CHAPTER 1

PLANT AND ANIMAL TISSUES

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

OR

A tissue is a group of similar cells with a common origin that together perform a specific function. The word tissue takes its origin from a Latin word which means 'weave'. In tissues, cells are woven together. Sometimes these tissues are bonded by a sticky substance that coat the cells.

- Branch of science that deals with study of tissues is known as Histology.

Plant tissues are categorised broadly into three tissue systems:

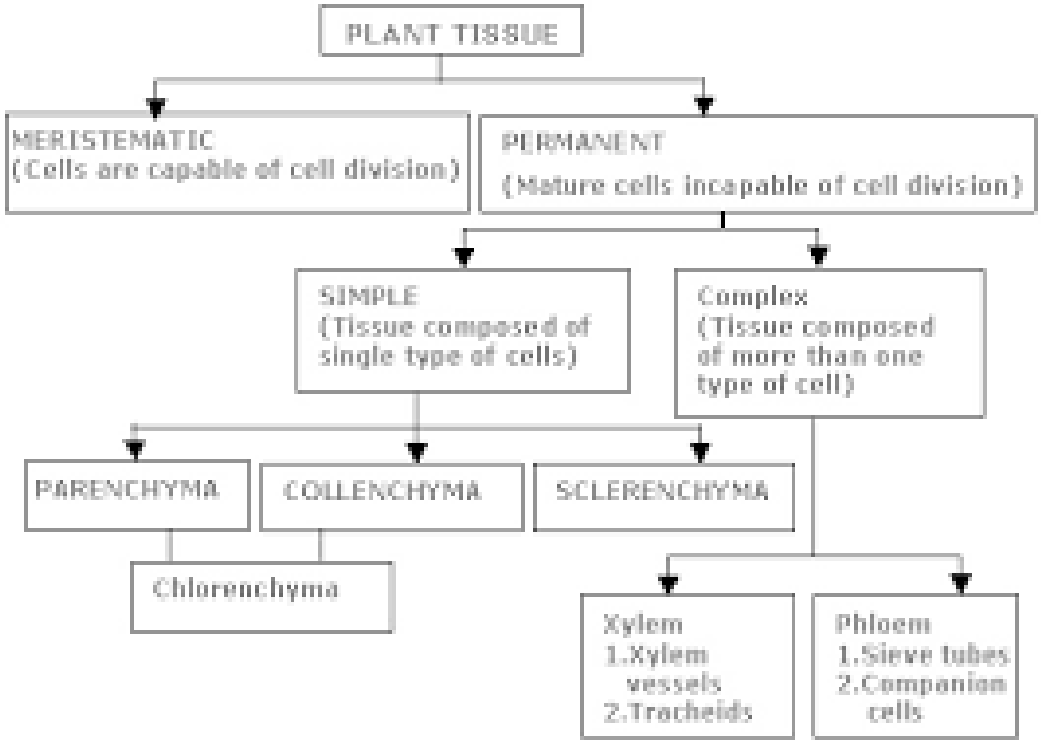
- **Epidermis Cells**: forming the outer surface of the leaves and of the young plant body.
- **Vascular tissue:** The primary components of vascular tissue are the xylem and phloem. These transport fluid and nutrients internally.
- **Ground tissue:** Ground tissue is less differentiated than other tissues. Ground tissue manufactures nutrients by photosynthesis and stores reserve nutrients.

Plant tissues can also be divided differently into two types based on their position and capability to grow.

1. Meristematic tissues

2. Permanent **tissues.**

TYPES OF PLANT TISSUES



COMPARING DIFFERENT TYPES OF MERISTEMATIC TISSUES

Apical Meristem	Lateral Meristem	Intercalary Meristem
• They are responsible for the growth of stems and roots in the plants • They are found on the tips of the roots and stems.	• They are responsible for increasing the circumference of the middle part of the stem and hence are found there.	• These tissues are present at internodes or stem regions between the places at which leaves attach.

COMPARING DIFFERENT TYPES OF PERMANENT TISSUES

Parenchyma	Collenchyma	Sclerenchyma
These tissues are responsible for	These tissues are responsible	These tissues are

photosynthesis, storage of food, gaseous exchange and floating of plants.	for providing flexibility to the plants so that they can bend easily.	responsible for making plants hard and rigid.
They are a group of living cells with cell wall made of cellulose.	They are a group of living cells with cell wall made of cellulose and pectin.	They are made up of dead cells having cell wall made of lignin.
The parenchyma cells have large intercellular spaces between them.	They have a little intercellular space in between them.	The cells do not have any intercellular spaces.
There are thin walls that surround each cell.	The cells present in these tissues are broad and irregularly thick at corners.	The cells have a long structure with thick walls.
They are found in leaves and newly formed branches.	They are present in leaves and stems of a plant.	They are found in stems, veins of the leaves and coverings of nuts and seeds.

PROTECTIVE TISSUE

- The main function of the epidermis is to protect the plants from fungi, water loss and any injuries by secrets a wax-like water-resistant substance called as **Cuticle** on the surface of the plants which protects the plants.
- Epidermis is a thin layer of single cells but in places with less water, the epidermis of the plants can become thick in order to avoid frequent water loss.
- Stomata are pore-like structures that are present in the epidermis of the leaves.

COMPARING COMPLEX PERMANENT TISSUES: XYLEM AND PHLOEM

Complex Permanent Tissues comprise of different kinds of cells. These different types of cells coordinate with each other and perform a common function in these tissues. Two Complex Permanent Tissues are - **Xylem** and **Phloem**.

The basic difference between xylem and phloem is listed below

Xylem	Phloem
It conduct water and minerals.	It conducts organic solutes or food materials
Conduction is mostly unidirectional, *i.e.*, from roots to apical parts of the plant.	In it conduction may be bidirectional, *i.e.*, from leaves to storage organs or growing parts or from storage organs to growing parts of plants.
Conducting channels or treachery elements are tracheids and vessels.	Conducting channels are sieve tubes.
Three of the four elements of xylem are dead (*i.e.*, tracheids, vessels and fibre). Only xylem parenchyma is the living element.	Three of four elements are living *i.e.*, sieve tubes, companion cells and phloem parenchyma while phloem fibre are dead elements.
In addition to conduction, xylem provides mechanical strength to the plant.	Phloem performs no mechanical function for the plants.

ANIMAL TISSUES

Animal tissues are made of unique cells and cellular products, which show inflammation reaction to any injury in an animal.

In animal, organs are made up of four basic types of tissues epithelial tissue, connective tissue, muscle tissue and nerve tissue. These tissues have distinctive features and specific functions which combine to form functioning organs.

1.Epithelial tissue:

Epithelial tissues form a protective layer. Epithelial tissue is made of closely packed cells arranged in flat sheets. Epithelia form the surface of the skin, line the various cavities and tubes of the body, and cover the internal organs. Epithelial tissues act as a barrier to keep the different body systems separate.

Different types of epithelial tissues are classified based on their shape and function.

1. Squamous epithelium is found in the organs to provide mechanical support.

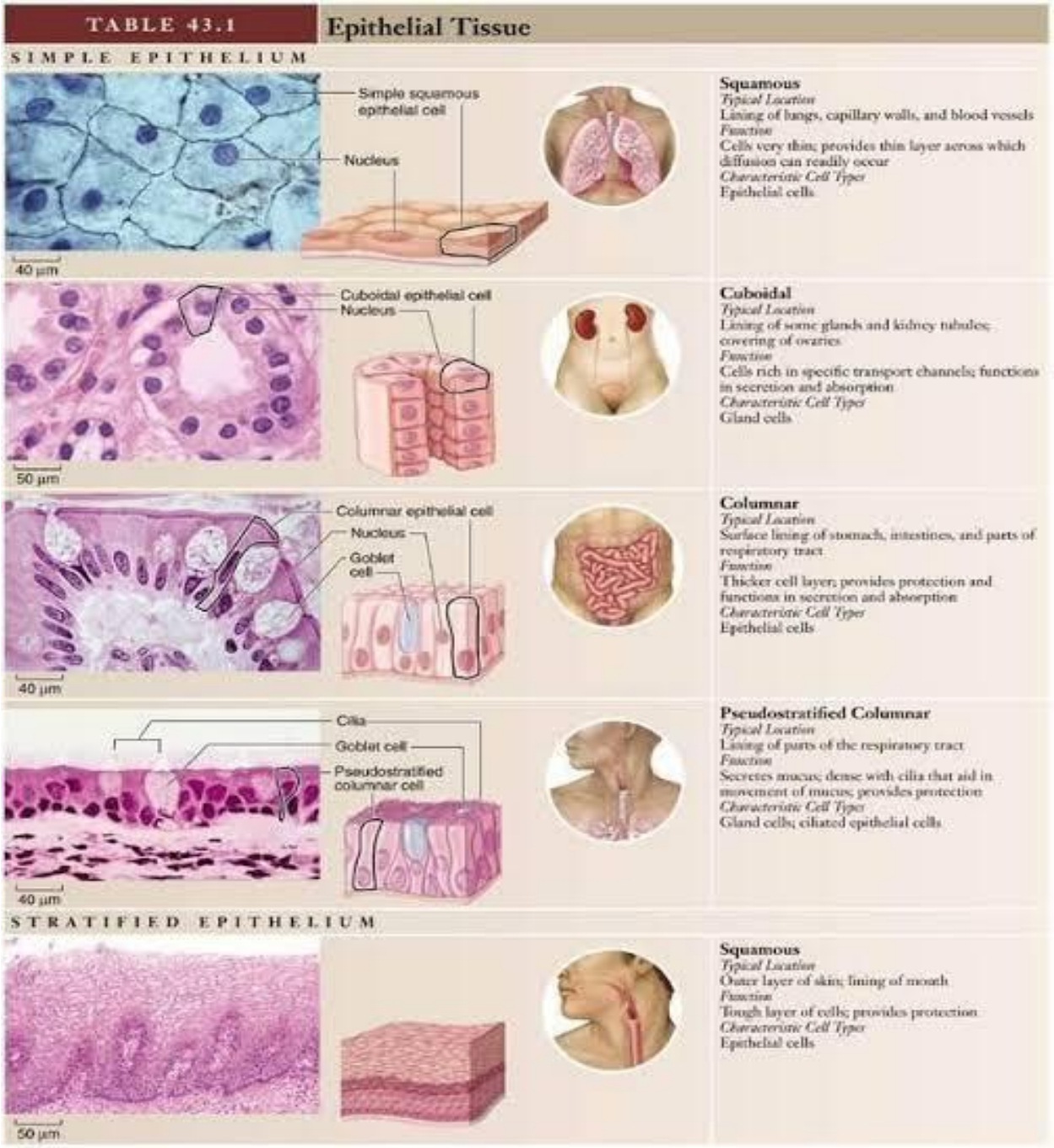
2. Columnar epithelium is in the lining of the organs to facilitate the movement of nutrients.

3. Glandular epithelium is found in the glands to produce secretions.

4. Ciliated epithelium is in the lining of the respiratory tract.

5. Cuboidal epithelium is found in organs to provide mechanical support.

6.Stratified epithelium is found in places of wear and tear.



2.Connective tissue:

Connective tissue connects different organs. Different types of connective tissues are classified based on their shape and functions.

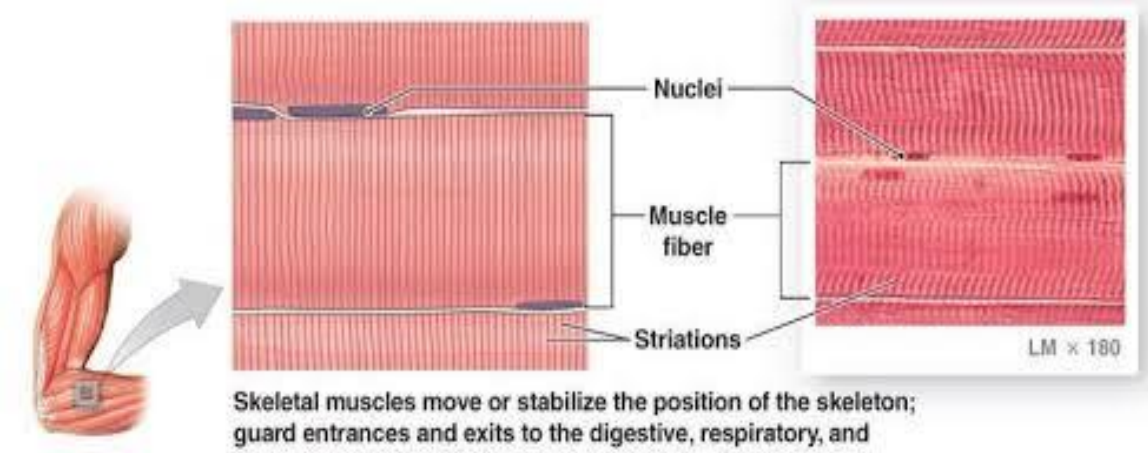
1. Blood is a type of fluid connective tissue.
2. Bone is a hard porous tissue that protects the internal organs.
3. Fibrous connective tissue pack and bind various organs.
4. Ligaments connect two bones and tendons connect bones to the muscles.
5. Cartilage is found at the end of long bones to give flexibility.
6. Areolar connective tissue fills the space inside organs.
7. Adipose tissue is found below the skin and around kidneys.

3.Muscular Tissues:

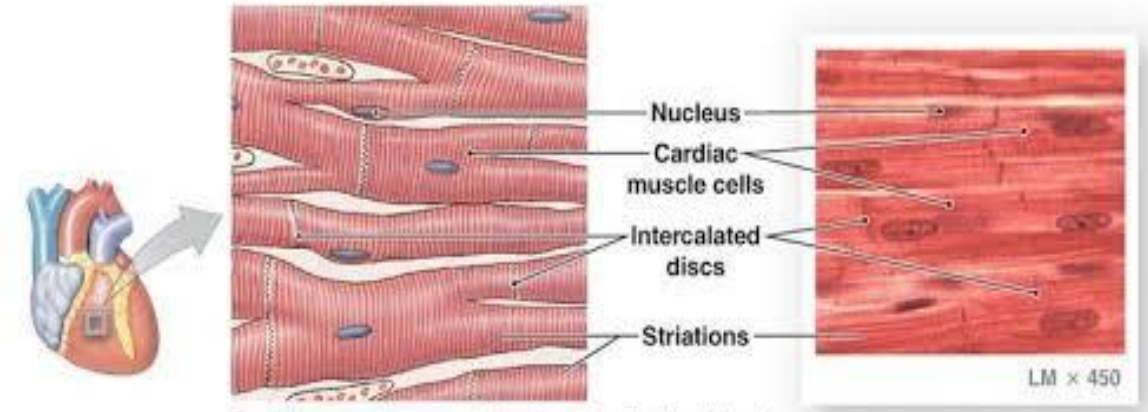
Man can move because of the elasticity and flexibility of muscular tissues.

- Striated muscles help us move our limbs at will.
- Unstriated muscles are found in the iris of the eye and bronchi of the lungs.
- Cardiac muscles are located near heart.The contraction and relaxation of cardiac muscles cause heart beats.

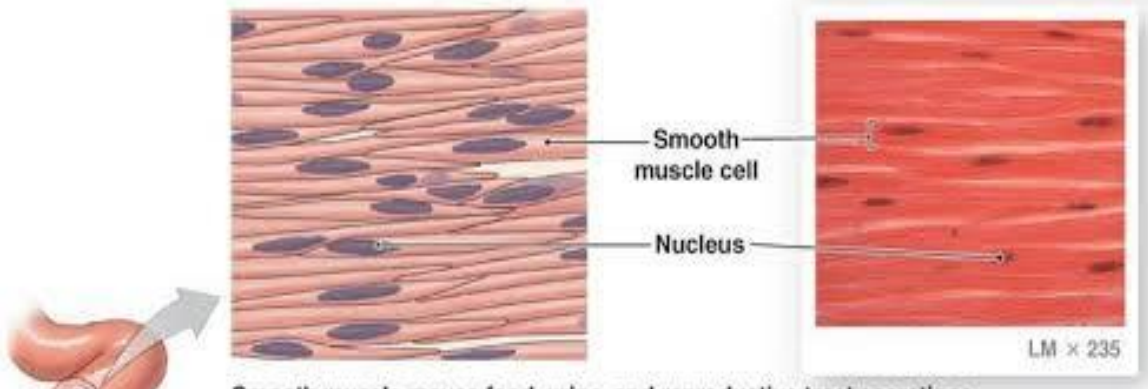
The structure and function of the three types of muscle tissue



Skeletal muscles move or stabilize the position of the skeleton; guard entrances and exits to the digestive, respiratory, and urinary tracts; generate heat; and protect internal organs.



Cardiac muscle moves blood and maintains blood pressure.



Smooth muscle moves food, urine, and reproductive tract secretions; controls diameter of respiratory passageways and regulates diameter of blood vessels.

4.Nerve Tissues:

Nervous tissue transfer information from one part of the body to another. Nervous tissues have elongated cells called **neurons.** Neurons join end to end to form nerve fibres.

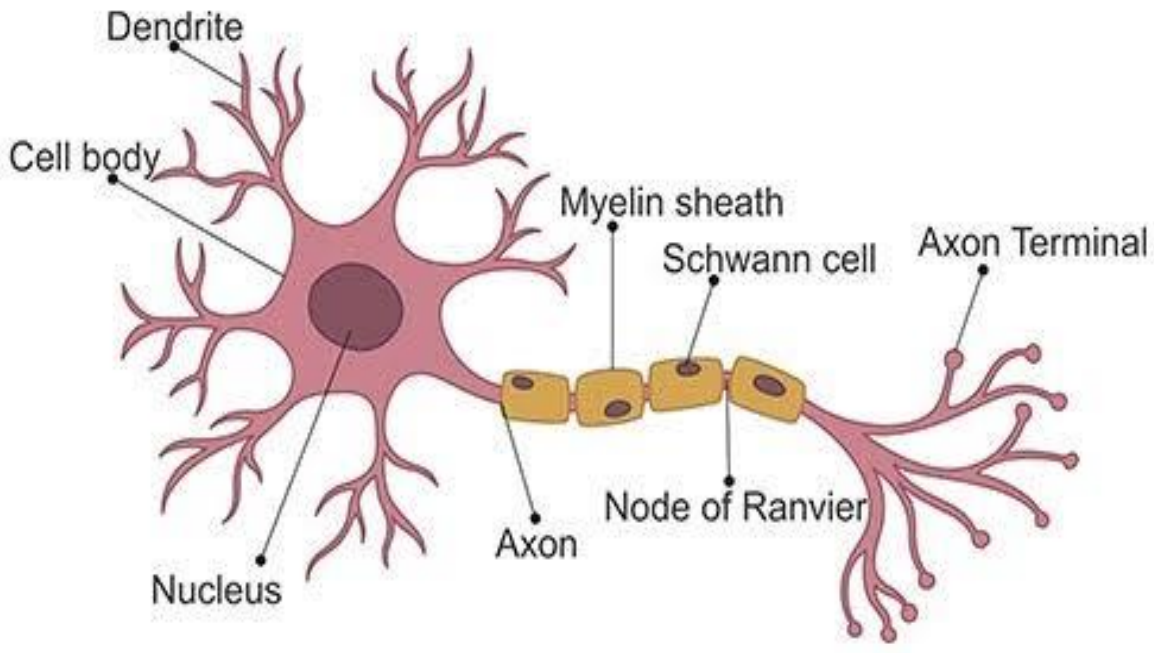
A typical neuron has:

a) Dendrites-

b) Cyton or soma or cell body-

c) Axon-

d) Axon ending-



Plant Tissues	Animal Tissues
Plants do not move so their tissues are predominantly the ones that provide support to them so that they can stand erect.	Animals need more energy as compared to plants because they are not stationary. Their tissues are the ones that can support movement.
These tissues are made up of dead cells because dead cells can also provide mechanical strength to the plants and do not require much maintenance.	The tissues in case of animals are made up of living cells so that they can move and perform several functions.
Only certain parts of the plant can grow. The tissues present in such regions of and divide themselves and form new tissues.	Cells in animals grow uniform early and not only in certain regions of the body.
The structure of plant tissues is not very specialized as compared to animals	The organs and organ systems in animals are highly developed.