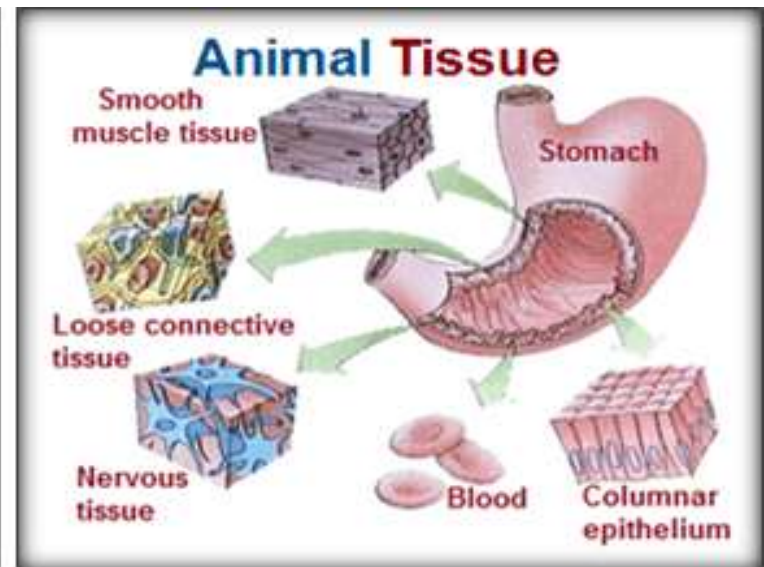
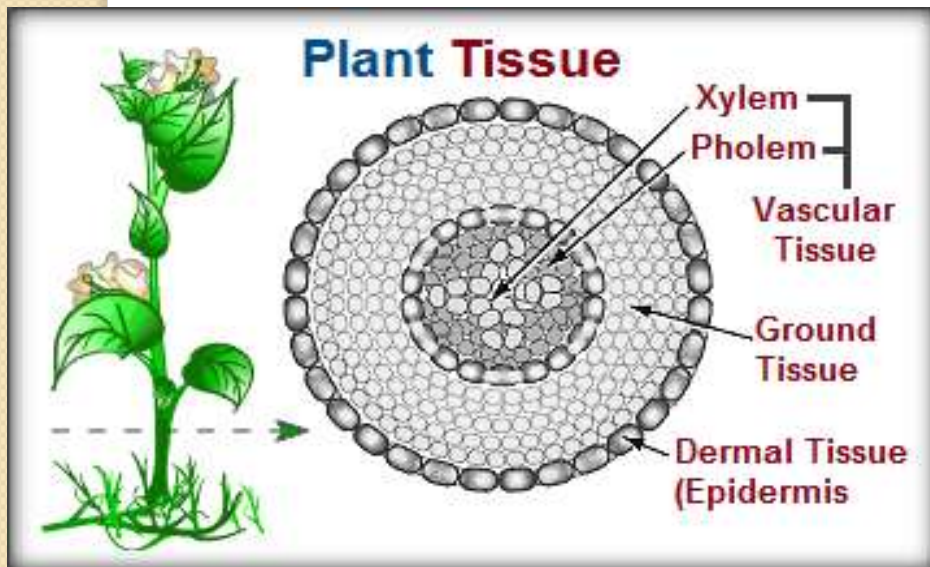


# Class-9

## Ch-6 Tissues



## Tissues :-

Tissue is a group of cells having similar structure and function.

In plants and animals groups of cells called tissues carry out specific functions.

### a) Plant tissues :-

- i) Plants do not move from place to place. Most of the cells and tissues in plants provide mechanical support and strength. So most of the tissues consists of dead cells because they provide mechanical support and strength to the plant.
- ii) The growth of plants takes place only in some regions. So plants have tissues called meristematic tissues which divide and help in growth and permanent tissues which do not divide.

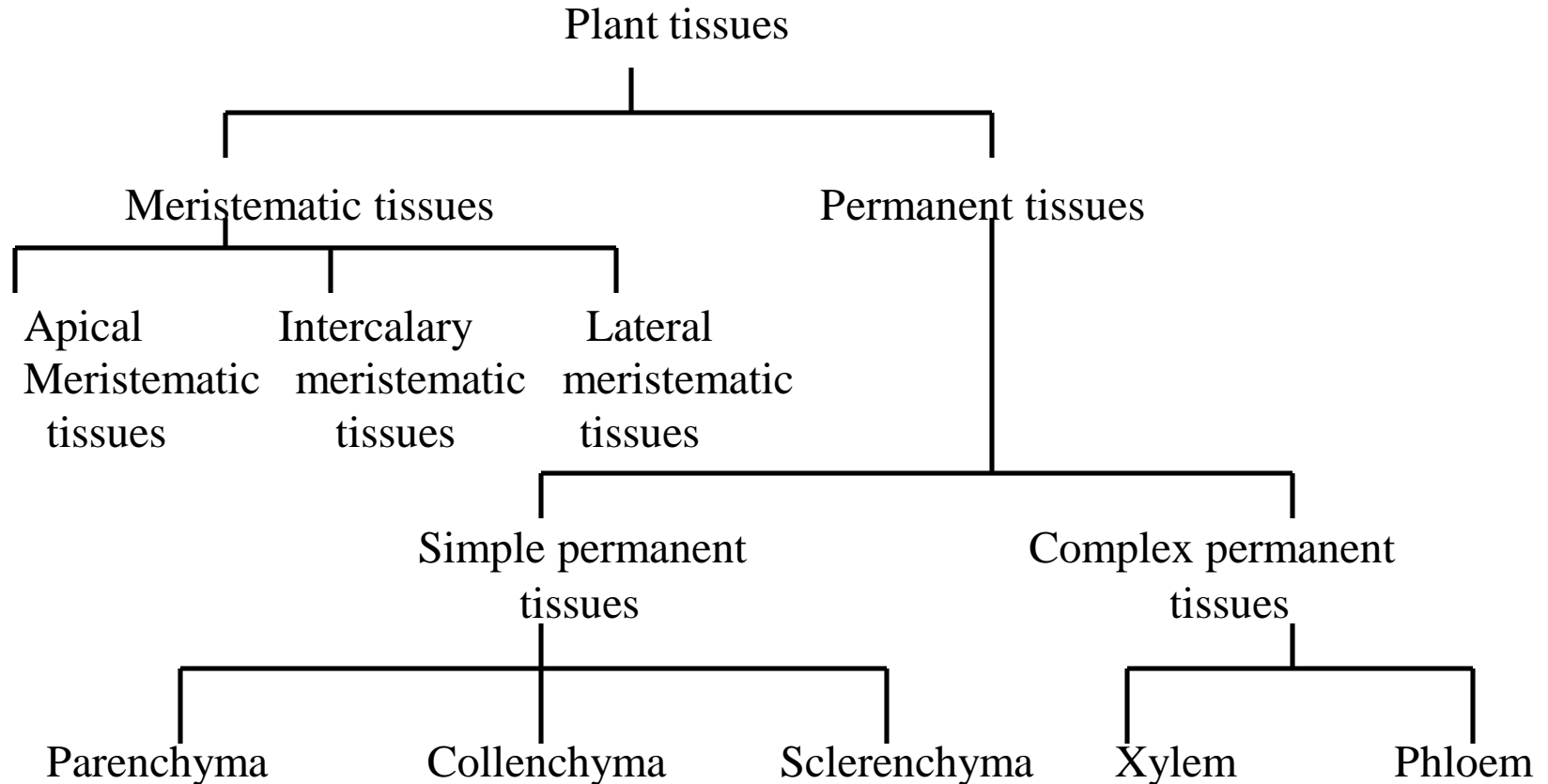
### b) Animal tissues :-

- i) Animals move from place to place and need more energy than plants. So most cells and tissues in animals are living cells.
- ii) The growth of animals is more uniform so animals do not have separate dividing and non dividing cells. Animals have organs having specialised functions. So the organs have specialised tissues.

## Plant tissues :-

Plant tissues are of two main types. They are Meristematic tissues and Permanent tissues.

- i) Meristematic tissues :- are of three types. They are Apical meristematic tissues, Intercalary meristematic tissues and Lateral meristematic tissues.
- ii) Permanent tissues :- are of two types . They are Simple permanent tissues and Complex permanent tissues. Simple permanent tissues are of three types. They are Parenchyma, Collenchyma and Sclerenchyma. Complex permanent tissues are of two types. They are Xylem and phloem.



## a) Meristematic tissue :-

Meristematic tissues are found in the growing regions of the plant like the tips of root, stem and branches. They divide continuously and help in the growth of the plant. They are of three types.

- i) Apical meristematic tissues :- are present in the tips of stems and roots. They help in the growth of stems and roots.
- ii) Lateral meristematic tissues :- are present in in the sides of stems and roots. They help to increase the girth of the stems and roots.
- iii) Intercalary meristematic tissues :- are present at the base of leaves and internodes and help in the growth of those parts.

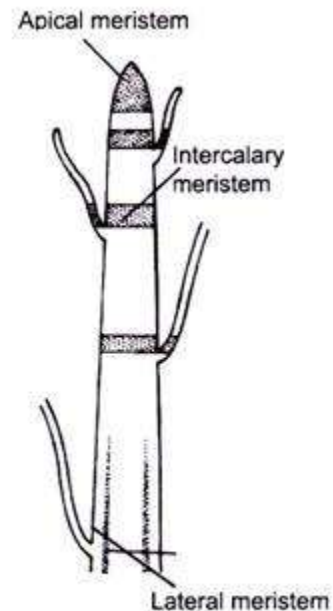


Fig. 3.1 Schematic representation of position of different meristems

## **b) Permanent tissues :-**

Formed from meristematic tissues. They do not divide and have permanent shape and

size. They differentiate into different types of permanent tissues. Permanent tissues are

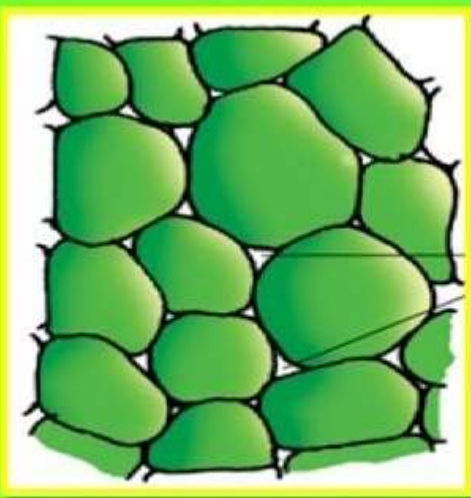
of two main types. They are Simple permanent tissues and Complex permanent tissues.

**i) Simple permanent tissues :-** are made up of one type of cells. They are of three types called Parenchyma, Collenchyma and Sclerenchyma.

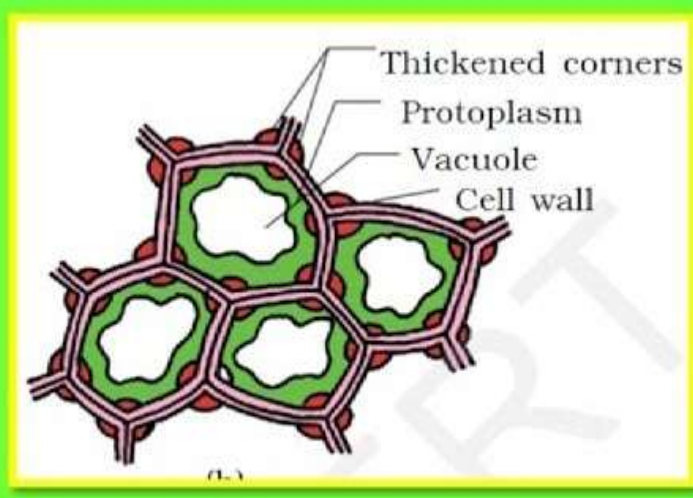
**Parenchyma :-** consists of loosely packed thin walled cells having more intercellular spaces. Some parenchyma cells in leaves contain chloroplast and prepares food by photosynthesis. Some parenchyma cells have large air cavities which help the plant to float on water. Some parenchyma cells of roots and stem store water and minerals.

**Collenchyma :-** consists of elongated cells having less intercellular spaces and thicker at the corners. They give flexibility and allows easy bending of different parts like stem, leaf etc. They also give mechanical support to the plant.

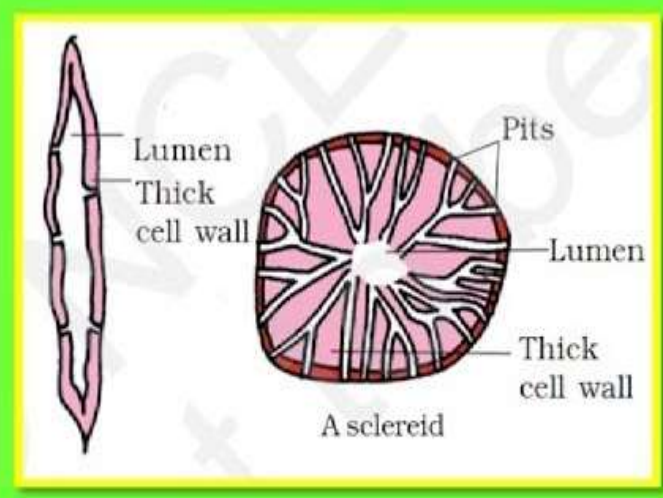
**Sclerenchyma :-** consists of long, narrow, dead thick walled cells. The cell walls contain lignin a chemical substance which act like cement and hardens them. It gives strength and hardness to the plant parts.



**PARENCHYMA**



**COLLENCHYMA**



**SCLERENCHYMA**



## ii) Complex Permanent Tissue

- The complex permanent tissues are made up of more than one type of cell. They coordinate together to perform the same specialized functions in the plant body. They are classified into two types – Xylem and Phloem
- **Xylem** – The xylem tissue is responsible for the conduction of water and minerals from the roots to the leaves and stem. It also provides support to the plants. It has four elements. They are tracheids, vessels, xylem parenchyma and xylem fibres.
- **Phloem** – This complex permanent tissue helps in the translocation of food that is prepared by photosynthesis in the leaves to various parts of the plant. Phloem consists of four elements. They are sieve tubes, companion cells, phloem fibres and phloem parenchyma.

## 4) Animal tissues :-

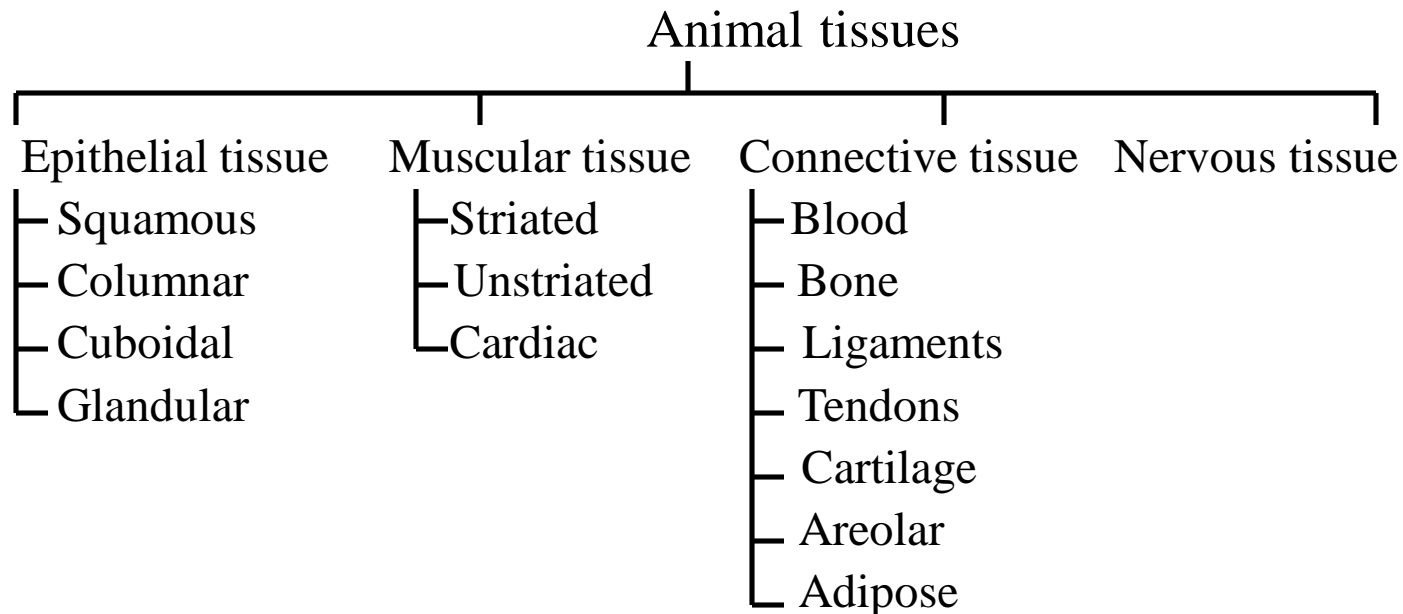
Animal tissues are of four main types . They are :- Epithelial tissue, Muscular tissue, Connective tissue and Nervous tissue.

i) Epithelial tissues :- are of different types. They are :- Squamous, Columnar, Cuboidal, Glandular etc.

ii) Muscular tissues :- are of three types. They are :- Striated, Unstriated and Cardiac.

iii) Connective tissues :- are of different types. They are :- Blood, Bone, Ligaments, Tendons, Cartilage, Areolar, Adipose etc.

iv) Nervous tissue :- consists of nerve cells called neurons.





## a) Epithelial tissue :-

Epithelial tissue is the covering or protective tissue in animals. It forms the outer covering like skin, outer covering of organs, inner lining of blood vessels, lungs, oesophagus, etc. It protects the body and controls the movement of materials between the body and the surroundings and between the parts of the body. The cells are closely arranged and have a fibrous basement membrane.

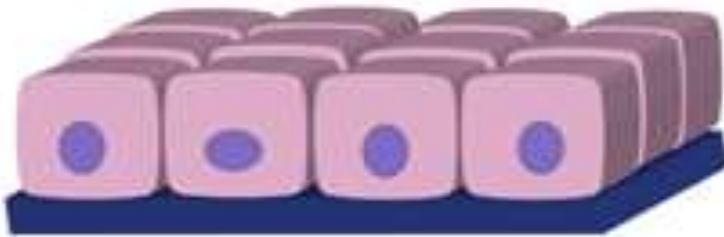
i) Squamous epithelial tissue :- consists of a layer of thin flat cells. It is present in the linings of blood vessels, lungs, mouth, oesophagus etc. The skin has several layers of epithelial cells. This tissue is called Stratified squamous tissue.

ii) Columnar epithelial tissue :- consists of tall pillar like cells. It is present in the walls of the intestine. The columnar epithelial tissue in the respiratory tract has hair like projections called cilia. This tissue is called Ciliated columnar epithelial tissue.

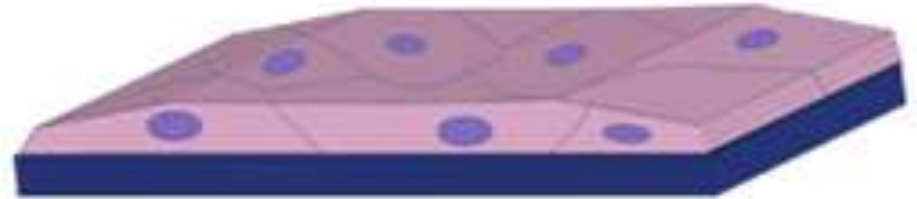
iii) Cuboidal epithelial tissue :- Consists of cone shape cells having a basement membrane. It forms the lining of kidney, tubules and ducts of salivary glands and provide mechanical support.

iv) Glandular epithelial tissue :- Sometimes epithelial tissue folds inwards and forms a multicellular gland which secretes substances. This tissue is called Glandular epithelial tissue.

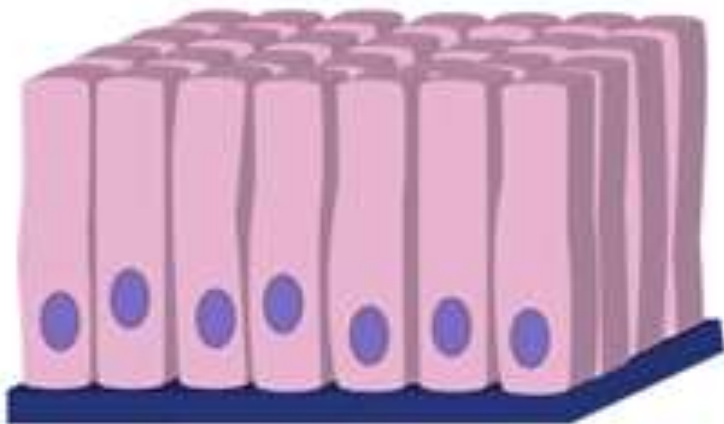
# Epithelial Tissue



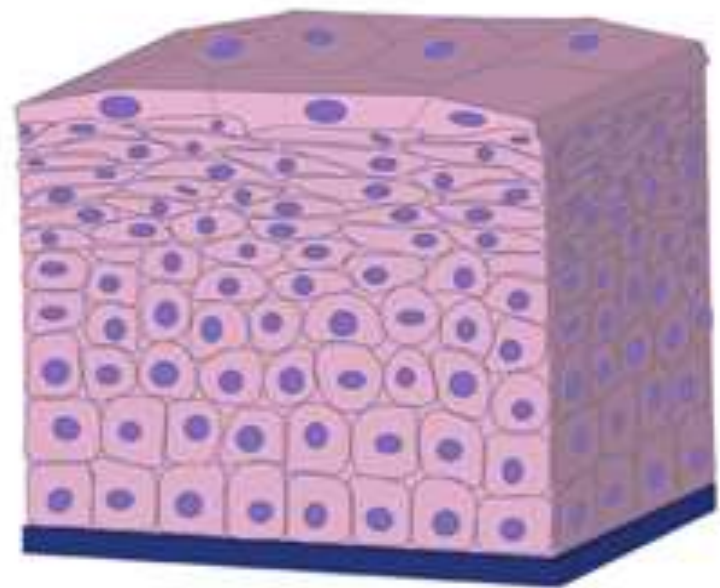
**Simple Cuboidal**



**Simple Squamous**



**Simple Columnar**



**Stratified Squamous**

## b) Muscular tissue :-

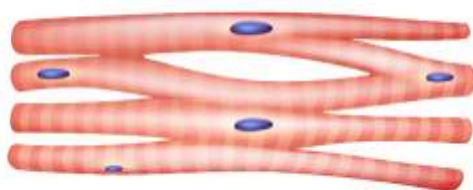
Connective tissue helps in the movements of the body. It consists of elongated cells called muscle fibres.

i) Striated muscles :- are voluntary muscles having light and dark striations. The cells are long, cylindrical and are multinucleated. They are also called skeletal muscles because they are attached to bones. They help in voluntary movements of the body.

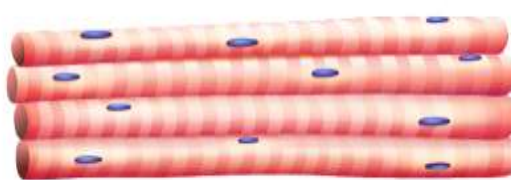
ii) Unstriated muscles ( Smooth muscles) :- are involuntary muscles having no striations. The cells are long and spindle shaped and are uninucleated. They are present in alimentary canal, blood vessels, bronchi of lungs, iris of eye etc. They help in involuntary movements.

iii) Cardiac muscles :- are involuntary muscles having faint striations. The cells are long, cylindrical, branched and multinucleated. They are present in the heart and helps in the contraction and relaxation of the heart.

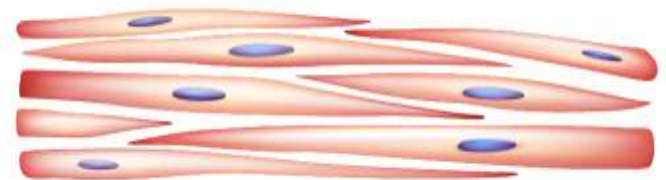
### Types of Muscle



**Cardiac muscle**



**Skeletal muscle**



**Smooth muscle**

## c) Connective tissue :-

Connective tissue connects and joins the different parts of the body together.

The cells of the connective tissue are loosely packed and the space between the cells are filled with a jelly like matrix.

i) Blood :- Blood contains a fluid matrix called plasma which contains red blood cells (RBC), white blood cells (WBC) and platelets. The blood transports gases, digested food, hormones, waste materials etc.

ii) Bone :- is a hard and strong tissue. It consists of cells which are embedded in a hard matrix containing calcium and phosphorus compounds. Bone forms the framework of the body and supports the body and the main organs.

iii) Ligaments :- are flexible tissues which joins bones together and helps in movements.

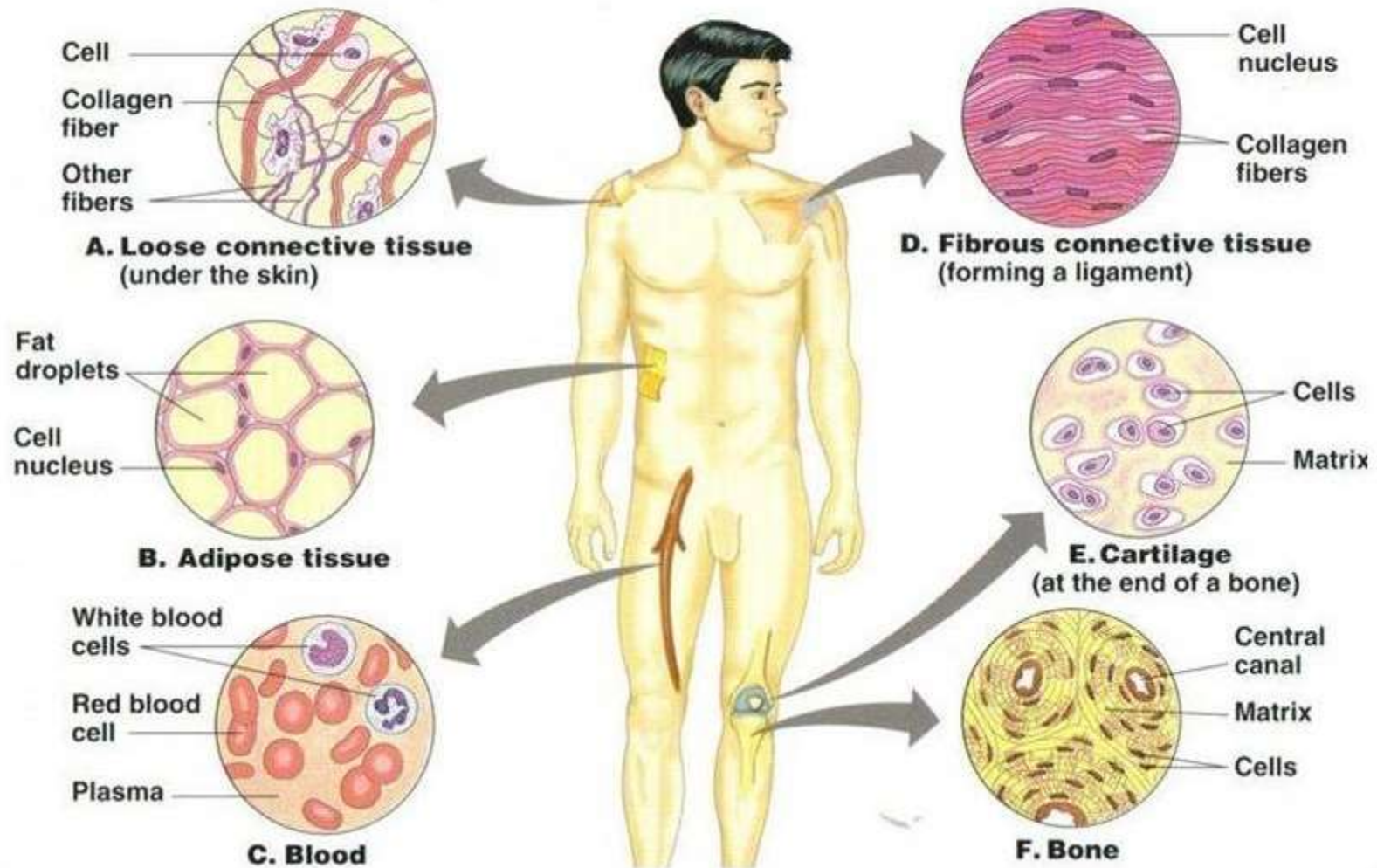
iv) Tendons :- are fibrous tissues which joins muscles to bones and helps in movements.

v) Areolar tissues :- fills the space between skin and muscles, inside the organs, around blood vessels etc. It helps to repair the tissues.

vi) Adipose tissue :- is found below the skin and between internal organs. It contains fats and helps to store fats.



# Connective tissue



## d) Nervous tissue :-

Nervous tissue helps to carry messages from one part of the body to the other and responds to stimuli. It is found in the brain, spinal cord and nerves. It consists of nerve cells called neurons.

Neuron (Nerve cell) :- has a cell body containing a nucleus and cytoplasm. It has hair like structures called dendrites and a long part called axon having nerve endings. The axon has a protective covering called myelin sheath. The neurons are joined together to form nerve fibres. The junction between two neurons is called synapse.

## Structure of a Typical Neuron

