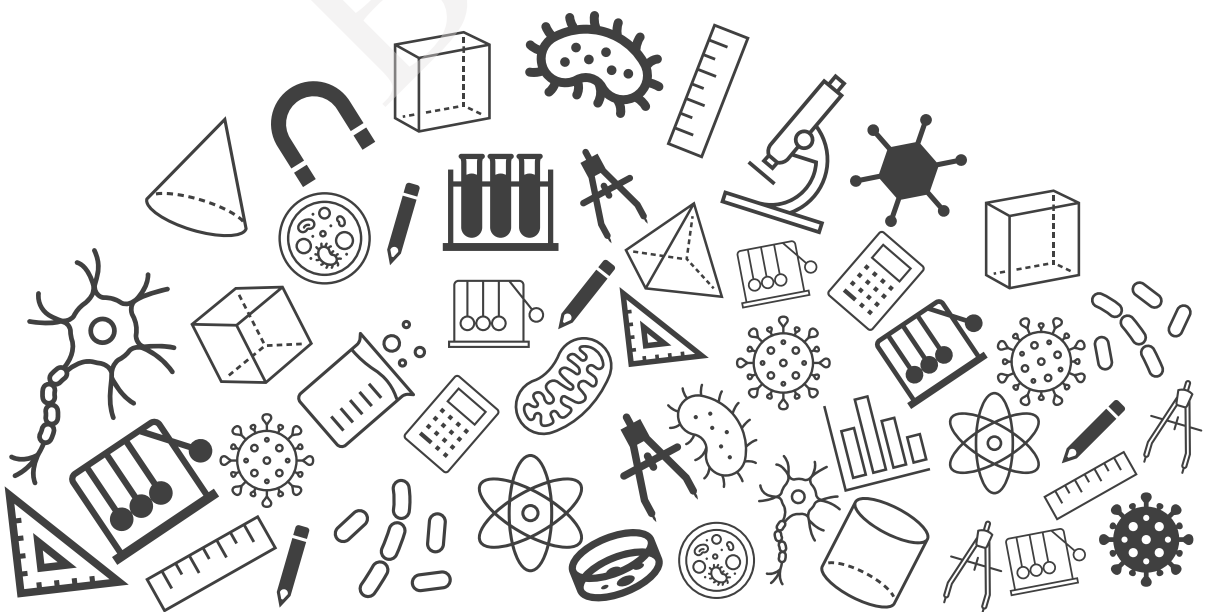




# Grade 09

## Science Chapter Notes





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# BYJU'S Classes

Chapter Notes

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## Tissues

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Grade 9

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# Topics to be Covered

B

1

## -Tissue

- 1.1 Definition
- 1.2 Levels of Organisation
- 1.3 Plant vs Animal Tissues

2

## - Plant Tissue

- 2.1 Classification of Plant tissues
- 2.2 Meristematic vs Permanent Tissues

3

## - Meristematic Tissue

- 3.1 Characteristics
- 3.2 Types of Meristematic Tissue

4

## - Permanent Tissue

- 4.1 Characteristics
- 4.2 Simple Permanent Tissue
- 4.3 Complex Permanent Tissue

5

## - Animal Tissue

- 5.1 Classification of Animal Tissue

## Topics to be Covered

B

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### Epithelial Tissue

- 6.1 Simple Squamous
- 6.2 Stratified Squamous
- 6.3 Columnar
- 6.4 Ciliated Columnar
- 6.5 Cuboidal
- 6.6 Glandular

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### Connective Tissue

- 7.1 Blood
- 7.2 Bone
- 7.3 Ligament
- 7.4 Tendon
- 7.5 Cartilage
- 7.6 Areolar
- 7.7 Adipose

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### Muscular Tissue

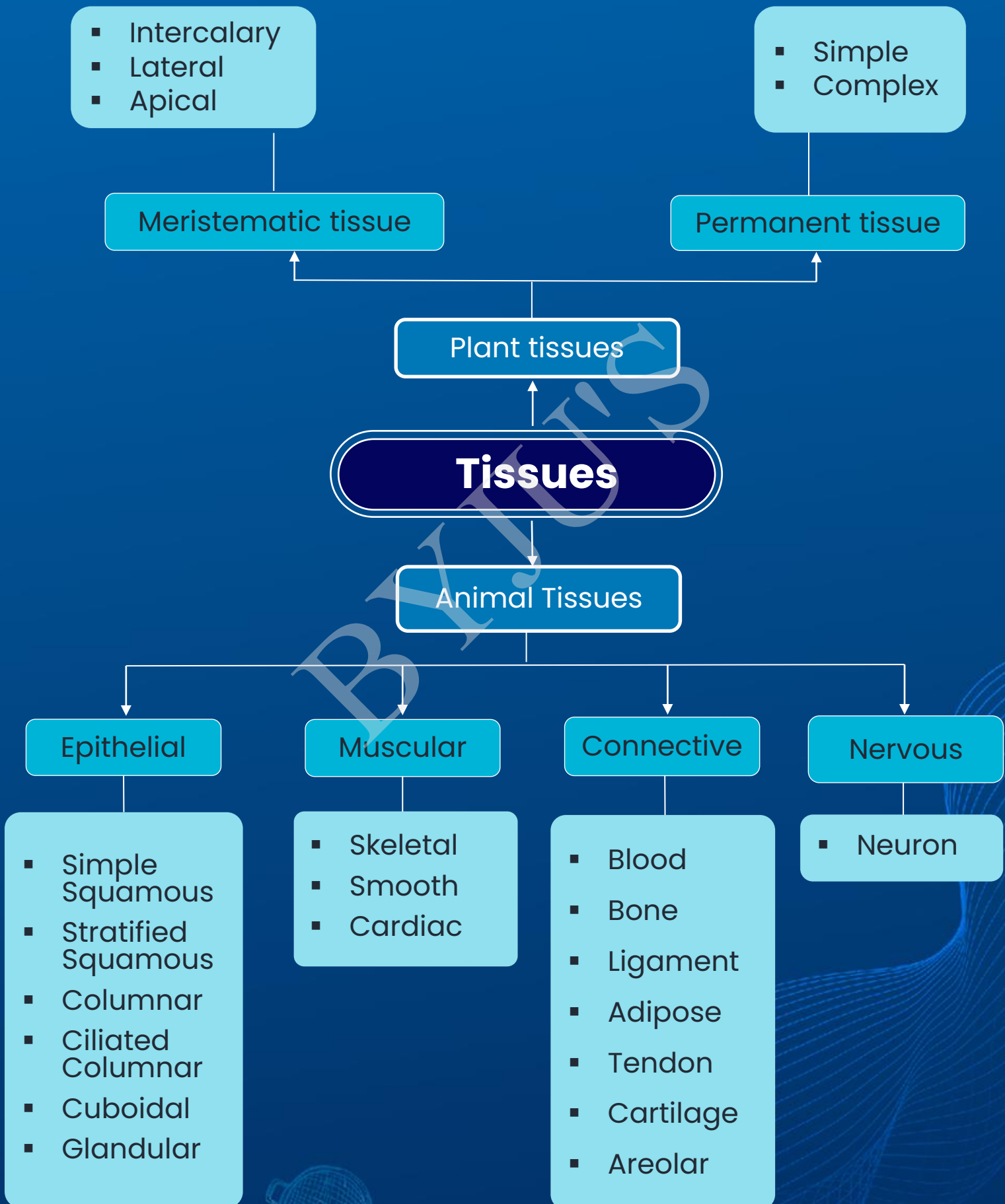
9

### Nervous Tissue

- 9.1 Neuron
- 9.2 Nerve fibre

# Mind Map

B



# 1. Tissues

B

## 1.1 Definition

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

## 1.2 Levels of Organisation



A cell is the basic unit of life



A tissue is a group of cells



A group of tissues come together to form an organ



Organs combine to form organ system



Different organ systems coordinate to perform various life processes and forms an organism

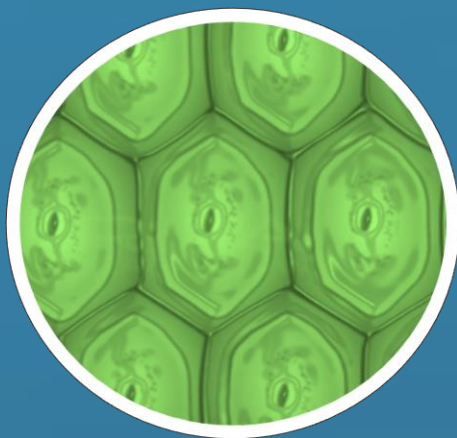
## 1.3 Plant vs Animal Tissues

### Plant Tissue

**Dead supportive tissues** are more abundant as compared to living tissues.

Growth tissues are not uniformly located, and some cells **divide continuously**.

Plants are **stationary** hence no muscular tissue are present.



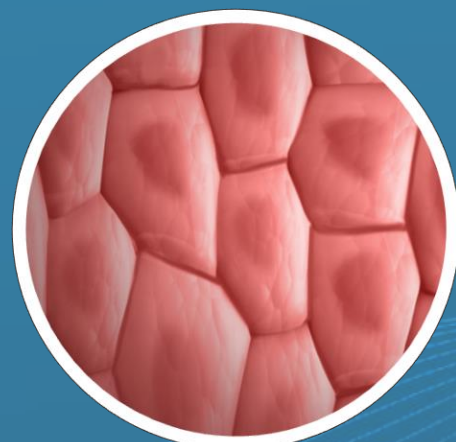
**Meristematic Tissue**

### Animal Tissue

**Living supportive tissues** are more abundant as compared to dead tissues.

Growth tissues are uniform and allow **limited growth** only.

Tissue organization is different as animals are **mobile** and need muscular tissue.

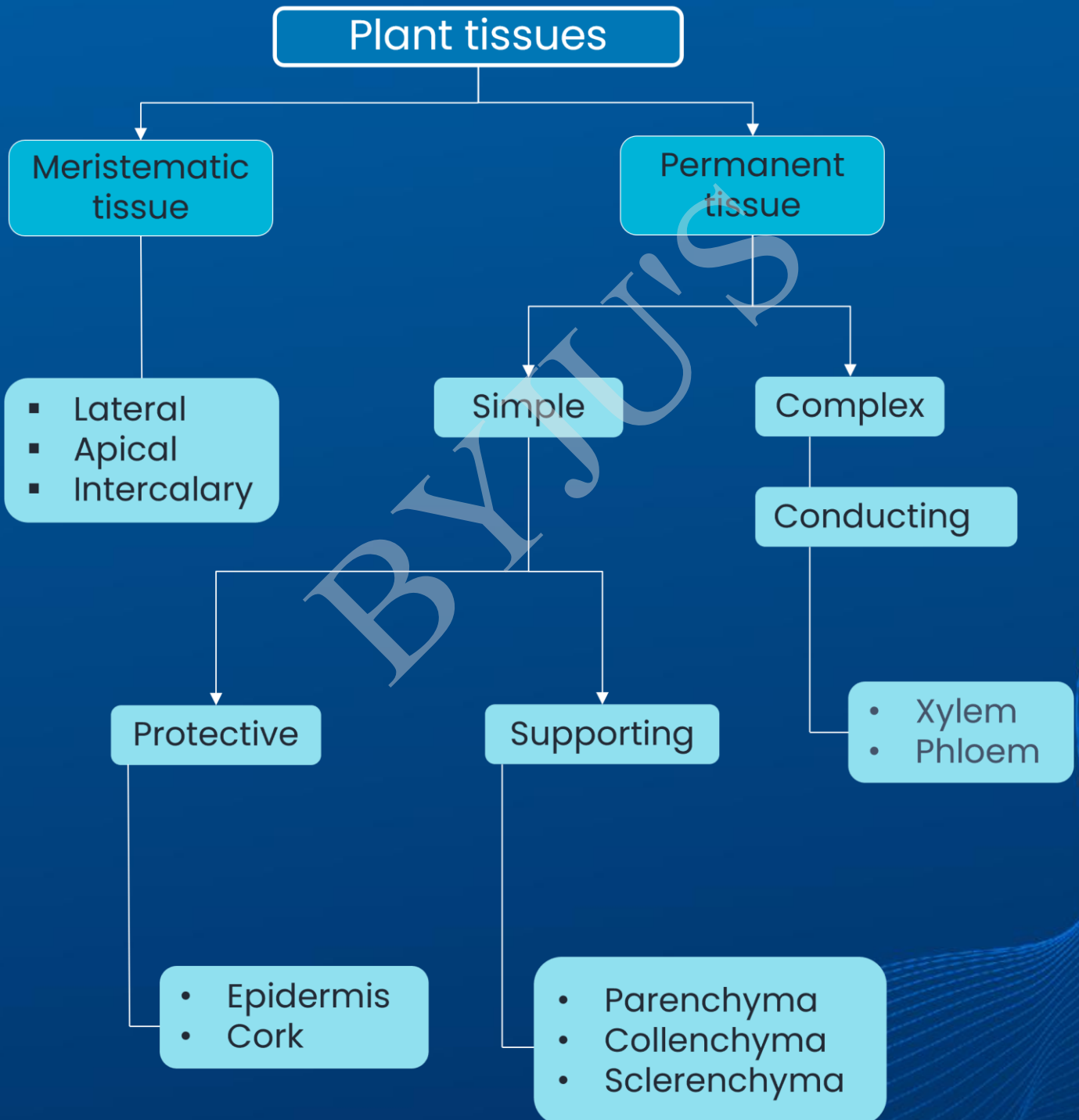


**Epithelial Tissue**

## 2. Plant Tissue

B

### 2.1. Classification of Plant Tissue





## 2.2 Meristematic Tissue vs Permanent Tissue

### Meristematic Tissue

Localised and undifferentiated

Cells grow and divide regularly

Promotes growth of the plant

### Permanent Tissue

Present throughout the plant and differentiated

Cells do not divide

Performs various functions like protection, support, and conduction

## 3. Meristematic Tissue

### 3.1 Characteristics

- Actively dividing cells
- Have dense cytoplasm and thin cellulose walls
- Have prominent nucleus and lack vacuole
- Few cells take up a specific role and lose the ability to divide to form permanent tissue

## Differentiation

Process of taking up a permanent shape, size, and function

### 3.2 Types of Meristematic Tissues

#### Apical

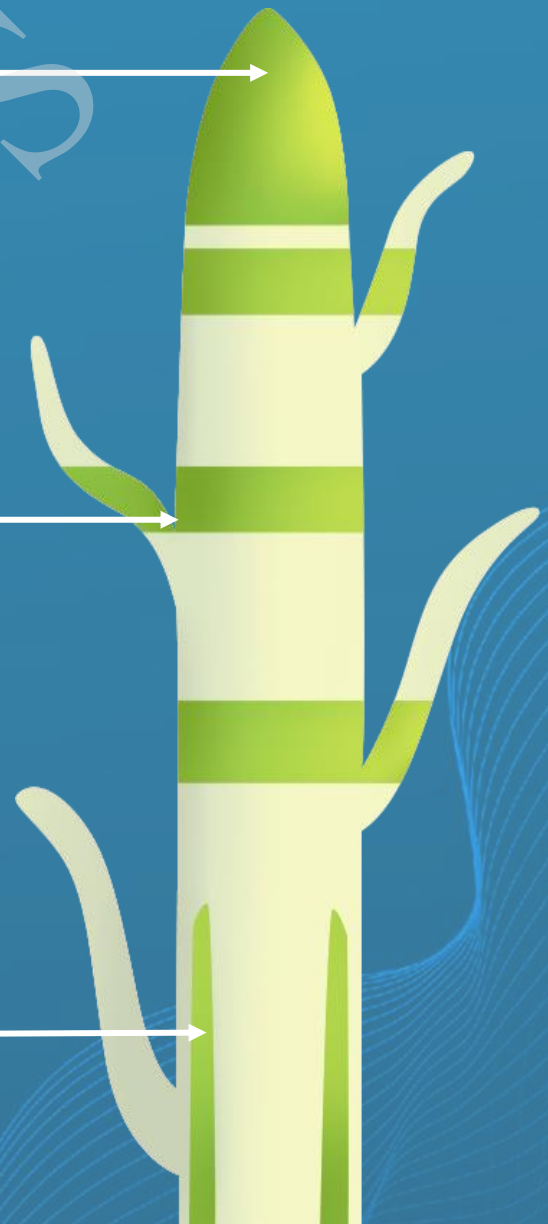
- Present at shoot and root tips
- Increases length

#### Intercalary

- Present at base of leaves or internodes
- Elongates internodes

#### Lateral

- Present at lateral side
- Increases girth of the stem



Location of meristematic tissue in plant body

## 4. Permanent Tissue

B

### 4.1 Characteristics

Permanent tissues are formed from meristematic tissue cells that have lost their ability to divide.

### 4.2 Simple Permanent Tissue

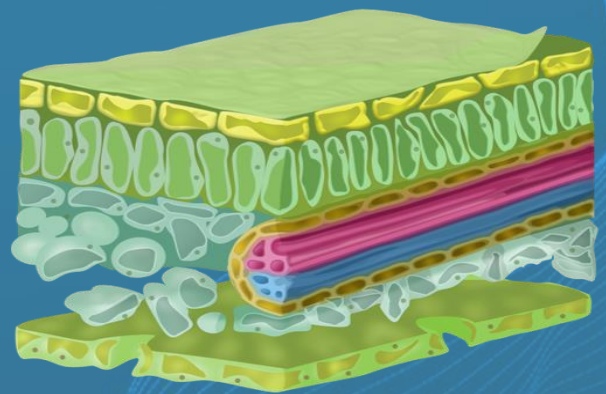
- This tissue is made of one type of cell.
- It is divided into protective and supportive tissues.

### 4.2 (A) Protective Tissue

- It consists of cells with thick walls.
- Epidermis is the protective tissue that undergoes changes in older plants to form cork.

### Types of Protective Tissue - Epidermis

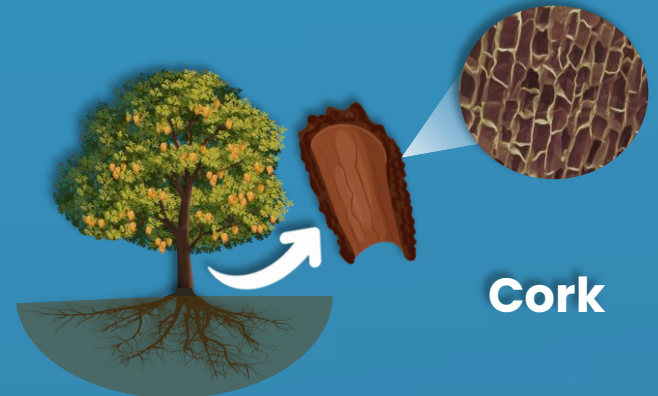
- Outer continuous layer without intercellular spaces
- Forms the cuticle layer
- Contains stomata for exchange of gases
- Function - Aids in gaseous exchange, protects the plant from water loss, mechanical injury, and parasitic invasion



**Epidermis**

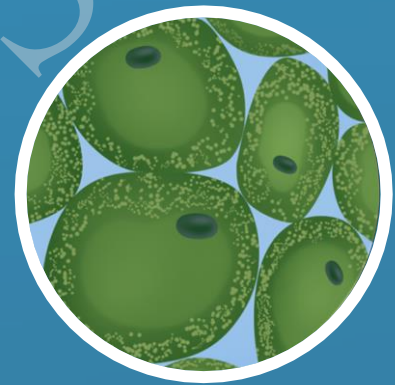
## Types of Protective Tissue – Cork

- Secondary meristem replaces the epidermis to form cork/bark as plants grow older.
- Cork contains dead cells and has suberin in their walls that makes them impervious to gases and water.



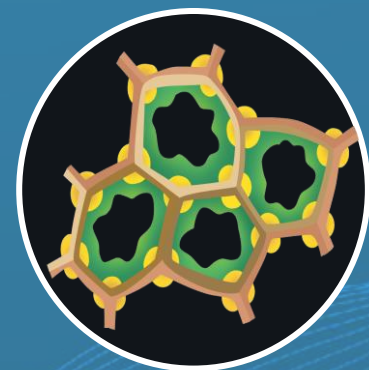
## 4.2 (B) Types of Supportive Tissue

- Unspecialised cells with thin cell walls and large intercellular spaces
- Present in soft parts of the plant and in the outer cortical region of roots and stems of plants
- Generally, stores food



**Parenchyma**

- Living, elongated cells with irregular thickened corners with very few intercellular spaces.
- Usually found in stalks of leaves or flowers
- Provides mechanical support and flexibility to the plants



**Collenchyma**

- Dead, elongated cells with evenly thickened, lignified walls and no intercellular spaces
- Present in hard parts of the plant (Ex. covering of seeds and nuts)
- Provides strength and toughness to plant parts



**Sclerenchyma**

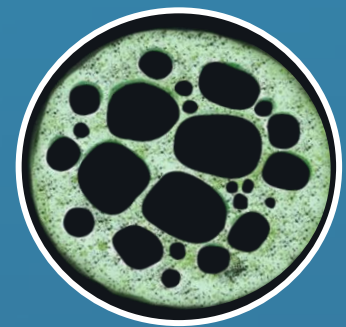
## 4.2 (C) Specialised Parenchyma Cells

- Parenchyma cells containing chloroplast
- Takes part in photosynthesis



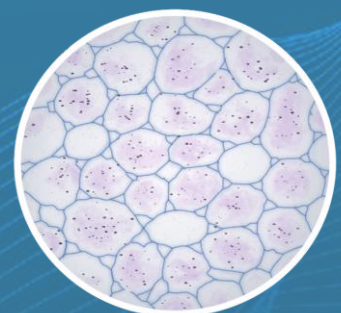
**Chlorenchyma**

- Parenchyma cells with air spaces between them
- Present in aquatic plants
- Provide buoyancy



**Aerenchyma**

- Parenchyma cells that help in the storage of food and water
- Act as food and water reservoir



**Storage parenchyma**

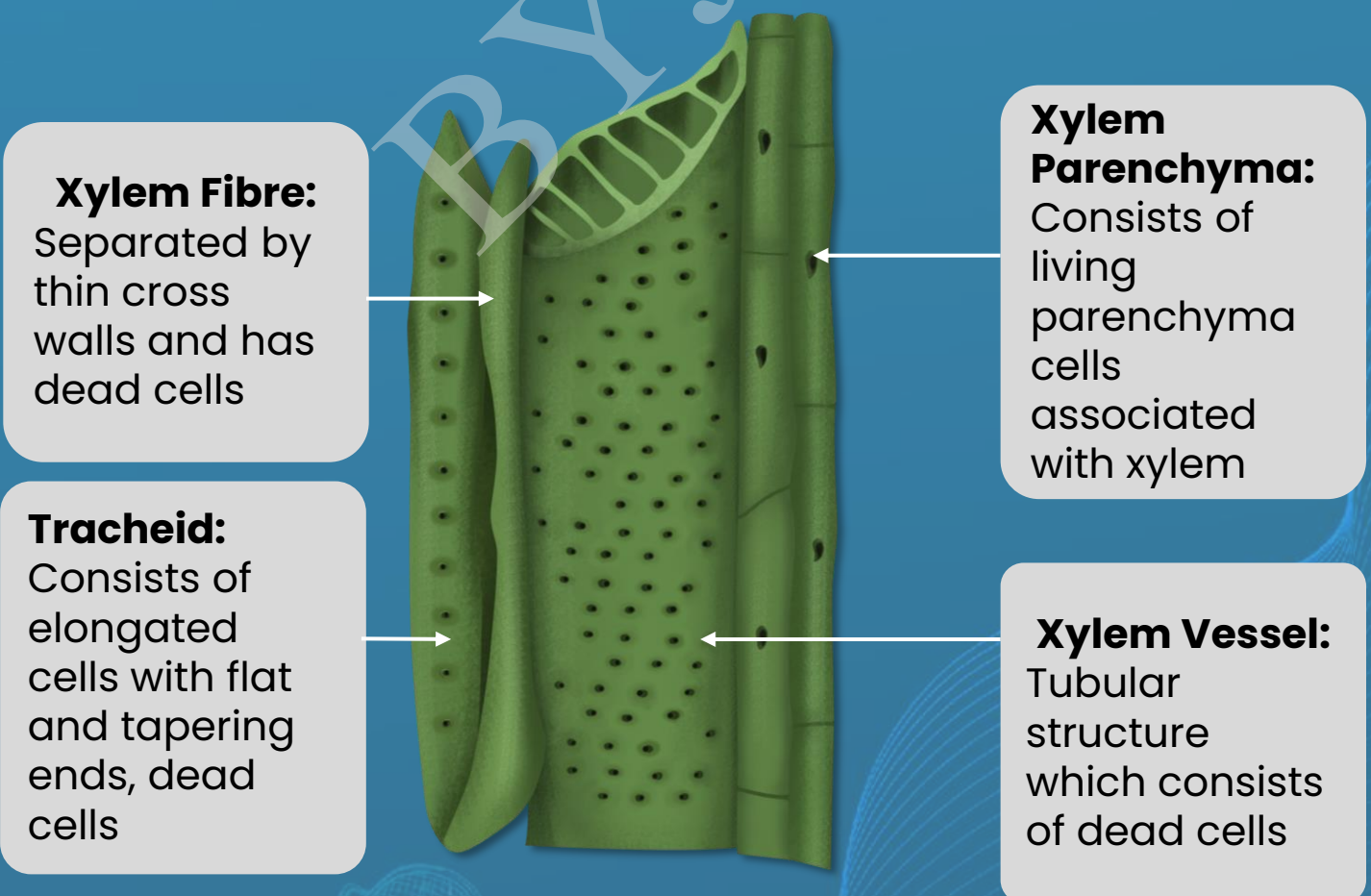
## 4.3 Complex Permanent Tissue

- Also called conducting or vascular tissue, made up of more than one type of cells
- Present in stems, roots, and leaves
- Two types – Xylem and Phloem

### Types of Conducting Tissue – Xylem

- Complex permanent tissue with thick-walled cells
- Present in the stem, roots and leaves
- Provides upward movement of water and dissolved minerals from roots to different parts of plants

### Components of Xylem



#### **Xylem Fibre:**

Separated by thin cross walls and has dead cells

#### **Tracheid:**

Consists of elongated cells with flat and tapering ends, dead cells

#### **Xylem**

#### **Parenchyma:**

Consists of living parenchyma cells associated with xylem

#### **Xylem Vessel:**

Tubular structure which consists of dead cells

## Types of Conducting Tissue – Phloem

- Complex permanent tissue which is composed mostly of living cells
- Provides passage for food from leaf to different parts

### Components of Phloem

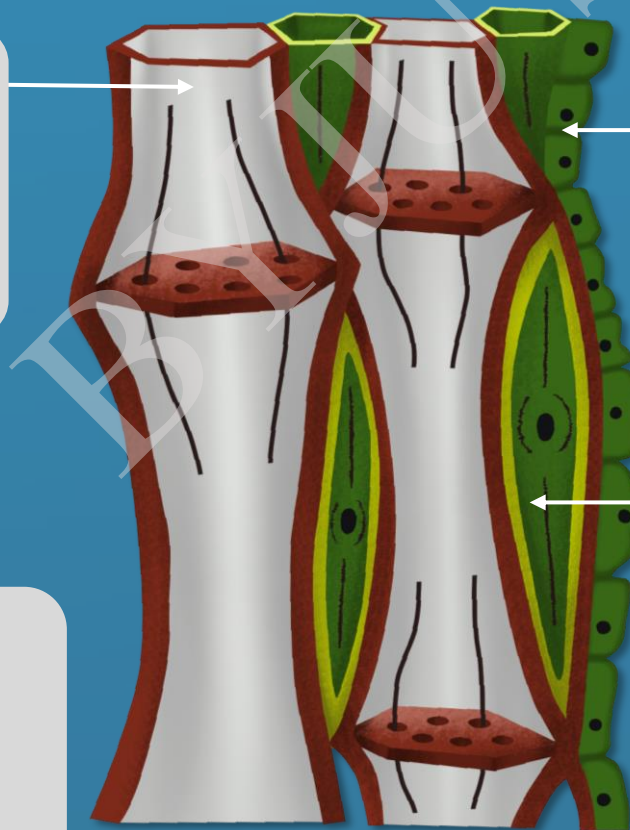
**Sieve tube:**  
Tubular cells arranged end to end

**Phloem parenchyma:**  
Consists of living parenchyma cells associated with phloem

**Companion cell:**  
Living cell closely linked with sieve elements

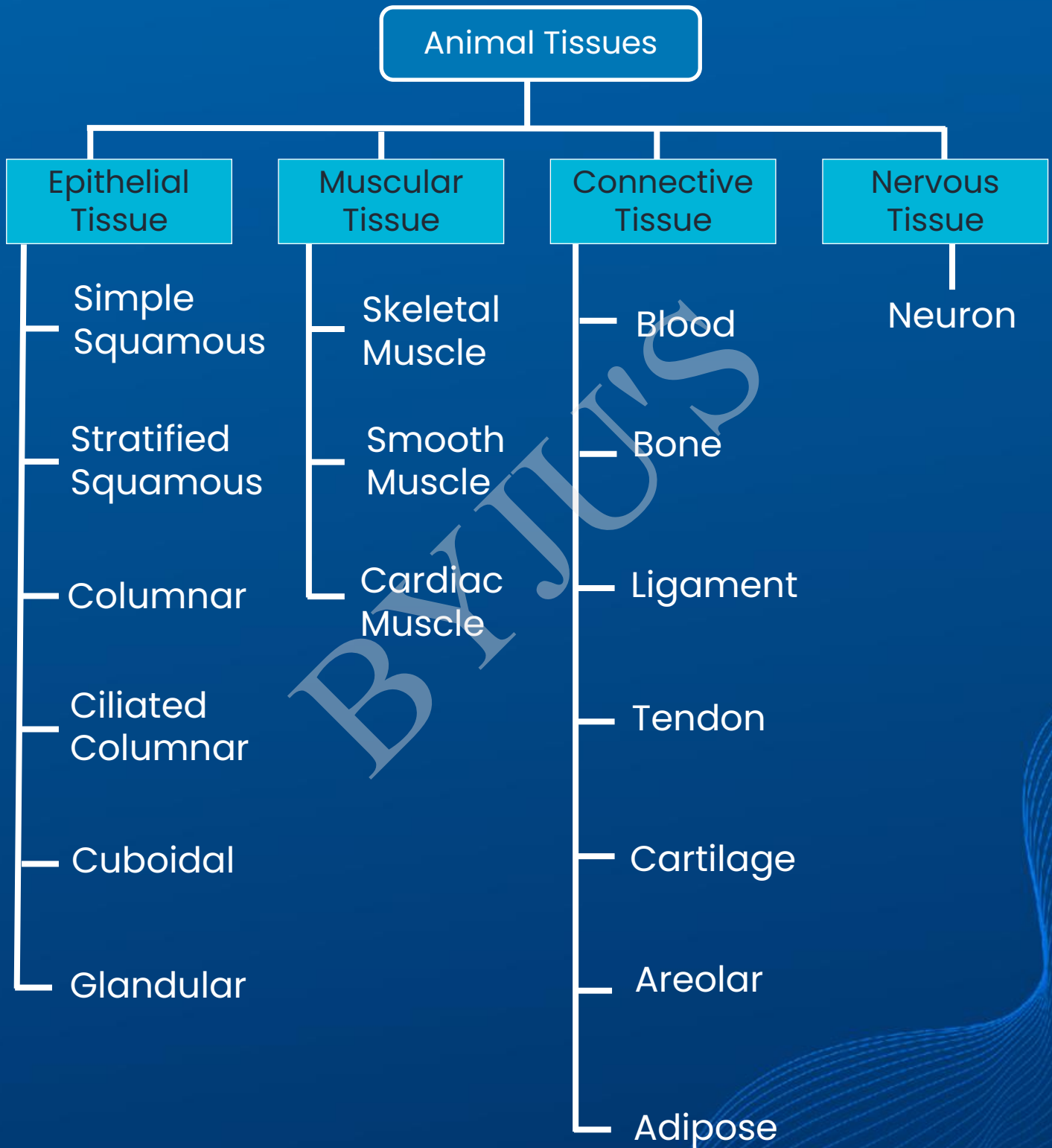
**Phloem fibre:**  
Elongated, tapering and dead cells with thickened cell walls

**Sieve cell:**  
Type of sieve element that performs conduction of food



# 5. Animal Tissue

## 5.1 Classification of Animal Tissue



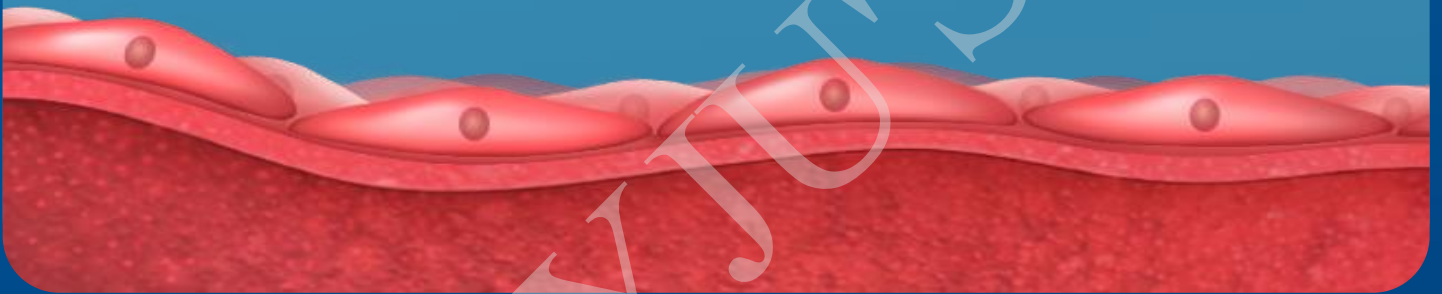


## 6. Epithelial Tissue

- Epithelium covers the outer body, most organs, and cavities within the body.
- Cells of epithelial tissue lie on a thin membrane called the basement membrane.

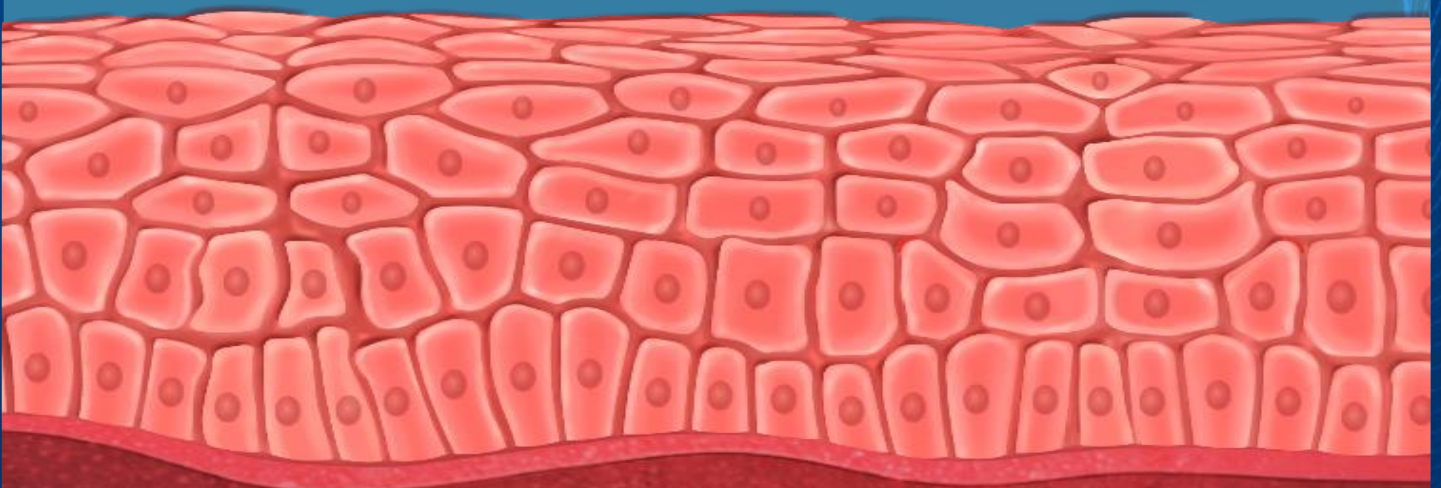
### 6.1 Simple Squamous

- Flat cells
- Forms the lining of alveoli, and blood vessels
- Facilitates the transportation of various substances across membranes



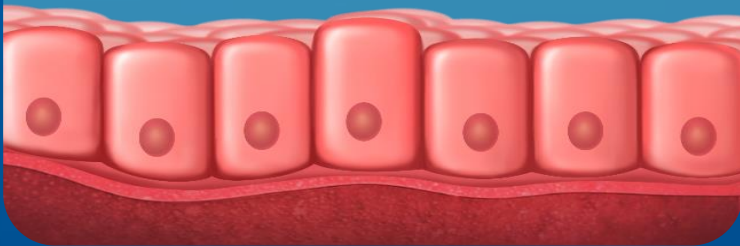
### 6.2 Stratified Squamous

- Flat cells, arranged in a pattern of layers
- Present in the skin
- Protects from wear and tear



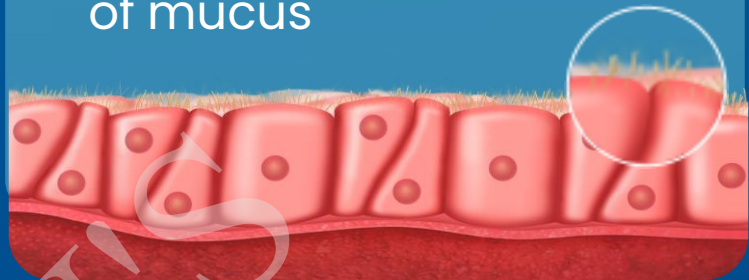
### 6.3 Columnar

- Pillar-like cells
- Present in the lining of the small intestine
- Helps in absorption and secretion



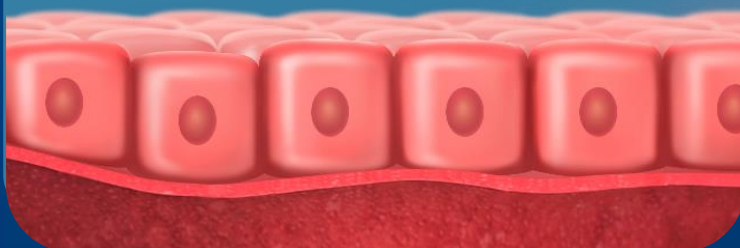
### 6.4 Ciliated Columnar

- Columnar cells have hair-like projections called cilia
- Present in the respiratory tract
- Facilitates the movement of mucus



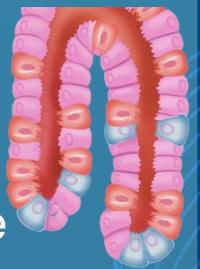
### 6.5 Cuboidal

- Cube-shaped cells
- Forms the lining of kidney tubules and ducts of glands
- Provides mechanical support



### 6.6 Glandular

- Epithelial cells acquire additional specialisation as gland cells
- Gland cells secrete substances at the epithelial surface
- Epithelial tissue folds inward to form a multicellular gland



## 7. Connective Tissue

B

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

### 7.1 Blood

- Has a fluid matrix called plasma, in which RBCs, WBCs, and platelets are suspended
- Transport gases, digested food, hormones, and waste materials to different parts of the body



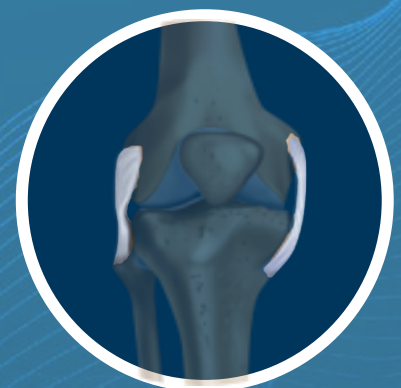
### 7.2 Bone

- Has a hard matrix composed of calcium and phosphorus compounds
- Strong and non-flexible
- Forms the framework that supports the body, anchors the muscles and supports the main organs of the body



### 7.3 Ligament

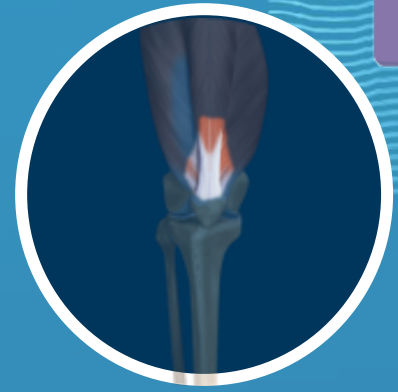
- Contains very little matrix
- Connects bones with bones
- Highly elastic and has considerable strength



## 7.4 Tendon

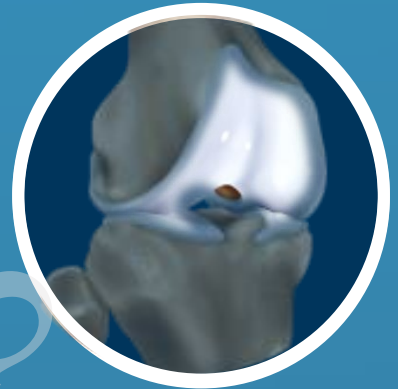
B

- Connects muscles to bones
- Fibrous and less flexible but has great strength



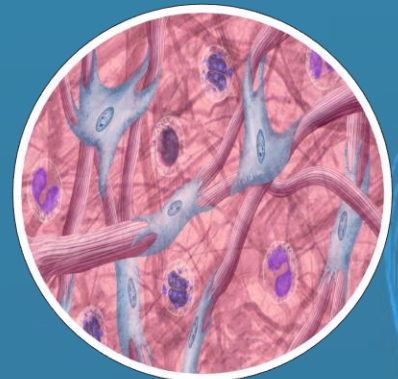
## 7.5 Cartilage

- Has a solid matrix composed of proteins and sugars
- Found in ear, nose, trachea, and joints
- Smoothens bone surfaces at joints and provides flexibility



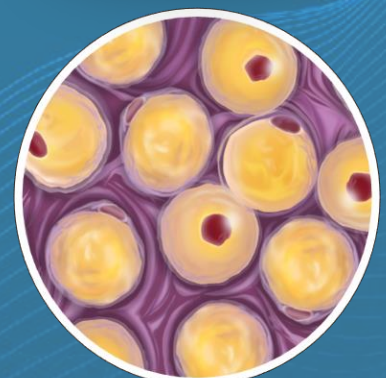
## 7.6 Areolar

- Found between the skin and muscles, around blood vessels and nerves, and in the bone marrow
- Fills the space inside the organs, supports internal organs and helps in repair of tissues



## 7.7 Adipose

- Found below the skin and between internal organs
- Tissue cells filled with fat globules
- Acts as an insulator (controls body temperature)



## 8. Muscular Tissue

- Muscular tissue consists of elongated cells and is responsible for the movement in our body.
- It contains contractile proteins which contract and relax to cause movement.

### Types of Muscle Tissue

#### Skeletal Muscle

Long, cylindrical, and unbranched cells

Multinucleate and striated

Voluntary muscle

Found in limbs



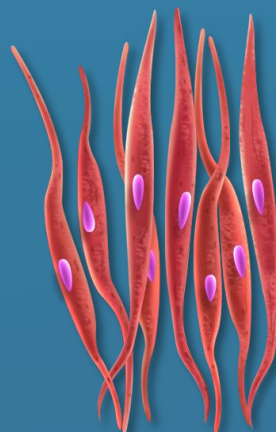
#### Smooth Muscle

Spindle-shaped and unbranched cells

Uninucleate and non-striated

Involuntary muscle

Found in iris, uterus, alimentary canal, bronchi



#### Cardiac Muscle

Cylindrical and branched cells

Uninucleate and striated

Involuntary muscles

Found in the heart



## 9. Nervous Tissue

B

- Cells of the nervous tissue are highly specialised for being stimulated and then transmitting the stimulus within the body.
- The brain, spinal cord and nerves are all composed of the nervous tissue

### 9.1 Neuron

#### **Cell Body:**

Contains nucleus and cytoplasm

#### **Dendrite:**

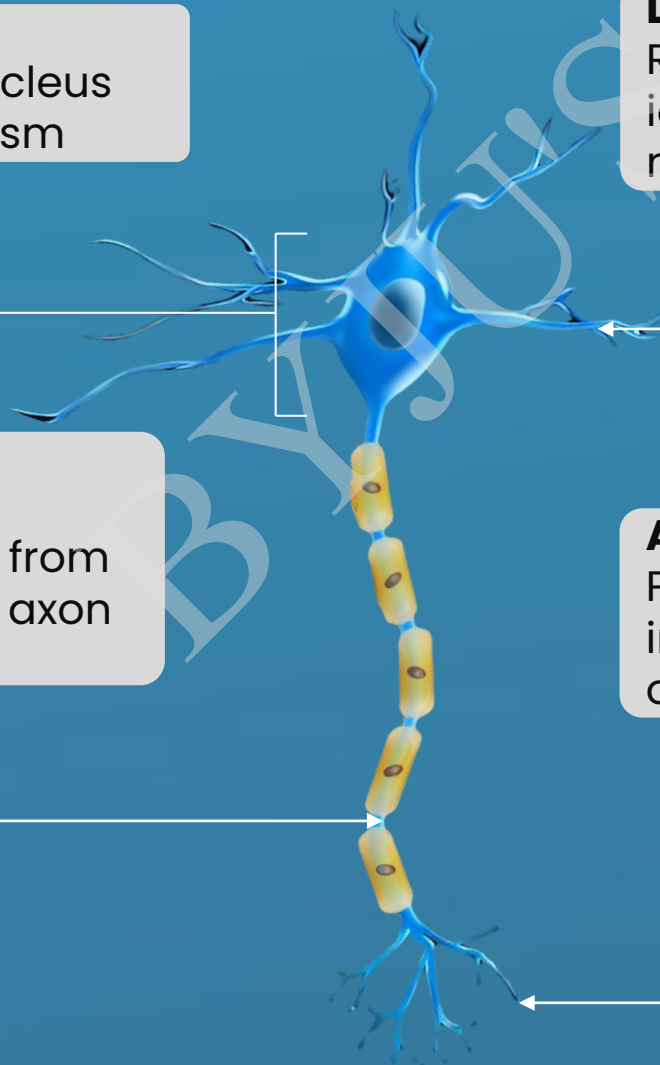
Receives information from other neurons

#### **Axon:**

Relays information from cell body to axon terminal

#### **Axon Terminal:**

Passes information to other neurons



### 9.2 Nerve Fibre

Connective tissues bind neurons which form nerve fibres, and nerve fibres bundle up to form a nerve.