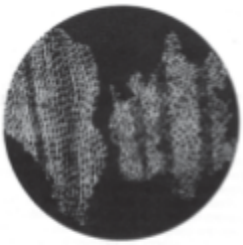
Board –CBSE	Class –8th	Topic –Cell: Structure and Function

INTRODUCTION

CELL:

- In living organisms, Cell is the basic structural and functional unit of life. All organisms are made up of cells.
- Cells are produced by the division of the pre-existing cell. Each cell contains genetic material that is passed down during the reproduction process.
- All basic chemical and physiological functions like repairing, growth, excretion movement, immunity, communication, and digestion - happen inside of cells.



Cork cells as observed by Robert Hooke

Discovery of the Cell:

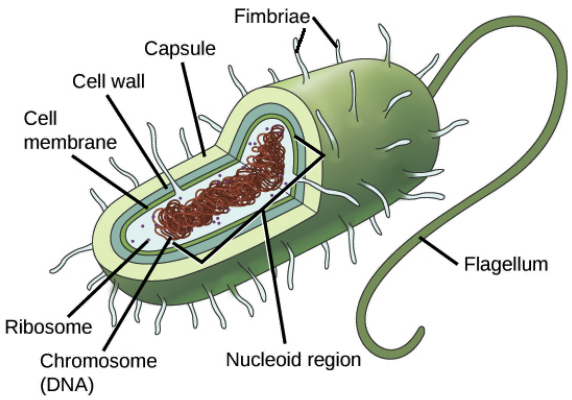
- In 1665, the English scientist “Robert Hooke” observed slices of cork noticed partitioned boxes or compartments in the cork slice, looked like a honeycomb.
- Cell theory, first proposed by the German botanist “Matthias Jacob Schleiden” and the German physiologist “Theodore Schwann” in 1838 and formalized by the German researcher “Rudolf Virchow” in 1858.

Types of cells:

1. Prokaryotic Cells:

The cells having genetic material without a nuclear membrane are termed prokaryotic cells. Examples: bacteria and blue-green algae.

Cell of Bacteria



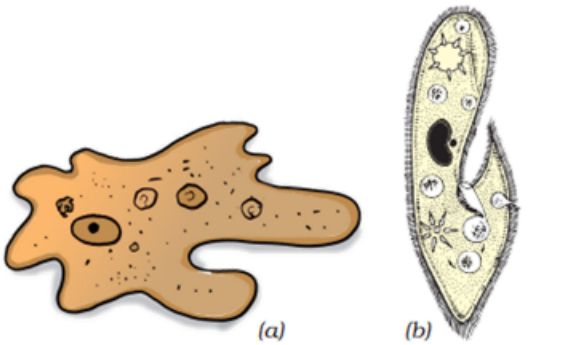
2. Eukaryotic cells:

The cells having a well-organized nucleus with a nuclear membrane are designated as eukaryotic cells. All organisms other than bacteria and blue-green algae are called Eukaryotes.

Organisms Show Variety in Cell Number, Shape, and Size:

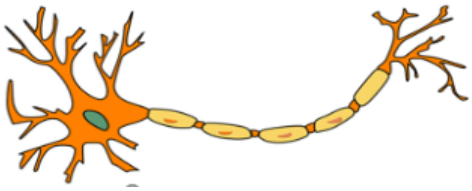
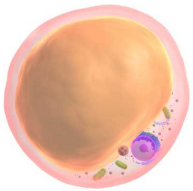
- Organisms made of more than one cell are called **multicellular organisms**. Single-celled organisms are made up of single cells called **unicellular organisms**. A single-celled organism performs all the necessary functions that multicellular organisms perform.

- A single-celled organism, like an amoeba, captures and digests food, respires, excretes, grows, and reproduces. Similar functions in multi-cellular organisms are carried out by groups of specialized cells forming different tissues. Tissues, in turn, form organs.



Amoeba **Paramecium**

The shape of Cells:

Cell	Shape	Picture
RBC	Biconcave	
Nerve cell	Irregular or amoeboid shape	
Muscle cell	Cylindrical and spindle shape	
Fat cell	Oval having large fat globule	

Size of Cells:

- The cell's size in living organisms may be as small as a millionth of a metre (micrometre or micron) or maybe as large as a few centimetres.

- The smallest cell is 0.1 to 0.5 micrometre in bacteria (mycoplasma). The largest cell measuring 170 mm ×130 mm, which is the egg of an ostrich.

Cell Structure and Function:

1. Cell membrane:

- The outermost membrane of a cell. It is also called a plasma membrane.
- This membrane separates cells from one another and also the cell from the surrounding medium.
- It is selectively permeable. It allows the flow of limited substances in and out of the cell.
- This gives shape to the cell.
- In addition to the cell membrane, an outer thick layer cell wall present in the plant protects against variations in temperature, high wind speed, atmospheric moisture, etc.
- The cell wall is completely permeable.
- The cell wall is made up of cellulose in plants but in fungi made up of chitin.
- Plant cells can be observed in the leaf peel of Tradescantia, Elodea, or Rhoeo.

2. Protoplasm: as the cell membrane is removed from the cell, the remaining mass is known as protoplasm (cytoplasm + nucleoplasm).

Cytoplasm:

- The cytoplasm is the jelly-like substance present between the cell membrane and the nucleus, contains various cell organelles.

(a) Mitochondria:

- Known as the power house of the cell.
- The outer membrane is porous and the inner membrane is folded to form cristae.
- The fluid inside it called a matrix contains its own ribosome and its genetic material.

Function: breakdown of food in presence of oxygen to produce ATP (Adenosine triphosphate).

(b) Endoplasmic Reticulum [ER]:

- Irregular network of membrane enclosing fluid in the cavity.
- ER also provides structural support to the cell.
- It is of two types: Rough ER and Smooth ER.
- Smooth ER synthesizes fats and proteins. It also helps in detoxification.
- RER helps in the synthesis of proteins.

(c) Golgi apparatus:

- Staked membrane or flattened cisternae having a fluid-filled cavity.
- In-plant cell it is called a Dictyosome.
- They secrete, packages, and dispatches cellular secretion.

(d) Lysosome:

- Membrane-bound vesicle containing powerful hydrolytic enzymes.
- Destroy the foreign material.
- Remove worn-out components.
- Suicidal bags of cells, even eat up their own cell if it gets damaged.

(e) Vacuole:

- Fluid (cell sap) filled structure enclosed by a single membrane (tonoplast), generally present in plants.
- They are mainly to store the nutrients.
- They give turgidity and rigidity to the cell.

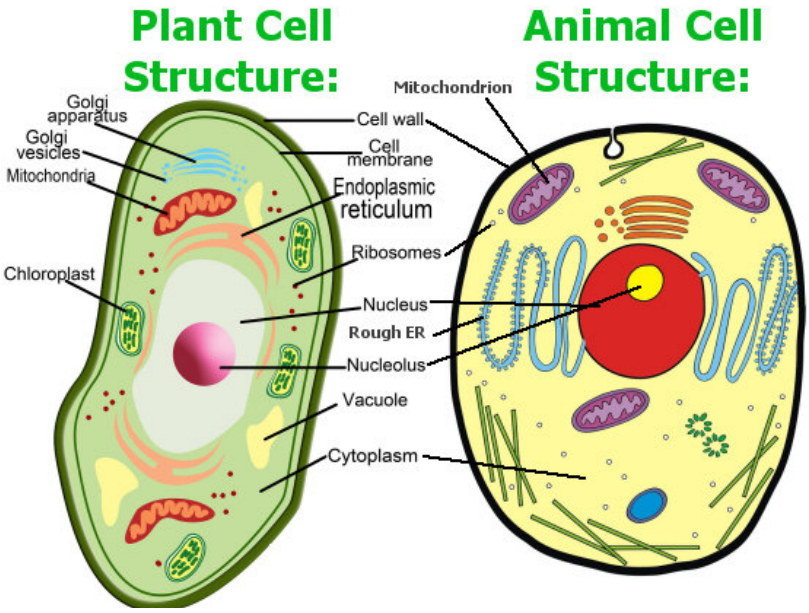
(f) Plastid:

- Present only in plant cells. Leucoplast, Chromoplast, and Chloroplast are three types of plastids.

- Chloroplast contains a green colour pigment known as chlorophyll, needed to trap sunlight to initiate the photosynthesis process.
- Chromoplast contains red and yellow colour pigments that provide colours to various parts of the plant.
- Leucoplast is colourless mainly stores nutrients.

(g) Nucleus:

- It consists of
- Nuclear membrane - The nucleus is separated from the cytoplasm by a membrane called the nuclear membrane. This membrane is also porous and allows the movement of materials between the cytoplasm and the inside of the nucleus.
- Nucleoplasm – fluid inside the nucleus.
- Nucleolus – small condensed oval body, rich in protein and RNA.
- Genetic material – contains chromosomes made up of DNA and proteins. They carry genes and help in the inheritance or transfer of characters from the parents to the offspring.
- The nucleus acts as the control centre of the activities of the cell.



Comparison of Plant and Animal Cell

Plant Cell	Animal Cell
1. Plant cells have a cell wall surrounding the cell membrane	1. Animal cells only have a membrane.
2. Plant cells contain chloroplasts which are used for photosynthesis.	2. Absent in animal cells.
3. Plant cells have a large vacuole (it's like a fluid sack), compared to an animal cell.	3. Animal cells have a small vacuole, compared to plant cells.
4. Cells in plants are more structured due to the cell wall and form a lattice-like structure which helps with rigidness.	4. Animal cells are 'blobby'