Chapter

TISSUE

- Cell → Tissue → Organs → Organ system → Organism (Body)
  - Tissue: → Group of cells → same function → same organism
  - Organs: (Stomach, Skin, Brain)

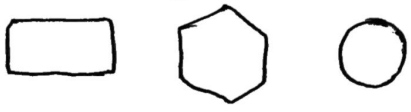
- **Tissues** → A group of cells that have a common origin and are similar in structure and function.

- Plant Tissues
  - Meristematic Tissues
    - Apical
    - Intercalary
    - Lateral
  - Permanent Tissues
    - Simple
      - Parenchyma
      - Collenchyma
      - Sclerenchyma
    - Complex
      - Xylem
      - Phloem

- Plant Tissues

Meristematic Tissues

- Cells are capable of cell division and have totipotency.
- These cells divide continuously.
- They have thin cellulose cell wall.
- The shape of cells could be spherical, oval, Polygonal or rectangular.



Permanent Tissues

- Mature cells incapable of cell division.

⊙ Meristematic Tissues

- They are growth tissues and are found in growing regions of the plant.

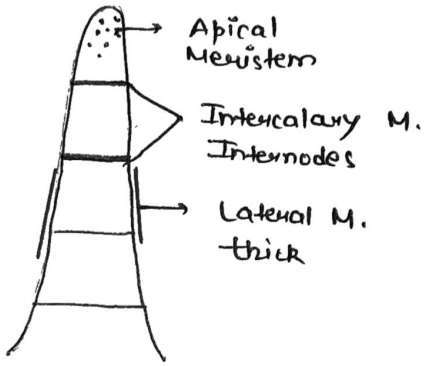
Meristematic Tissue

Apical
- They are situated in growing tip of stems and roots i.e., shoot apex & root apex.

Tip

Intercalary
- They are located at the base of leaves or internode
eg) stems of grasses.

Lateral
- They are found beneath the bark and in vascular bundles of dicot roots and stems.



- Apical Meristem

functions → 1) Helps in elongation of root & stem.
2) Increases height of the plant (Primary growth)

- Lateral Meristem

functions → 1) Helps the stem or root to increase in diameter and girth (secondary growth).

- Intercalary Meristem

functions → 1) Helps to increase the length of leaves and internodes.

⊙ PERMANENT TISSUE

- These are formed from meristematic tissues.
- Meristematic tissue take up specific role & stop dividing.
- These cells take up permanent shape, size and function called as (differentiation).

Permanent Tissue

Simple Tissue

- Protective and supporting
- Composed of single type of cells.

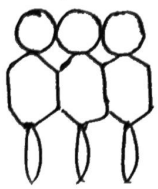
○○○ [one type of cells]

- Simple Tissue

Parenchyma ↓ Collenchyma ↘ Sclerenchyma

Complex Tissue

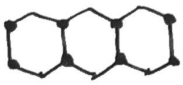
- Conducting → xylem & Phloem
- composed of more than one type of cells



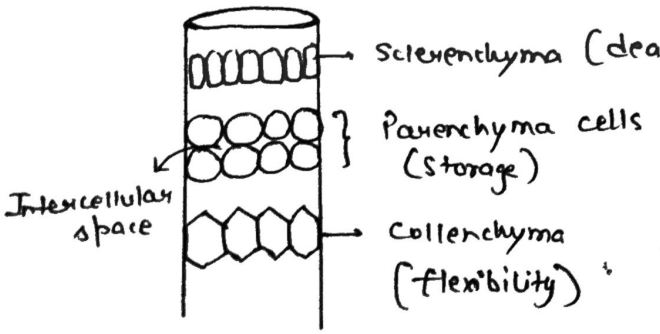
Function Same.

- complex Tissue

xylem ↘ Phloem

Parenchyma	Collenchyma	Sclerenchyma
1) The cell wall of Parenchyma is thin. 	1) The cell wall of collenchyma is irregular in shape, that means it is thick at the borders. 	1) The cell wall of sclerenchyma are seen to be thick.
2) cells are loosely arranged.	2) There is very little space between the cells.	2) There are no intercellular spaces present between the cells.
3) cell wall is made up of cellulose.	3) cell wall is made up of Pectin and hemicellulose	3) Mainly formed of Lignin.

Pear ↓↓ Lignin in cell wall.



⇒ Simple permanent Tissue

- If chloroplast is present, the parenchyma tissue is called Chlorenchyma and it performs photosynthesis.

↳ Photosynthesis.

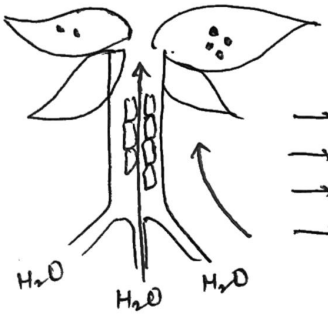
- In aquatic plants, large air cavities are present in parenchyma to give buoyancy to the plants to help them float. Such a Parenchyma type is called Aerenchyma.

⇒ Complex Permanent Tissue

- The complex tissue consists of more than one types of cells having a common function and origin.
- Xylem or wood → H_2O Transport (unidirectional)
- Phloem or bark

Xylem

→ Xylem Parenchyma
→ Xylem fibres
→ Tracheids
→ Vessels
} dead



↳ Bidirectional

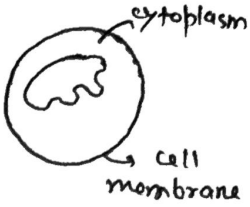
Phloem

→ Phloem Parenchyma (L)
→ Phloem fibres (D)
→ Sieve Tubes (L)
→ Companion cells (L)

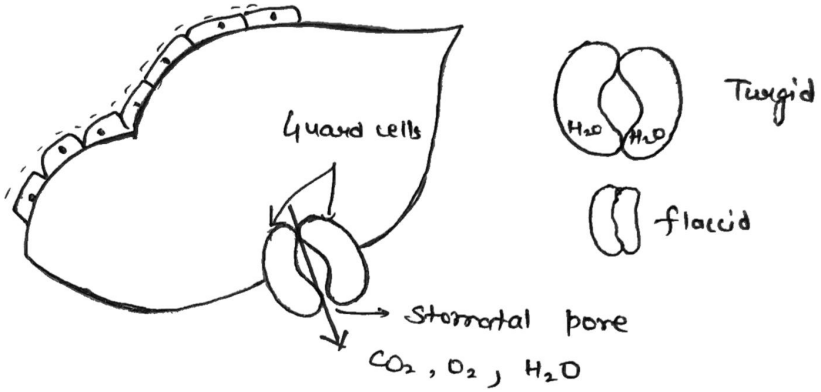
Xylem	Phloem
1) It conducts water and minerals from roots to leaves.	1) It conducts food from leaves to all parts of the plant.
2) It is composed of mainly dead elements.	2) It is composed of mainly living elements
3) Transport is unidirectional.	3) Transport is bidirectional.
4) It has four types of cells → • Tracheids • Vessels • xylem Parenchyma • xylem fibres.	4) It has four types of cells → • sieve tubes • companion cells • Phloem fibres • Phloem Parenchyma

- **Protective Tissue**

- Protective Tissue are part of Plant Tissue system.
- It includes :-
  - → Epidermis
  - → Cork



1) It protects plants from water loss in transpiration
2) It acts as boundary tissue surrounding the plant.
3) Exchange of gases through stomata
4) Storage of water and metabolic products.



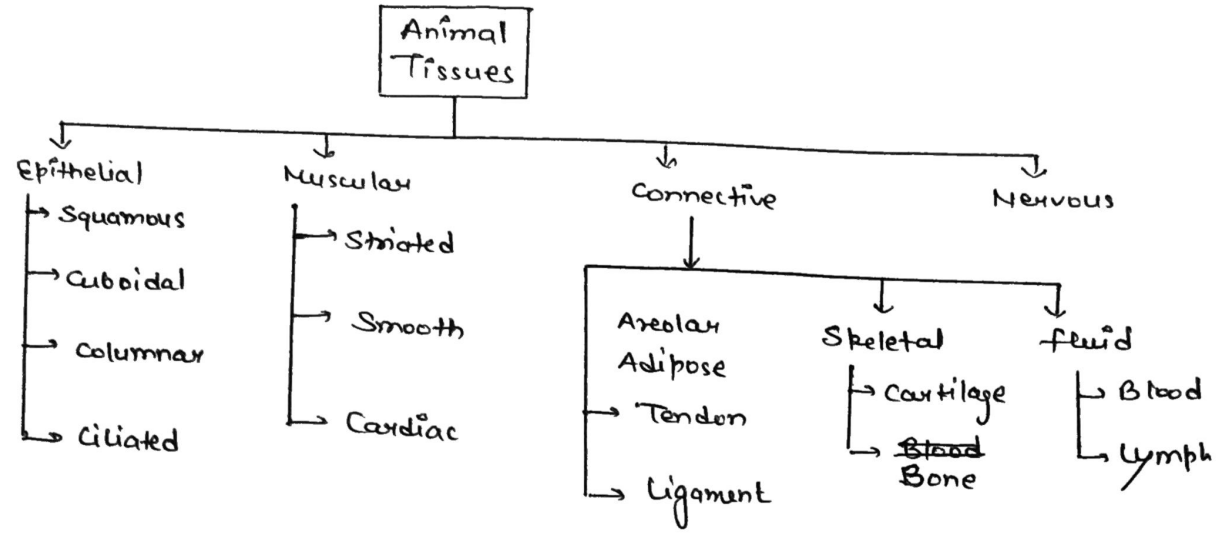
- **Epidermis Tissue**

- cells of epidermis are elongated and flattened, without intercellular space.
- In leaves, epidermis bears small pores called Stomata.
- In very dry habitats, the epidermis may be thicker, with a waxy coating of water resistant chemical called Cutin.
  - → XEROPHYTES.

- **Cork / Phellem Tissue**

- Cork cells are dead cells without having intercellular space.
- They appear at the periphery of roots and stems when they grow older and increase in girth.
- They also have a chemical called Suberin in their walls that make them impervious to gases & water.

Animal Tissues



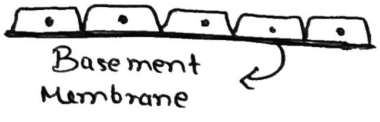
1) Epithelial Tissue

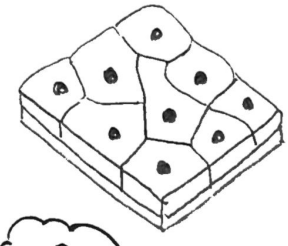
- Covering or protective tissue
- Covers most organs and cavities within the body.
- Has tightly packed cells and no intercellular spaces.

i) Squamous Epithelium

Squamous → flat

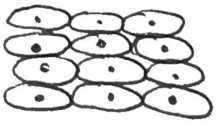
- Thin, flat and irregular shaped cells.
- found in the lining of mouth, oesophagus, nose, alveoli, blood vessels, and covering of tongue & spine.





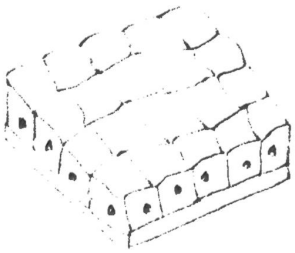
⇒ Stratified Squamous Epithelium ⇒ Skin

- These are multilayers of squamous epithelium.

Thick { 

ii) Cuboidal Epithelium

- Cube like cells
- found in kidney tubules, thyroid vesicles and in salivary glands & sweat glands.

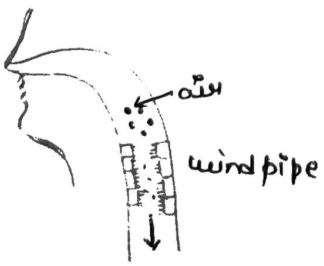


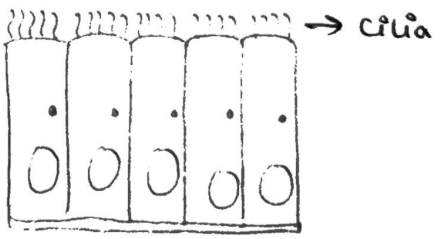
iii) Columnar Epithelium

- Tall cells with nuclei towards the base
- found in lining of stomach, small intestine, gall bladder and oviducts.
- Columnar epithelium modifies to form Glandular epithelium. (digestive organs)

iv) Ciliated Epithelium

- Cuboid shaped cells with cilia.
- found in sperm ducts, lining of trachea, kidney tubules & oviducts.





Connective Tissue

- The cells of connective tissue are loosely spaced and embedded in an intercellular matrix.
- The matrix could be jelly like, fluid, dense or rigid.

Cells + Matrix

Solid
Liquid / Jelly.

⊙ Fluid Connective Tissue (Blood)

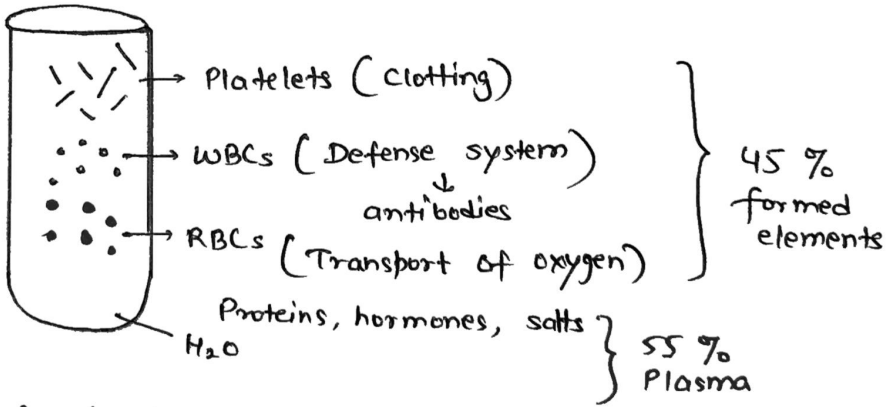
- Has liquid matrix called Plasma.
- Blood has two components (Plasma and elements).
- Plasma contains proteins, salts and hormones.

↘ BLOOD

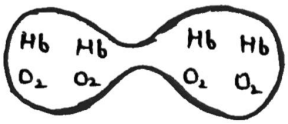
⊙ 3 elements present in Blood :-

→ Red Blood cells
→ White Blood cells
→ Platelets

Blood composition



- Functions : Helps in transportation of gases, digested food, hormones & waste materials.



oxyhaemoglobin

NO Nucleus, Mitochondria, ER.

Lymph

- Lymph has a colourless fluid
- Does not have RBCs and some blood proteins are absent.

Lymphocytes → a type of WBCs to make antibodies.

① functions : → Lymph transport the nutrients like blood.
→ Lymph has lymphocytes (WBCs) that protects the body against infection.

② Skeletal Tissue

- **Bone**
  - Bone cells are embedded in a hard matrix.
  - Composed of calcium & Phosphorous.

⇒ functions : ① It form the framework & supports the body.
② It also anchors the muscles & supports the main organs of the body.

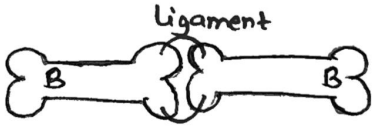
⇒ **Tendons**

- contains very little matrix.

⇒ functions : Connects muscles to bones and provides strength to the tissue.

⇒ **Ligaments**

- contains very little matrix.



⇒ functions : • It connects bones with bones.
• Ligament is elastic tissue and has considerable strength.

- **Cartilage**

"Chondrocytes"
→ Soft structure
→ Nose & ears.

⊙ **Adipose Tissue** ⇒ fat storage tissue.

- This tissue is present below the skin and between internal organs.
- These cells are filled with fat globules.
- This tissue also act as an (insulator).

⊙ **Areolar Tissue**

- Areolar connective connects and surrounds different organs in the human body.
- It provides nutrition to the cells and also acts as a cushion to protect the organs from various external sources.

MUSCULAR TISSUE

Skeletal

- Also called Striated / Striped muscles.

- Striated
- cylindrical
- Not Branched
- Nucleus in Periphery
- Voluntary

Smooth

- called unstriated / non-striped / Visceral muscles.

- Not striated
- Spindle shaped
- Not Branched
- Nucleus in centre
- Involuntary

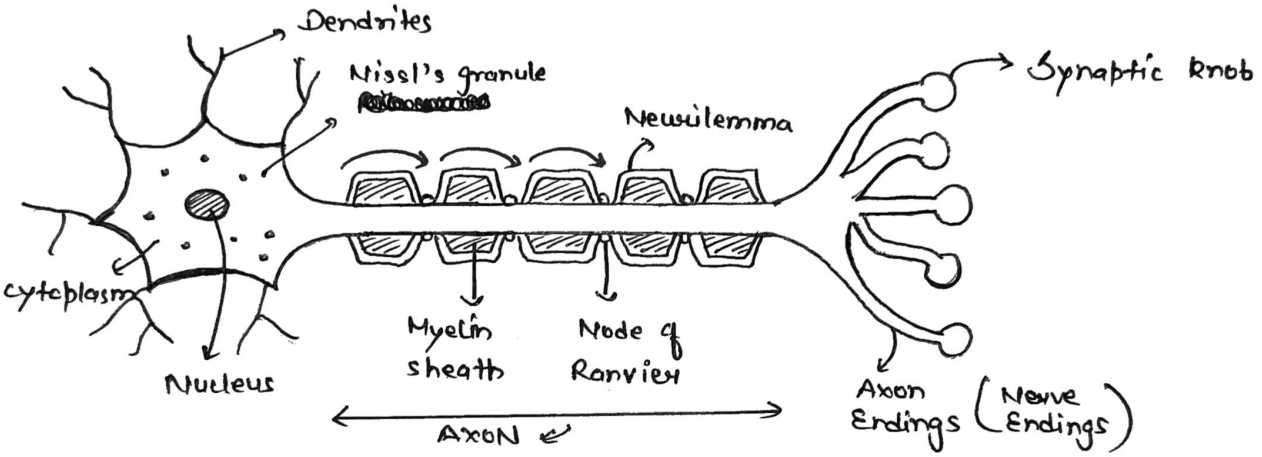
Cardiac

- called Heart Muscles.

- Striated
- Cylindrical
- Branched
- Nucleus in centre
- Involuntary

NERVOUS TISSUE (Neurons / Nerve fibres)

- Short hair like extensions are arriving from the cyton and are called Dendrites.
- The longest dendrite is called AXON.
- Nerve cells receive stimuli and carry message to the brain and spinal cord in the form of electric current or impulses.



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