

**BAL BHARATI PUBLIC SCHOOL, NOIDA**

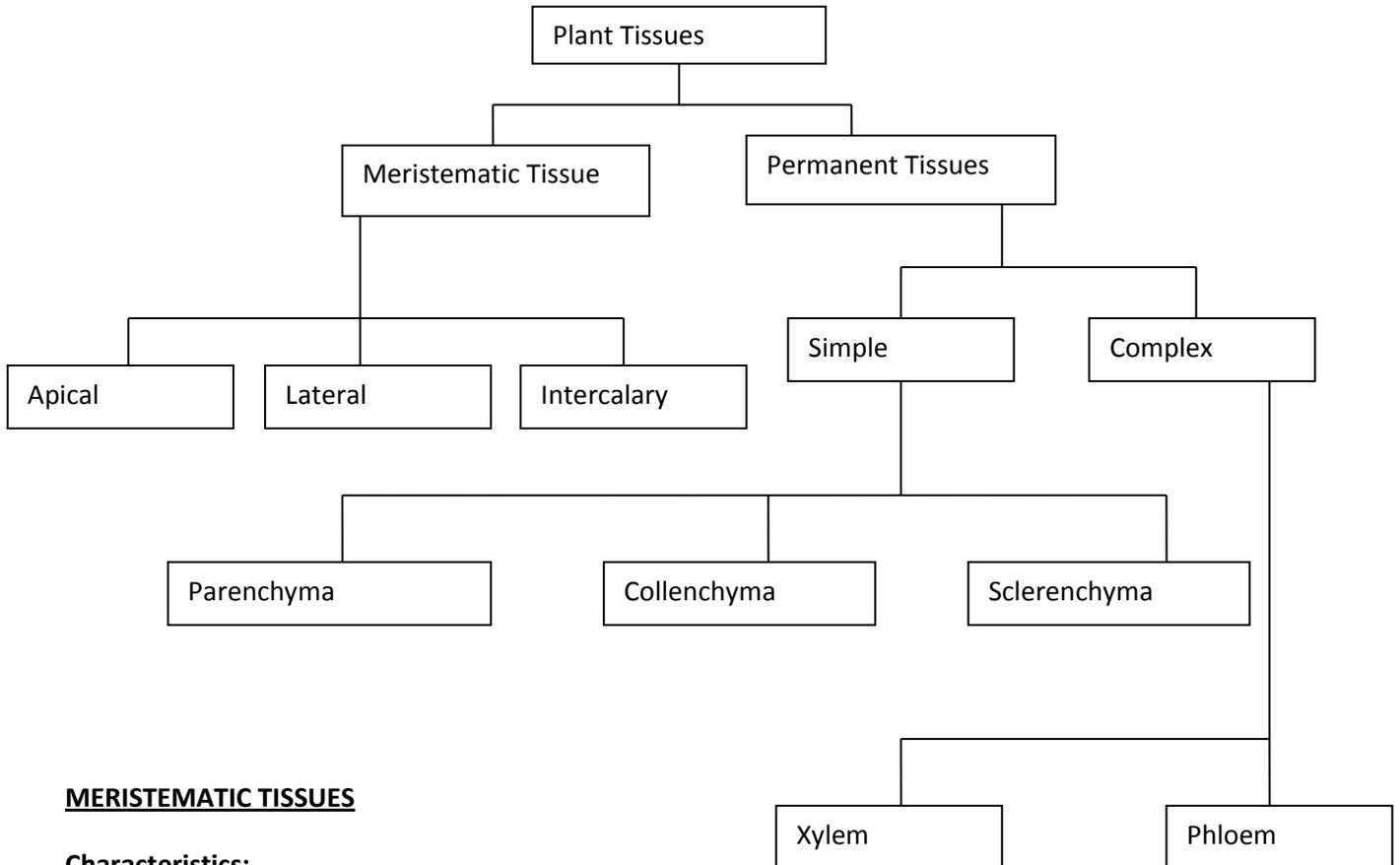
**CLASS-IX**

**BIOLOGY**

**TOPIC- TISSUES**

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**Defination-** A group of cells similar in structure and performing a particular function forms a tissue. Also this group od cells has a common origin.



**MERISTEMATIC TISSUES**

**Characteristics:**

- Ever dividing
- Non Differentiated
- Cells are living
- Cells are thin walled, with less vacuole, more cytoplasm and prominent nucleus.
- Cells in this tissue divide to increase the length and girth of the plant.

**Depending on the location, the types of meristem:**

<b>Apical</b>	<b>Lateral</b>	<b>Intercalary</b>
Present at the root tip, shoot tip and axillary buds	Present almost parallel to the long axis of stem	Present at the base of leaves and internodes.
Brings about an increase in the length of the plant	Bring about an increase in the girth (Thickness) of the plant	Brings about an increase in the length of the plant.

**PERMANENT TISSUES**

**Characteristics:**

- Do not divide
- Differentiated to carry out specific functions
- Cells may be living or dead

### SIMPLE PERMANENT TISSUES

Characteristics	Parenchyma	Collenchyma	Sclerenchyma
<b>Structure</b>	<ol style="list-style-type: none"><li>1. Unspecialized living cells</li><li>2. Thin walled</li><li>3. Large intercellular spaces</li></ol>	<ol style="list-style-type: none"><li>1. Cells are living</li><li>2. Cells are elongated</li><li>3. Cells have irregular thickening at their corners</li></ol>	<ol style="list-style-type: none"><li>1. Cells are dead</li><li>2. Long and narrow cells</li><li>3. Walls thickened due to lignin</li></ol>
<b>Location</b>	Present throughout the plant	Present in leaf stalks below epidermis	Present in the stems around the vascular bundles, veins of leaves and hard covering of the seeds and nuts.
<b>Functions</b>	<ol style="list-style-type: none"><li>1. Support</li><li>2. Packing tissue</li><li>3. May contain Chlorophyll (Chlorenchyma) or air space (aerenchyma)</li></ol>	<ol style="list-style-type: none"><li>1. Helps in easy bending without breaking</li><li>2. Makes plant hard and flexible</li><li>3. Mechanical support</li></ol>	<ol style="list-style-type: none"><li>1. Provides support</li><li>2. Makes plant hard and stiff</li></ol>

### PROTECTIVE TISSUE

- The outermost layer of the plant body such as stems, roots and leaves are modified into protective tissues.
- The protective tissues protect the plant from undue loss of water and minor external injuries.
- Those cells are specialized in number of ways to act as protective tissues.
- The two types of protective tissues are:
  - Epidermis
  - Cork

### EPIDERMIS

- Outermost layer of all soft parts of the plant.
- One cell thick and is covered with cuticle.
- Cells are elongated, flattened and irregular in shape, without intercellular spaces.
- They have minute openings called stomata in the leaves and green shoots.
- They are parenchymatous in nature

#### Functions of Epidermis

1. Epidermis acts as a protective tissue, covering the plant body.
2. It protects the plant from excessive heat or cold and from the attack of parasitic fungi and bacteria.
3. It allows exchange of gases and transpiration through stomata.
4. The cuticle of epidermis checks the excessive evaporation of water.

### CORK

- Outermost protective tissue of older stems and roots.
- Formed by secondary lateral meristem called cork cambium.
- Cells are rectangular in shape, which are composed of dead cells.
- Cells are arranged compactly without intercellular spaces.
- Cork cells have thick walls, which are impermeable

### Functions of Cork

1. Prevents loss of water by evaporation.
2. Protects plants from entry of harmful micro-organisms.
3. Protection against mechanical injury.
4. Commercially used in manufacture of stoppers for bottles, insulation boards, etc.

### COMPLEX PERMANENT TISSUE

#### TWO TYPES:

1. Xylem
2. Phloem

Both are conducting tissues and together constitute a Vascular Bundle.

#### XYLEM

- All cells have thick cell walls. Cells may be living or dead.
- Four Components –
  1. Tracheids (Both tracheids and vessels are tubular cells which transports water and minerals vertically.)
  2. Vessels
  3. Xylem Parenchyma – Stores food and helps in sideways conduction of water.
  4. Xylem Fibers – Supportive in function.

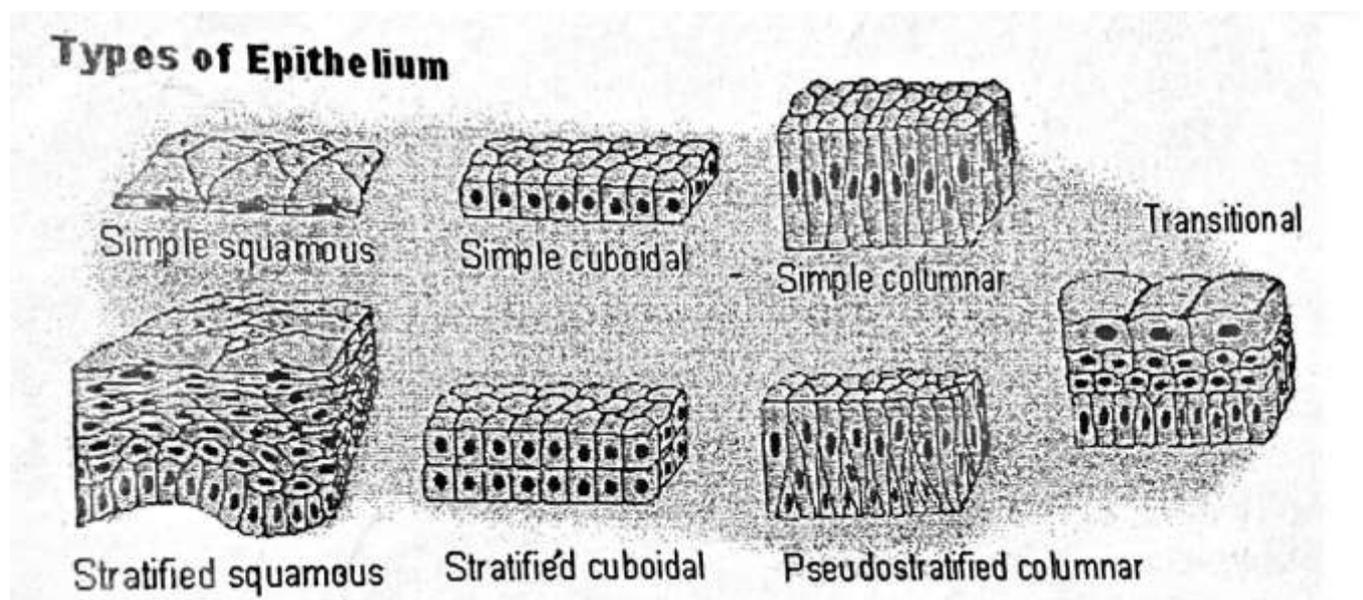
#### PHLOEM

- Four Components-
  1. Sieve tubes (Sieve tubes and companion cells are tubular cells with perforated walls . Helps in movement of food in both directions.)
  2. Companion Cells.
  3. Phloem Parenchyma – Store food.
  4. Phloem Fibers – Supportive in function.

## TOPIC-ANIMAL TISSUES

### TYPES OF ANIMAL TISSUES:

1. Epithelial Tissues- Protection, secretion and absorption.
2. Muscular Tissues- Movement and locomotion
3. Connective Tissue- Binding, Support, Protection, Transport, and Circulation
4. Nervous Tissues- Conduction of Nerve Impulse, Control and Co-ordination of Body.



## EPITHELIAL TISSUE

S.NO	TYPE	STRUCTURE	LOCATION	FUNCTIONS
1	Squamous Epithelium	Thin flattened cells with a centrally placed nucleus.	<ul style="list-style-type: none"><li>• From lining of mouth, oesophagus and lungs</li><li>• Inner lining of blood vessels</li><li>• Cover the skin surface (stratified epithelium)</li></ul>	<ul style="list-style-type: none"><li>• Diffusion of materials or exchange of gases.</li><li>• Protection from chemical and mechanical injury.</li><li>• Entry of germs or from drying.</li></ul>
2	Cuboidal Epithelium	Cube like cells with a central spherical nucleus	Lining of kidney tubules, lining of salivary, pancreatic and seat ducts	Secretion, excretion and absorption
3	Columnar Epithelium	Tall, pillar or column like cells with nucleus at the base	Lining of stomach, intestine and gall bladder	Secretion and absorption
4	Ciliated Epithelium	Certain cuboidal and columnar epitheliums have Cilia at their free ends. Cilia are thin, hair like projections that move to and fro.	Oviducts, trachea, bronchioles and in parts of nephron in kidney.	Movement of cilia directs the flow of fluids in a one particular direction.
5	Glandular Epithelium	Cuboidal and Columnar epithelium are modified are into glands	Salivary, gastric, intestinal and sweat glands	Secretes enzymes, mucous or hormones

## CONNECTIVE TISSUE

A composite tissue, it has following three basic components-

1. Cells – Living part, loosely spaced, embedded in the matrix.
2. Fibers – Non-living part, several types, scattered in between the cells.
3. Matrix – Basic ground tissue may be jelly like, fluid dense or rigid. **Matrix decides the nature and function of the connective tissue.**

Functions

1. Binding and packaging tissues
2. Other function includes storing fat, transporting substances depending on the location of the tissue.

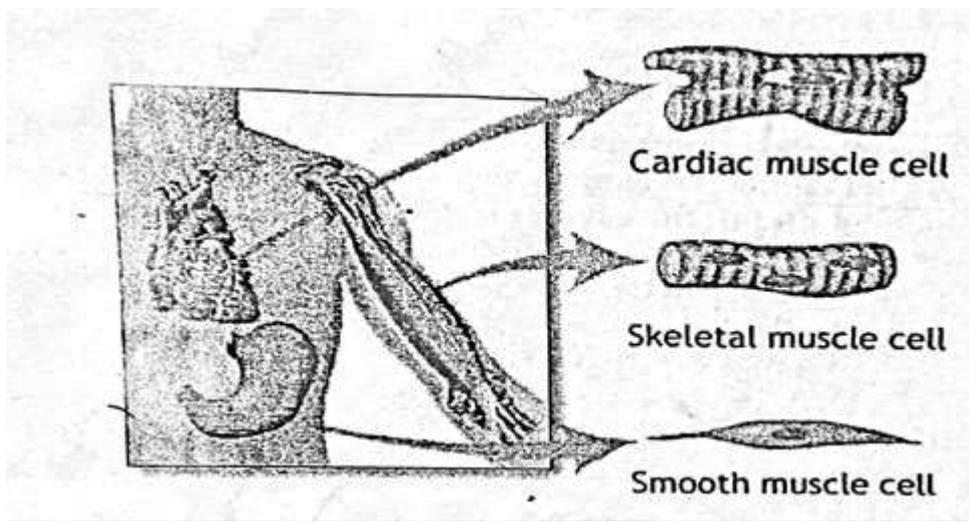
S No.	Type of Matrix	Type of Tissue	Functions
1.	Fluid	Blood	<ul style="list-style-type: none"> <li>Helps in transport of various substances.</li> <li>Red blood cells carry oxygen since they contain hemoglobin.</li> <li>While blood cells provide immunity to the body.</li> <li>Platelets help in blood clotting.</li> </ul>
2.	Solid (Rich in Calcium & Phosphorus)	Bone	<ul style="list-style-type: none"> <li>It is an important component of the skeletal framework</li> <li>Provides strength &amp; support to the body.</li> </ul>
3.	Solid (Rich in Proteins & Sugars)	Cartilage	<ul style="list-style-type: none"> <li>It is an important structural component of the body along with the bones.</li> <li>Found in external or pinna and tip of the nose.</li> </ul>
4.	Solid	Tendon	Tendon connects a bone to a muscle
5.	Solid	Ligament	Connects bone to another bone at the joints
6.	Semi-Solid	Areolar Tissue	<ul style="list-style-type: none"> <li>It fills the cavities inside the organs</li> <li>Provide support to the organs</li> <li>Helps in repair of tissues</li> </ul>
7.	Semi-Solid (Rich in adipocytes)	Adipose Tissue	<ul style="list-style-type: none"> <li>Acts as an insulator</li> <li>Acts as a shock absorber</li> </ul>

Differences between Tendons and Ligament –

S No	Tendon	Ligaments
1	Tendons are very tough and non-elastic	Ligaments are very elastic
2	Connects skeletal muscles to the bones	Connects a bone to another bone at the joint
3	Made up of more amount of fibrous tissue	Made up of elastic fibers
4	Show great strength but limited flexibility	Are very flexible

### MUSCULAR TISSUE

SNo.	Straited Muscles	Non-Straited Muscles	Cardiac Muscle
1	Also called as skeletal or Voluntary muscles	Also called as smooth or involuntary muscles.	Also called as Heart Muscle
2	Attached to the bones of the body	Present within the walls of the body organ like stomach, intestine, bronchi etc. Also found in blood vessels, iris of eye	Present in the wall of the heart
3	Elongated, cylindrical and unbranched	Spindle shaped and tapering at the ends	Elongated, Cylindrical and branched.
4	Light and dark bands present	No striations	Faint regular striations
5	Multy-Nucleated	Uni-nucleated	One or two nuclei
6	Voluntry	Involuntry	Involuntry
7	Undergo rapid contraction, Get tired easily	Undergo slow and rhythmic contraction. Do not get tired	Undergo continous and rhythmic, contractions and relaxations without getting fatigued



### **NERVOUS TISSUE (Refer to figure6.12 NCERT)**

It is made up of millions of nerve cells called Neurons. They are highly specialized cells. Brain, Spinal cord and nerves are all composed of neurons.

#### **Structure :-**

A neuron consists of the following parts-

1. Cell body or cyton- Has nucleus and cytoplasm. Cytoplasm has nissl's granules.
2. Dendrites-
  - Fine branched fibre also called nerve fibre.
  - Numerous in number
  - Carry impulses towards the cell body
3. Axon-
  - Single elongated fibre also called nerve fibre
  - Generally unbranched.
  - Ends in many end fibres.
  - Conducts nerve impulses away from cell body.

#### **Function of Nervous Tissue:-**

1. Specialized to receive and transmit messages in the body
2. Dendrites receive the impulse and axon takes the impulse away from the cell body.

<u>SNo.</u>	<u>Dendrites</u>	<u>Axon</u>
<u>1</u>	<u>Short, numerous branched</u>	<u>Long, generally unbranched- may be 1 or 2</u>
<u>2</u>	<u>Carry impulses towards the cell body of the neuron</u>	<u>Carry impulses away from the body of the neuron</u>