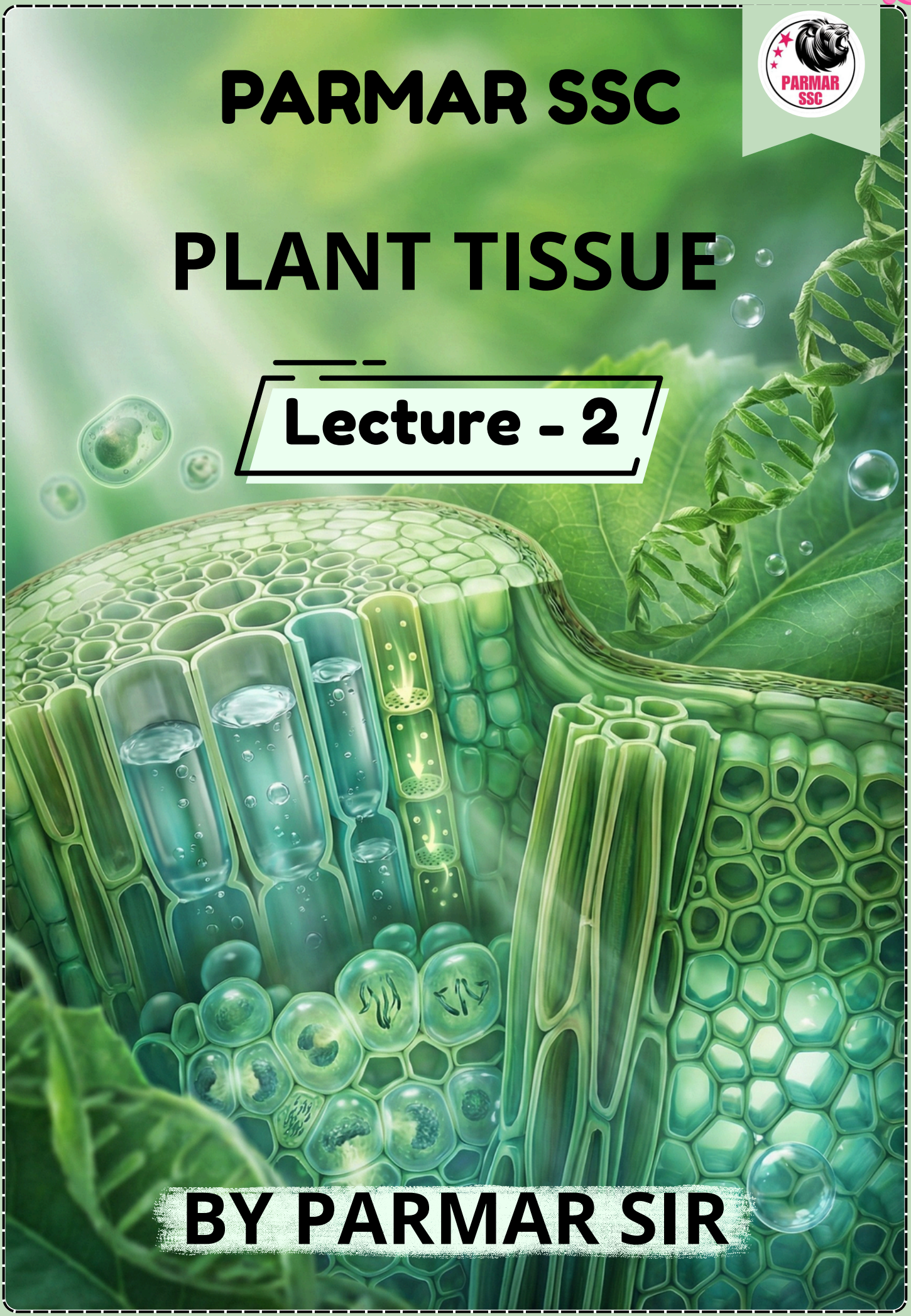
PARMAR SSC

PLANT TISSUE

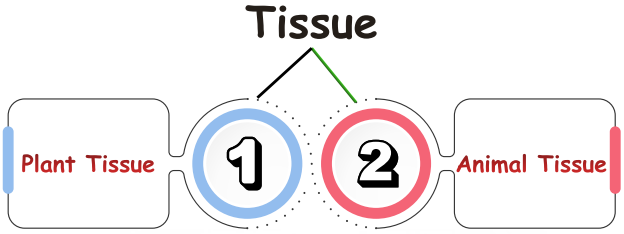
Lecture - 2



BY PARMAR SIR

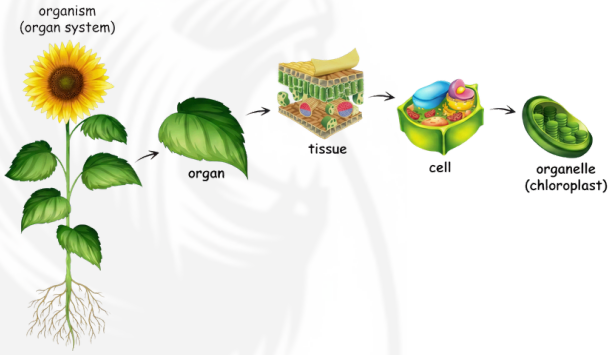
Introduction to Plant Tissues

- Tissue is a group of cells that work together to perform a specific function in the body.



Importance of Tissues

- It causes division of labour in multicellular organisms.
- It decreases workload on individual cells.
- The organization of tissues into organs and organ systems leads to improved body organization.



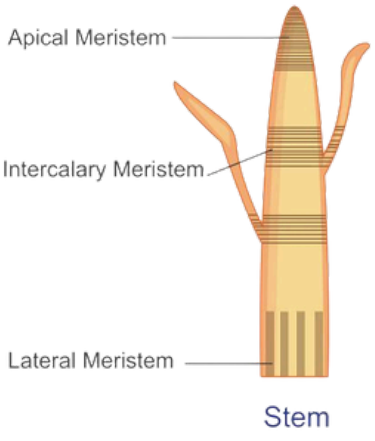
CLASSIFICATION OF PLANT TISSUES

- Plant tissues are broadly classified into two main categories:

1. **Meristematic Tissue:** Capable of continuous division.
2. **Permanent Tissue:** Mature cells incapable of division.

Meristematic Tissue

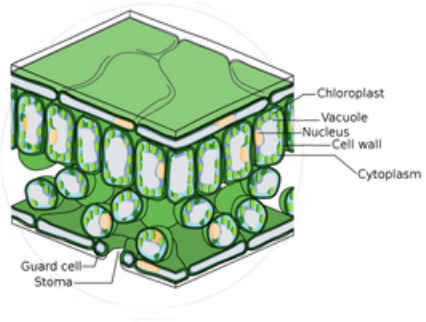
- These tissues are made up of cells that can divide continuously, helping in plant growth.



Characteristics

- **Occurrence:** Growing regions of plant (root, shoot, etc.).
- **Shape:** Spherical, oval, or rectangular.
- Cells are small and thin, with dense cytoplasm and large nuclei.
- Intercellular spaces and vacuoles are absent.
- They are active cells.
- Cell wall is made up of cellulose.

Permanent Tissue



- These are non-dividing cells that have attained maturity and perform specific functions.
- Through the process of differentiation, meristematic tissues convert into permanent tissues.

Characteristics

- **Occurrence:** Roots, stem, leaves, etc.
- **Shape:** Round or oval or elongated, polygonal, or even irregular.
- Cell wall is thin or thick with large central vacuoles.
- **Functions:** Permanent tissues in plants perform a variety of essential functions, including support, storage, conduction, and protection.

Type	Location	Function
Apical Meristem	Present at shoot apex and root apex	Increases length of root and shoot
Lateral Meristem	Beneath the bark	Increases thickness of root and stem
Intercalary Meristem	At the base of leaves or internodes (grasses)	Increase in length of leaves and internodes (E.g. Leaf blades)

- Protoderm is a part of apical meristem found in root and shoot and gives rise to epidermis.

- **Cambium:** A lateral meristematic tissue present between xylem and phloem that produces secondary xylem and secondary phloem, causing secondary growth (increase in girth) in plants.

Types of Permanent Tissue

1. Simple Permanent Tissue

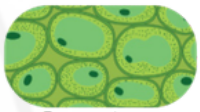
- These tissues are also known as homogenous tissues.
- They are made up of a single cell type, usually with the same origin, structure, and function.

Types:

1. Parenchyma
2. Collenchyma
3. Sclerenchyma

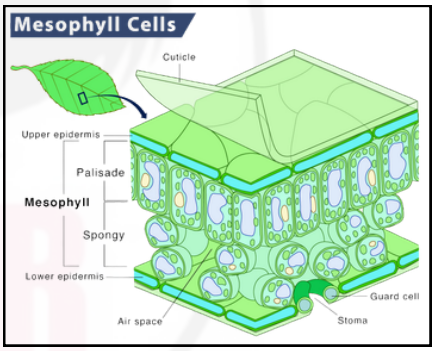
Parenchyma Tissue

- **Occurrence:** Throughout the plant body, particularly in soft parts like the cortex and pith of roots and stems, leaf mesophyll, and within vascular bundles.
- They are living cells.
- They have a large lumen.


Parenchyma

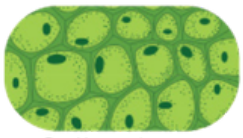
Functions:

- It acts as a food storage tissue. In some cases, it contains chlorophyll, thus called Chlorenchyma.
- When loosely packed, intercellular spaces are present called Aerenchyma. Aerenchyma provides buoyancy to parts and helps them to float.



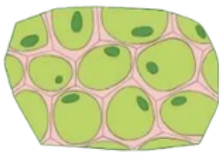
Collenchyma Tissue

- **Occurrence:** In leaf stalks, stem of dicots epidermis and the vascular bundle of dicot leaf.
- Cells are living, elongated, irregularly thickened at corners.
- There is very little intracellular space in-between the cells.
- They have a narrow (moderate) lumen.


Collenchyma

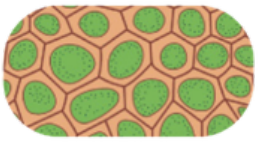
Functions:

- They act as mechanical tissue and thus provide mechanical strength to plants.
- They provides flexibility (allow bending of parts). E.g. Tendrils and stems of climbers.

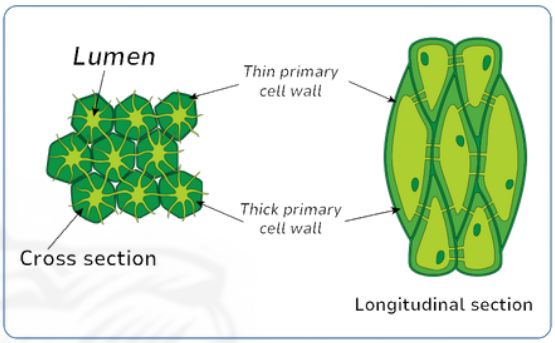

Cross Section


Longitudinal

Sclerenchyma Tissue


Sclerenchyma

- **Occurrence:** In stems, around vascular bundles, in leaf veins, and in the hard coverings (E.g. Bark, husk of coconut).
- These are dead tissues, very hard and rigid in texture.
- They provide toughness to the tissue.
- They have a very narrow or nearly absent (obliterated) lumen.



Functions:

- These provide mechanical support and rigidity to the plant.
- Sclereids are responsible for hardness of seeds and the shell of walnut.
- The cell walls are thickened due to the secretion and deposition of a chemical called Lignin.
- This lignin act as a cement, providing extreme hardness and rigidity to the tissue.

2. Complex Permanent Tissue

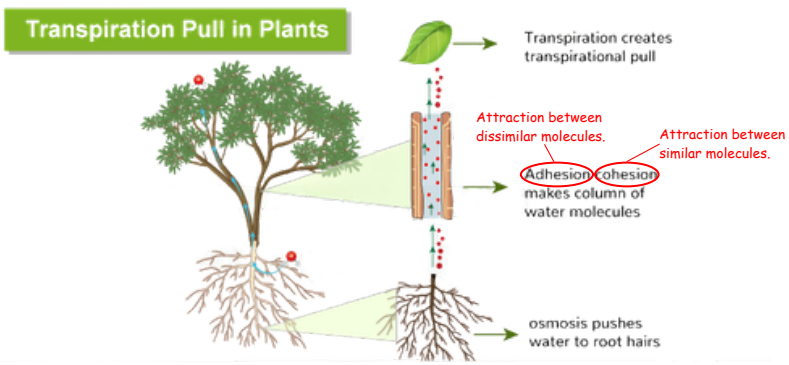
- These tissues are made up of various cell types that work together as a unit to perform a specific function.

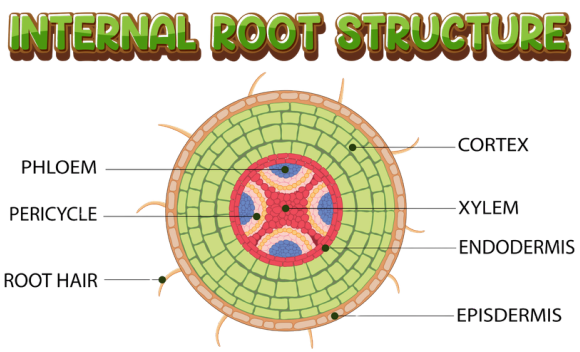
Types :

1. Xylem
2. Phloem

Xylem

- Xylem (Conducts water ››››One-way conduction)
- It transports water and nutrients from the roots to the leaves of the plant through transpiration pull.
- It provides support to the plants.
- **It is composed of:** Tracheids, vessels, xylem fiber, and xylem parenchyma.
- Only xylem parenchyma is a living tissue.

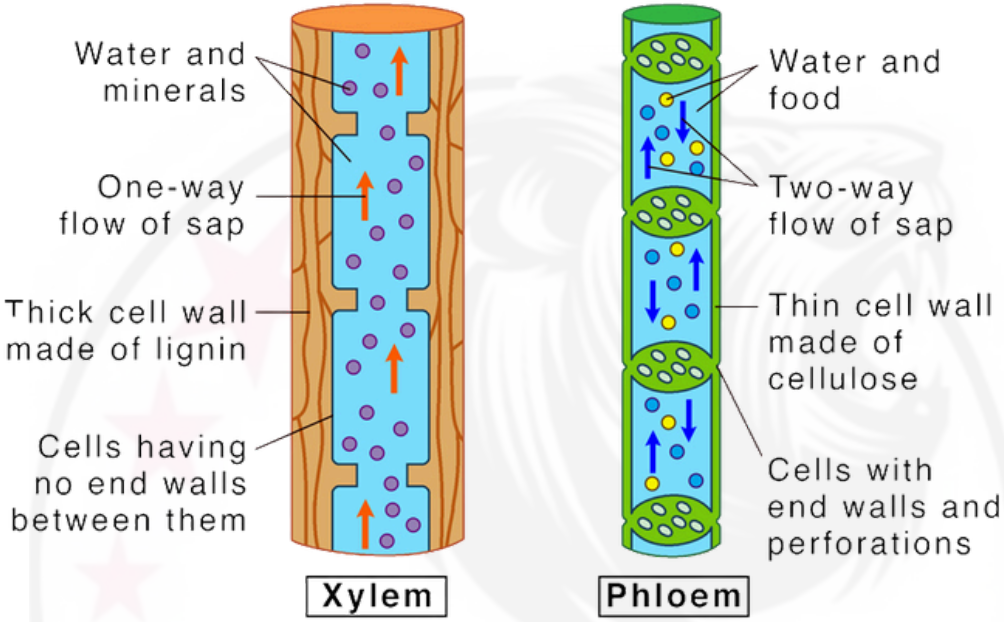




Phloem

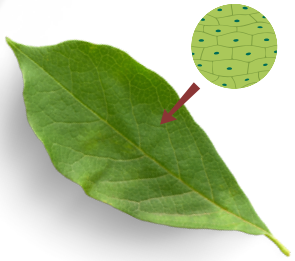
- Phloem (Conducts food >>>>Two-way conduction)
- It translocates the prepared food from the leaves to different parts of the plant.
- **It is composed of**: Sieve tubes, companion cells, phloem parenchyma, and phloem fibre.
- Only phloem fibre is a dead tissue.

Sieve tubes -> Non nucleated at maturity

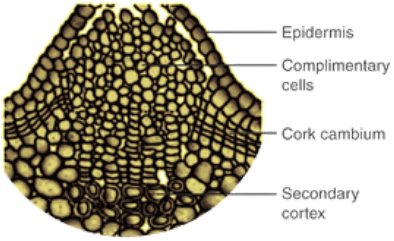


Protective Tissue (part of simple tissue)

- Protective tissues in plants are specialized tissues that form the outermost layers of the plant body, serving to shield it from various external factors like mechanical damage, pathogens, and water loss.
- In plants, protective tissues include the epidermis and cork.



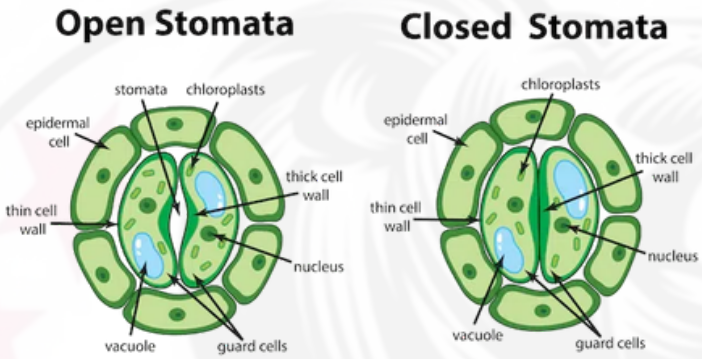
Epidermis



- The outermost layer of cells covering plant organs.
- **Occurrence:** Occurs in outermost layer of all the plant parts. E.g. leaves, flowers, stem and roots.

Functions

- It protects all parts of plants.
- Plants of dry habitats have thicker epidermis.
- Plants growing in desert have cuticle (waxy coverings). Layer of cutin is called cuticle. Cutin is a waxy material and water resistant. It also aids in protection against water loss, injury and invasion of fungi.
- Epidermal cells of the roots forms hair like structure. Long hair like parts increase absorption on surface area of roots.
- In leaves, epidermal cells form stomata that are guarded by Guard cells. Guard cells are kidney shaped structures that regulate gaseous exchange in plants.

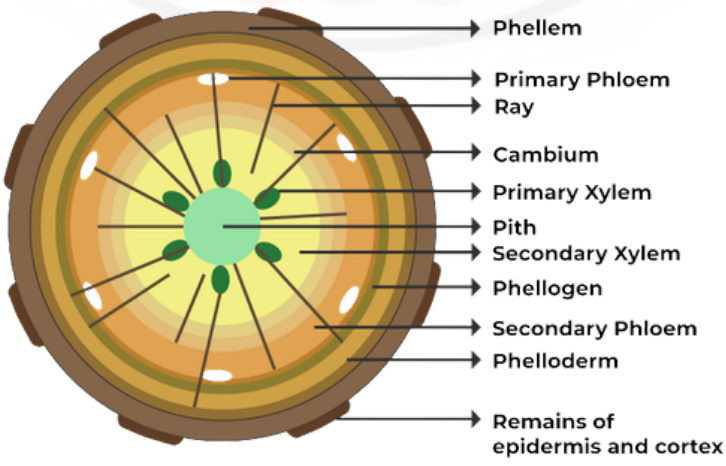


Cork

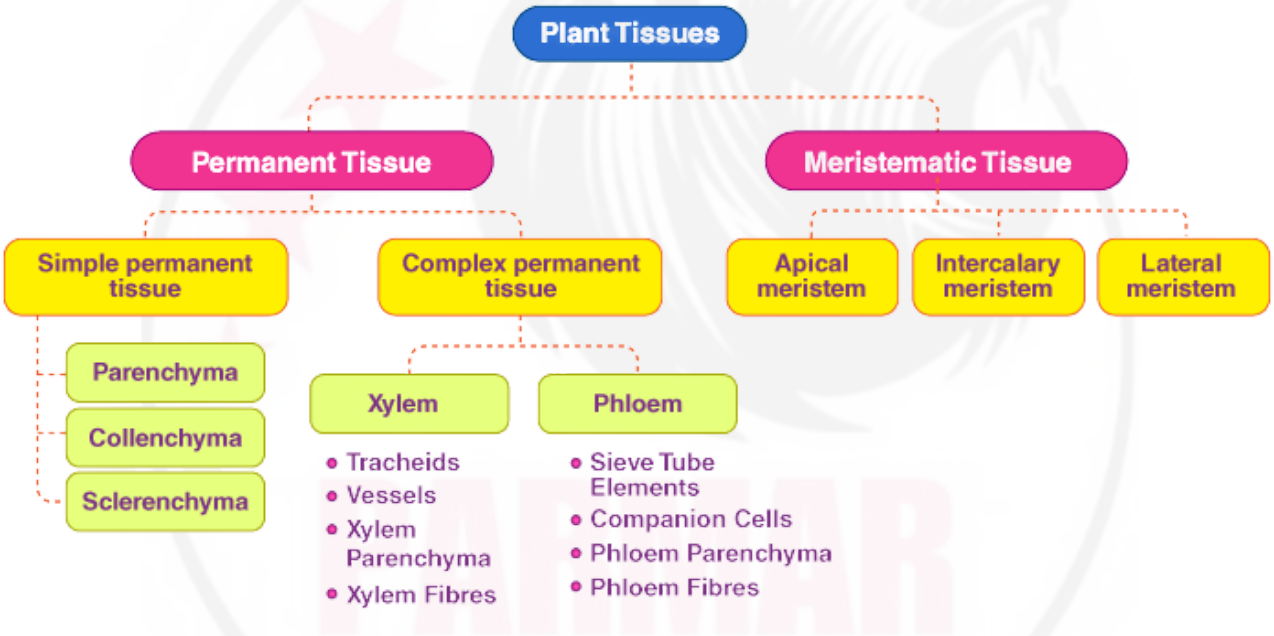
- Cork cells form the external protective tissue of plants. These cells are dead and compactly arranged, with their walls coated in suberin.
- Occurrence: Outer covering of stem and tree trunks.

Functions:

- It provides protection to mature roots and shoots.
- Suberin acts as a protective barrier for the plants. The suberin does not allow the water and gases to go outside of the cork cells.



Transpiration	Guttation
Loss of water vapour	Loss of water droplets
Through stomata, cuticle and lenticels	Through hydathodes (Present on leaf sides)
Leads to loss of turgidity (wilting)	No effects on turgidity
Cools the plant body	No cooling of plant body
Happens at day time	Happens at night time



- Xylem and phloem are collectively called vascular bundles.



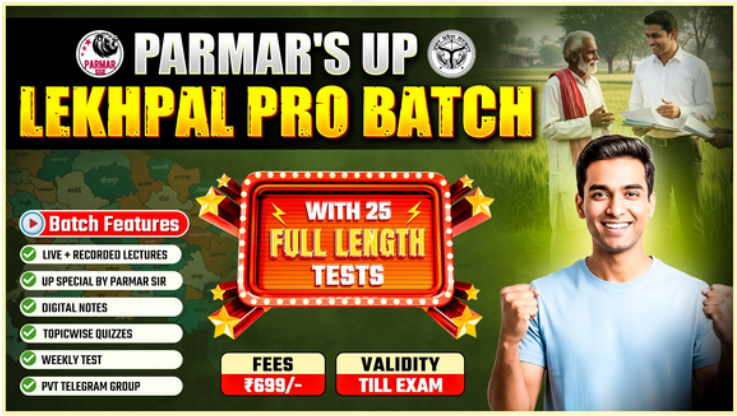


Join Now – Start Your Smart Preparation Today!

CLICK HERE

Join Now – Start Your Smart Preparation Today!

CLICK HERE





Join Now – Start Your Smart Preparation Today!

CLICK HERE

Join Now – Start Your Smart Preparation Today!

CLICK HERE





Join Now – Start Your Smart Preparation Today!

CLICK HERE