

# NEET · CBSE eBOOKS

CLASS 11 & 12th



Learning Inquiry  
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**CLASS 11<sup>th</sup>**

**Cell: The Unit of Life**

**misostudy**



## 01. Introduction

The study of cell is called **cytology**. It deals with the study of cell terms of structure, function and chemistry. Robert Hooke is considered as the **Father of Cytology**.

### Cell theory

This theory was formulated by a German botanist Matthias Jakob Schleiden (5 April, 1804-23 June, 1881) and a German physiologist Theodor Schwann (7 December, 1810-11 Jun, 1882) in the year 1838-39. A major expansion of this theory was done by Virchow 1855. He gave the statement '*Omnis cellula-e-cellula*, i.e. all cells arise from pre-existing cells. The statement '*Omnis cellula-e-cellula*' is also known as **cell lineage theory**. This concept was the actual idea of Nageli (1846). It was experimentally proved by Louis Pasteur in 1862.

### Cell Types

Broadly all living cells are classified into two groups namely **prokaryotic** (Gr. Pro-primitive or pre or before; *karyon*-nucleus) and **eukaryotic** (Gr. Eu-true; *karyon*-nucleus). Prokaryotic cells contain a primitive type of nucleus which is not bounded by a membrane. It is also called as **nucleoid** or **genophore**. On the other hand eukaryotic cells contain a true double membrane bound nucleus. Sometimes, a third type of cell, i.e. **mesokaryotic** cells are also found. These cells have well-defined nucleus, but their DNA lacks histone proteins, e.g. Some algae and Protozoa.

### Cell Shape and size

Cells differ from each other in size, shape and activities. Even some cells may have constantly changing shapes also, such cells are called **Pleomorphic cells**, e.g. WBCs, Amoeba, etc. Cells that have fixed shape are of following types

**Flattened, Cubical, Columnar, Spherical, Spindle, Subglobose or Polyhedral, Elongate, Branched,**

Longest cell – Plant (sclerenchymatous fibre) Animal (neuron)

Largest cellular component – Nucleus

Largest cell organelle- Plastid (plant), mitochondria (Animal)

Smallest cell organelle – Ribosome

## 02. Cell Structural organisation

The components of a cell can be broadly categorized into following three categories)

- (i) **Outer covering**, i.e. cell wall and cell membrane.
- (ii) **Protoplasm**, i.e. the fluid content of cell.
- (iii) **Cell organelles**, i.e. structures that float within the protoplasm like, mitochondria, chloroplast, ribosome, etc.

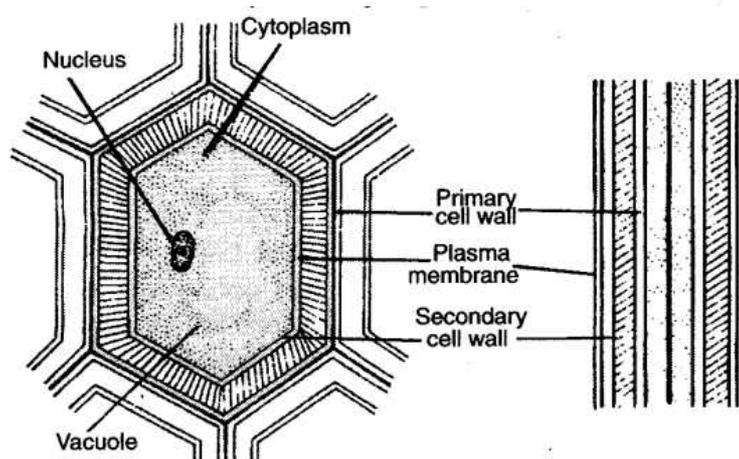
### Outer coverings cell wall

It is the outermost, rigid and non-living covering of the cell. It was discovered by Robert Hooke in 1665 in the cork cells. It is protective and supportive in nature.

## Structure

Cell wall is made up of pectin or hemicellulose.

- (i) **Middle lamella** It is the outermost layer of cell wall. It exist as a cementing layer between primary cell walls of neighbouring cell. Its major constituent are Ca and Mg pectates.
- (ii) **Primary cell wall** It is thin and elastic layer which is capable of growth. It is found in cell wall of younger plant cell and disintegrates as cell matures. Primary cell wall is present inner to the middle lamella. It is composed of 2-5% cellulose and 50% hemicellulose.



- (iii) **Secondary cell wall** This layer is present inner to primary cell wall and just outside the plasma membrane. The main constituents of this layer are cellulose (50-95%) and hemicellulose (5-25%). The other components include xylan, lignin, etc Due to more cellulose component, this layer is non-elastic and rigid
- (iv) **Tertiary cell wall** It may present occasionally inside to the secondary cell wall. This cell wall is purely cellulose in nature. Some times xylan is also present in this layer, e.g. tracheids of gymnosperms.

## Formation and growth of cell wall

The formation and Growth of cell wall occur by either of the following two ways

- (i) **By intussusception** it is the deposition of cell wall material in the for fine granules. These granules become embedded within the original wall.
- (ii) **By apposition** In this method, the new cell wall material is deposited in the form of thin plates one over the other.

## Functions

- (i) It maintains the shape of plant cell and protects it form mechanical injury.
- (ii) It acts as a protective covering barrier against pathogens.
- (iii) It provides the mechanical support to plant. Thus, allowing it to stand erect.
- (iv) It allows the protoplasmic continuation. This continuation is important for the transport of substance between the cells.
- (v) It prevents the osmotic bursting of the cell.
- (vi) It helps in cell to cell adhesion and prevent the entry of undesirable macromolecules.