

## **Experiment No: 2: Study of cell Ultra-structure**

**Aim:** To study about different types of cells and their structure..

**PROCEDURE:** The cell is the basic unit of organization or structure of all living matter. Loewy and Sickevitz (1963) defined the cell as a unit of biological activity delimited by a semi-permeable membrane and capable of self-reproduction in a medium free of other living systems. Cells will reproduce, assimilate, respire and respond to changes in environment and absorb water from internal and external sources. Cell consists of cell wall, cytoplasm, nucleus and cell organelles.

### **A. CELL WALL:**

It is the membrane which converts the cell. It gives shape and structure to the cell. Protect the cell. It also provides mechanical support to the cell.

#### **Structure:**

The cell wall is complex in nature and is differentiated into middle lamella, primary cell wall and secondary cell wall. Middle lamella is the outer most layer of the plant cell wall and it connects the two adjacent cells. It is composed of calcium and magnesium pectate and does not contain any cellulose. Primary cell wall is thin and elastic and lies between middle lamella and secondary cell wall. It is mainly composed of cellulose. Secondary wall is the inner most layer of the cell wall and lies between primary cell wall and plasma membrane. Secondary cell wall is relatively thick and is primarily composed of microfibrils of cellulose. In some tissues, besides cellulose, lignin and suberin are also found in secondary cell wall.

## **B. PLASMA MEMBRANE:**

The cytoplasm is surrounded on the outer side by a thin and flexible membrane known as plasma lemma, which is composed of lipids and proteins. It acts as a selectively permeable membrane such that it allows molecules like minerals into the cell and restricts their outward movement. Plasma membrane checks the entry of toxic substances from outside into the cytoplasm.

## **C. CYTOPLASM:**

Cytoplasm is the jelly-like substance surrounding the nucleus within the cell membrane. It contains the cell organelles like mitochondria, ribosomes, etc. All the substance inside the cell except the nucleus is called cytoplasm. Cytoplasm is the main area of cellular activities in both plant and animal cells. Various reactions take place in it to keep the cell in a living stage.

**PROTOPLASM = Cell membrane + Cytoplasm + Nucleus**

**HYALOPLASM = cytoplasm – Cell organelles – Nucleus**

## **D. CELL ULTRA STRUCTURE (CELL ORGANELLES):**

### **1. ENDOPLASMIC RETICULUM**

Endoplasmic reticulum refers to a vast network of membrane enclosed tubules, vesicles and sacs in the cytoplasm. It is found in differentiated cells only.

#### **Structure:**

Endoplasmic reticulum appears as a double membrane with variable spaces. It forms a continuous system and is attached to the nuclear envelope on one side and cell membrane on the other. It is of two types viz. rough and smooth. The endoplasmic reticulum carrying ribosomes has granular surface and is therefore called rough endoplasmic reticulum, while the ribosome free region has smooth surface and is hence called smooth endoplasmic reticulum.

#### **Functions:**

1. Rough endoplasmic reticulum is associated with the synthesis of proteins.
2. Smooth endoplasmic reticulum is associated with synthesis of lipids and glycogen.
3. It acts as an inter-cellular transport system for various substances.
4. It contains many enzymes which perform various synthetic and metabolic activities..
5. It provides a passage for mRNA from nucleus to the cytoplasm.
6. It is involved in the formation of the new nuclear membrane after each nuclear division.

## 2. GOLGI COMPLEX

They are cellular organelles which consist of a series of concentric double membranes. They are located either near nuclear membrane or cell periphery. They arise from rough endoplasmic reticulum.

Sub-microscopic spaces or sacs are enclosed by the double membranes and are known as cisternae. Each golgi complex has 3 to 12 inter-connected cisternae which are composed of lipo-proteins.

### Functions:

1. Packaging of food materials such as proteins, lipids and phospholipids for transport to other cells.
2. It plays a role in the formation of the plasma membrane.
3. It is involved in the formation of the cell wall of plant cells.

### Question:

1. Draw a neatly labeled diagram of the Golgi complex.

### 3. LYSOSOMES:

- It originates from Golgibody.
- It is rich in hydrolyticenzymes.
- Its main function is digestion.

### 4. VACUOLE:

- Membrane bound space found in thecytoplasm.
- It contains water, sap, excretory product and some othermaterials.
- It is maintaining the internal pressure and avoids cells fromcollapsing.