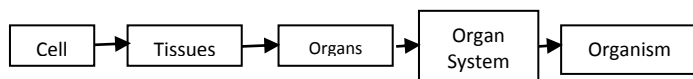


Introduction

Introduction

- A group of similar cell which perform a particular function is called a tissue.
- Term tissue was coined by Bichat.
- Branch of biology deals with the study of tissue is called Histology.

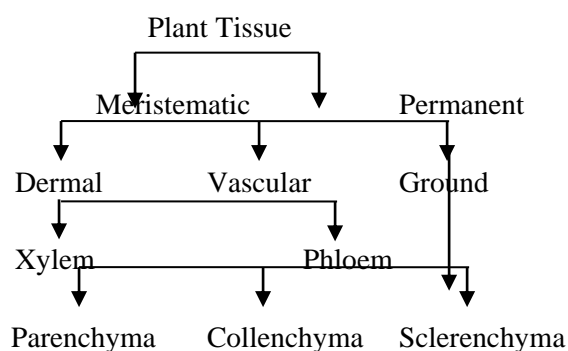


Tissues can be divided into two types — Plant and animal tissues.

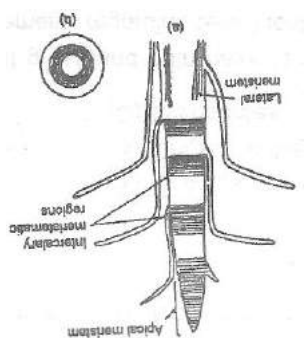
Plant Tissues

Mainly they are of two types:

- Meristematic Permanent



- (a) Meristematic Tissue: These are simple living tissues having thin walled compactly arranged immature cells which are capable of division and formation of new cells.



- (i) Main features of meristematic tissues are:
- (A) Thin primary cell wall (cellulosic).
 - (B) Intercellular spaces are absent (Compact tissue).
 - (C) Generally vacuoles are absent, dense cytoplasm & prominent nuclei are present.
 - (D) Large number of cell organelles are present.
 - (E) Active metabolic state, stored food is absent.

- (F) Active dividing cells are present in growing regions of plants, e.g. root & shoot tips

(ii) Classification on the basis of origin:

(A) Primary (Promeristem):

- Derived directly from the meristems of embryo.

(B) Secondary:

- Formed by primary permanent tissues.

(iii) Classification on the basis of location:

(A) Apical meristem: It is present at the growing tips of stems and roots. Cell division in this tissue leads to the elongation of stem & root thus it is involved in primary growth of the plant.

(B) Intercalary meristem: It is the part of apical meristem which is left behind during growth period. These are present at the base of leaf & internode region. These lead to the increase in the length of leaf (Primary growth) e.g. In grass stem, bamboo stem, mint stem etc.

(C) Lateral meristem: it is also called as secondary meristem.

(b) Permanent Tissue:

- The permanent tissues are composed of those cells which have lost their capability to divide.
- The division & differentiation of the cells of meristematic tissues give rise to permanent tissues.
- The permanent Tissues are Classified into two Types:

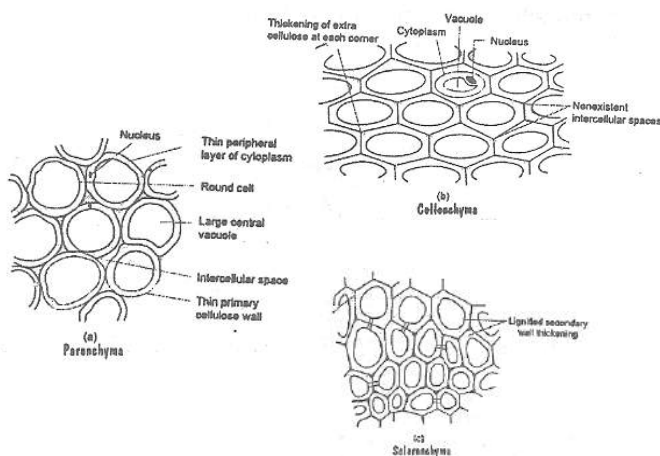
(i) Simple permanent tissues: These tissues are made up of same type of cells which are similar structurally and functionally. They include two types of tissue:

(A) Protective Tissues: These tissues are primarily protective in function. They consist of:

- Epidermis: Epidermis forms unicellular thick outermost layer of various body organs of plants such as leaves, flowers, stems and roots. Epidermis is covered outside by cuticle. Cuticle is a water proof layer of waxy substance called as cutin.
- Cuticle is very thick in xerophytes.
- Cells of epidermis of leaves are not continuous at some places due to the presence of small pores called as stomata. Each stomata is guarded by a pair of bean shaped cells called as guard cells.

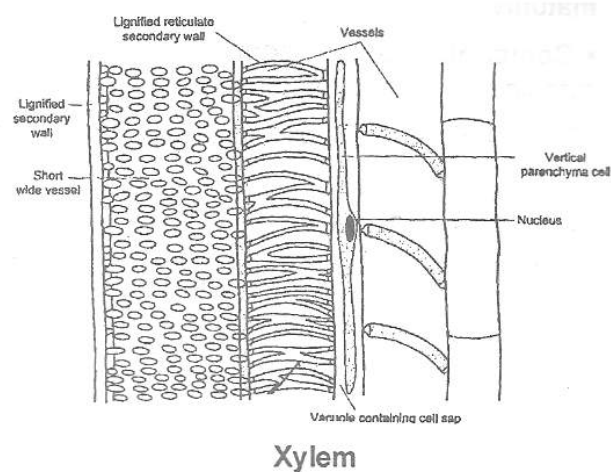
• **Function:**

- (i) The main function of epidermis is to protect the plant from desiccation and infection.
 - (ii) Cuticle of epidermis cuts the rate of transpiration and evaporation of water and prevents wilting.
 - (iii) Stomata in epidermis allow gaseous exchange to occur during photosynthesis and respiration.
 - (iv) Stomata also helps in transpiration. Cork is made up of dead cells with thick walls and do not have any intercellular spaces. The cell walls in cork deposit waxy substance called as suberin.
- (B) **Supporting tissue:** These are supportive in function and of three types:



- Parenchyma: It is the fundamental tissue. Parenchymatous cells have thin cell wall.
- Cell wall mainly composed of cellulose & pectin.
- Large central vacuole for food & water storage.
- Primary function is food storage.
- Chloroplast containing parenchyma tissues are chlorenchyma which perform photosynthesis e.g. mesophyll of leaves.
- In hydroptic plants aerenchyma (A type of parenchyma containing air spaces) provides buoyancy.
- Collenchyma: It is the living mechanical tissue.
- Elongated cells with thick corners.
- Localized cellulose & pectin thickening.
- Provides flexibility to plant part & easy bending of various parts of plant.
- It gives mechanical strength & elasticity to the growing stems.
- Sclerenchyma: (Scleras- hard)
- Strengthening tissue.

- Composed of extremely thick walled cells with little or no protoplasm.
 - Cells are dead & possess very thick lignified walls.
 - Lignin is water proof material.
 - Inter cellular spaces are absent.
 - Cells of sclerenchyma are of two types:
 - Sclereids:
 - Fibres: They are very long, narrow, thick, lignified cells.
 - Sclerenchyma fibres are used in the manufacture of ropes, mats & certain textile fibres.
 - Jute & coir are obtained from the bundles of fibres.
- (ii) Complex permanent tissue: It consists of more than one type of cells which work together as a unit.
- It helps in transportation of organic materials, water & minerals.
 - It is also known as conducting or vascular tissue.
 - Xylem & phloem together form vascular bundles.
- (A) Xylem: Also known as wood and is a vascular and mechanical tissue. Thick walled cells are found in the form of tubular passages.

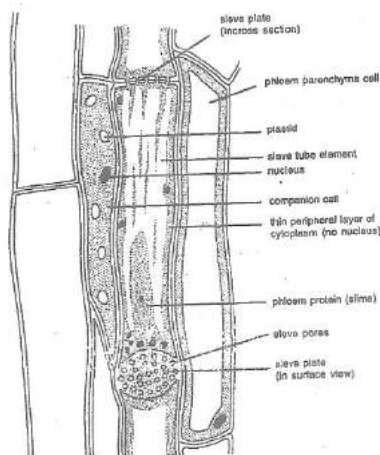


- Xylem consists of four types of cells called as elements
- Tracheids: They are elongated angular dead cells (primitive elements) mainly involved in conduction of water & minerals in gymnosperms.
- Vessels: They are advanced elements (Generally found in angiosperms). Vessels are cylindrical

tube like structures placed one above the other end to end which form a continuous channel for efficient conduction of water.

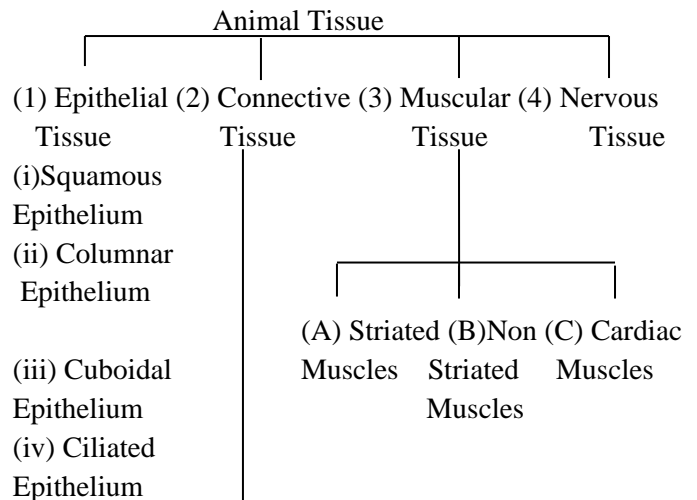
- Xylem parenchyma: They are small & thick walled parenchymatous cells subjected for storage of starch (food).
- Xylem sclerenchyma: They are non living fibres with thick walls & narrow cavities provide mechanical support.
- Except xylem parenchyma all other xylem elements are dead.
- The annual rings present in the trunk of a tree are xylem rings. By counting the number of annual rings we can determine the age of a tree is known as dendrochronology.

(B) Phloem: They also consist of both parenchymatous & sclerenchymatous cells.



Phloem

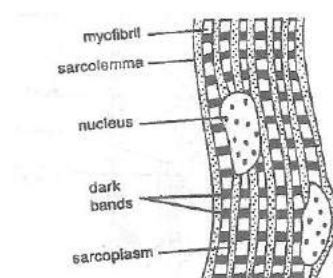
- Phloem consist of four types of elements:
- Sieve tubes: Sieve tubes are slender tube like structure made up of elongated, walled cells placed end to end. Nucleus of sieve cell absent at maturity.
- Companion cells: Companion cells have dense cytoplasm and prominent nuclei.
- Phloem fibre: They give mechanical support to sieve tubes. Phloem parenchyma: They store food & help in radial conduction of food.
- In phloem except phloem sclerenchyma all elements are living.



(A) Connective Tissue
 Proper
 (1) Cartilage
 (2) Bone
 (1) Areolar tissue
 (2) White fibrous
 (3) Yellow fibrous
 (4) Adipose Tissue

- White fibrous connective tissue: They are very little matrix containing abundant white fibres forming layers. Bundles of this tissue are called as tendons, which attaches muscles to the bones.
- Yellow fibrous connection tissue: They are very elastic due to the presence of a network of yellow fibres in it's matrix called as ligament which attaches bone to bone.
- Muscular tissue: Movements are brought about in our body with the help of muscular tissues.
- **Types:** It is of three types:

(i) Striated Muscles: They are also called as voluntary muscles because these are under the control of one's will.

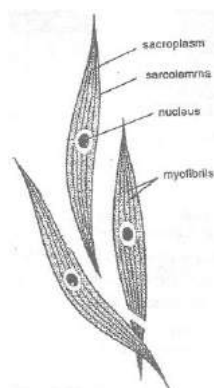


Striated Muscles

Animal Tissue

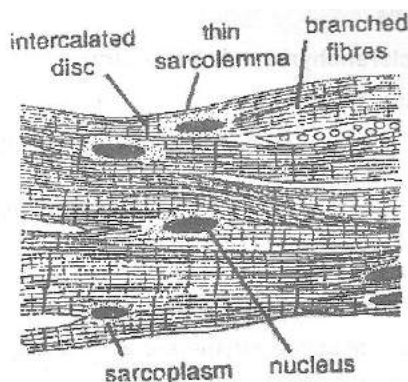
Outline classification of Animal tissue

- (ii) Non striated muscles: they are involuntary muscles also called as smooth muscles. These muscle fibres are uninucleated & spindle shaped.



Non-Striated Muscles

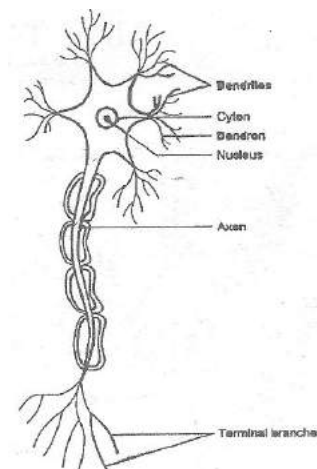
- (iii) Cardiac muscle fibres: They are also involuntary muscles. Only found in the walls of heart. Their structure is in between the striated & non-striated muscles. They are uninucleated & branched. Branches are united by intercalated disc. In these muscles rhythmic contraction & relaxation occurs throughout the life.



Cardiac muscle fibres

- **Nervous Tissue:**
- They are highly specialized tissues due to which the animals are able to perceive and respond to the stimuli.
- Their functional unit is called as nerve cell or Neuron.
- Cell body is cyton covered by plasma membrane.
- Short, hair like extensions arising from cyton are Dendron which are further subdivide into dendrites.

- Axon is long, tail like cylindrical process with fine branches at the end. Axon is covered by a sheath.



- **Functions:**

- (i) They control all the body activities
- (ii) They co-ordinate between various body parts during any body function.
- Spinal cord & brain are made up of nervous tissue.

EXERCISE

1. A tissue is
 - (A) A group of separate organs that coordinates in their activities
 - (B) A group of cells which are similar in function and structure
 - (C) Layer of cells that surrounding an organ
 - (D) Sheet of cells that is one layer thick
2. The wall of cork cells are heavily thickened by the deposition of

(a) Cutin	(b) suberin
(c) lignin	(d) pectin
3. Which muscle cell is spindle shaped?
 - (a) Smooth muscle cell
 - (b) Striated muscle cell
 - (c) Cardiac Muscle cell
 - (d) None of these are correct
4. Blood is formed of-
 - (A) Plasma and bone marrow cells
 - (B) Plasma, white & red blood cells and blood platelets.
 - (C) Plasma & WBC
 - (D) Plasma & RBC
5. Myelin sheath is a layer covering-

- (A) Vertebrate nerve fibre
(B) Vertebrate muscle fibre
(C) Insect nerve fibre
(D) Chick embryo
6. Adipose tissues store-
(A) Protein (B) carbohydrates
(C) Fat droplets (D) All of the above
7. A protective noncellular layer found on the outside of plant organ is-
(A) Epiblema (B) Velamen
(C) Cuticle (D) Cork
8. Contraction and relaxation are unique features of
(A) Epithelial tissue (B) Connective tissue
(C) Muscle tissue (D) Nervous tissue
9. Specialised parenchyma occurring in aquatic plants is-
(A) Prosenchyma (B) chlorenchyma
(C) Aerenchyma (D) None of the above
10. Root hair are-
(A) Unicellular (B) multicellular
(C) acellular (D) mixed type
11. Sieve tubes are found in –
(A) Xylem (B) phloem
(C) cortex (D) pith
12. Apical meristem, intercalary meristem and lateral meristem are differentiated on the basis of-
(A) Development (B) position
(C) function (D) origin
13. Phloem in the plants does the function of –
(A) Photosynthesis
(B) Providing support
(C) Conduction of food
(D) Conduction of water
14. Which of the following tissue is composed of mainly dead cells?
(A) Phloem (B) Epidermis
(C) Endodermis (D) Endodermis
15. Active division take place in the cells of:
(A) Xylem (B) Phloem
(C) Sclerenchyma (D) Cambium
16. Match the items of :
Column A Column B
(a) Platelets (1) attach bone with muscle
(b) Neuron (2) locomotion
(c) Tendon (3) blood coagulation
(d) Striated muscle (4) respond to stimuli
- Which of the following is correct?
(A) (a-2), (b-3), (c-4), (d-1)
(B) (a-3), (b-4), (c-1), (d-2)
(C) (a-4), (b-1), (c-2), (d-3)
(D) (a-1), (b-2), (c-3), (d-4)

ANSWER KEY

TISSUE																
Q.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
A.	B	B	A	B	A	C	C	C	C	A	B	B	C	C	D	B