TISSUES

Tissue

Tissue is a group or collection of similar or dissimilar cells that perform or help to perform a common function and have a common origin.

Differences between the tissues of plants and animals

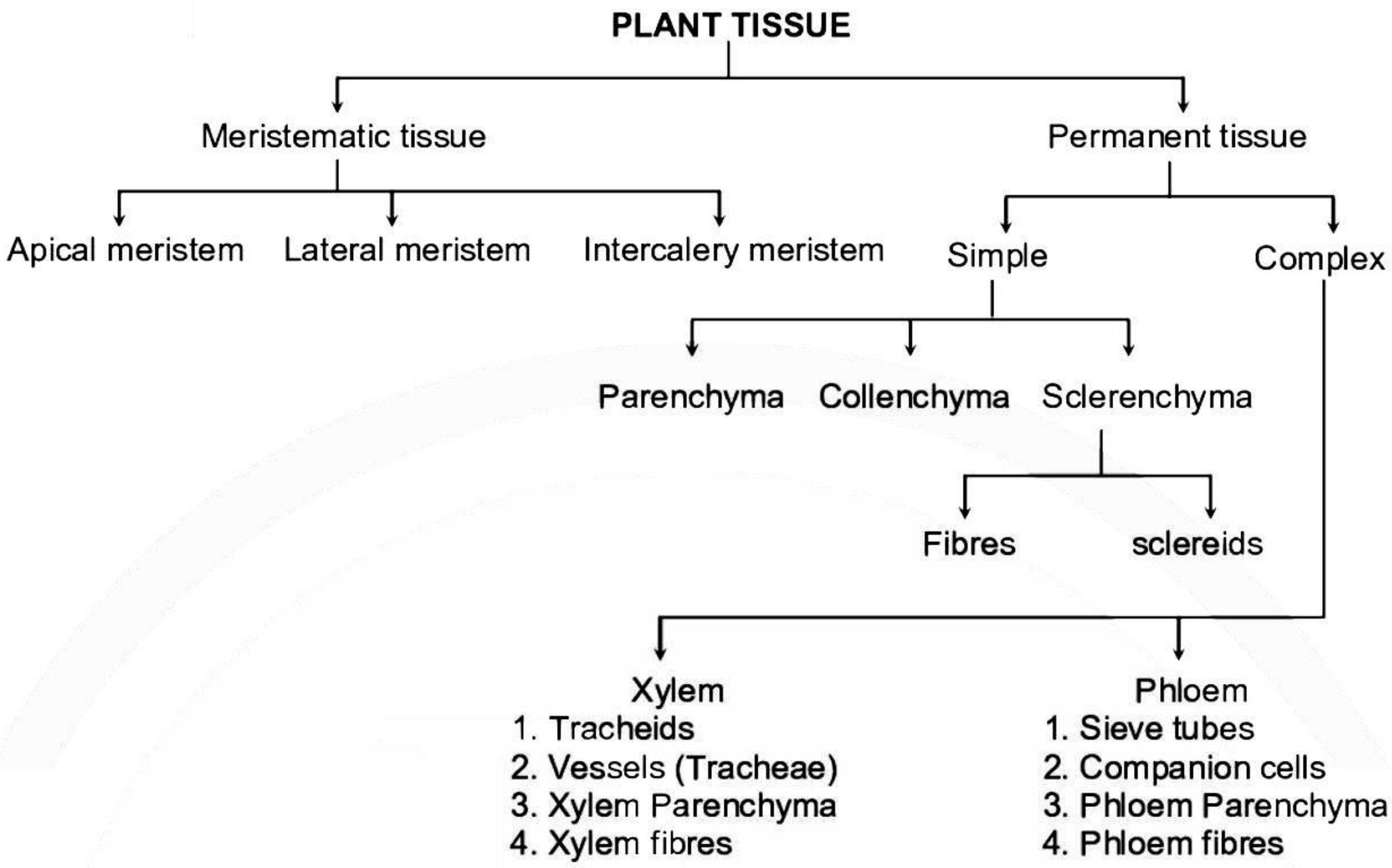
S. No.	Plant tissues	Animal tissues
1.	Most of the plants remain fixed at one place (sedentary) and need less energy. Therefore the tissues are thick – walled and dead to provide mechanical support. E.g., Sclerenchyma.	Animals show active locomotion and hence need more energy. Therefore the tissues are made up of living cells. E.g. – Nervous tissue.
2.	Growth in plants is indefinite. Certain tissues (meristematic) in root and shoot apex divide throughout life and add new cells. These cells differentiate and stop dividing to form permanent tissues.	Growth in animals is definite. In other words, they do not posses dividing and non-dividing tissues. The animal organs grow more or less uniform.
3.	Plant tissues are not much complicated.	Animal tissues are much more complicated.

Levels of organization

Cell $\longrightarrow$ Tissue $\longrightarrow$ Organ $\longrightarrow$ Organ system $\longrightarrow$ Organism

(group of cells) (group of tissues) (group of organs) (group of organ system)

Plant Tissues



Depending upon the position of the plant body, the meristematic tissues are classified into apical, lateral and intercalary.

(a) Apical meristem : Apical or Primary meristem is present at the growing tips of main and lateral shoots and roots. Cells derived from apical meristem differentiate into Permanent tissues.

(b) Lateral meristem : This tissue occurs along the sides of the central axis of the plant. Lateral meristems usually occur beneath the bark in the form of cork cambium and in vascular bundles in the form of vascular cambium. Lateral meristems are secondary meristems.

(c) Intercalary meristem : This tissue is present at the base of internode or leaf.

Functions of Meristematic tissues

(a) Apical meristem is responsible for the linear growth of an organ (e.g. root and shoot)

(b) Lateral meristem cause the organ (like stem or trunk) to increase in diameter and girth.

(c) Intercalary meristems are responsible for growth in length.

- Permanent tissues originate from meristematic tissues and become permanent at fixed positions in the plant body.

Permanent tissues

Cells of meristematic tissue give rise to permanent tissues. The cells of this tissue are mature and have undergone growth and differentiation.

Characteristics of Permanent tissues

(a) The cells have lost their power of division.

(b) The cells possess definite shape, size and function.

(c) They may be living or dead.

(d) The living permanent cells are large, thin walled with a vacuolated cytoplasm.

(e) Dead permanent cells are thick walled without cytoplasm.

Types of Permanent tissues

The permanent tissues are classified on the basis of their composition into two types.

(a) Simple Permanent tissue : These tissues are composed of similar types of cells which have common origin and function. They are further classified as parenchyma, collenchyma and sclerenchyma.

Modification of Parenchyma

- **In Storage parenchyma**, cells enlarge to store nutrients and water.
- In **Aerenchyma,** large air cavities are present to store gases and provide buoyancy to aquatic plants.
- In **Chlorenchyma**, the cells contain chloroplasts and perform photosynthesis.

Functions

- Its main function is assimilation and storage of reserve food materials.
- It also stores waste products such as tannin, gum, resins, etc.
- It serves as a packing tissue.

Differences between parenchyma and collenchyma

S. No.	Parenchyma	Collenchyma
1.	It consists of thin-walled living cells.	It consists of cells with localized thickenings.
2.	It is distributed in all plant parts.	It is found in aerial parts and restricted to outer layers.
3.	The cells of parenchyma assimilate, store food and waste products.	Collenchyma forms the mechanical tissue in young parts of the plants.

Differences between collenchyma and sclerenchyma

S. No.	Collenchyma	Schlerenchyma
1.	Cells of collenchyma are living	Cells of sclenenchyma are dead.
2.	Cells have thin walls.	Cells have thick and hard walls.
3.	Cells have localized thickenings at corners.	Cells have uniform thickening.
4.	Cells are filled with protoplasm.	Cells are empty with narrow lumen.
5.	Collenchyma provides mechanical strength and elasticity.	Sclerenchyma provides mechanical support.

(b) Complex permanent tissue : A group of more than one type of cells having a common origin and function is called complex permanent tissue. The two complex tissues are xylem and phloem.

Differentiate between Xylem and Phloem.

S. No.	Xylem	Phloem

1.	The various components of xylem are – Tracheids, vessels, xylem fibres and parenchyma.	The various components of Phloem are – Sieve tubes, companion cells, phloem fibres and parenchyma.
2.	All the components of xylem except xylem parenchyma are non-living.	All the components of phloem except phloem fibres are living.
3.	It brings about unidirectional conduction of water and minerals from roots to leaves.	It brings about bidirectional translocation of synthesized food from leaves to various plant parts.

Animal Tissues

- Animal tissues are classified into – epithelial tissue, muscular tissue, connective tissue and nervous tissue.