Course Title

BIO 101/ **GENERAL BIOLOGY 1 (2 Units)**

PROF (MRS) I.A . KEHINDE

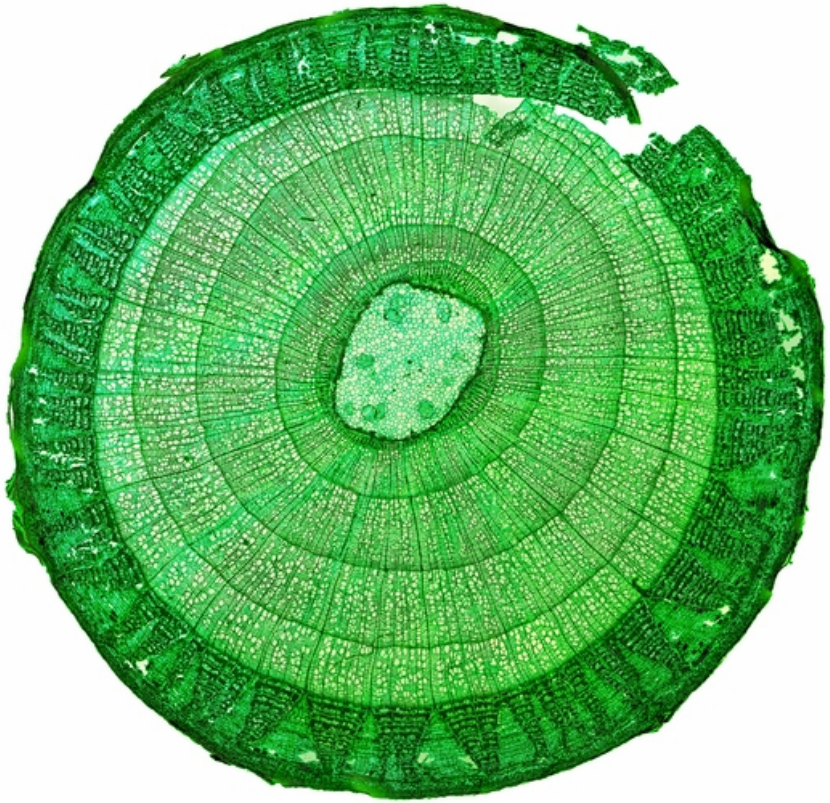
Section Title

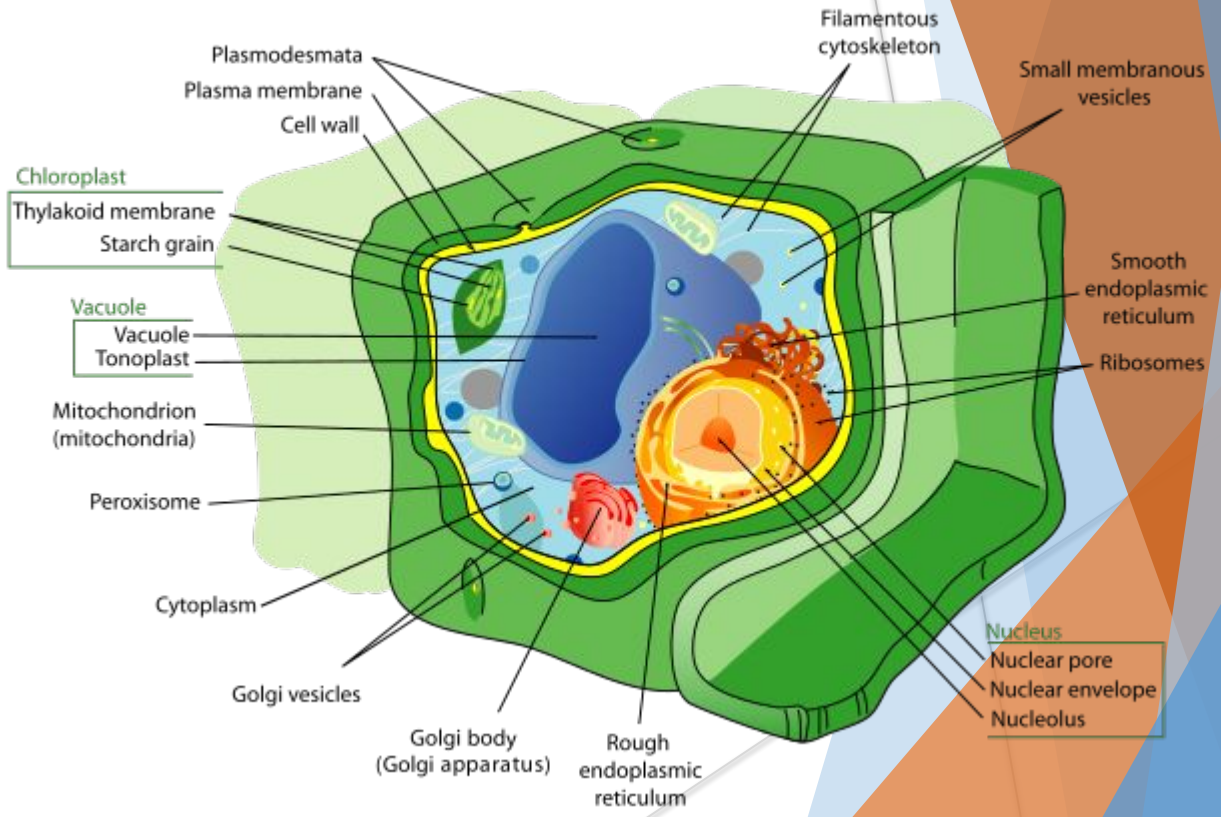
The plant cell

CLASS MODULE

- The plant cell
- Prokaryotic and eukaryotic cells
- Cell growth, cell division and reproduction.
- General characteristics and morphology of cryptogams and phanerogams.
- Introduction to plant classification.

The Plant Cell





INTRODUCTION

- Plant cells are the basic unit of life in organisms of the kingdom Plantae.
- They are eukaryotic cells, which have a true nucleus along with specialized structures called organelles with which different functions are carried out.
- A distinctive feature of plant cell is the presence of a cell wall outside the cell membrane.
- The plant cell is rectangular and comparatively larger than the animal cell.

Types of Plant Cell

Cells of matured higher plants become specialized to perform some important functions that are essential for their survival.

Such as

Transportation of nutrients and water,

Food storage.

These specialized cells include;

1. **Parenchyma Cells**

Typically more flexible than others because they are thinner.

Living cells of plants which are:

- Involved in the production of leaves.
- Involved in gaseous exchange
- Production of food,
- Storage of organic products and cell metabolism.

2. Collenchyma Cells

- Hard or rigid cells,
- Primary role is to provide support to the plants

3. Sclerenchyma Cells

- Usually found in all plant roots

- Involved mainly in providing support to plants.
- More rigid compared to collenchyma cells.

4. Xylem Cells

- Transport cells in vascular plants.
- Transport of water and minerals from the roots to the leaves and other parts of the plants.

5. Phloem Cells

- Transport cells in vascular plants.
- Transport food prepared by leaves to different parts of the plants.

Plant Cell Structure and Functions

- The subcellular structures in the cell carry out different and specific functions. These structures are called as **ORGANELLES**

Plant cell organelles include the following

i. Cell Wall:

- Rigid outermost layer of a plant cell.
- Makes cell rigid (provides cells with mechanical support hence protection). This is only present in plant.

ii. Cell Membrane:

- Protective layer that surrounds every cell and separates it from its external environment.

- Found inside the cell wall and made up of complex lipids (fats) and proteins.

iii. Nucleus:

- Control center of cells.
- Present only in eukaryotic cells.
- Contains Deoxyribonucleic acid (DNA), the genetic material that directs all the activities of the cell.

- Nucleus contains;
  - **Nucleolus**: Manufactures cell's protein-producing structures and ribosomes.

Nucleopore: Nuclear membrane is perforated with holes called nucleopore that allows proteins and nucleic acids to pass through.

iv. Nuclear membrane: Specialized membrane which separates the nucleus from the cytoplasm

v. Cytoplasm:

- Thick, aqueous solution in which the organelles are found.
- Substances such as salts, nutrients, minerals and enzymes (molecules involved in metabolism) are dissolved in the cytoplasm.

vi. Endoplasmic Reticulum (ER):

- Membrane system of folded sacs and tunnels.
- Move proteins within the cell as well as export them outside of the cell.

There are two types of endoplasmic reticulum.

- **Rough endoplasmic reticulum**: Reticulum covered with ribosomes.
- **Smooth endoplasmic reticulum**; Reticulum without ribosomes

vii. Ribosomes:

- Little round structures that synthesize proteins.
- Found in the cytoplasm or attached to the endoplasmic reticulum.

viii. Golgi body:

- Stack of membrane-covered sacs that prepares proteins for export from the cell.

ix. Lysosome:

- Digestive center of cells
- Produce many different types of enzymes which a

  To break down food particles

  Recycle worn out components of the cell.

x. Mitochondrion: **The powerhouse** of cells.

- Converts the energy stored in food (sugar and fat) into energy-rich molecules (Adenosine triphosphate – ATP) needed by cells.

xi. Vacuoles: mainly found in plants

- Large membrane-enclosed compartments
  - store toxic wastes as well as useful products such as water.

xii. Plastids:

- Membrane-bound organelles with its own DNA.
- For storage of starch and carry out the process of photosynthesis.
- Used in the synthesis of many molecules, which form the building blocks of the cell.

- Vital types of plastids and their functions:
  - **Leucoplasts:**
    - Found in non-photosynthetic tissues of plants.
    - used for the storage of protein, lipid and starch.
  - **Chloroplasts**:
    - Elongated organelle enclosed by phospholipid membrane.
    - Shaped like a disc
    - Contains a green coloured pigment called **chlorophyll** required for the process of photosynthesis.
    - Absorbs light energy from the sun and uses it to transform carbon dioxide and water into glucose.
    - **Stroma** is the fluid within the chloroplast that comprises a circular DNA.

Uniqueness of Plant Cells

1. Presence of cell wall
2. Plant cells contain vacuoles.
3. Plant cells contain chloroplasts.

Assignment: Draw a large labelled diagram of the plant cell explaining features that differentiates it from the animal cells.