

Part-1



# Biology



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## About the Tutorial

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Biology is one of the disciplines of science under which, we study about the various aspects of living organisms. In its given premises, biology includes a wide range of topics such as physiology, morphology, anatomy, behavior, origin, distribution, etc.

Broadly, Biology is categorized as Zoology (i.e. study of Animalia Kingdom) and Botany (i.e. study of Plantae Kingdom).

Because of having wide range of topics, this tutorial is divided into two parts namely Biology Part 1 and Biology Part 2. Further, these two parts are divided into different chapters for an easy understanding.

## Audience

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This tutorial is designed exclusively for the students preparing for the different competitive exams including **civil services, banking, railway, eligibility test**, and all other competitive exams of such kind.

## Prerequisites

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This tutorial is partly based on **NCERT Biology** (class 8<sup>th</sup> to 10<sup>th</sup>) i.e. Part I and Part 2 is prepared from different reliable sources and represents largely the significant facts and figures vital for the competitive exams.

This tutorial starts with the basic concept of biology; however, prior experience of reading the NCERT science (Biology) books is recommended for the easy understanding.

## Disclaimer & Copyright

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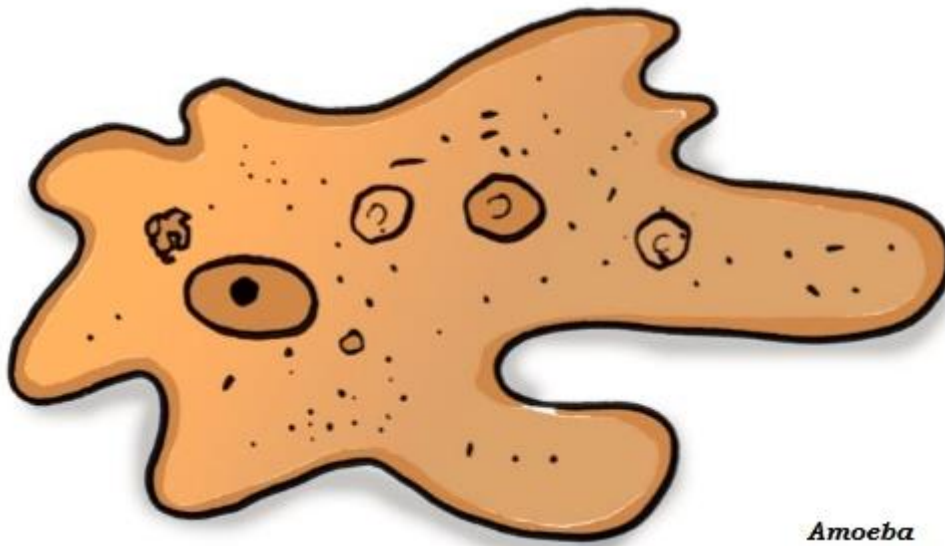


# 1. CELL — STRUCTURE AND FUNCTIONS

## Introduction

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- The basic structural unit of an organ is known as the **cell**.
- In 1665, Robert Hooke discovered the cell.
- A cell is a living organism.
- A human body has trillions of cells, which vary in shapes and sizes.
- The organism, which is made up of more than one cell, is known as multicellular organism.
- The single-celled organisms are known as unicellular organism. E.g. Amoeba.



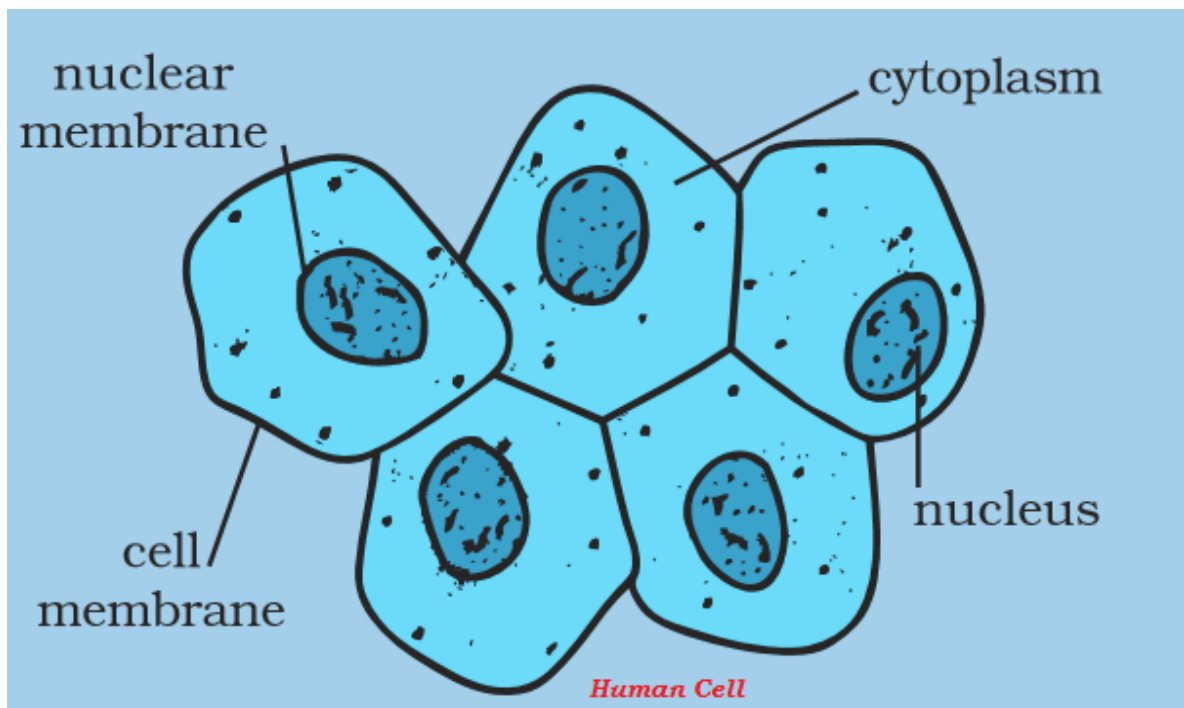
- A single-celled organism performs all the essential functions that a multicellular organism performs.
- Unlike other organisms, Amoeba has no definite shape; so, it keeps on changing its shape.
- Amoeba has pseudopodia, which means – **pseudo** means false and **podia** means feet.
- Amoeba is a full-fledged organism capable of independent existence.
- Shape of the cells are normally round, spherical, or elongated.

- Protoplasm is known as the living substance of the cell.
- The cells having nuclear substances without nuclear membrane are known as **prokaryotic cells**. E.g. bacteria and blue green algae.
- The cells having well organized nucleus with a nuclear membrane are designated as **eukaryotic cells**. All multicellular organisms are eukaryotic cells.

## Cell Structure and Function

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- The basic parts of a cell are cell membrane, cytoplasm, and nucleus.



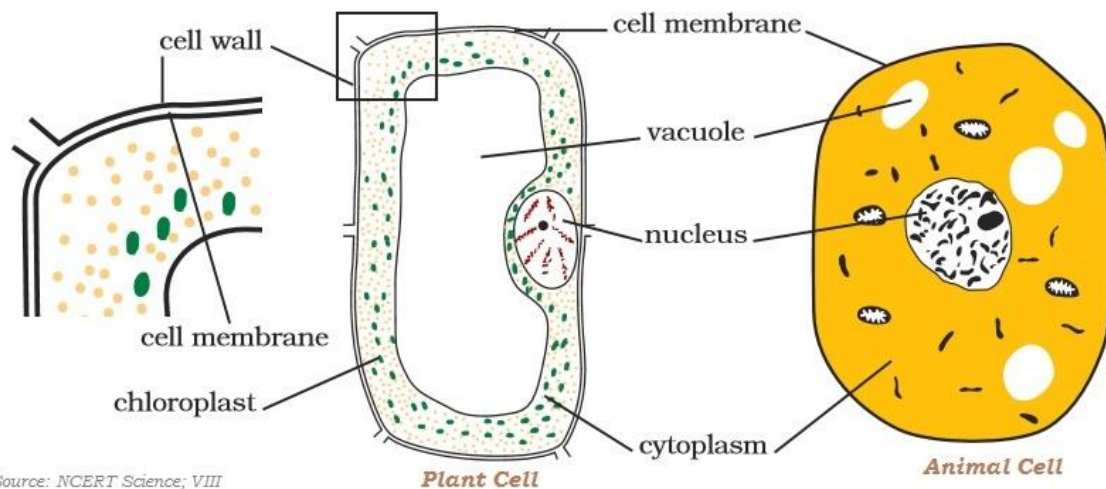
- Cell membrane is also known as the **plasma membrane**.
- The plasma membrane is porous and allows certain substances or materials move both inward and outward.
- The central dense round structure in the center is known as **nucleus**.
- The jelly-like substance between the nucleus and the cell membrane (as shown in the above image) is known as **cytoplasm**.
- Different organelles of cells are also present in the cytoplasm such as Mitochondria, Golgi bodies, Ribosomes, etc.
- Located in central part, nucleus is almost in spherical shape.

- Nucleus is separated from the cytoplasm by a porous membrane known as the **nuclear membrane**.
- The smaller and spherical structure, found inside the nucleus, is known as **nucleolus**.
- Nucleus contains thread-like structures known as **chromosomes**.
- Chromosomes carry **genes** and help in inheriting the characteristics of the parents to the offspring.
- **Gene** is a fundamental unit of inheritance in living organisms.
- The entire constituents of a living cell are known as **protoplasm**, which include nucleus and cytoplasm.

## Plant Cell

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- The cell membrane provides shape to the cells of plants and animals.
- In plant cell, **cell wall** is an additional covering over the cell membrane.



- An animal cell does not have cell wall.
- Cell wall gives shape and rigidity to plant cells.
- Cell wall gives protection, plant cells need protection against varying temperature, high wind speed, atmospheric moisture, etc.
- Bacterial cell also has a cell wall.
- Usually, most of the cells are microscopic in size and are not visible to the naked eye.
- The size of smallest cell is 0.1 to 0.5 micrometer found in bacteria.

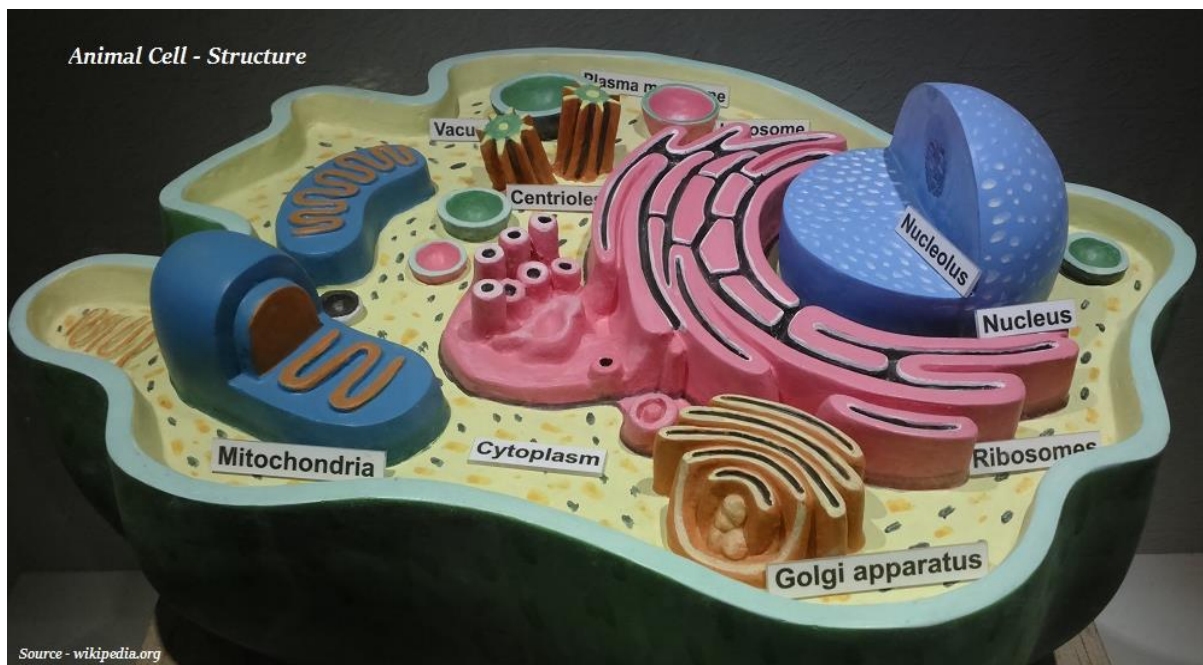
- The size of largest cell is 170 mm × 130 mm, found in the egg of an ostrich.
- The size of the cells however has no relation with the size of the body of the animal or plant.
- Some small colored bodies in the cytoplasm of the cells of *Tradescantia* leaf are known as **plastids**.
- Plastids are found in different colors.
- Some plastids have green pigment and known as **chlorophyll**.
- Green colored plastids are known as **chloroplasts**.
- **Chloroplasts** give green color to the leaves.
- Chlorophyll is essential for the photosynthesis.

## 2. THE FUNDAMENTAL UNIT OF LIFE

### Introduction

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- The fundamental unit of life is cell.
- Cell was first discovered by Robert Hooke in 1665 in a simple microscope.



- In 1674, Leeuwenhoek, with the help of developed microscope, discovered the free living cells in pond water.
- In 1831, Robert Brown had discovered the **nucleus** in the cell.
- In 1839, Purkinje used the term 'protoplasm' for the fluid substance found in the cell.
- The cell theory was proposed by Schleiden (1838) and Schwann (1839).
- According to the cell theory, all the plants and animals are composed of cells and that the cell is the basic unit of life.
- In 1855, Virchow further expanded the cell theory and suggested that all cells arise from pre-existing cells.

- In 1940, the discovery of electron microscope made possible to observe and understand the complex structure of the cell.

## Unicellular Organisms

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- The single cellular organisms, such as *Amoeba*, *Chlamydomonas*, *Paramecium*, and bacteria, are known as unicellular organisms.

## Multicellular Organisms

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- The organisms consisting of many cells are known as multicellular organisms. E.g. human being, animals, birds, etc.

## Significant Characteristics of Cells

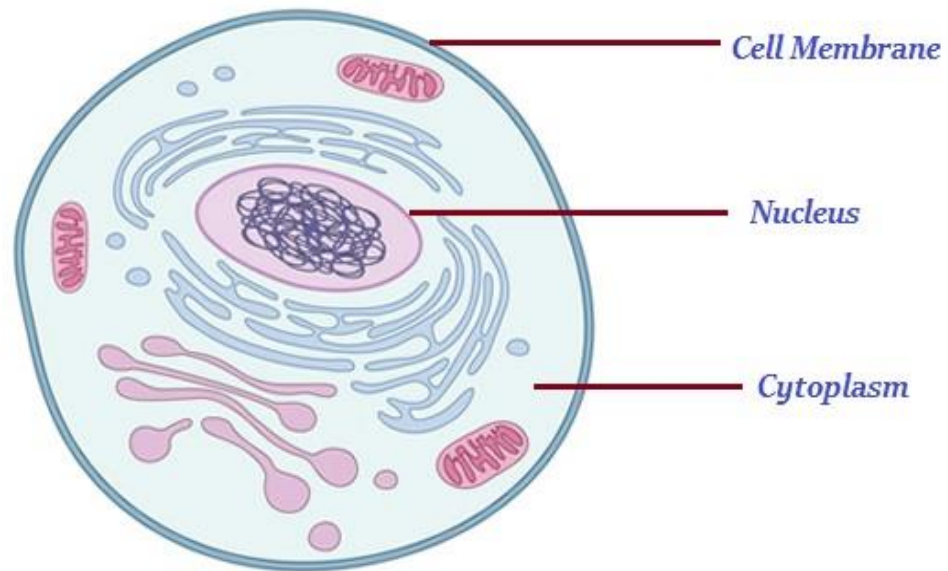
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- Each living cell has the aptitude to perform certain basic functions that are characteristic of all living forms.
- Each such cell has certain specific components within it known as cell organelles.
- Different types of cells have different function and each cell organelle performs a special function.
- These organelles collectively constitute the basic unit of life known as cell.
- All cells are found to have the same organelles, irrespective of their different functions and the organism they found in.

## Structural Organization of Cell

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- Following are the three basic features that every cell possesses:
  - **Plasma Membrane/Cell Membrane**
  - **Nucleus**
  - **Cytoplasm**



### ***Basic Features of Cell***

- Let's discuss each one of them in brief.

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