

Tissues

- A **tissue** is a group of cells that have a similar structure and work together to perform a specific function.
- The study of tissues is called **Histology**.

Unicellular vs Multicellular Organisms

- In **unicellular organisms**, a single cell performs all life processes (e.g., respiration, digestion).
- In **multicellular organisms** (plants and animals):
 - There is **division of labour**.
 - Different tissues perform different functions efficiently.

Difference Between Plant and Animal Tissues

Plant Tissues

- Mostly **dead tissues**.
- Require **less maintenance**.
- Show **continuous growth** throughout life.
- Growth occurs at specific regions (meristems).

Animal Tissues

- Mostly **living tissues**.
- Require **more energy and maintenance**.
- Growth **stops after maturity** (in most cases).
- Tissues are highly specialized.

Types of Plant Tissues

- Plant tissues are of two main types:

(A) Meristematic Tissue

- Composed of **actively dividing cells**.
- Found in regions of **growth**.

Characteristics

- Cells are small, thin-walled, and densely packed.
- No intercellular spaces.
- Large nucleus and active cytoplasm.

Types of Meristematic Tissue

1. Apical Meristem

- Located at root and shoot tips.
- Responsible for **increase in length** (primary growth).

2. Lateral Meristem

- Found on the sides of stems and roots.
- Helps in **increase in girth** (secondary growth).

3. Intercalary Meristem

- Located at nodes or internodes.
- Helps in **regrowth of grasses**.

(B) Permanent Tissue

- Formed from **meristematic tissues** after differentiation.
- Cells lose their ability to divide.

Types of Permanent Tissue

(i) Simple Permanent Tissue

Made of **one type of cells**.

1. Parenchyma

- Living tissue with **thin cell walls**.
- Cells are loosely packed → **intercellular spaces present**.

Functions:

- Storage of food.
- Photosynthesis (when chlorophyll is present → **Chlorenchyma**).
- Buoyancy in aquatic plants → **Aerenchyma** (air cavities present).

2. Collenchyma

- Living cells with **unevenly thickened corners**.
- Provides **flexibility and mechanical support**.

Location:

- Below epidermis of dicot stem and leaf stalk.

3. Sclerenchyma

- Dead tissue with **thick, lignified walls**.

- Cells are long and narrow.

Functions:

- Provides **strength and rigidity**.

Examples:

- Coconut husk
- Seed coverings

4. Epidermal Tissue

- Outermost protective layer of plants.

Features:

- Covered with **waxy cuticle** (prevents water loss).
- Protects against **mechanical injury**.

Stomata

- Small pores on leaf surface.
- Help in **gas exchange** and **transpiration**.
- Surrounded by **guard cells**.

Cork/Bark

- Made of dead cells.
- Protects older stems.

(ii) Complex Permanent Tissue

- Made of **different types of cells** working together.

1. Xylem

- Conducts **water and minerals** from roots to other parts.

Components:

- ❖ Tracheids
- ❖ Vessels
- ❖ Xylem parenchyma
- ❖ Xylem fibres

2. Phloem

- Transports **food (sugars)** from leaves to other parts.

Components:

- ❖ Sieve tubes
- ❖ Companion cells
- ❖ Phloem parenchyma
- ❖ Phloem fibres (**only dead cells in phloem**)

Types of Animal Tissues

(i) Epithelial Tissue

- Forms **protective covering** of body surfaces and organs.

Types:

1. Squamous Epithelium

- Thin and flat cells.
- Found in **mouth and oesophagus**.

2. Columnar Epithelium

- Tall, pillar-like cells.
- Found in **intestine**.
- Sometimes have **cilia** (in respiratory tract).

3. Cuboidal Epithelium

- Cube-shaped cells.
- Found in **kidney tubules and glands**.

4. Stratified Squamous Epithelium

- Multi-layered cells.
- Found in **skin** (protection).

(ii) Connective Tissue

- Connects and supports different parts of the body.

Types:

Blood

- Fluid connective tissue.
- Components:
 - ❖ Plasma
 - ❖ RBCs (carry oxygen)
 - ❖ WBCs (fight infection)

- ❖ Platelets (help in clotting)

Bone

- Hard tissue forming body framework.
- Protects organs like **brain, heart, lungs**.

Cartilage

- Flexible tissue.
- Found in **nose, ear, joints**.

(iii) Muscular Tissue

- Responsible for **movement**.

Types:

1. Striated (Voluntary) Muscles

- Under conscious control.
- Found in limbs.

2. Smooth (Involuntary) Muscles

- Not under conscious control.
- Found in internal organs (stomach, intestine).

3. Cardiac Muscles

- Found only in the **heart**.
- Show rhythmic contraction.

(iv) Nervous Tissue

- Made of **neurons (nerve cells)**.

Functions:

- Control and coordination.
- Transmit signals between brain, spinal cord, and body parts.