

# Tissues

Prepared by John Ebenezer

**Class: IX**

**Biology**

## 1. What is a tissue?

A group of cells that are similar in structure and work together to achieve a particular function forms a tissue.

In unicellular organisms, a single cell performs all basic functions.

## 2. What is differentiation of meristematic tissue?

The process of cells of meristematic tissue taking up a permanent shape, size, and a function is called differentiation.

## 3. Animals of colder regions and fishes of cold water have thicker layer of subcutaneous fat. Describe why?

Animals of colder regions and fishes of cold water have a thicker layer of subcutaneous fat because fat acts as an insulator and prevent the escape of heat from their body.

This will help the animals in resisting low temperature in cold climates.

## 4. If a potted plant is covered with a glass jar, water vapour appears on the wall of glass jar. Explain why?

Transpiration takes place through stomata. Water vapour comes out of leaves during transpiration.

When a potted plant is covered with a glass jar, water vapour (coming out because of transpiration) condenses on the wall of glass jar and hence it appears as fine droplets.

## 5. Name the different components of xylem and draw a living component.

Xylem comprises tracheids, vessels, xylem parenchyma and xylem fibres.

The only living component of xylem is **xylem parenchyma**.

## 6. Water hyacinth float on water surface. Explain.

Water hyacinth float on the water surface because of the presence of the air cavities present in the parenchyma tissue.

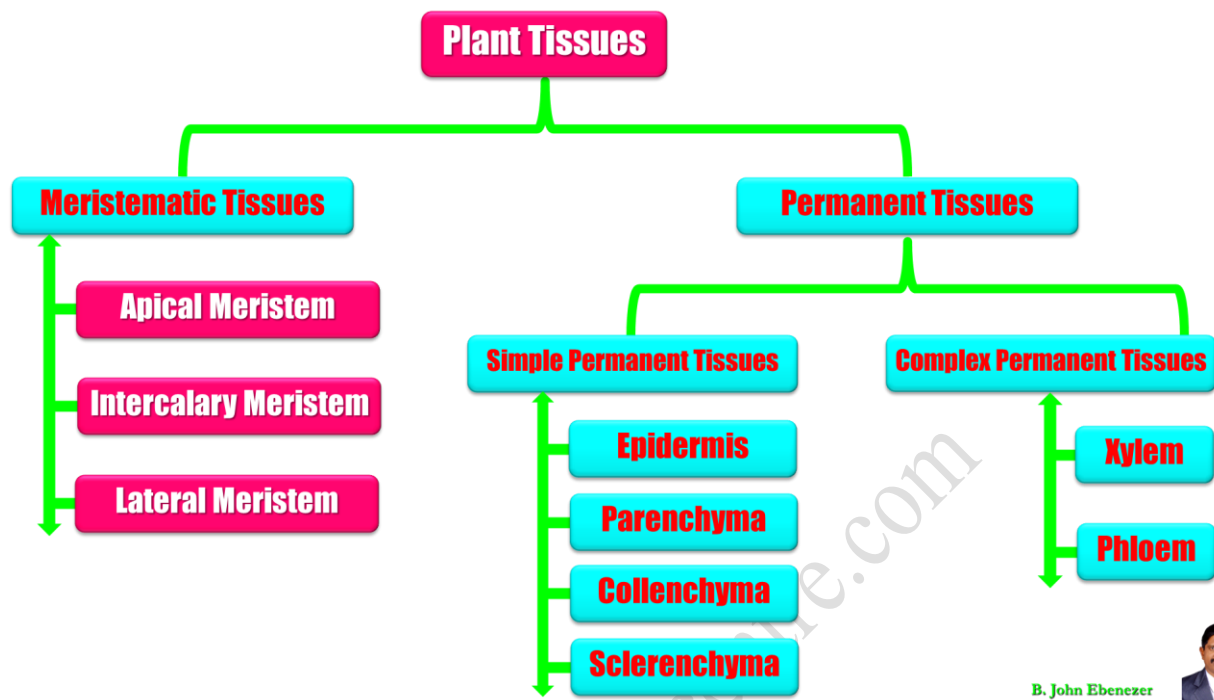
## 7. What is a secondary Tissue?

As plants grow older, a strip of secondary meristem replaces the epidermis of the stem.

Cells on the outside are formed from this layer.

This forms the several-layer thick cork or the bark of the tree.

## 8. Illustrate the classification of plant tissues



## 9. What is cork?

Cells of cork are dead and compactly arranged without intercellular spaces.

The suberin present in the walls of cork cells makes them impervious to gases and water.

## 10. Which structure protects the plant body against the invasion of parasites?

The epidermis is the structure that protects the plant body against the invasion of parasites.

It has thick cuticle and dermal tissue which help in preventing the attack from parasites.

## 11. Why is epidermis important for the plants?

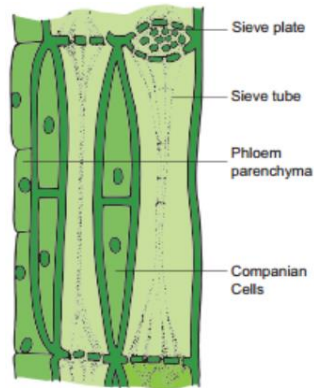
The epidermis is important for it gives protection against water loss.

Epidermal cell present on the aerial parts of the plant often secretes a waxy, water-resistant layer on their outer surface.

This provides protection against loss of water, mechanical injury and invasion by parasitic fungi.

Epidermal tissue forms a continuous layer which helps to avoid mechanical stress.

## 12. Draw and identify different elements of phloem.



## 13. What is a meristematic tissue? Classify the meristem based on the region where they are present and explain each type.

Meristematic tissues are classified into apical, lateral and intercalary meristem based on the region.

### Apical meristem

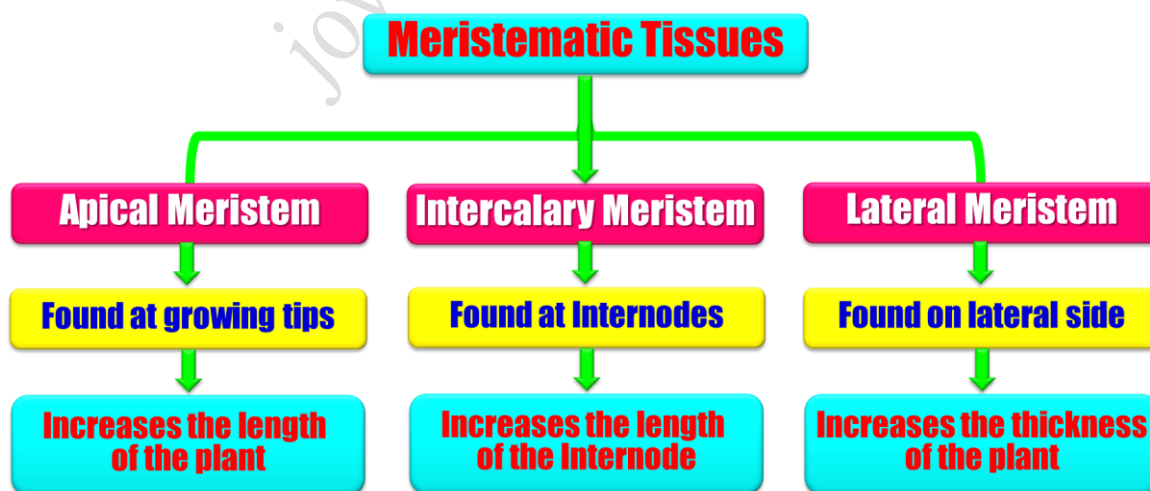
Apical meristem is present at the growing tips of stems and roots and increases the length of the stem and the root.

### Lateral meristem

The girth of the stem or root increases due to lateral meristem (cambium).

### Intercalary meristem

Intercalary meristem is the meristem at the base of the leaves or internodes (on either side of the node) on twigs.



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#### 14. Define the following:

- (a) Permanent Tissues
- (b) Simple Permanent Tissues
- (c) Complex Permanent Tissues

##### (a) Permanent Tissues:

The tissues in which the cells have lost the ability to divide are called permanent tissues.

##### (b) Simple Permanent Tissues:

The permanent tissues which are made of **only one kind of cells**, are called **simple permanent** tissues.

##### (c) Complex Permanent Tissues:

The permanent tissues which are made of **different kinds of cells** (more than one kind of cells) are called complex permanent tissues.

#### 15. Describe the structure and functions of epidermis.

##### Epidermis

Epidermis is the outermost layer of plant cells.

It is made of a single layer of cells.

It forms a continuous layer without intercellular spaces.

Most epidermal cells are relatively flat. Their outer and side walls are thicker than the inner wall.

##### Functions of Epidermis:

It protects all the parts of the plant.

Cuticle formed by the Epidermis on the aerial parts of the plant is a water-resistant layer which prevents loss of water, mechanical injury and invasion by parasitic fungi.

Epidermis of desert plants has a thick cuticle which prevents loss of water.

Epidermal cells of the roots bear root hairs absorb water.



**16. What are the pores in the epidermis of the leaf called? Comment on their functions.**

The pores in the epidermis of the leaf are called stomata.

Stomata are enclosed by two kidney-shaped cells called guard cells.

They help in exchange of gases with the atmosphere.

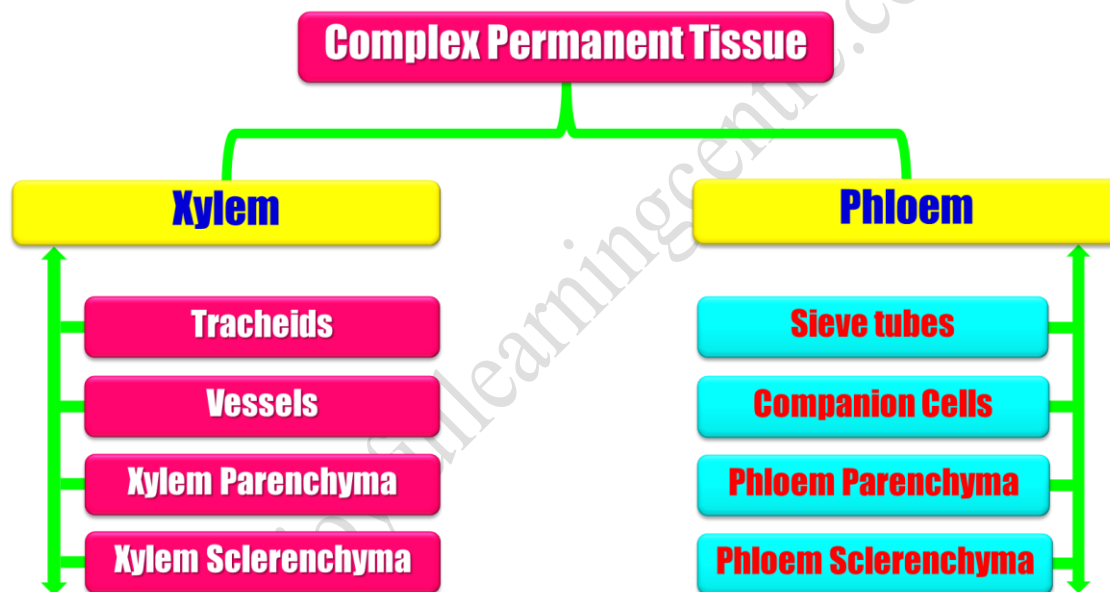
Transpiration also takes place through stomata.

**17. What are complex permanent tissues? Describe the components of xylem and write the functions of each component.**

Complex tissues are made of more than one type of cells. All these cells coordinate to perform a common function.

Xylem and phloem are examples of such complex tissues.

They are both conducting tissues and constitute a vascular bundle.



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**Xylem**

Xylem consists of **tracheids, vessels, xylem parenchyma and xylem fibres.**

The cells have thick walls, and many of them are dead cells.

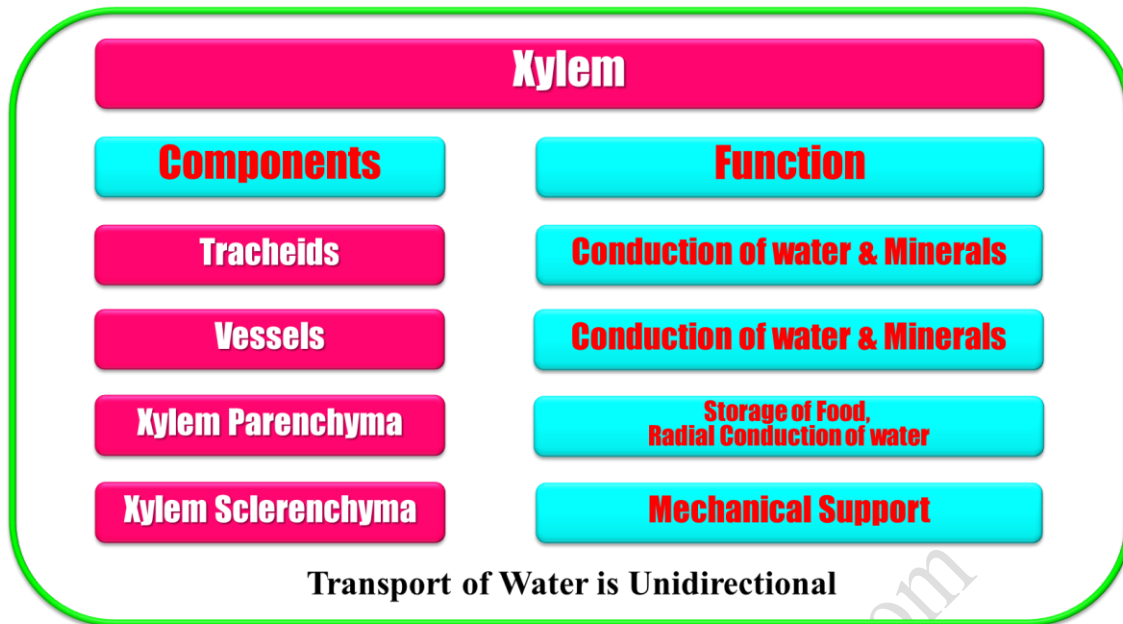
Tracheids and vessels are tubular structures.

They transport water and minerals vertically.

The parenchyma stores food and helps in the sideways conduction of water.

Xylem fibres provide mechanical support.





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18. Describe the components of phloem and write the functions of each component.

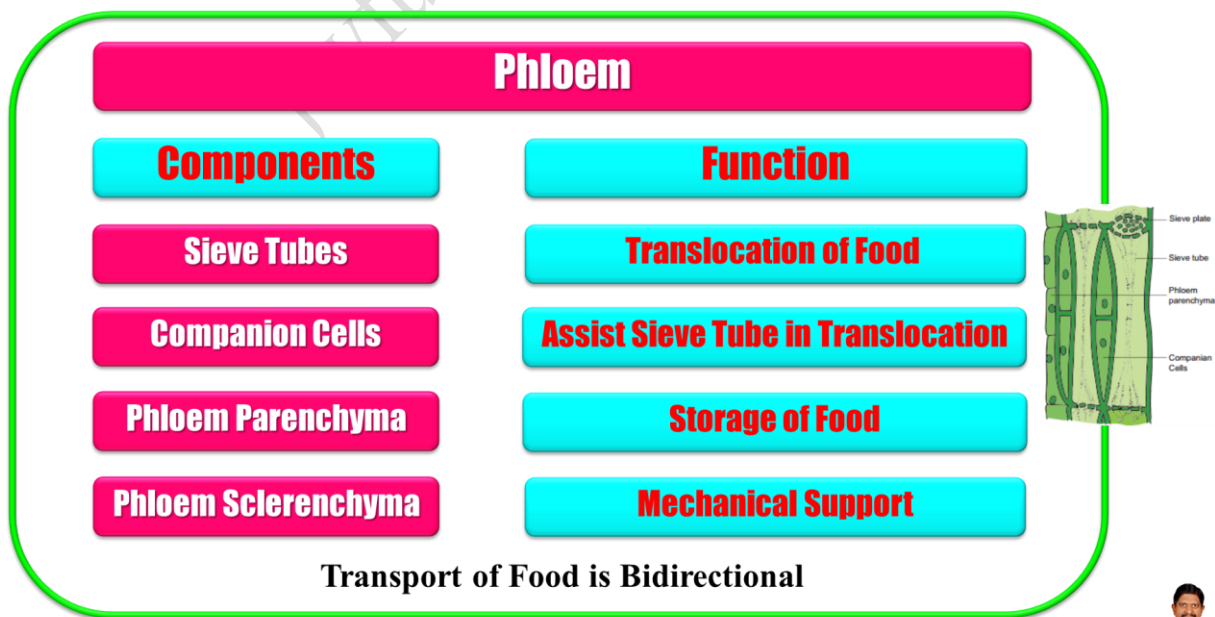
**Phloem**

Phloem is made up of four types of elements: sieve tubes, companion cells, phloem fibres and the phloem parenchyma.

Sieve tubes are tubular cells with perforated walls.

Phloem transports food from leaves to other parts of the plant in both the directions.

Except for phloem fibres, phloem cells are living cells.



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## 18. Give reasons for

- (a) Meristematic cells have a prominent nucleus and dense cytoplasm but they lack vacuole.
- (b) Intercellular spaces are absent in sclerenchymatous tissues.
- (c) We get a crunchy and granular feeling, when we chew pear fruit.
- (d) Branches of a tree move and bend freely in high wind velocity.
- (e) It is difficult to pull out the husk of a coconut tree.

a) Meristematic tissue cells are continuously dividing and they have a prominent nucleus and a dense cytoplasm.

Since they are dividing rapidly, they need not store food or waste products hence they lack vacuoles.

b) Cell wall of sclerenchyma are lignified and are packed densely to protect the plant and to give mechanical strength hence intercellular spaces are absent in sclerenchymatous tissues.

c) In pear fruit sclerenchyma cells are called stone cells. They are small, thick and hard. Due to this, we get a crunchy and granular feeling, when we chew pear fruit.

d) Junction of the tree branch composed of collenchyma cells which provide rigidity and flexibility to the branches. Hence, branches of a tree move and bend freely in high wind velocity.

e) Husk of coconut tree is sclerenchyma which is hard. Hence it is difficult to pull out the husk of a coconut tree.

## 19. List the characteristics of cork. How are they formed? Mention their role.

### Characteristics of cork:

Cork cells are compactly arranged dead cells and they lack intercellular spaces.

Walls of cork cells are thickened with suberin which is fat.

Due to Suberin, these cells are impermeable to water and gases.

Outer protective tissue of the plant undergoes changes with age.

### Formation:

The epidermis of the stem is replaced by a secondary meristem called cork cambium.

The layer of cells which is made by cork cambium on the outer side ultimately becomes several layered thick cork (bark) of trees.

Cork cells contain tannins and chloroplasts.

### **Role of cork:**

Cork provides protection to plant and it prevents loss of water from plant body.

Cork protects the plants from infection and mechanical injury.

Cork is light in weight and it doesn't catch fire. Because of this property, it is used as insulators.

Cork is hard in nature hence it is used to make sports goods.

**20. (a) Differentiate between meristematic and permanent tissues in plants**

**(b) Define the process of differentiation.**

**(c) Name any two simple and two complex permanent tissues in plants.**

**(a) The basic differences between meristematic and permanent tissues of plants are tabulated below.**

No	Meristematic Tissue	Permanent Tissue
1	The cells are living.	The cells may be living or dead.
2	The cells are small, spherical or polygonal and undifferentiated.	The cells are large, differentiated with different shapes.
3	They have distinct nucleus and dense cytoplasm.	They do not have distinct nucleus and dense cytoplasm.
4	The vacuoles are absent.	They have large central vacuole in living permanent cell.
5	Intercellular spaces are absent.	Intercellular spaces are present.
6	The cell wall is thin and elastic.	The cell wall may either thin or thick.
7	The cells grow and divide regularly.	The cells do not divide.
8	It is a simple tissue.	It can be simple, complex or specialized,
9	Cell organelles are simple	Cell organelles are well- developed.
10	It provides growth to the plant.	It provides protection, support and performs transportation, photosynthesis, storage, etc.

### **Process of differentiation:**

(b) Cells derived from the division of meristematic tissues take up specific roles and gradually lose their ability to divide. Thus, they form permanent tissue.



Differentiation is a process by which the cells divide meristematically to take a permanent shape, size and function.

**Simple and complex permanent tissues in plants:**

(c) Parenchyma and collenchyma are two simple permanent tissues, whereas xylem and phloem are two complex permanent tissues.

**21. How will you classify the animal tissues based on their functions?**

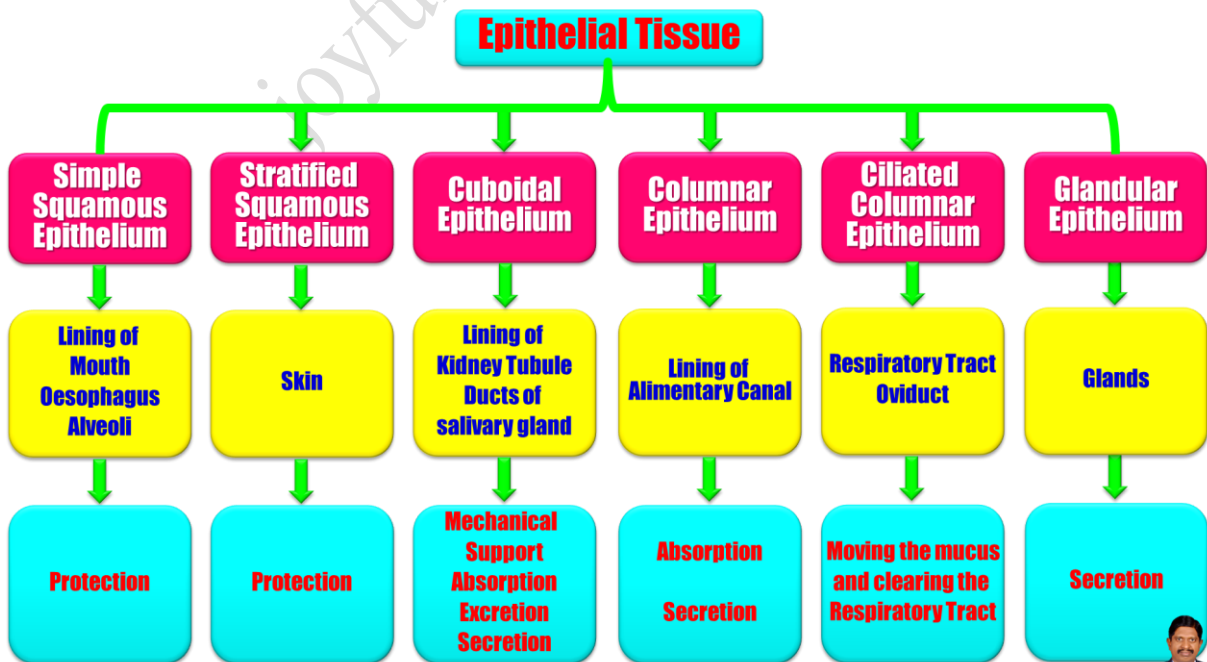
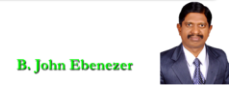
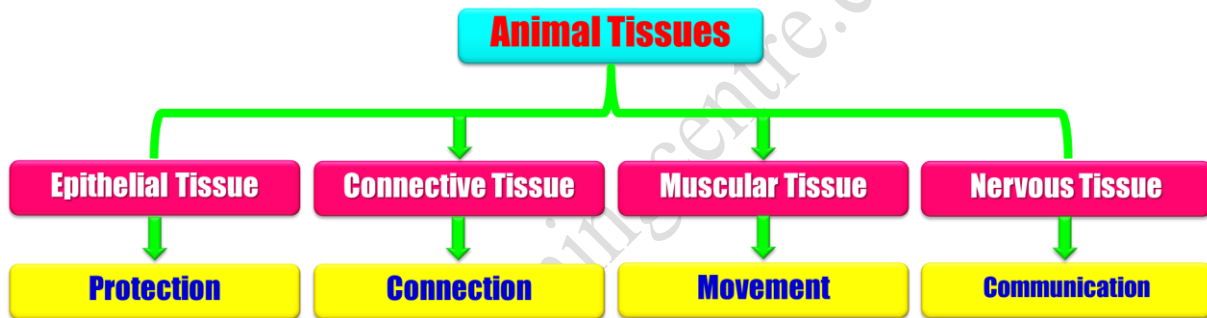
Animal tissues can be classified into the following types based on their function.

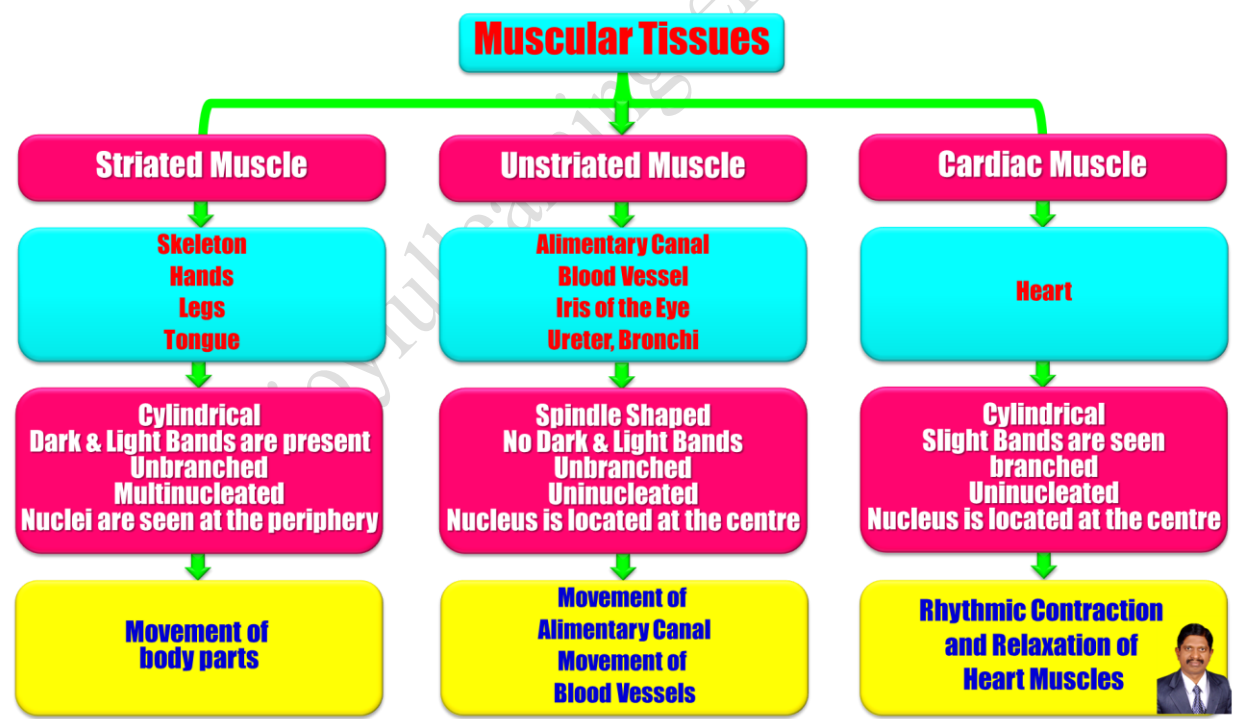
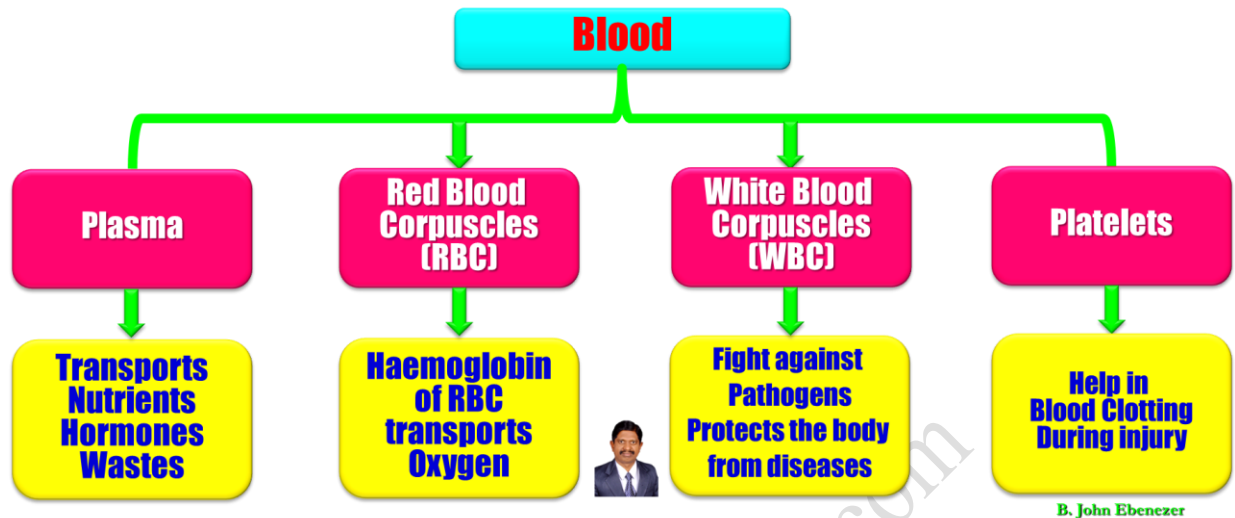
Epithelial tissue, connective tissue, muscular tissue and nervous tissue.

**Epithelial tissue:** It provides protection to internal organs.

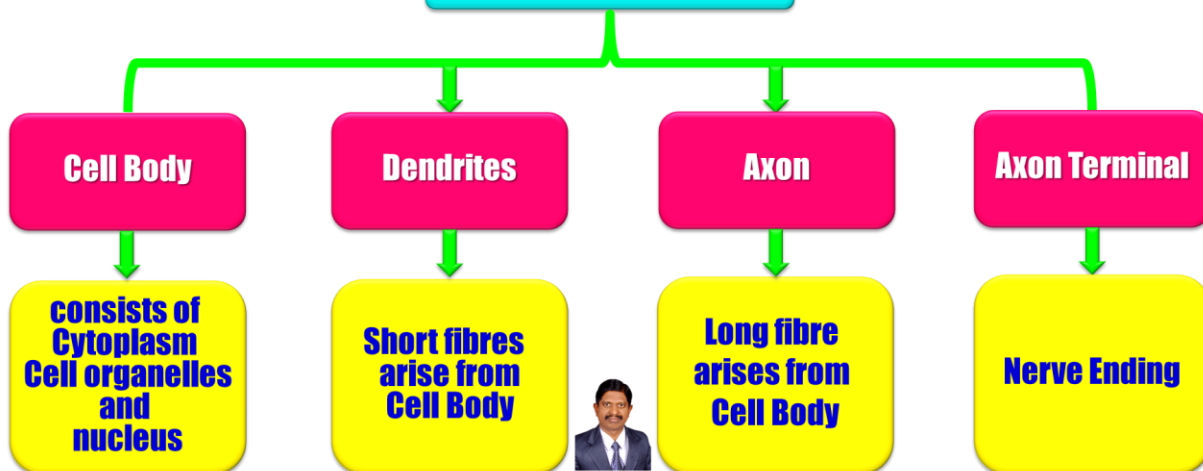
**Connective tissue:** It connects the various parts of our body.

**Muscular tissue:** It helps in the movement of various body parts.



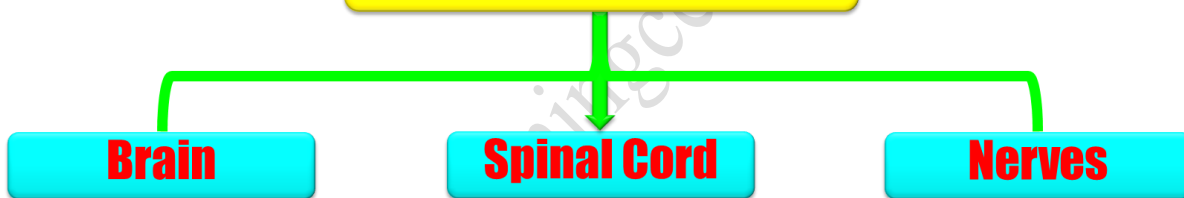


# Nerve Cell (Neuron)



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# Central Nervous System



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