

Science

Tissues

Tissues - A group of cells having similar shape and function act together to perform a specific function is known as a tissue.

Structural Organisation in living Organisms -

Cell - Tissue - Organ $\rightarrow$ Organ system - Organism

Trick for Plant Tissues -

Story - I went to MP. There I met ALI. He told me there are two ~~group~~ type of people. One group is same and one is different. Same as cracked PCS and Different brings water and Food.

meristematic tissue

M.P. - Permanent tissue

$\rightarrow$ Lateral meristem

$\rightarrow$ Intercalary meristem

Apical meristem

Simple permanent tissue

S

Parenchyma

P

CS

Collenchyma

$\rightarrow$ Sclerenchyma

Complex permanent tissue

Food water

(Phloem) (Xylem)

#

Plant Tissue

Meristematic Tissue

1. They have capacity to divide.

2. Meristematic tissue

has cells small in size and same in shape.

3. Vacuoles are usually absent.

4. Intercellular space is generally absent.

5. Cell walls are thin.

Permanent Tissue

1. They don't have the capacity to divide.

2. Permanent tissue has cells large in size and their shape varies.

3. Vacuoles are present in living cells.

4. Visible intercellular space are present.

5. Cell walls can be thin or thick.

Meristematic Tissue

⇒ Apical meristem:-

- These tissues are found at the tips of stems and roots and sometimes on leaves.

⇒ The help the roots and shoots grow longer, making the plant taller.

⇒ This type of growth is known as primary growth.

⇒ There is two types:-

SAM (Shoot Apical meristem) RAM (Root Apical meristem)

⇒ Lateral meristem:-

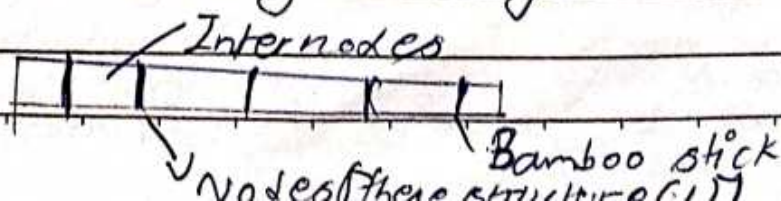
⇒ It helps the root or stem become thicker.

⇒ This thickening is known as secondary growth.

⇒ Intercalary meristem:-

⇒ Intercalary meristem is found at the base of leaves or between nodes on branches.

⇒ It helps parts like the internode or leaves grow longer.



Q. How do meristematic tissues contribute to the healing of wounds in plants.

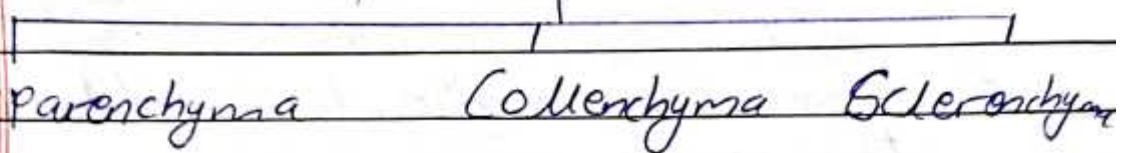
Ans) Meristematic tissues contribute in healing of wounds in the plants as the cells present in it can divide.

Permanent Tissues:-

- The permanent tissues are composed of those cells which have lost their capability to divide.
- They have definite shape, size and thickness. The permanent tissue ~~give rise to~~ may be dead or living.
- The division & differentiation of the cells of meristematic tissues give rise to permanent tissues.
- In cell differentiation developing tissue and organs change from simple to more complex forms to become specialized for specific functions.

- Permanent tissues are classified into two types ~~of~~ on basis of structure and composition i.e. simple permanent tissues and complex permanent tissues.

Simple Permanent Tissue



Parenchyma :-

- ⇒ Parenchyma tissues support plants and store foods in roots and stems.
- ⇒ They form the basic packing tissue in plants.
- ⇒ The cells are simple and not very specialized.
- ⇒ These cells have thin walls and alive.
- ⇒ They have large gaps between them because they are loosely packed.

Chlorenchyma Tissue

Parenchyma tissues which contain chlorophyll and can perform photosynthesis.

Aerenchyma Tissues

Parenchyma tissues with large air spaces help plants float by making them buoyant. (Air fills in the large air spaces) Ex - Lotus.

Collenchyma Tissue:-

- ⇒ Collenchyma tissues are found in leaf stalks just below surface.
- ⇒ They provide flexibility, allowing leaves and stems to bend without breaking.
- ⇒ These cells are alive, long, and have thick corners.
- ⇒ There is very little space between these cells.

Sclerenchyma Tissue:-

- ⇒ The hard husk of a coconut is made up of sclerenchyma tissues.
- ⇒ These tissues are found in stems, around vascular bundles, in leaf veins, and in the hard coverings of seeds and nuts.
- ⇒ Their role is to provide hardness and stiffness.

⇒ Sclerenchyma cells are dead, long, and narrow with thick walls.

⇒ The walls are thickened by lignin, making them very strong.

⇒ There is little to no space between these cells due to their thick walls.

Complex permanent Tissue

XYLEM
(Water)

Phloem
(Food)

XYLEM

⇒ It is also known as wood and is a vascular and mechanical tissue.

⇒ Thick walled cells are found in the form of tubular passages.

⇒ Xylem ~~tissue~~ consists of four types of cells called as elements; Tracheids, Vessels, xylem parenchyma and xylem fibre.

Tracheids:-

=> They are elongated angular dead cells (primitive elements) mainly involved in conduction of water and minerals. ~~in xylem~~

Vessels:-

=> They are advance elements (dead).

=> Vessels are cylindrical tube like structures placed one above the other end to end which form a continuous channel for element conduction of water.

XYLEM Parenchyma [Living]:-

=> They are small & thick walled parenchymatous cells subjected for storage of starch (food).

Xylem Sclerenchyma/Fibre:-

=> They are non-living fibres which with thick walls and narrow cavities provide mechanical support.
↓
strength

=> 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.

Phloem

=> They also consist of both ~~plant~~ parenchymatous and sclerenchymatous cells.

=> Phloem consists of four types of element which are Sieve tubes, Companion cells, Phloem fibre and Phloem parenchyma.

Sieve tube

=> Sieve tubes are slender tube like structures made up of elongated, thin walled cells placed end to end. The end of walls of sieve tubes cells are perforated by numerous ~~pore~~ pores called as sieve plates. Nucleus is absent. Sieve cells possess slime protein which helps in growth and repair.

Companion cells:-

⇒ Companion cells have dense cytoplasm and prominent nuclei. Sieve cells and companion cells are so called sister cells because they originate from single mother cell.

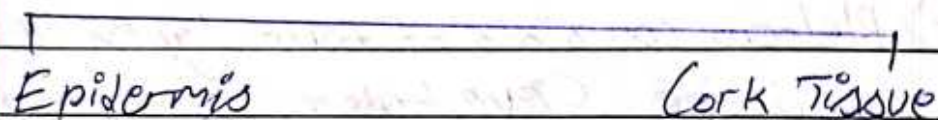
Phloem fibres:-

⇒ They give mechanical support to sieve tube.

Phloem Parenchyma:-

⇒ They store food and help in radial ~~condition~~ Conduction of food.

Protective Tissue



Epidermis

⇒ Epidermis protects plants from injury, pathogens, and water loss.

⇒ In desert plants (Xerophytes), the thick cuticle of the epidermis reduces water loss by lowering the rate of transpiration.

⇒ The epidermis in certain area also allows gas exchange.

⇒ In roots, epidermal cells increase the surface area, aiding in better absorption of water & nutrients.

Cork Tissue

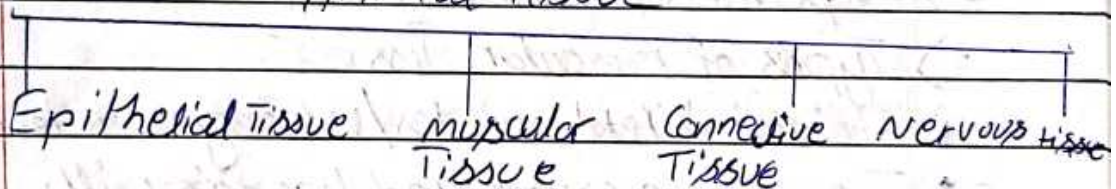
⇒ Outer protective coat of a tree - Cork.

⇒ The tissues of bark become old and gets replaced by meristem.

⇒ Functions of cork cells:-

- It protects from bacterial or fungal infection.
- It prevents water loss through transpiration.

Animal Tissue



Epithelial Tissue [Skin].

⇒ Always grows on some other types of tissue.

⇒ Cells of epithelium are set very close to each other.

⇒ Consists of single layer of cells.

⇒ Blood vessels are absent and non-nervous in nature.

⇒ It covers all the organs and lines the cavities of hollow organs like stomach.

⇒ It is primarily protective in function.

⇒ Epithelium Tissues are of Five types -

- Trick - C³S²
- Squamous Epithelium - Inner surface of mouth, Oesophagus, blood vessels, alveoli (lungs).
 - Stratified Squamous Epithelium - Outer layer of skin.
 - Cuboidal Epithelium - Nephron (tubules of kidney), salivary gland.
 - Columnar Epithelium - inner surface of intestinal alimentary canal.
 - Ciliated Epithelium - nasal cavity, Trachea, Bronchi, etc.

Muscular Tissue

⇒ Cells of the connective tissue are widely spaced and embedded in an extracellular matrix are brought in our body with help of muscular tissue.

⇒ They are long fibre-like cells called muscle fibres.

⇒ Capable of contraction & relaxation

⇒ Types of muscular tissue -

(a) Striated/Skeletal muscles/Voluntary muscles -

⇒ They can be controlled by one's will.

⇒ Muscle fibres/cell are multinucleated and unbranched.

⇒ Cytoplasm is called sarcoplasm.

⇒ These muscles "get tired & need rest."

⇒ Each fibre is enclosed by thin membrane - sarcolemma.

(b) ~~Smooth~~ Non-striated/Involuntary muscles -

⇒ Cannot be controlled by one's will.

⇒ ^{these} Muscle fibres are uninucleated & spindle shaped.

⇒ Ex - walls of stomach, intestine, iris of eye, etc.

⇒ Movements in alimentary canal due to smooth muscles - Peristaltic movement.

1) Cardiac muscle Fibres:-

- ⇒ Only involuntary muscles.
- ⇒ Found in walls of heart.

* Connective Tissues

- ⇒ Provides structural framework.
- ⇒ Connects body parts.
- ⇒ Stores Fats.
- ⇒ Offers protection against infections.

= Blood [Connective Tissue]

- ⇒ Blood flows and transports gases, digested food, hormone and waste materials and also provides protection.

(a) Plasma - Forms 55% of blood, (90-91% water, 7% protein & 0.9% inorganic salt, etc.)

(b) RBC (Red Blood corpuscles) - also called ~~erythro~~ erythrocytes, containing haemoglobin giving red color to blood.

(c) WBC's (Soldiers of the body)

- ⇒ Also called thrombocytes
- ⇒ Protect us from infection.
- ⇒ Spindle shaped cells which clot blood.

Cartilage

1. It is soft, elastic & flexible.

2. Its matrix occurs in homogenous mass.

3. Tissue has a rich blood supply.

4. Growth is bidirectional.

Bone

1. It is hard, tough & inflexible.

2. Its matrix occurs in lamellae.

3. It does not have a rich blood supply.

4. Growth is unidirectional.

Nervous Tissue

⇒ They are highly specialized tissue due to which we are able to perceive and ~~to~~ respond to the stimuli.

⇒ Their functional unit - nerve cell/neuron [longest cell in body]

⇒ Cell body is called cyton which is covered by plasma membrane