

Kingdom of Plant

Plant Classification

- ❖ Domain: Eukaryota
- ❖ Kingdom: Plantae
- ❖ Cell type: eukaryotic
- ❖ Cell number: multicellular
- ❖ Feeding: autotrophic (photosynthesis)
- ❖ Reproduction: sexual (seeds)

Plant Origin

- 1) Plants evolved from green algae (protists)
- 2) They are first classified as
 - a) Nonvascular – short plants with no transport tissue (like veins), e.g. moss
 - b) Vascular – taller plants with veins, e.g. trees
 - i) Xylem – veins for water
 - ii) Phloem – veins for food

Vascular plants can further be classified as

- ❖ **Gymnosperms** – cone bearing plants, e.g. pine trees
- ❖ **Angiosperms** – flowering plants, e.g. roses

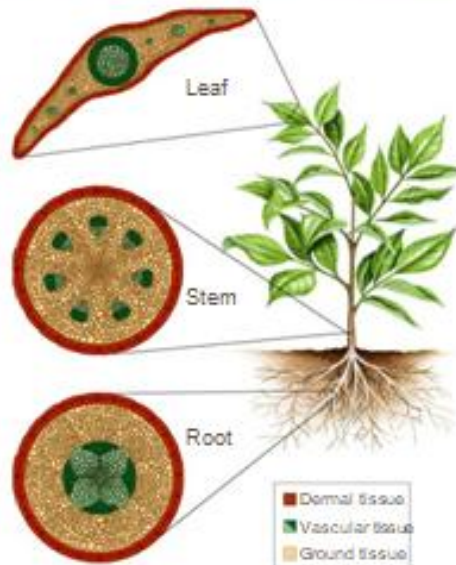
Plant Anatomy

- ❖ **Anatomy**: study of the **structure** of organisms... looking at cells, tissues
- ❖ **Morphology**: Study of form
- ❖ **Physiology**: study of the **function** of cells, tissues, organs of living things and the physics/chemistry of these functions.

Plant Tissues consist of:

Roots, Stems, and Leaves

Root, Stem, and Leaf Tissues

**Root Functions**

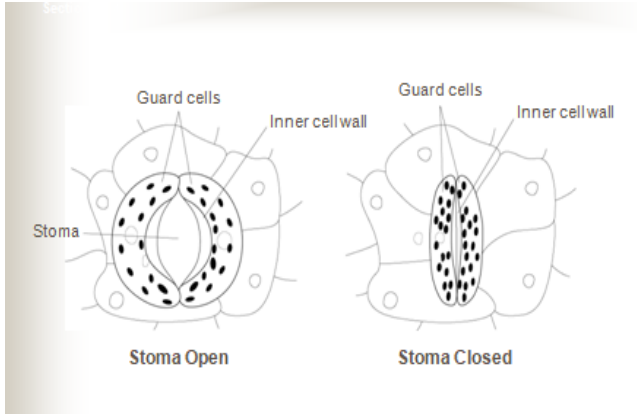
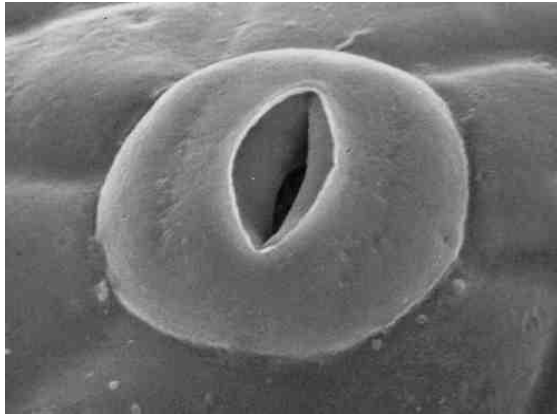
1. Anchors the plant
2. Absorbs water and minerals from soil
3. Stores food

Stem Functions

1. Connects the leaves with the roots
2. Displays the leaves for maximum sunlight exposure.
3. Stores food
4. Minor photosynthetic ability
5. Contains vascular tissue:
 - Phloem – transports sugars from leaves
 - Xylem – transports water and minerals from roots

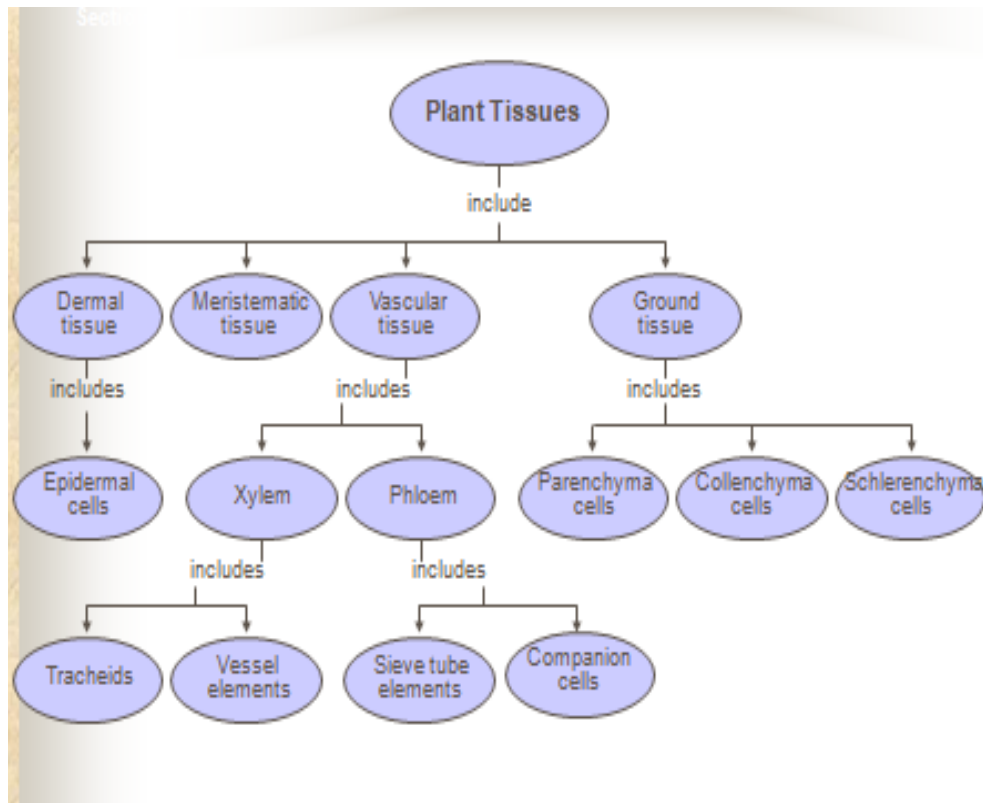
Leaf Functions

1. Carries on Photosynthesis
2. Stores food
3. Regulates transpiration through stomata



Stomata

Classification of plant tissues



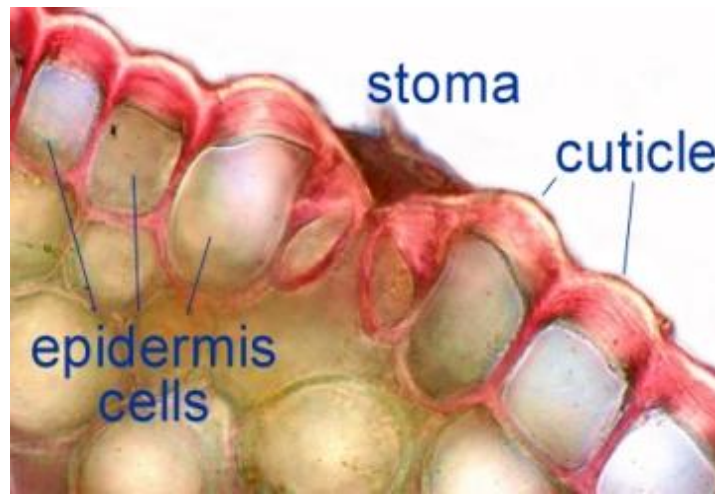
Plant Tissues Types

All plant organs (roots, stems, leaves) are composed of the same tissue types.

There are three types of tissue:

1-Dermal tissues

- Is a thin layer of cells covering the soft parts of a plant. In stems and leaves, epidermis has **cuticle**, a waxy layer that prevents water loss.



- Some have **trichomes**, hairs.
- Root epidermis has **root hairs**, for water and nutrient absorption



2-Meristematic tissues

Actively growing regions of plant.

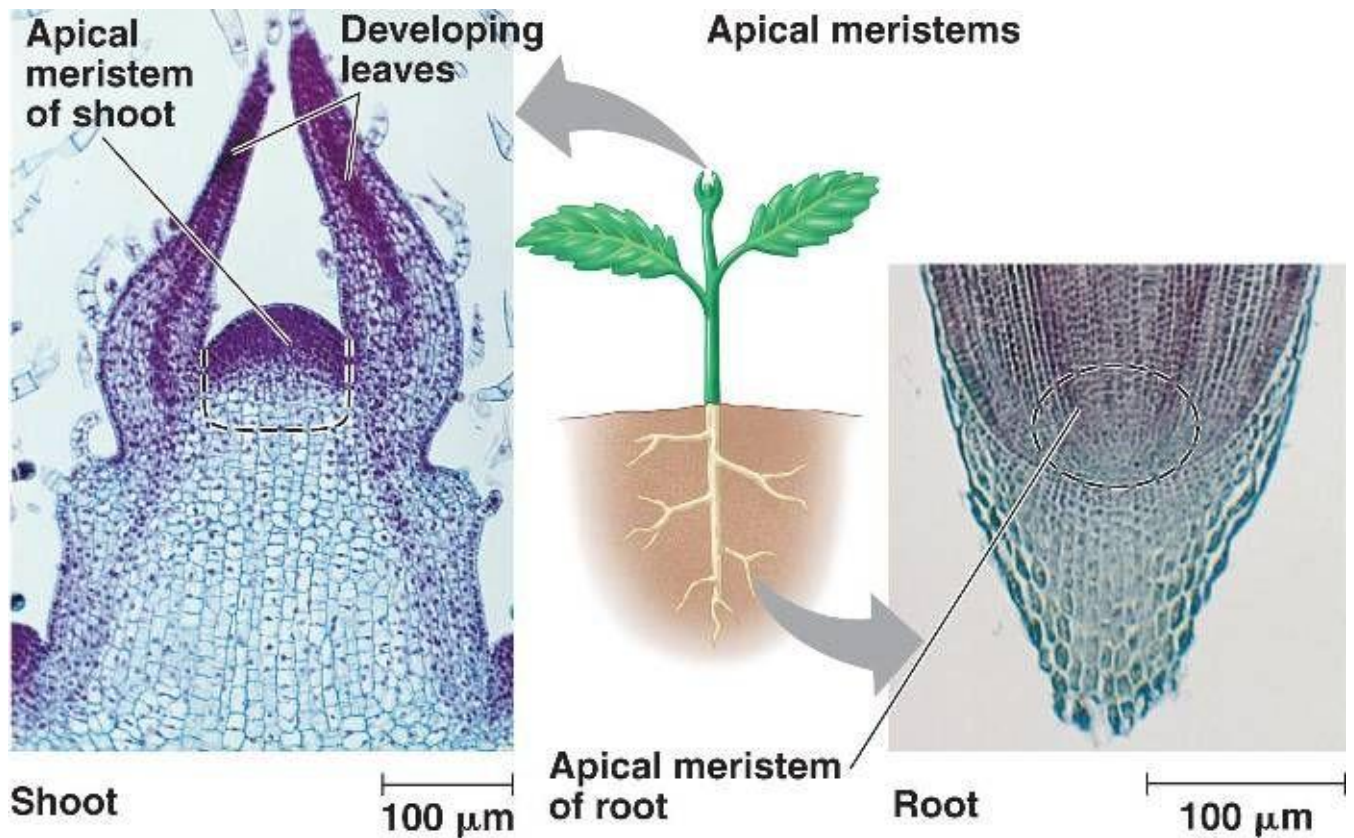
Meristems consist of:

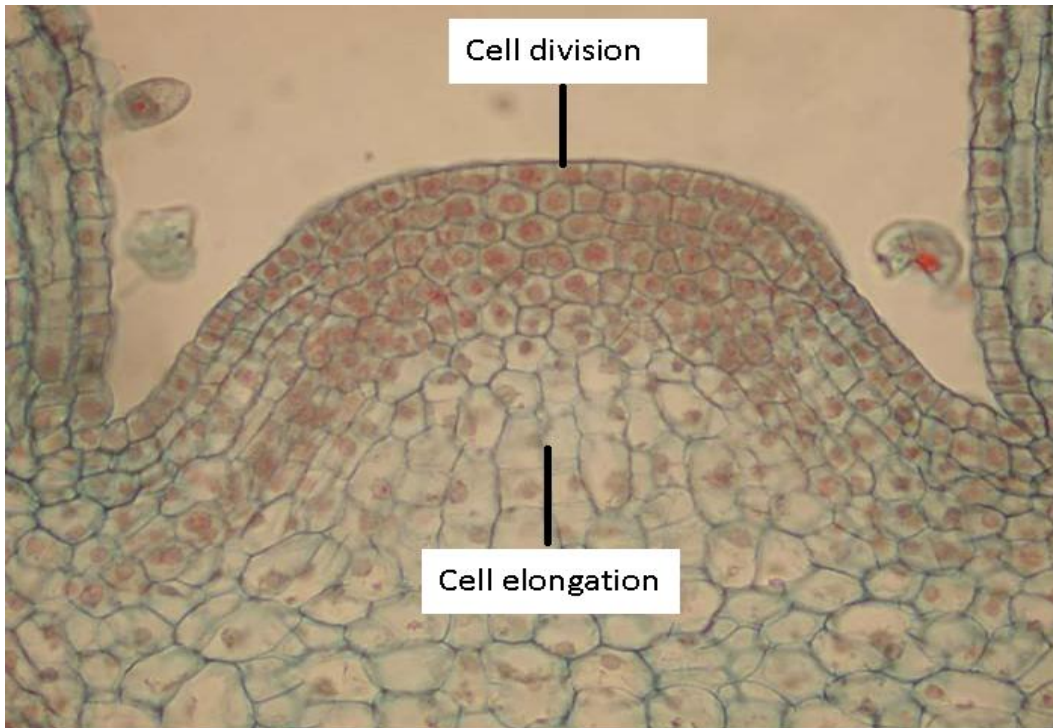
1. Primary meristems
2. Root apical meristems
3. Shoot apical meristems

Meristems regions:

- 1- cell division
- 2- cell elongation
- 3- cell differentiation

Cell differentiation results in different cell and tissue types.





3-Vascular tissues: Is a complex conducting tissue, formed of more than one cell type, found in vascular plants.

- Vascular bundles – composed of both xylem and phloem

- **Xylem** specialized cells consist of:

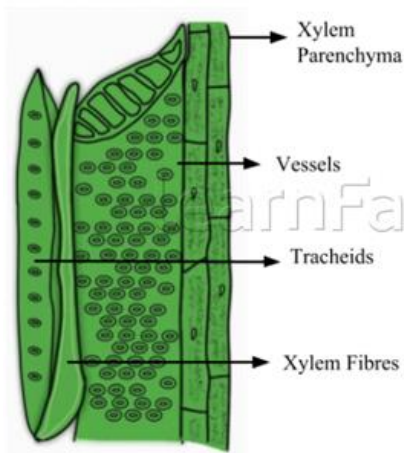
1. Parenchyma
2. Fibers
3. Tracheary elements (2 types: tracheids and vessels)

- **Phloem** specialized cells consist of:

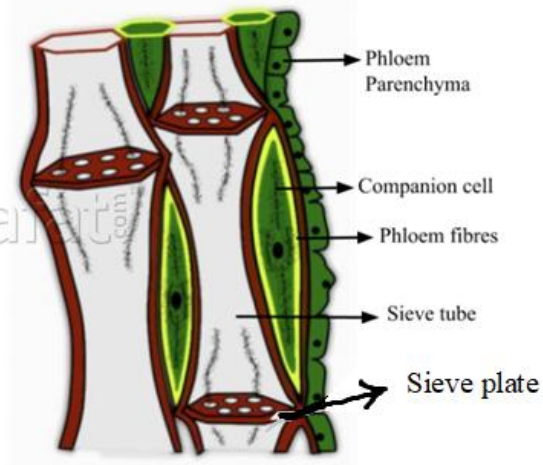
1. Companion cell
2. Parenchyma
3. Fibers
4. Sieve elements (2 types: sieve cells or sieve tube members)

Vascular cambium located in the middle of the vascular bundle, between xylem and phloem

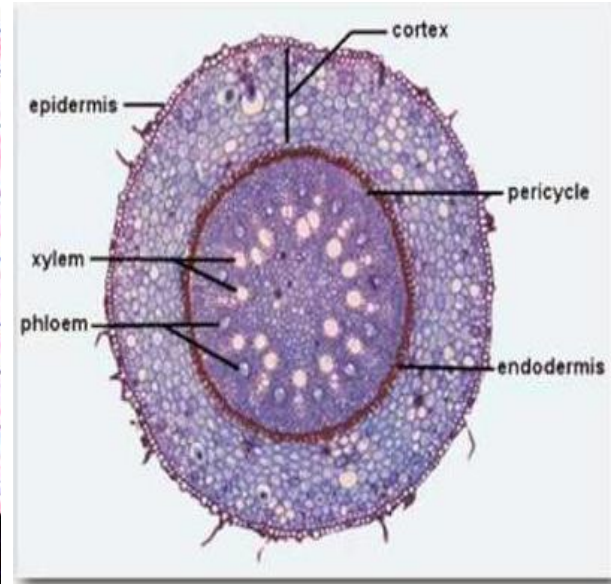
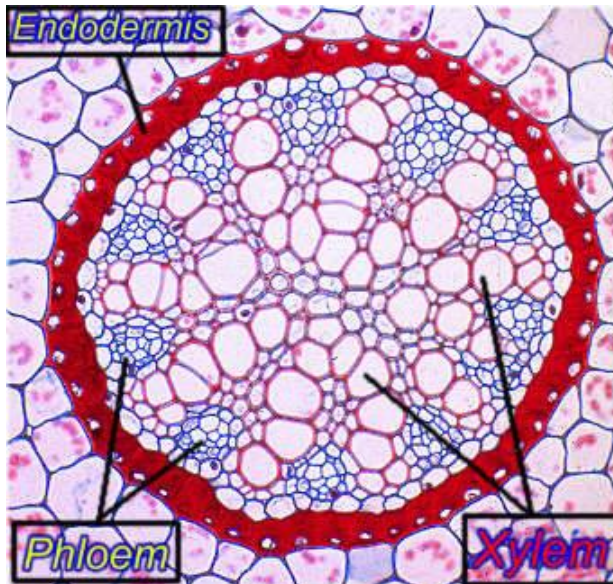
Complex Permanent Tissue



Xylem



Phloem



Comparisons between Xylem and Phloem

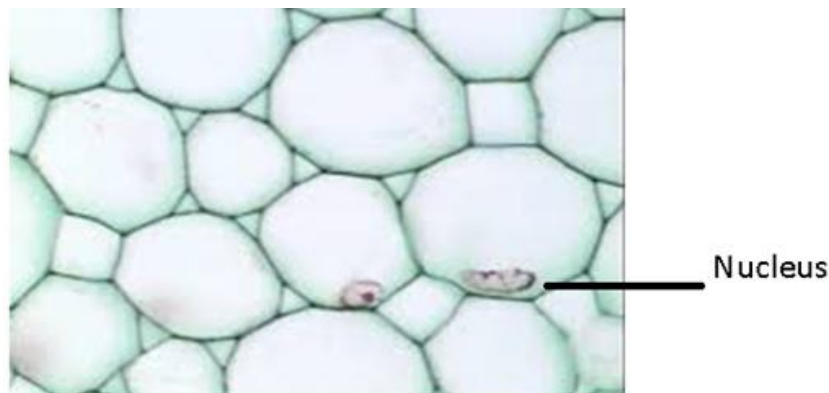
	Xylem	Phloem
Made of	Dead cells	Living cells
Cell wall thickness	Thick	Thin
Cell wall material	Lignin (rigid)	Cellulose
Permeability	Impermeable	Permeable
Cytoplasm?	None	Cytoplasm lining
Transports...	Water & minerals	Food
Carried to...	Leaves	Growing parts & storage organs
Direction of flow	Upwards	Up and down
Tissue also has...	Fibres	Companion cells

4-Ground tissue of plants includes all tissues that are neither dermal nor vascular.

It can be divided into three types based on the nature of the cell walls

A-Parenchyma cell

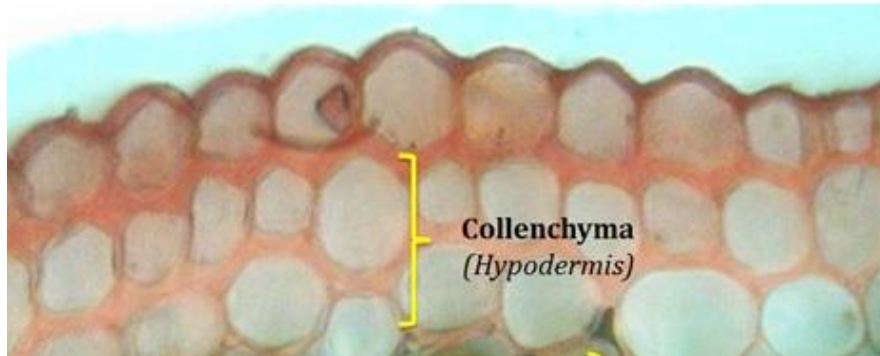
Parenchyma cells have thin, permeable primary walls enabling the transport of small molecules between them, and their cytoplasm is responsible for a wide range of biochemical functions such as nectar secretion.



- These cells synthesize (by photosynthesis) and store organic products in the plant. The soft tissue of fruits is also composed of parenchyma cells.
- Parenchyma cells are living cells that have functions ranging from storage and support to photosynthesis.

B- Collenchyma cells

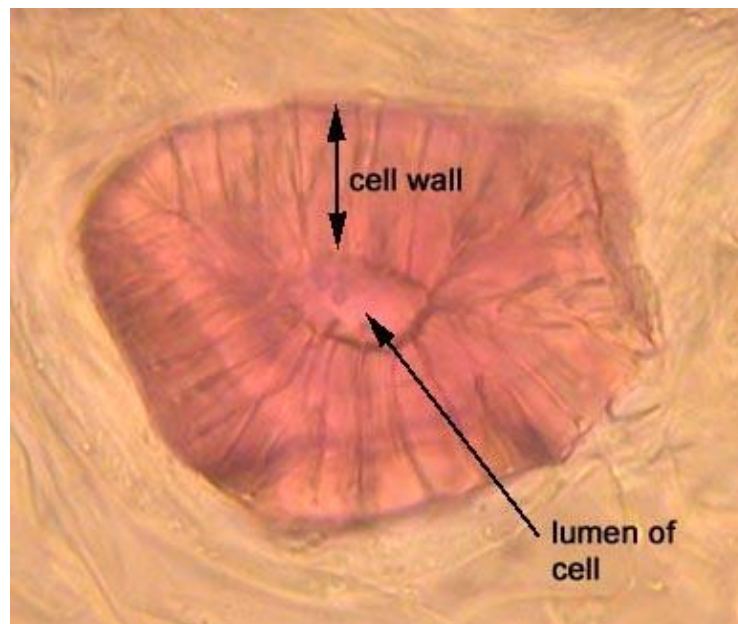
- Have a support function in plants, particularly in young plants.
- Collenchyma cells are alive at maturity and have only a primary wall.
- The wall is most commonly thickest at the corners.



C-Sclerenchyma Cells

These cells are thick and contain various shapes.

Sclerenchyma cells form the hard outer shell of nuts and seeds. They are found in stems, roots, and leaf vascular bundles. Sclerenchyma cells are typically dead at functional maturity, and the cytoplasm is missing, leaving an empty central cavity. Sclerenchyma cells also have a support function in plants.



Scleride cell