

CLASS : 9

SUBJECT : BIOLOGY

CHAPTER: TISSUE

What is a Tissue?

A group of cells that are similar in structure /or Work together to achieve a particular function For example :Blood, Phloem ,Muscle etc.

Differences between plants and animal tissue

Utility of Tissues

Tissues are arranged and designed to give the highest possible efficiency of function.

Plant Tissues	Animal Tissues
<ul style="list-style-type: none">• Most of the tissues of plants have dead cells which are supportive in function and provide mechanical strength .	<ul style="list-style-type: none">• Animal tissues are made up of living cells .
<ul style="list-style-type: none">• Plants have dividing and non dividing tissues located at specific regions	<ul style="list-style-type: none">• No demarcation of dividing and non dividing tissues in plants .
<ul style="list-style-type: none">• Plant tissues are less complex	<ul style="list-style-type: none">• Animals tissues are more complex .

Plant Tissues

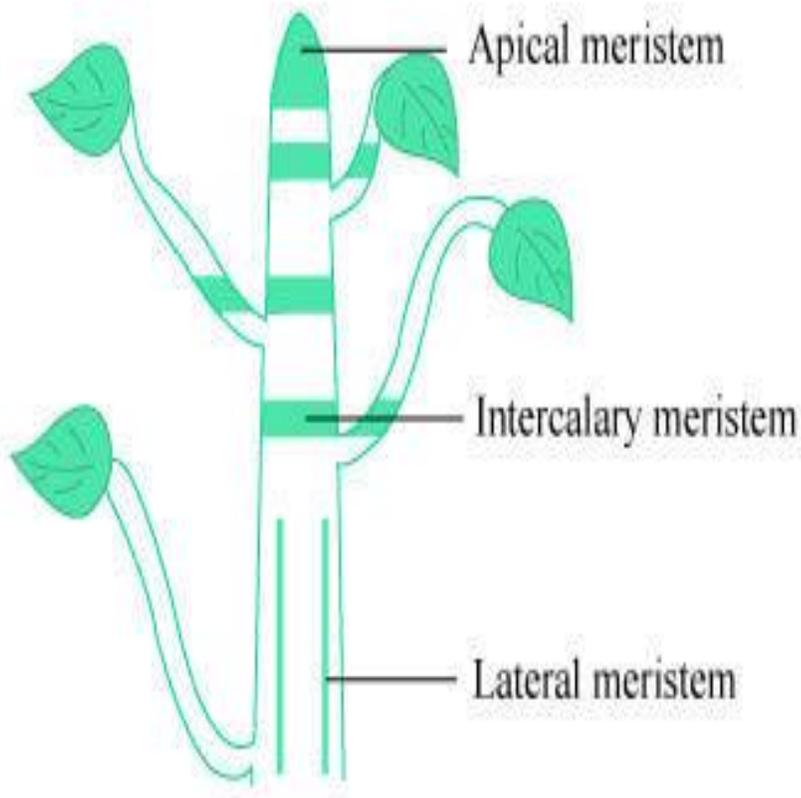
Meristematic tissue

- contains actively dividing cells
- Localised in certain regions

Permanent Tissue

- contains non dividing cells
- formed by differentiation process by which cells are modified to perform specific functions.

Meristematic Tissues



Characteristics of cells of Meristematic tissue

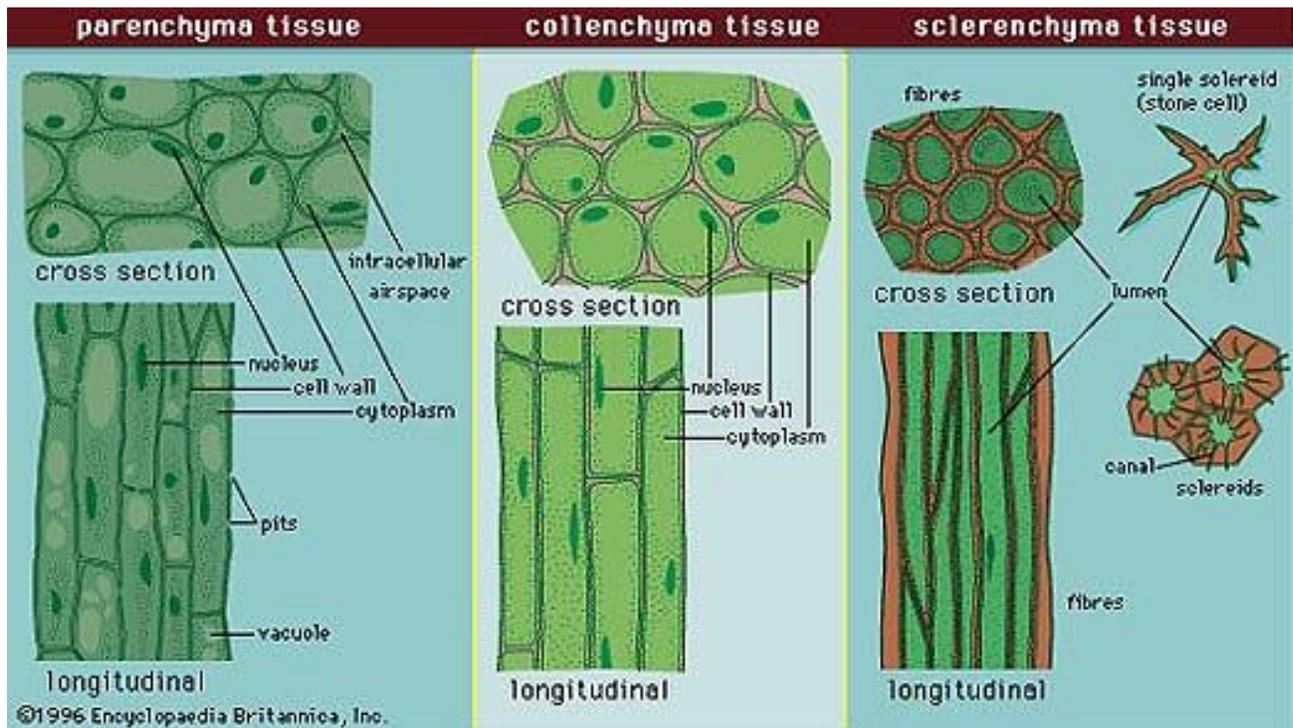
- Cells are very active.
- They have dense cytoplasm.
- Cells have thin cellulose walls.
- Cells have prominent nuclei.
- They lack vacuoles.

Meristematic Tissues

Types	Location	Function
• Apical	Tip of root and stem	Increases the length of root and stem
• Lateral	On the sides both in root and stem	Increases the girth of root and stem
• Intercalary	At the base of leaves or internodes on twigs	Growth of leaves and internodes

Differentiation : The cells formed by meristematic tissue take up a specific role and lose the ability to divide. As a result, they form a permanent tissue. This process of taking up a permanent shape, size and a function is called differentiation.

Permanent tissues



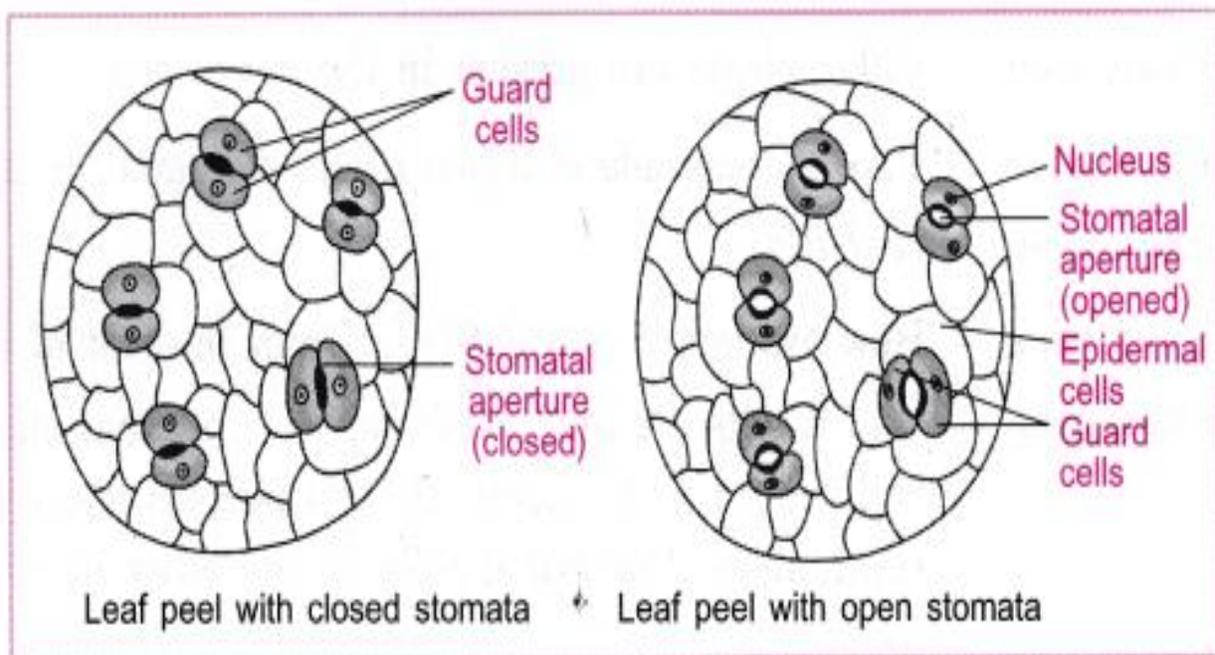
Types of permanent Tissues

Simple permanent Tissue	Complex Permanent Tissue
<ul style="list-style-type: none"> • Its Cells are of same ,shape ,size, structure and have same function 	<ul style="list-style-type: none"> • It has more than one type of cells
<ul style="list-style-type: none"> • For example : Parenchyma,Collenchyma Sclerenchyma 	<ul style="list-style-type: none"> • For example: Xylem & Phloem

Simple permanent Tissues: Types of simple permanent tissue

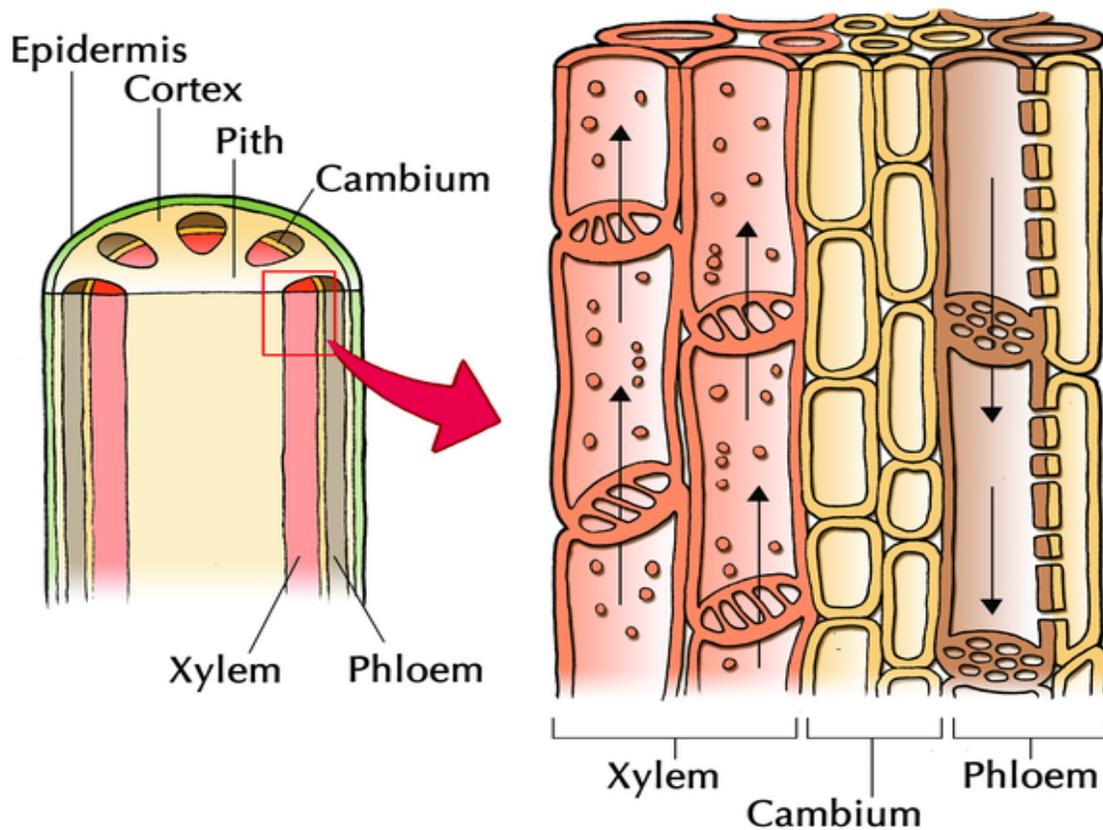
Property	Parenchyma	Collenchyma	Sclerenchyma
• Inter cellular spaces	Large intercellular spaces in between cells.	Little intercellular spaces in between cells.	No Intercellular spaces in between cells.
• Cell wall	Thin cell wall made of	Cell wall has chemical	Cell wall has deposition of

	cellulose.	substances (pectin) deposited at corners	a hard cement like substance called lignin.
• Living/Dead	Living tissue	Living tissue	Dead tissue
• Location	Present in stem ,roots ,flowers ,fruits etc.	In leaf stalk below epidermis	In stem, around vascular bundles, in the husk of coconut and in the hard covering of seeds and nuts.



Functions of Epidermis

- Epidermis helps in protection against loss of water, mechanical ,injury and invasion of parasitic fungi.
- Epidermis of roots have root hairs for the better absorption of water from soil because it increases the absorptive surface area .
- It protects all parts of plants as it is the outer covering of plants .
- The epidermis of desert plants has a layer of cutin which is waterproof and prevents the loss of water .
- Epidermis of leaves has stomata for transpiration and exchange of gases



Differences between

Xylem and phloem

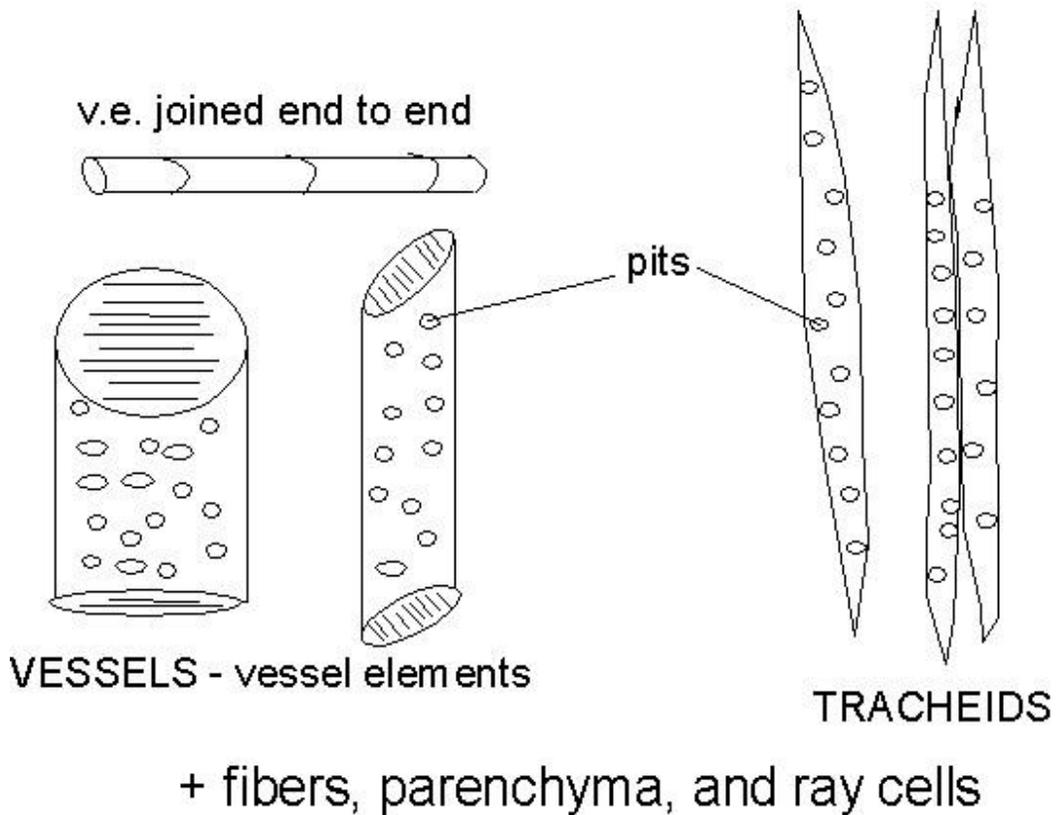
Xylem	Phloem
<ul style="list-style-type: none"> Xylem helps in transportation of water and minerals from roots to other parts of plants. 	<ul style="list-style-type: none"> Phloem helps in the transportation of food from leaves to other parts of plants.
<ul style="list-style-type: none"> It is a dead tissue 	<ul style="list-style-type: none"> It is a living tissue .
<ul style="list-style-type: none"> It transports water in upward direction and sideways but not in downward direction . 	<ul style="list-style-type: none"> It transports food in upward and downward directions and sideways also .
<ul style="list-style-type: none"> Components of xylem are xylem vessels, xylem Tracheids, xylem fibres and xylem parenchyma . 	<ul style="list-style-type: none"> Components of phloem are sieve tubes ,sieve plates, companion cells ,phloem fibres and phloem parenchyma .

- Xylem parenchyma is dead .

Phloem parenchyma is living .

Xylem

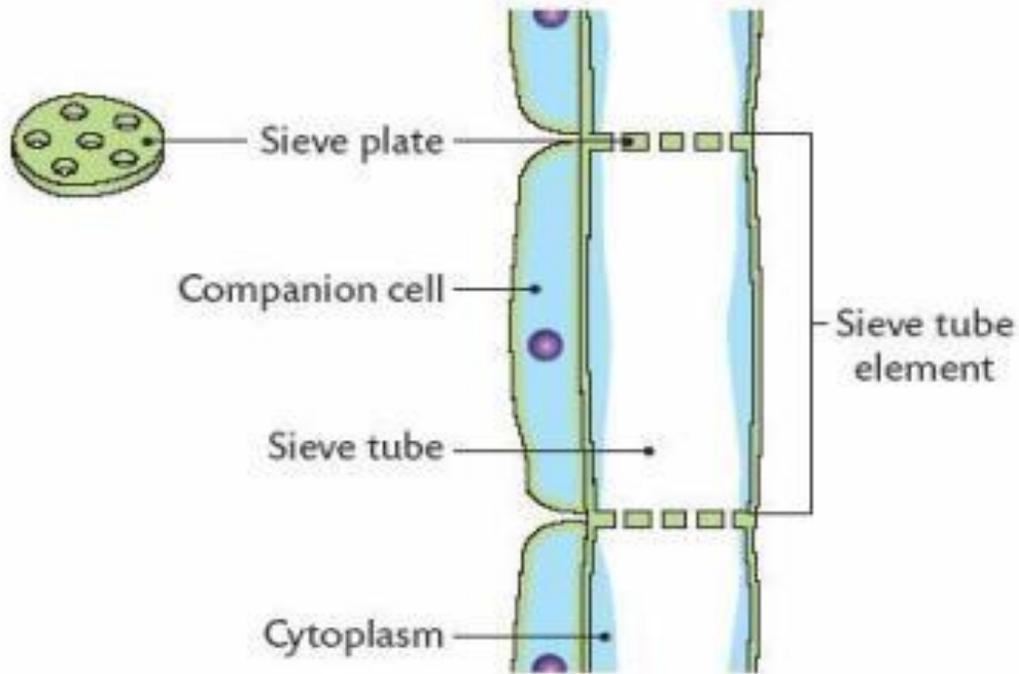
COMPONENTS OF XYLEM



Components	Functions
1 Xylem vessels	Tubular structures which allow transport of water and minerals vertically upwards
2 Xylem Tracheids	Allow transportation of water and minerals vertically upwards .
3 Xylem Parenchyma	It stores food and helps in the sideways conduction of water .

4 Xylem Fibres	Supportive in function
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Phloem



Components Functions

1. Sieve tubes	Tubular cells with perforated walls and help in movement of food from leaves .
2. Companion cells	Help sieve tubes in the movement of food from leaves

	to other parts of plant .
3. Phloem parenchyma	Stores nutrients
4. Ploem fibres	Supportive in function.

ANIMAL TISSUE

On the basis of functions they perform, animal tissues are classified into four basic types namely epithelial, connective muscular and nervous tissue.

Epithelial Tissue

The covering or protective tissues n the animal body are epithelial tissues. It covers most organs and cavities of the body.

It forms a barrier to keep different body systems separated from each other.

On the basis of shape of the cells and their arrangement, epithelial tissues are further classified as follows:-

S.No.	Types	Location	Function.
1	Simple Squamous Epithelium	Lining of blood vessels and lung alveoli	Transportation of substance.
2.	Stratified	Esophagus, anus	It is resistant to mechanical injury
3.	Cuboidal Epithelium	Lining of kidney tubules and ducts of salivary glands.	Help in absorption, excretion and secretion.
4.	Columnar Epithelium	Inner lining of intestine.	Absorption, protection.
5.	Ciliated columnar epithelium.	Respiratory tract and also lines oviducts sperm ducts, kidney tubules etc.	Cilia's Movement pushes substances like mucus forward.
6.	Glandular Epithelium	Lining of the different glands.	Absorption of water, nutrients and elimination of waste products from the body.

Connective Tissue.

This tissue is specialized to connect various body organs with each other . For e.g., it connects two or more bones to each other, muscles to bones etc.

The cells of connective tissue are loosely packed, living and embedded in an intercellular matrix that may either be jelly-like, fluid, dense or rigid in nature.

Various types of connective tissues are:

1) Blood

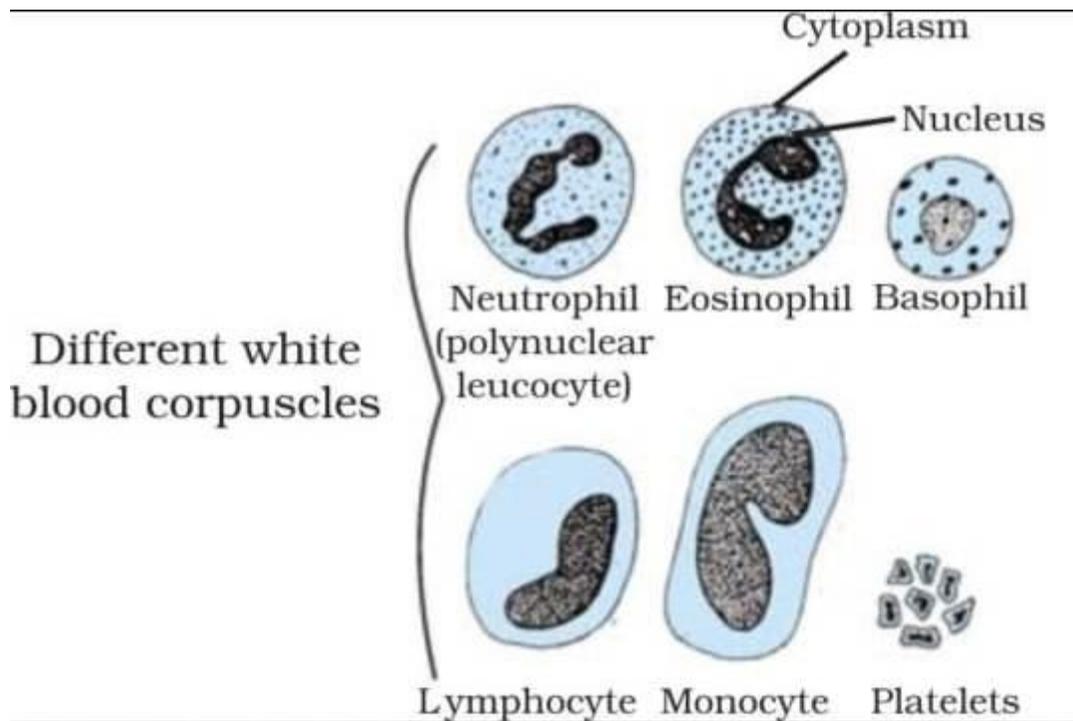
It is fluid connective tissue that links different parts of the body. It helps to maintain the continuity of body. It contains fluid matrix called plasma and blood cells such as RBCs (Red Blood Corpuscles or Cells), WBCs (White Blood Corpuscles) and platelets suspended in it. Plasma also contains proteins, salts and hormones and vitamins to various tissues of the body.

RBCs.

It help in transport of respiratory gases, oxygen and carbon dioxide with the help of hemoglobin to and from the various parts of our body, The average lifespan of RBCs is 120 days.

WBCs

Also called leucocytes, fights with diseases by producing antibodies.

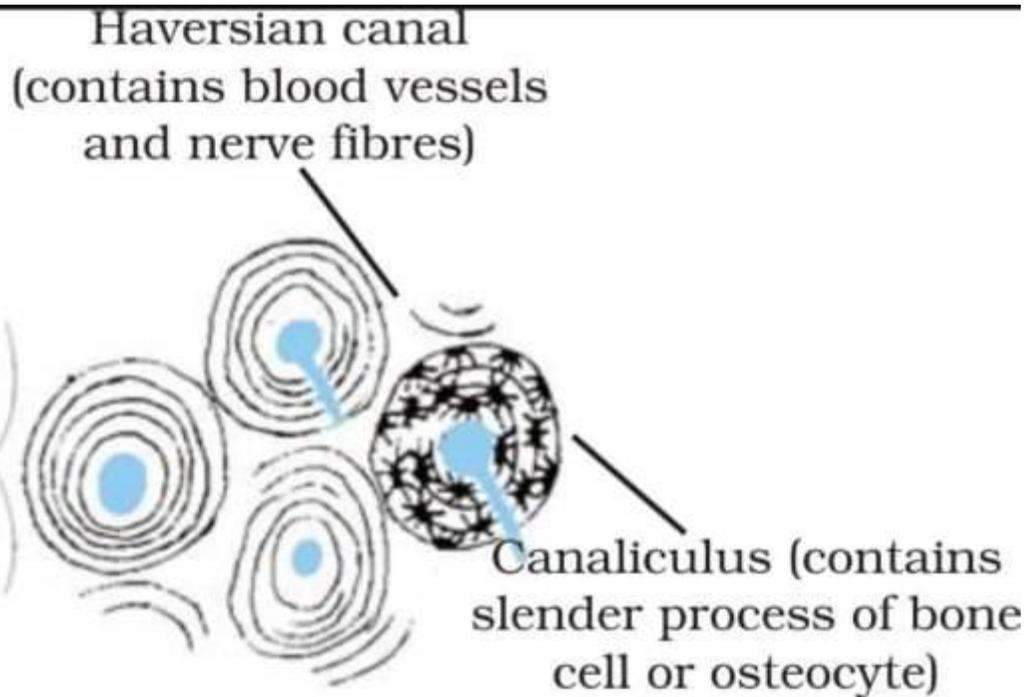


Blood Platelets

Also called thrombocytes, help in the clotting of blood.

Bone

It is very strong and non-flexible tissue. It is porous, highly vascular, mineralized, hard and rigid. Its matrix is made up of proteins and is rich in salts of calcium and phosphorus. It forms the framework that supports the body. It also anchors the muscles and supports the main organs.



Ligaments

They connect one bone to other bone. A ligament is very elastic and has considerable strength. It contains very little matrix. Ligaments strengthen joints and permit normal movement. Their overstretching leads to sprain.

Tendons.

They are strong and inelastic structures, which join skeletal muscles to bones. These are composed of white fibrous tissues with limited flexibility, but great strength.

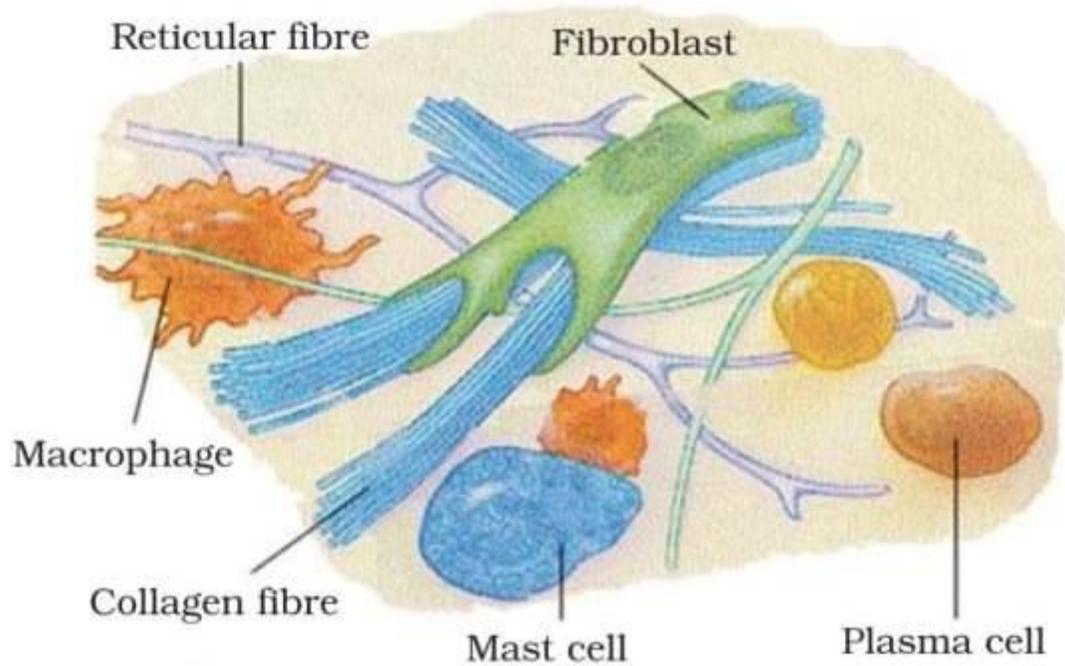
Cartilage.

It is specialized connective tissue having widely spaced cells. It has solid matrix called chondrin which is composed of proteins and sugars.

Cartilage provides smoothness to the bone surfaces at the joints. It is present in nose, ear, trachea and larynx. We can fold the cartilage of the ears, but we cannot bend the bones in our arms.

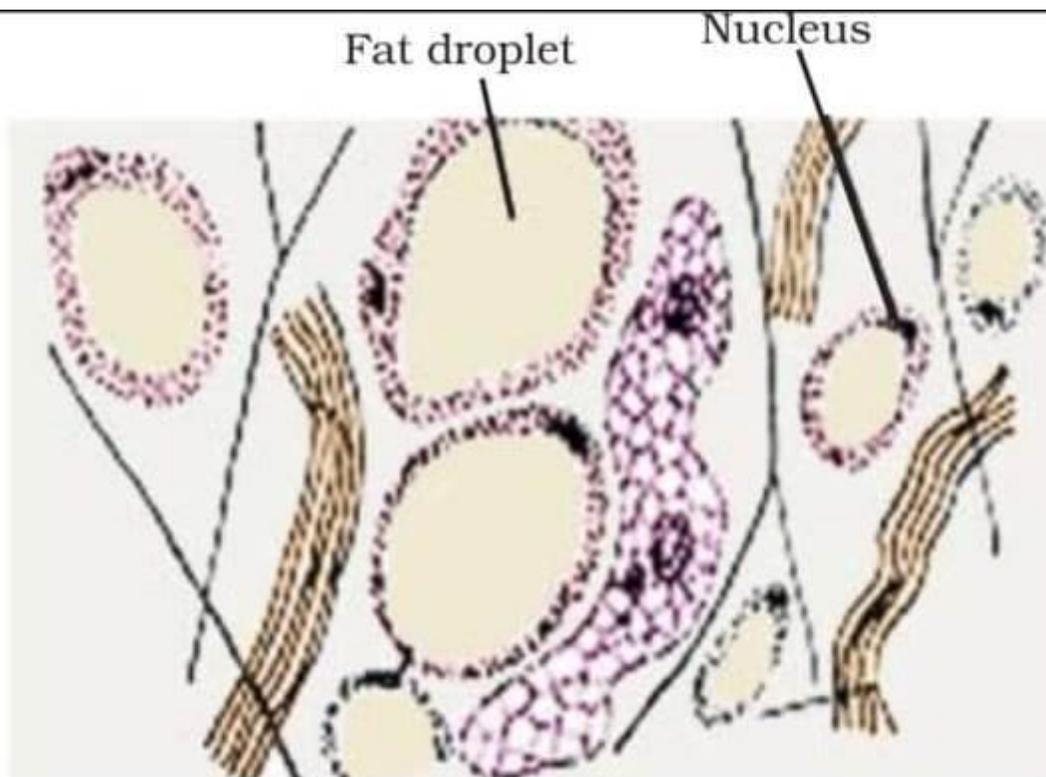
Areolar tissue.

It is supporting and packing tissue found between the organs lying in body cavity. It is located between skin and muscles, around blood vessels and nerves and in the bone marrow. It is a loose and cellular tissue. It fills the space inside the organs, supports internal organs. It helps in the repair of tissues.



Adipose tissue.

It serves as a fat reservoir, keeps visceral organs in position. It acts as an insulator due to the storage of fats. It is located below the skin in between the internal organs.

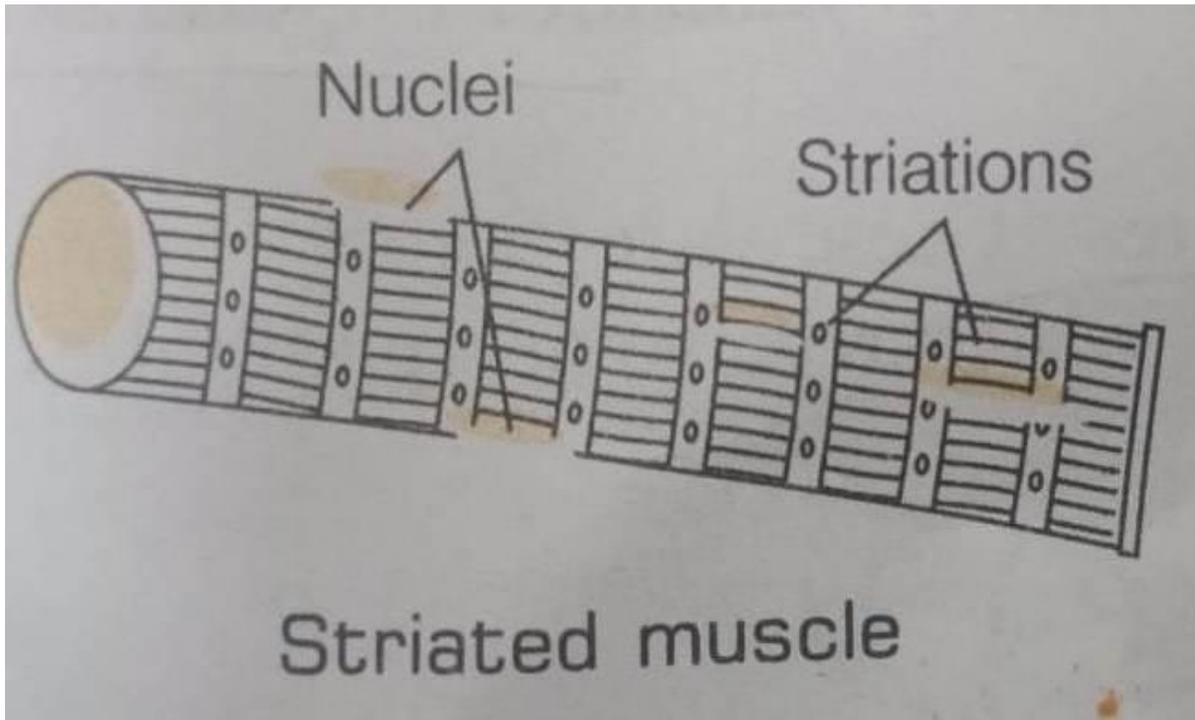


Muscular Tissue.

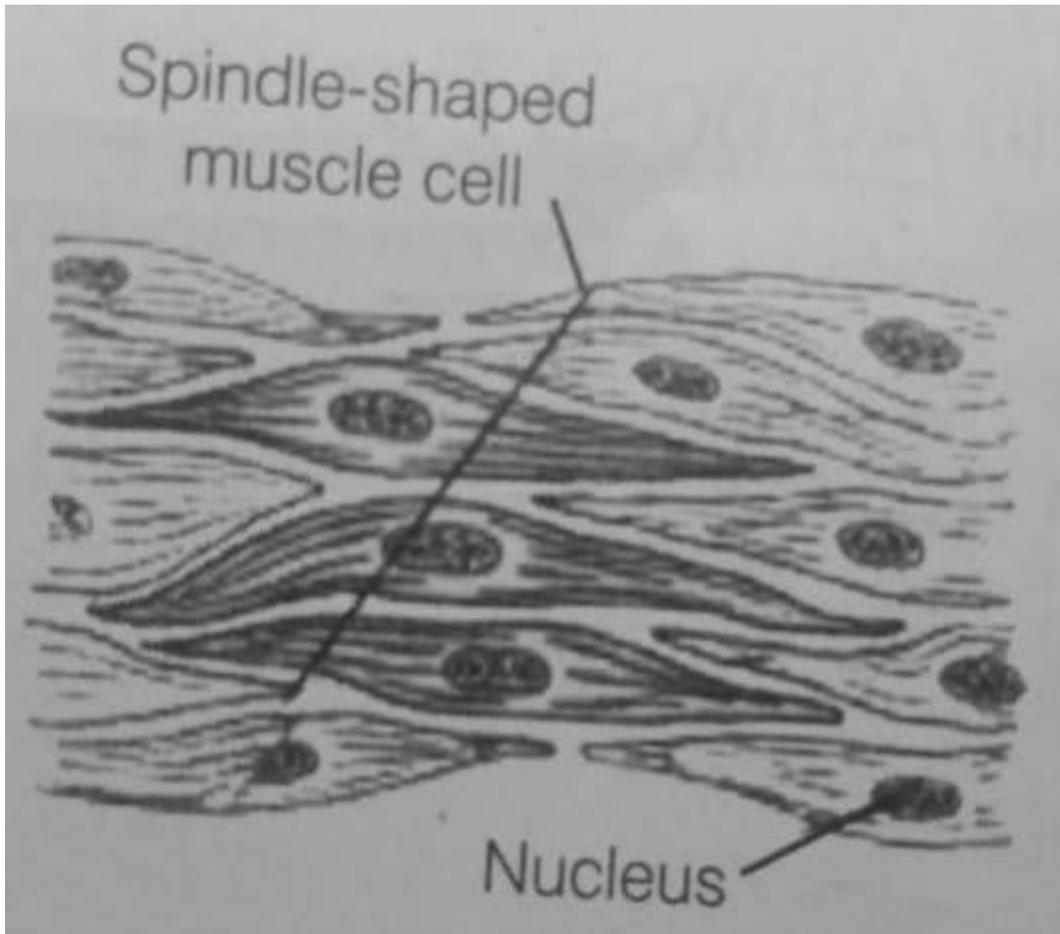
It consists of elongated cells, called muscle fibers. This tissue is responsible for the movement in our body. It contains special type of proteins called contractile proteins which causes movement of muscles by contraction and relaxation. Different types of muscular tissues are given below.

S.No.	Striated Muscles.	Unstriated	Cardiac Muscles.
1	Blunt ended	Spindle shaped	Blunt ended.
2.	Voluntary	Involuntary	Involuntary
3.	Multinucleate	Single	Single
4	Present in our limbs.	Iris of eye, uterus.	Heart.
5.	Unbranched	Unbranched.	Branched.
6.	Get tired soon	Tired after some times.	Never tired.

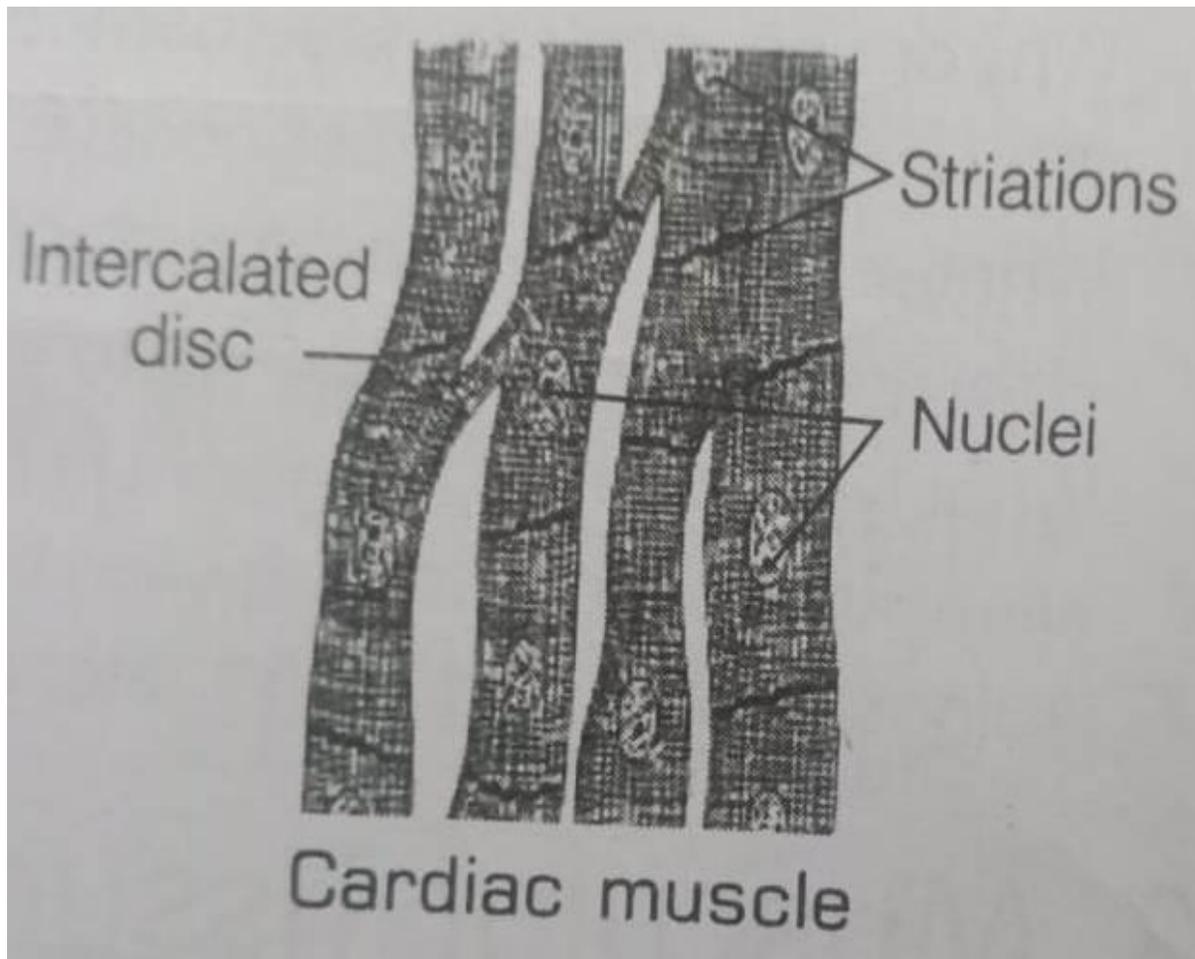
Striated Muscles.



Unstriated Muscles.



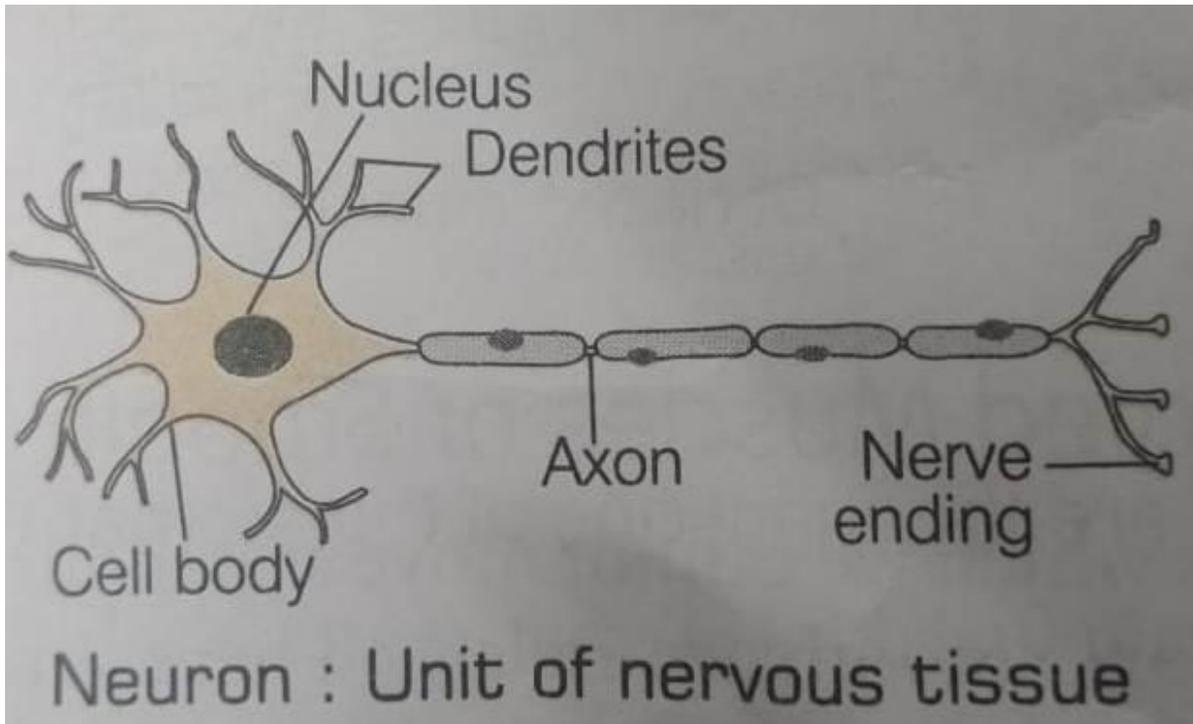
Cardiac Muscles.



- **Nervous Tissue**

The Tissue that receive stimulus and transmit it from one part of the tissue to other, are nervous tissues.

- The cells that constitute nervous tissue are called nerve cells or neuron. These are highly specialized for receiving stimulus and then transmitting it very rapidly from one place to another within the body itself.
- Brain, spinal cord and nerves are composed of nervous tissues.



An individual nerve cell or a neuron may be upto a metre long and composed of three major parts:

Cell body: It is polygonal, broader and nucleated part of neuron.

Axon: It is a single long conducting fibre extending from neuron. It transmits impulse away from the cell body.

Dendrites: These are short branched fibres of neuron, which receive nerve impulses.