



CHAPTER 13 TISSUE

NOTES

TISSUES: A group of cells similar in structure and work together to perform a particular function.

- Most of the plant tissues like xylem and phloem are dead cells and provide mechanical strength while animal tissues are living.
- The growth in plant is limited to certain regions while growth in animals is uniform.

FLOW CHART OF PLANT TISSUE

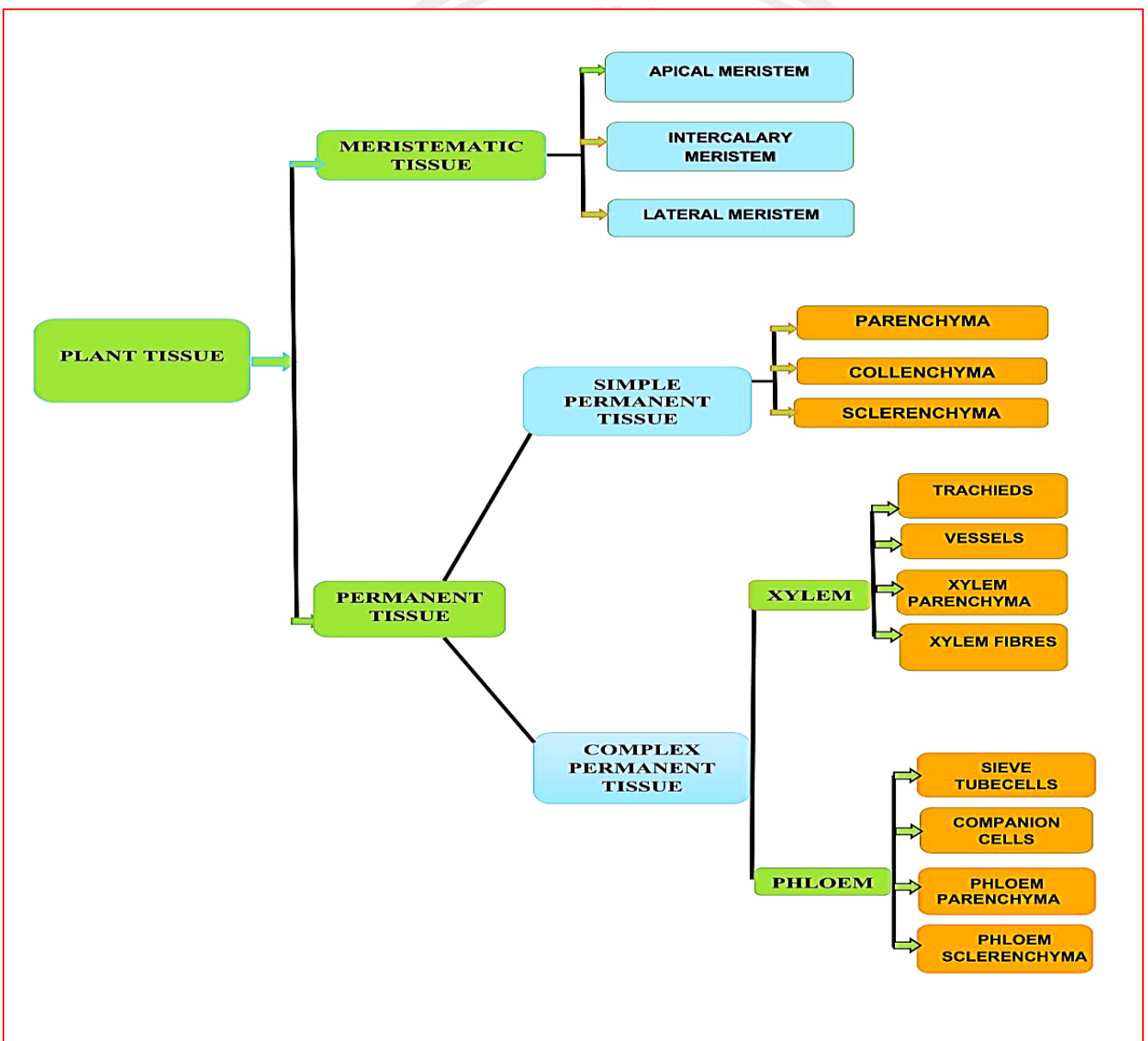


Fig. A schematic flowchart of Plant Tissue



PLANT TISSUE:

The two main types of plant tissue are - **Meristematic tissue** and **Permanent tissue**.

MERISTEMATIC TISSUE	PERMANENT TISSUE
<ul style="list-style-type: none"> ➤ Cells are living and dividing ➤ Cells are compactly arranged, intercellular spaces and vacuoles are generally absent. ➤ Cells don't take up permanent shape, size and function. 	<ul style="list-style-type: none"> ➤ Cells lack the power of division. ➤ Intercellular spaces and vacuoles are generally present ➤ Cells take up permanent shape, size and function.

TYPES OF MERISTEMATIC TISSUE: Based on position three types of meristematic tissue are classified as:

Apical meristems are found at the apex of stems, roots and leaves; responsible for elongation of stems and roots.

Intercalary meristems are present at the base of leaves and internodes; also responsible for increase in length of plant.

Lateral meristems are present along the sides of stem and roots; responsible for increase in diameter or girth of plant body. e.g. Cork cambium.

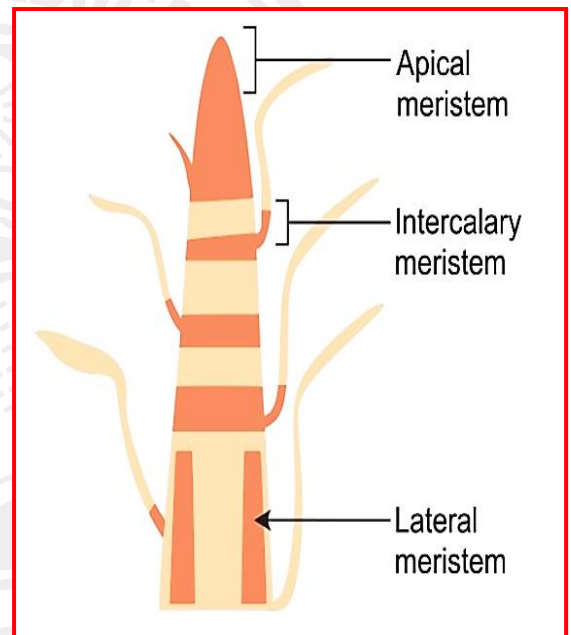


Fig. A diagram showing types of Meristematic Tissue

TYPES OF PERMANENT TISSUE: There are two types of permanent tissue – **simple and complex**.

Comparison between Simple Permanent Tissue and Complex Permanent Tissue

SIMPLE PERMANENT TISSUE	COMPLEX PERMANENT TISSUE
<ul style="list-style-type: none"> ➤ They are made up of a group of similar types of cells. ➤ Parenchyma, collenchyma and sclerenchyma are the three simple permanent tissues. ➤ They are not conducting tissues. 	<ul style="list-style-type: none"> ➤ They are made up of more than one type of cells. ➤ Xylem and phloem are the two permanent tissues. ➤ They are conducting tissue.



TYPES OF SIMPLE PERMANENT TISSUES:

TYPES	PARENCHYMA	COLLENCHYMA	SCLERENCHYMA
Cell Wall	Cells are isodiametric, oval, rounded or polygonal with uniform thin wall.	Cells are often elongated with wall thickenings at corners places due to cellulose, hemicelluloses and pectin.	Cells are irregularly shaped; walls are regularly thickened with lignin. Fibres are elongated cells.
Location	They are found in soft parts of plant body.	They are found below the epidermis in dicot stem and leaf stalk.	They are found around vascular bundle in leaves and in the hard covering of seeds and nuts.
Function	Primary function is storage of food and water	It provides flexibility and mechanical support particularly in young growing organ.	Purely mechanical and provides strength to the plants and make them hard and stiff

- Parenchyma can be centre of photosynthesis in **chlorenchyma** and may impart buoyancy in case of **aerenchyma**.

SIMPLE PERMANENT TISSUES

- They consist of one group of cells forming uniform structures and performing the same function.
- It includes **Parenchyma, Collenchyma** and **Sclerenchyma**
- **Epidermal tissue system** includes epidermis and associated structures like cuticle, stomata etc.
- **Cuticle** is the waxy coating on epidermal cells whereas **Stomata** are minute pores on leaves surrounded by guard cells. Stoma is concerned with exchange of gases and transpiration.
- In **roots cuticle, stomata are absent** but unicellular hairs are present however in stem cuticle, stomata and multicellular hairs are present.
- **The opening and closing of the stomata** is due to **turgidity and flaccidity of the guard cell**. When guard cells swell it opens and when guard cells shrink it remains close.



COMPLEX PERMANENT TISSUES

➤ They are made of more than one type of cells and include – **Xylem and Phloem**

➤ **Xylem** includes **tracheids, vessels, xylem parenchyma and xylem fibres**. Tracheids and vessels are tube like tracheary elements; parenchyma help in storage and lateral conduction while fibres provide mechanical support.

➤ **Phloem** includes **sieve tubes, companion cells, phloem parenchyma and phloem sclerenchyma**. All the components are living except sclerenchyma; sieve tubes are tube like and help in transport of organic food.

➤ Xylem and phloem are collectively known as **vascular bundles** and represent conducting tissue. **Xylem** is responsible for **transport of water and minerals** whereas **phloem** is responsible for **transport of food materials**.

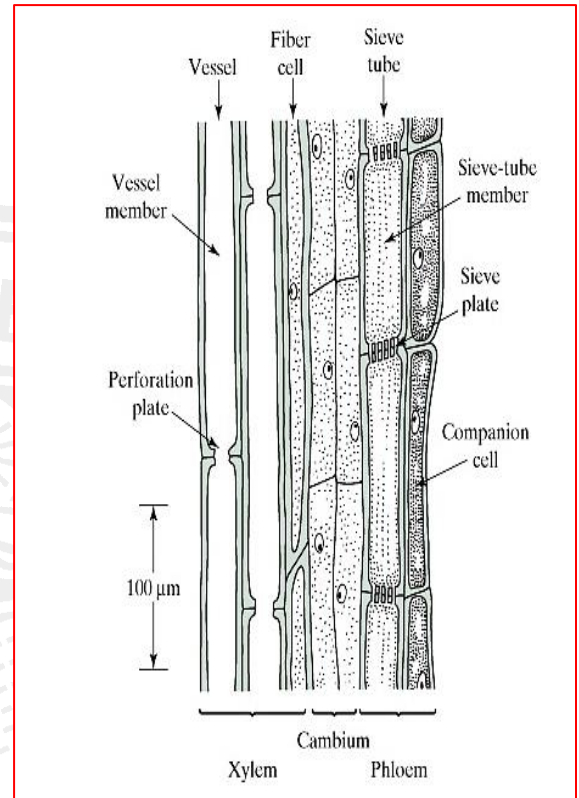


Fig. Diagram showing Xylem and Phloem (Cambium) of Plant Tissue

ANIMAL TISSUE:

➤ Animal tissues are of four types:

Epithelial tissue, Connective tissue, Muscular tissue and Nervous tissue

➤ **Epithelial tissue:** Protective in function; forms the covering of body parts and lining of blood vessels, oesophagus, mouth etc. It may be **simple** (single layer) or **stratified** (several layer).

➤ Epithelial tissues specialized for secretions are known as **glandular epithelium**.

➤ **Connective tissue:** It binds different structures with one another, provide support and also help in transport of gases and food.

➤ **Muscular tissue:** It helps in movement and locomotion.

➤ **Nervous tissue:** It helps in collection of information and produces a general response.



FLOW CHART OF ANIMAL TISSUE

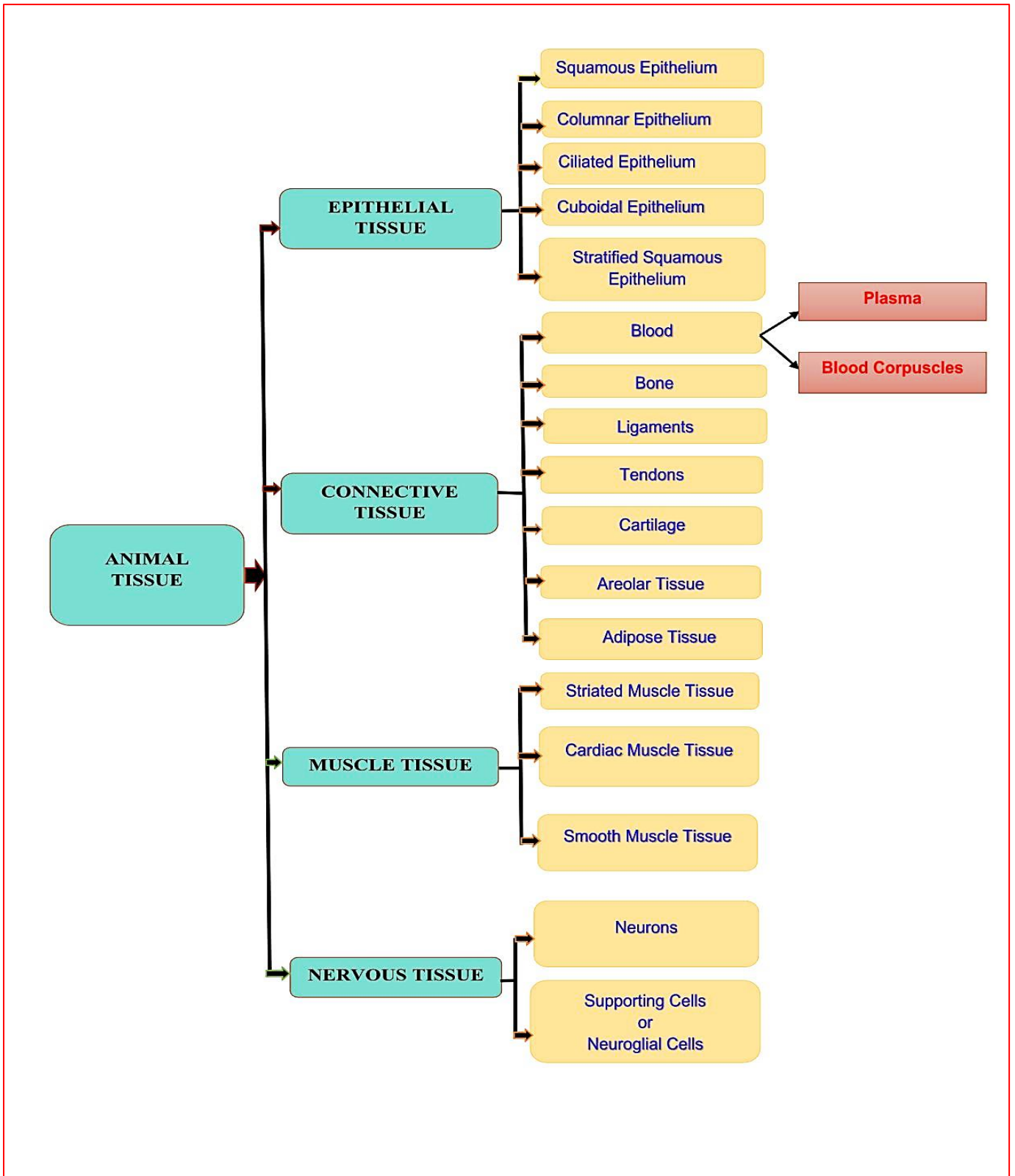


Fig. A schematic flowchart of Animal Tissue



EPITHELIAL TISSUE (TYPES)

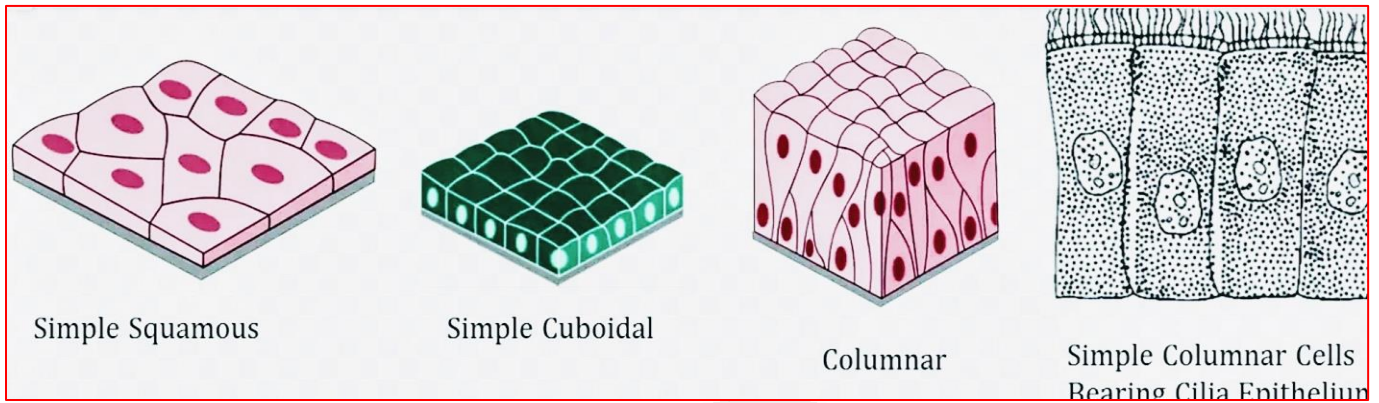


Fig. A schematic diagram showing types of Epithelial Tissues

SUMMARY OF VARIOUS CONNECTIVE TISSUES

BLOOD	BONE	CARTILAGE
<ul style="list-style-type: none"> ➤ Fluid tissue. ➤ Matrix is liquid. ➤ Transports digested food, gases, proteins, hormones & waste materials. 	<ul style="list-style-type: none"> ➤ Skeletal tissue. ➤ Matrix is hard. (calcium and phosphorus) ➤ Provides shape, supports to the body; and protects vital organs. 	<ul style="list-style-type: none"> ➤ Skeletal tissue. ➤ Matrix is solid. ➤ Provides support, flexibility and also makes bone surfaces smooth at joints

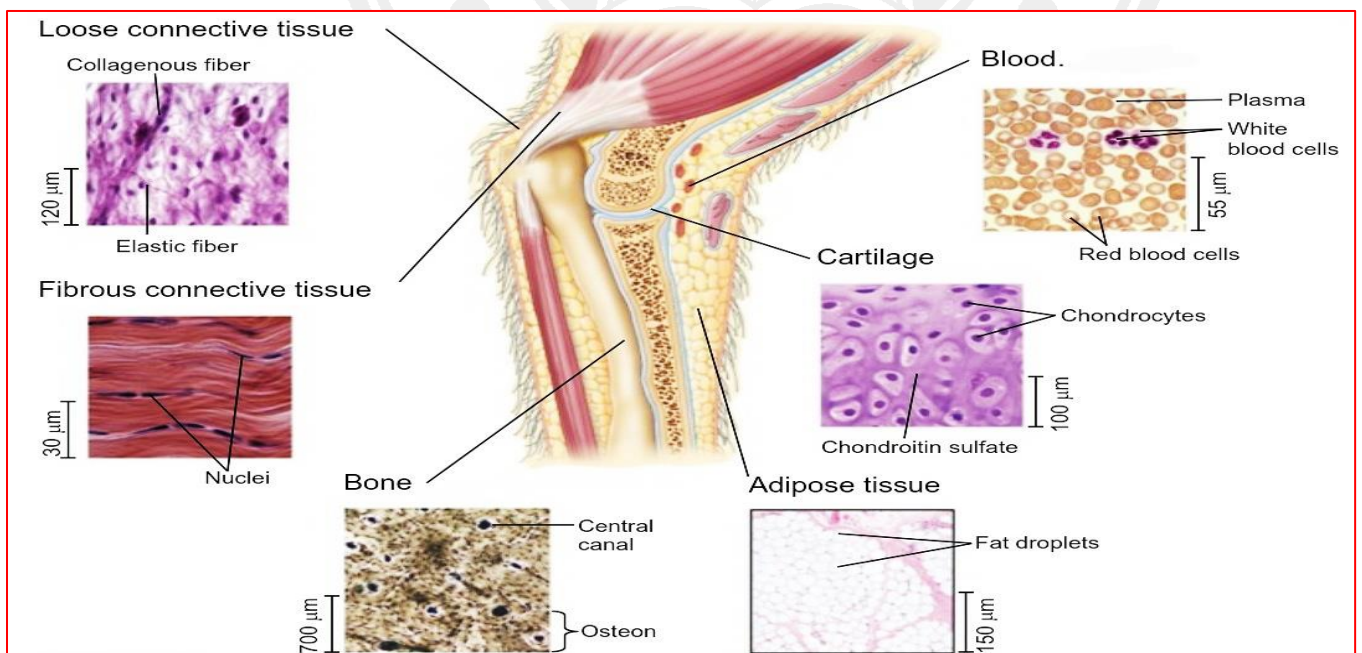


Fig. A schematic diagram showing various Connective Tissues



Comparison amongst Ligament, Tendon, Areolar Tissue and Adipose Tissue

LIGAMENT	TENDON	AREOLAR TISSUE	ADIPOSE TISSUE
<ul style="list-style-type: none"> ➤ Dense connective tissue. ➤ Matrix is little. ➤ Connects bone to bones. ➤ Highly elastic with considerable strength. 	<ul style="list-style-type: none"> ➤ Dense connective tissue. ➤ Matrix is hard. ➤ Connects muscle to bones. ➤ Inelastic with limited flexibility. 	<ul style="list-style-type: none"> ➤ Cells are irregularly shaped. ➤ Found between skin and muscles, around blood vessels and in bone marrow ➤ It supports internal organ and helps in repair of tissue after injury. 	<ul style="list-style-type: none"> ➤ Cells are modified to store fat. ➤ Found below the skin, around vital organs. ➤ It stores fat and also acts as insulator.

MUSCULAR TISSUE AND TYPES

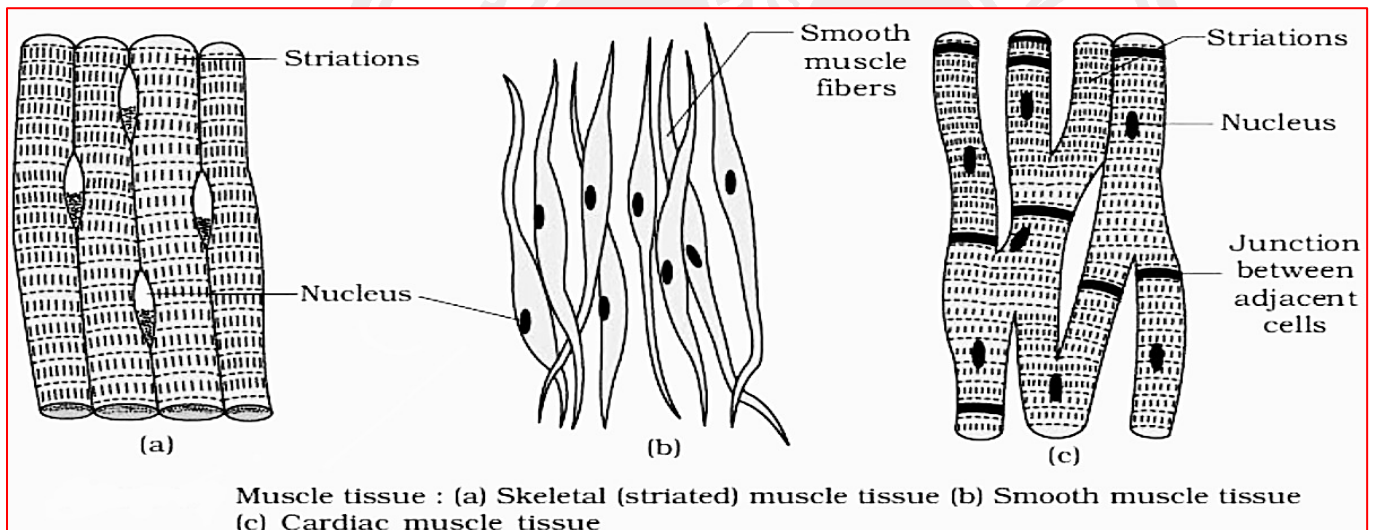


Fig. Diagrams showing Skeletal/Striated Muscle Tissue, Smooth Muscle Tissue and Cardiac Muscle Tissue

Comparison amongst Skeletal/Striated Muscle Tissue, Smooth Muscle Tissue and Cardiac Muscle Tissue

STRIATED MUSCLE	SMOOTH MUSCLE	CARDIAC MUSCLE
<ul style="list-style-type: none"> ➤ Cylindrical, unbranched, multinucleated. ➤ Voluntary, present attached to bones in limbs. ➤ Dark and light bands present 	<ul style="list-style-type: none"> ➤ Spindle, unbranched and have single nucleus. ➤ Involuntary, found in iris of eye, ureters and bronchi of lungs. ➤ Dark and light bands Absent 	<ul style="list-style-type: none"> ➤ Cylindrical, branched and have single nucleus. ➤ Involuntary, non-fatigued muscle fibres present in the walls of heart etc. ➤ Dark and light bands present but faint.

