

## Introduction

- Cells are the major structural unit of an organ.
- Just as bricks are arranged together to make a building, similarly cell is arranged to make body of every organism.
- In 1665 Robert Hooke observed slices of cork under a magnifying instrument.
- Cork is a part of the bark of a tree. He detected compartments in the cork slice.
- He also noticed walls between two compartments which were actually dead cells.

## Cell Theory

- Cell Theory states that cells are the smallest unit of life with a definite structure and have specific functions.
- Cells are basic units of life. All living organisms are formed of cells. Cells are the building blocks of plants and animals both.
- Most of the cells are too small to be seen with a naked eye.
- Cells can be of two types: Animal cells and Plant cells.

## Variety of organisms

- Human body has trillions of cells of various shapes and sizes. Different groups of cells have different functions to perform.
- **Unicellular Organisms:** Organisms made of a single cell are called Unicellular. The single cell performs all necessary functions such as locomotion, growth, reproduction, excretion etc. Examples: Amoeba, Chlamydomonas, Paramecium.
- **Multicellular Organisms:** Organisms made of more than one cell are called Multicellular Organisms. Different cells perform specialised functions.

## Shapes of cells

- Mostly cells are round, spherical or elongated.
- Some are spindle- shaped that is long and pointed at both ends. Eg. Muscle cell.
- Some are long and branched like nerve cell or neuron.
- Some may be kidney shaped like guard cells in leaves.
- The cell and its constituents are enclosed by a thin membrane called cell wall.
- The cell wall provides shape and rigidity to the cells.

## Size of cells

- Size of a cell can be very small as millionth of a meter or as large as a few meters.

- Mostly cells are microscopic in size and are not visible to naked eye.
- They can be seen only by a microscope.
- The smallest cell is of the size 0.1 to 0.5 micrometre in bacteria.
- The largest cell is the egg of an ostrich whose size is 170 mm ×130 mm.
- Size of a cell is independent of the size of an organism but depends on the function it performs.

## Level of organisation

- In multicellular organisms, individual cell or group of cells perform specific functions.
- Following are the levels of organization starting from simple to the most complex:
- **Cell:** the fundamental and the smallest unit of living organisms.
- **Tissue:** a tissue is a group of cells performing similar functions. Example: nerve tissue, epithelial, muscle etc.
- **Organ:** organ is a group of tissues which have same structure and perform similar activity. Example: skin, heart etc.
- **Organ System:** Many organs come together to form an organ system. These organs work together to perform one or more functions. Examples: respiratory system, Digestive system
- **Organisms:** Collection of organ systems is called Organisms. The human beings have 11 organ systems.

## Parts of the cell

- Cell is made of mainly three components: Cell membrane, cytoplasm and nucleus.

## Cell Membrane

- The outer thin covering of a cell is called Cell membrane or plasma membrane.
- Cell membrane gives shape to the cell and protects it.
- The cell membrane has tiny pores and controls the movement of substances in and out of the cell.
- Cell membrane encloses the cytoplasm and the nucleus.

## Cytoplasm

- Cytoplasm is a transparent jelly like material that completely fills the cell.
- Many tiny structures called organelles are present in the cytoplasm.
- Cytoplasm contains various organelles like nucleus, mitochondria, ribosomes etc.
- The cytoplasm and the nucleus are together called protoplasm.

## Nucleus

- Nucleus is mostly spherical in shape and located in the centre of the cell.
- A thin membrane called nuclear membrane separates nucleus from the cytoplasm.
- The nucleus contains a tiny round structure called nucleolus.
- Nucleus contains thread like structure called chromosomes. These contain genes which are responsible for transmission of characteristics from parents to offspring.

## Prokaryotic and Eukaryotic cells

- The cells that contain nuclear material without a nuclear membrane are called prokaryotic cells.
- The organisms that contain such cells are called Prokaryotes.
- Examples are bacteria and blue green algae.
- Cells containing a well organised nucleus with a nuclear membrane are called Eukaryotic cells.
- All organisms other than bacteria and blue green algae are Eukaryotes.

## Vacuoles

- Vacuole is a membrane bound organelle in the cytoplasm.
- It is filled with a liquid called cell sap which contains dissolved sugar and salts.
- Vacuoles of plant cell are larger in size whereas that of animal cell are smaller in size.

## Plastids

- Plastids are small coloured bodies found scattered in plant cells.
- These are of different colours. Those containing green pigment chlorophyll are called Chloroplasts.

## Comparison between plant and animal cell

Part of the cell	Plant cell	Animal cell
Cell wall	Distinct cell wall	absent
Nucleus	present	present
Nuclear membrane	present	present
cytoplasm	present	present
plastids	present	absent
Vacuole	One and large in size	Many and smaller in size
Cell membrane	present	present

