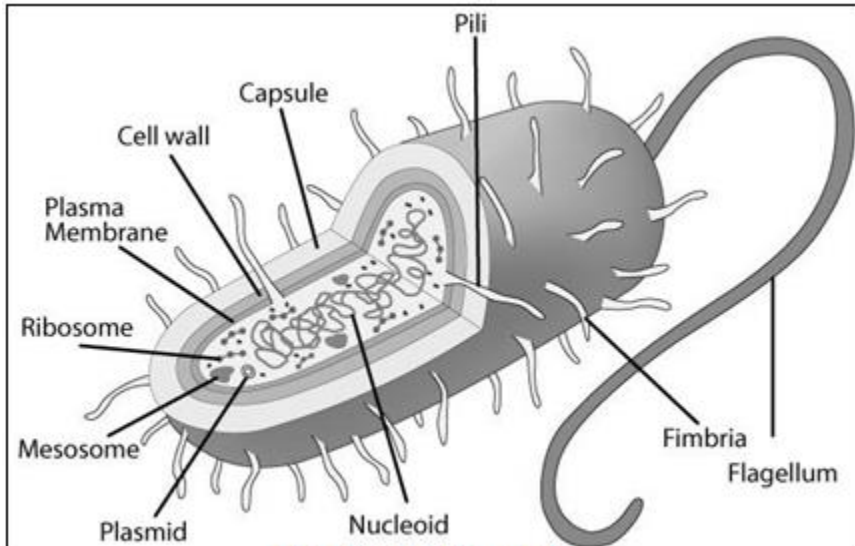
A **modern version of the cell theory** was eventually formulated, and it contains the following postulates:

- Energy flows within the cells.
- Genetic information is passed on from one cell to the other.

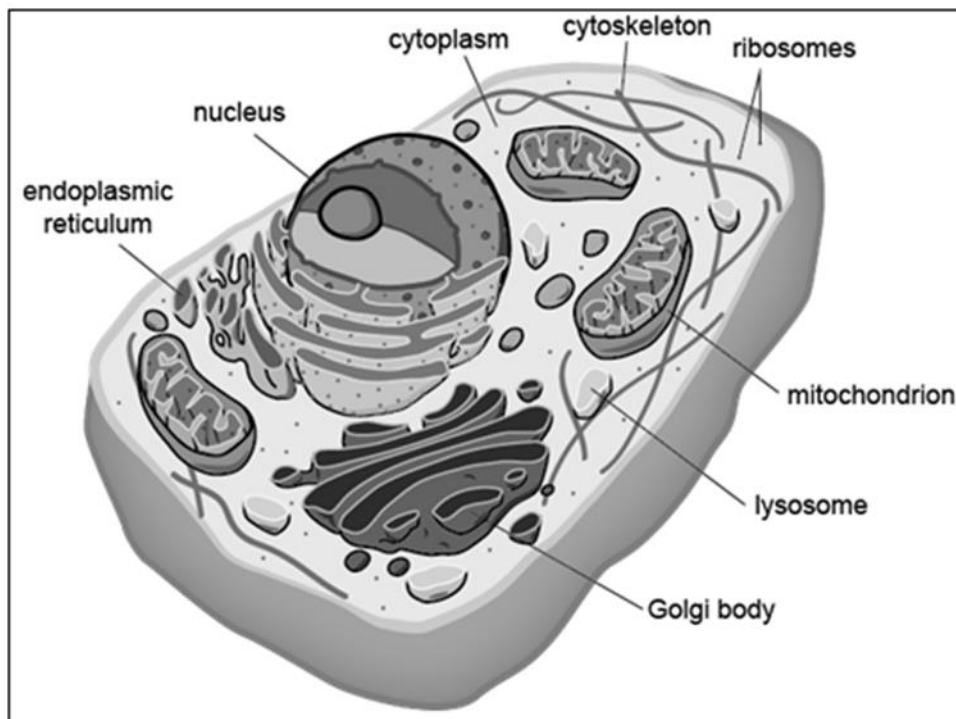
Difference Between Prokaryotic and Eukaryotic Cells:

S. No.	Prokaryotic cell	Eukaryotic cell
1.	Size of cell is generally small (1-10 mm).	Size of cell is generally large (5-100 mm).
2.	Nucleus is absent.	Nucleus is present.
3.	It contains single chromosome.	It contains more than one chromosome.
4.	Nucleolus is absent.	Nucleolus is present.
5.	Membrane bound cell organelles are absent.	Membrane bound cell organelles such as mitochondria, plastids, endoplasmic reticulum, golgi apparatus, lysosomes, etc., are present.
6.	Cell division takes place	Cell division takes place by mitotic or meiotic cell division.

by fission or budding.



Prokaryotic cell



Eukaryotic cell

Difference Between Animal Cell and Plant Cell:

S. No.	Animal cell	Plant cell
1.	Animal cells are generally small in size.	Plant cells are larger than animal cells.
2.	Cell wall is absent.	Plasma membrane of plant cell is surrounded by a rigid cell wall of cellulose.
3.	Plastids are absent except in case of protozoan Euglena.	Plastids are present.
4.	Here vacuoles are many, small and temporary.	They have a permanent and large central sap vacuole.
5.	They have centrosome and centrioles.	They lack centrosome and centrioles.

