

## 2.3 CELLS ARE GROUPED INTO TISSUES

Learning outcomes

At the end of this lesson, students should be able to:

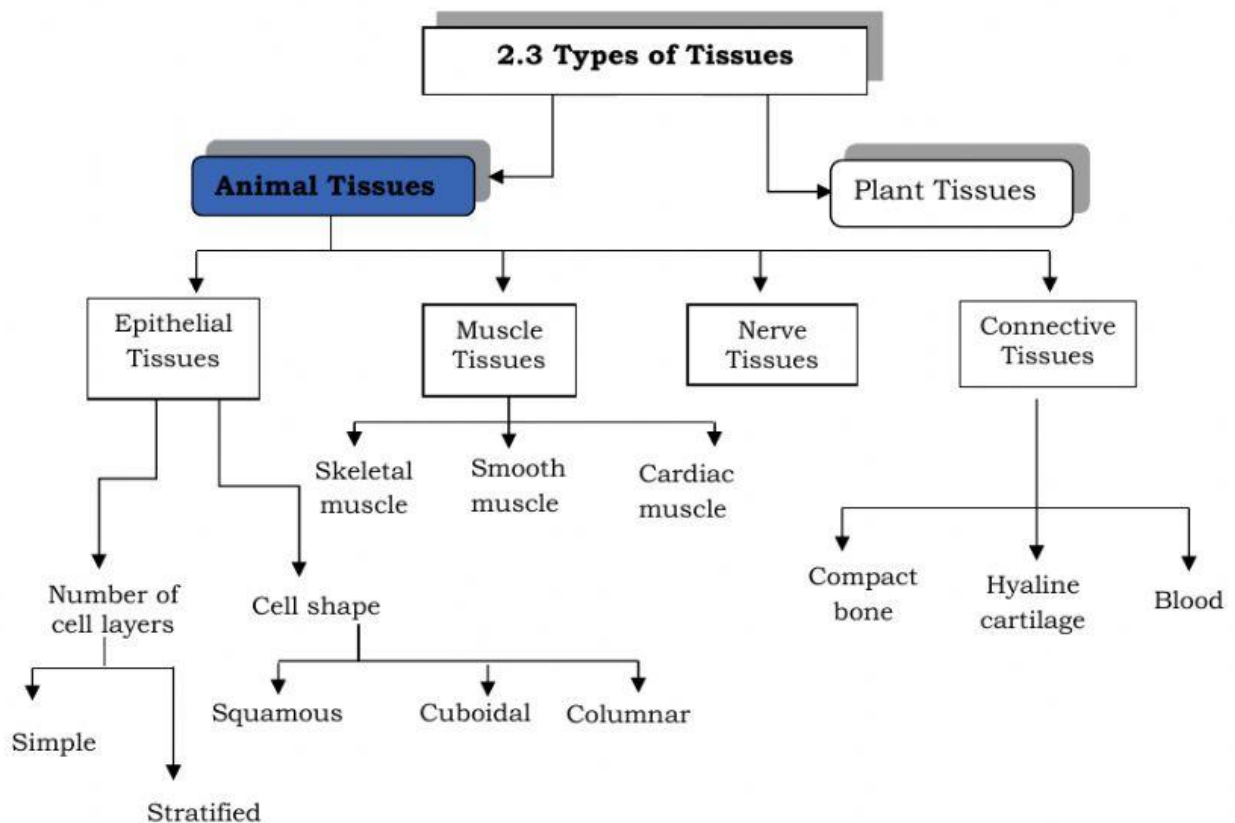
- I. **Describe animal tissues and plant tissues**
- II. **State the types, structure, functions and distributions of the following tissues:**

a. **Animal cells & tissues:**

- **Epithelial cells (simple squamous, simple cuboidal, simple columnar),**
- **Nerve cell (motor neuron),**
- **Muscle cells (smooth muscle),**
- **Connective tissues (blood).**

b. **Plant cells & tissues:**

- **Apical meristem,**
- **Ground tissues (parenchyma, collenchyma, sclerenchyma)**
- **Vascular tissues (xylem, phloem)**



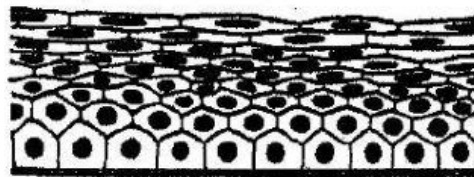
### 2.3.1 Animal cells and tissues

#### Epithelial tissues

- Can be differentiated based on;
  - i. number of cell layers
  - ii. cell shape
- Based on number of cell layers, we have simple epithelium tissues and stratified epithelium tissues.



**A) Simple** epithelium tissues



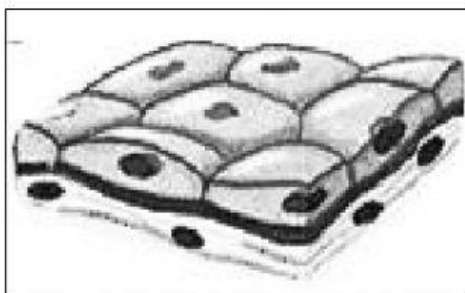
**B) Stratified** epithelium tissues

- Based on the cell shape, we have;
  - i. \_\_\_\_\_ epithelium
  - ii. \_\_\_\_\_ epithelium
  - iii. \_\_\_\_\_ epithelium

**Exercise 2.3 (a):** Based on cell shape, identify types of cell below.

#### **A) Simple Epithelium Tissues**

##### **i. Simple \_\_\_\_\_ Epithelium**



##### **Shape:**

- ✓ Single layer of \_\_\_\_\_ cells
- ✓ With \_\_\_\_\_-shaped central nuclei

##### **Function:**

- ✓ Facilitate \_\_\_\_\_ & filtration of substances (due to very thin & permeable structure)

##### **Location:**

- Glomerulus & Bowman capsule (in kidney)
- \_\_\_\_\_  
Lining of blood vessel (endothelium)

ii. Simple \_\_\_\_\_ Epithelium



**Shape:**

- ✓ Single layer of \_\_\_\_\_ cells

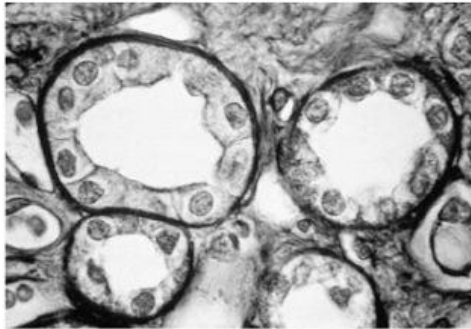
- ✓ With \_\_\_\_\_-shaped central nuclei

**Function:**

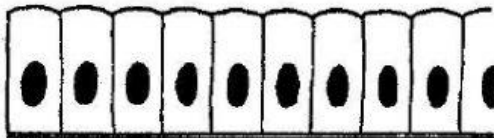
- ✓ Facilitate \_\_\_\_\_  
& \_\_\_\_\_

**Location:**

- ✓ Lining of \_\_\_\_\_ tubules
- ✓ Some glands
  - example: salivary gland



iii. Simple \_\_\_\_\_ Epithelium



**Shape:**

- ✓ Single layer of \_\_\_\_\_ cells

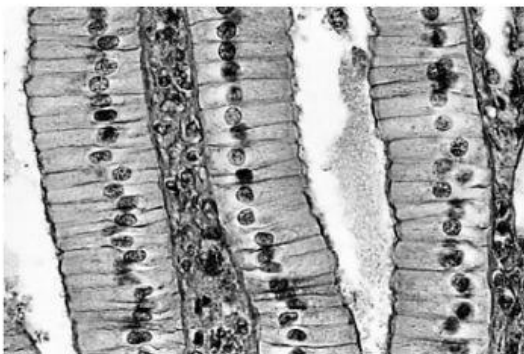
- ✓ With \_\_\_\_\_-shaped nuclei located near to the base

**Function:**

- ✓ Facilitate \_\_\_\_\_ & \_\_\_\_\_

**Location:**

- ✓ Lining of \_\_\_\_\_ tract, gallbladder



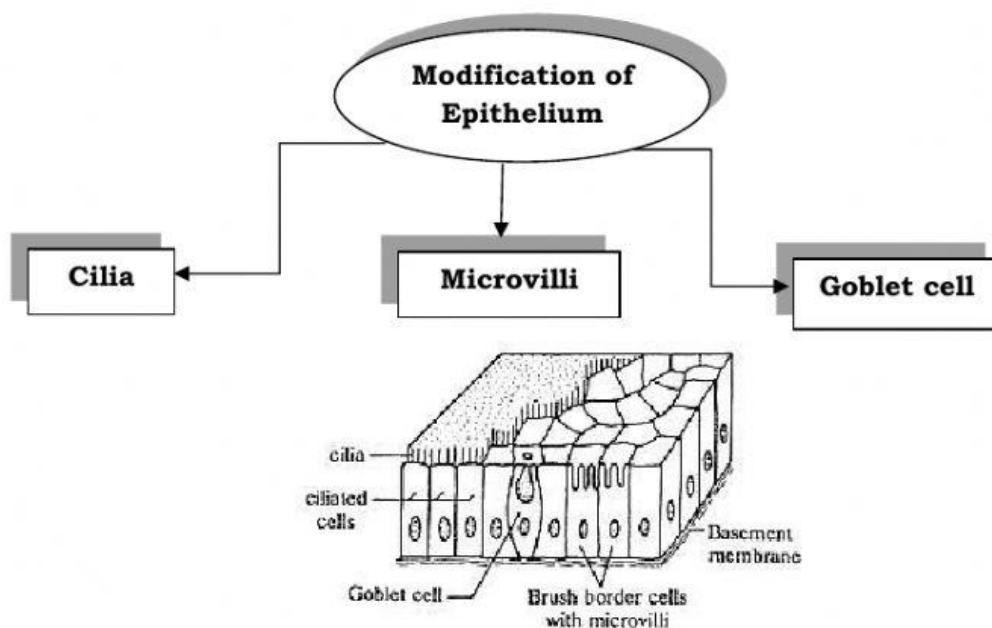
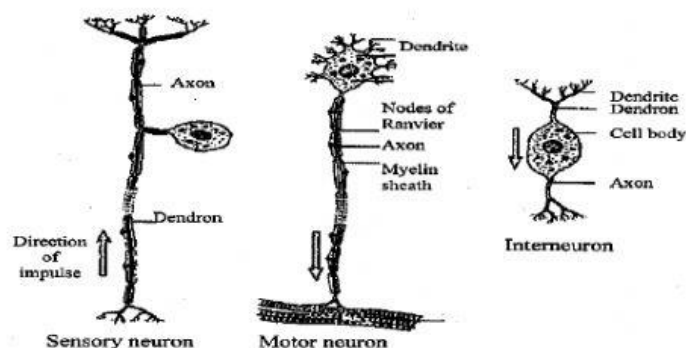


Fig. 4-3 - Simple columnar epithelium

<p><b>Cilia</b> – small &amp; short hair-like structure. Beating of cilia create motion to move material</p> <p>Example: simple ciliated columnar epithelium</p> <p><b>Location:</b> lining of bronchi</p> <p><b>Function:</b> to remove dust trapped in the respiratory tract</p>	<p><b>Microvilli</b> - small finger-like projections due to the folding of plasma membrane - Increase surface area for absorption</p> <p><b>Location:</b> lining of digestive tract</p> <p><b>Function:</b> to increase surface area for absorption of nutrients</p>	<p><b>Goblet cells</b> - cup-shaped cells</p> <p><b>Location:</b> Digestive tract</p> <p><b>Function:</b> secrete mucus to lubricate &amp; trap dust which enter respiratory tract</p>
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### Nerve cells (neurons)



Types of neurons based on function

**Exercise 2.3 (b):** Label and colour the diagram below as suggested in the table.

<b>Axon</b> - purple	<b>Axon terminals</b> - orange	<b>Myelin sheath</b> - yellow
<b>cell body</b> - blue	<b>Dendrites</b> - brown	<b>Muscle fibers</b> - red

**Motor neuron**



**Exercise 2.3 (c):** Match the descriptions in the table below using the terms in the list.

Neuron  
Motor neuron  
Cell body

Axon  
Node of Ranvier  
Dendrite

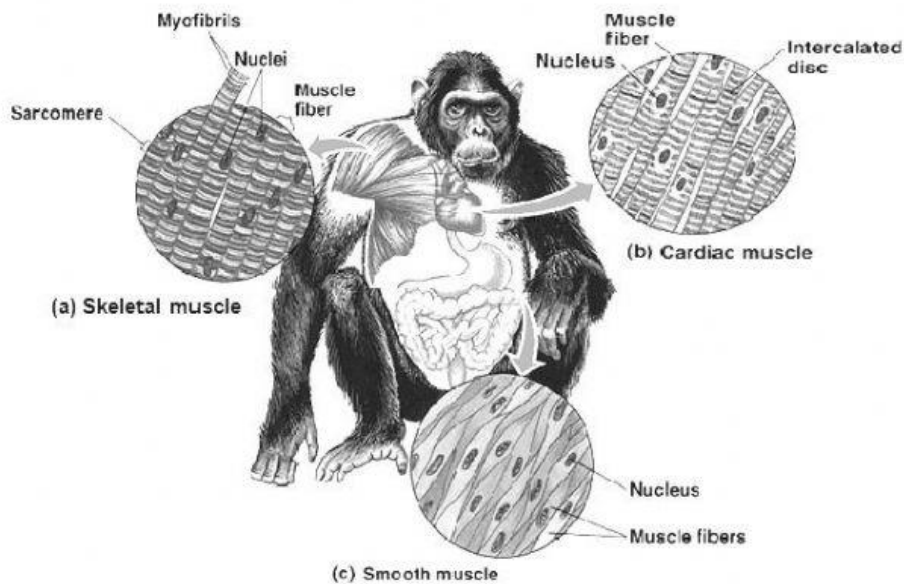
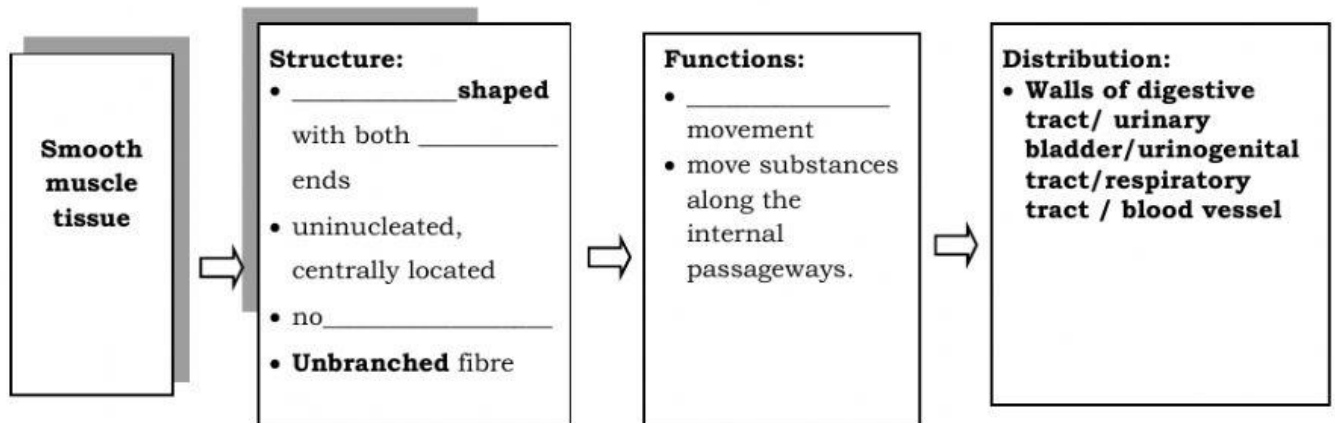
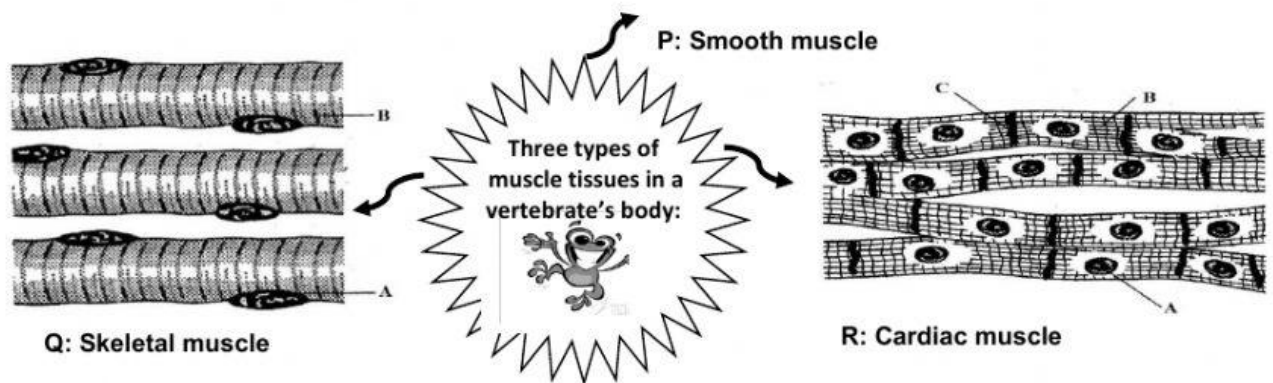
Myelin sheath  
Interneuron  
Sensory neuron

	Connect one neuron with another neuron
	The long fiber that carries the nerve impulses <u>away</u> from cell body.
	Uncovered part of axon between the Schwann cells
	Electrical insulator that speeds up the impulse transmission
	Carries the nerve impulse to the cell body
	Transmit impulse from central nervous system to effectors
	Transmit impulse from the receptor to central nervous system
	Functional unit of the nervous system
	Contain large nucleus, have organelles (except centriole), numerous mitochondria & extensive rough endoplasmic reticulum (Nissl granules)

**Muscle tissues:**

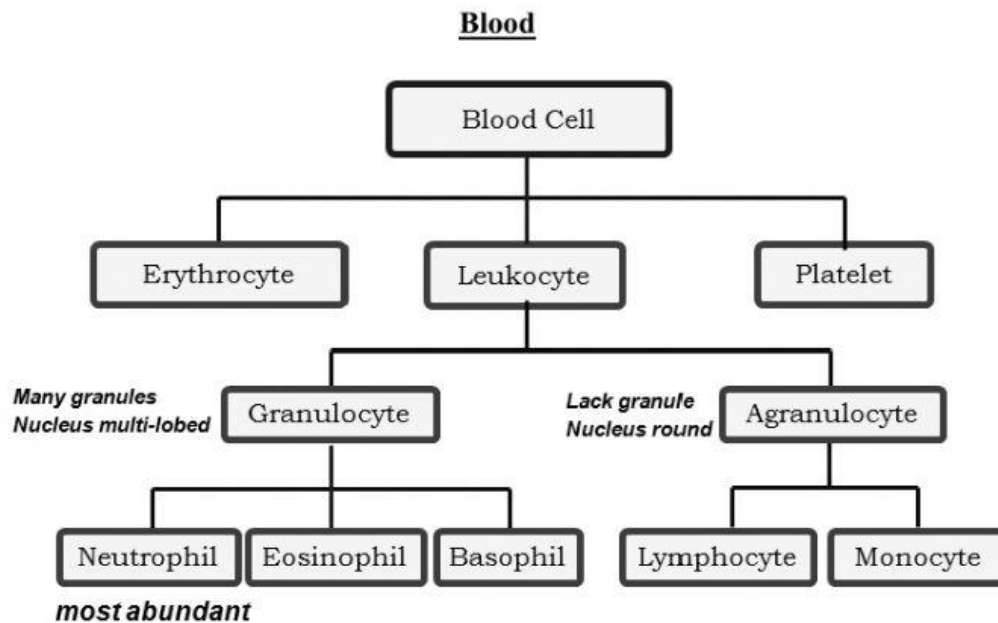
**A – Nucleus**  
**B – Striation**  
**C – Intercalated disc**  
**D – cell membrane**





### Connective tissues:

- There are three (3) connective tissues:
  - i. Compact bone
  - ii. Hyaline cartilage
  - iii. Blood

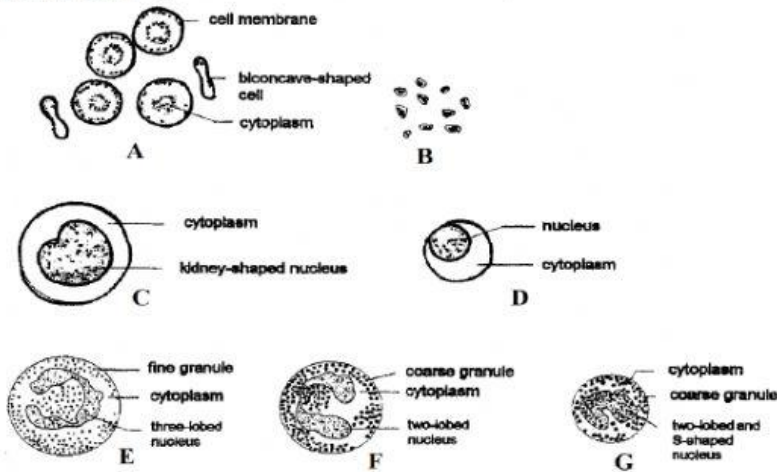


**Exercise 2.3 (d):** Use the concept map above to fill in the blanks below.

- Has three types of cells: erythrocytes, \_\_\_\_\_ and \_\_\_\_\_ (Thrombocytes).
- Erythrocyte has \_\_\_\_\_ shape with no nucleus.
- Leukocyte is divided into 2 groups: \_\_\_\_\_ & \_\_\_\_\_
- \_\_\_\_\_ has many granules and multi-lobed nucleus.
- 3 types of granulocytes: Neutrophil, \_\_\_\_\_ and \_\_\_\_\_
- Agranulocytes: lymphocyte and \_\_\_\_\_.
- Platelet is a cytoplasmic fragment of large cells, usually irregular shaped and lack of nucleus.
- Blood cells are suspended in fluid matrix called \_\_\_\_\_, consisting mainly of 90% water, inorganic mineral salts and protein

**Exercise 2.3 (e):** Identify each of the blood components in the diagram below.

Identify cell A- G



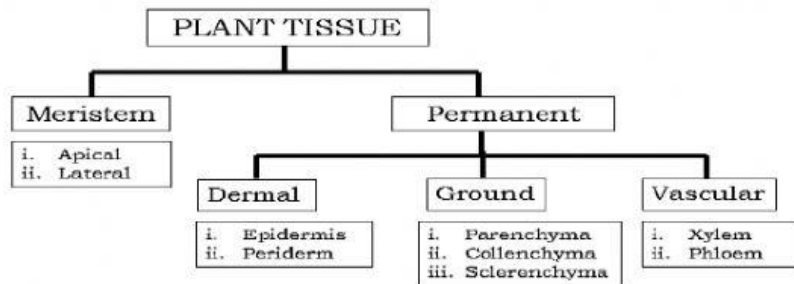
A- \_\_\_\_\_  
 B- \_\_\_\_\_  
 C- \_\_\_\_\_  
 D- \_\_\_\_\_  
 E- \_\_\_\_\_  
 F- \_\_\_\_\_  
 G- \_\_\_\_\_

Functions:

- Erythrocytes: \_\_\_\_\_  
 \_\_\_\_\_
- Leukocyte: \_\_\_\_\_  
 \_\_\_\_\_
- Platelets: \_\_\_\_\_  
 \_\_\_\_\_

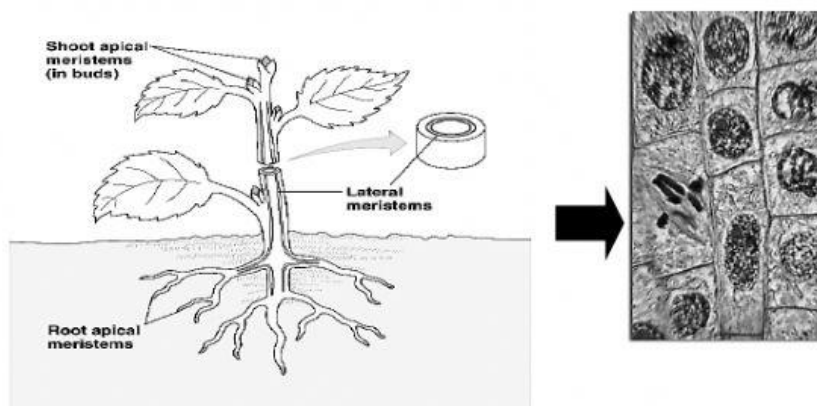


### 2.3.2 Plant Cells and Tissues



#### A. Meristem tissue

Types of meristem	Location	Function
Apical	_____ tips & _____ tips	Increase the <u>length</u> of stems & roots (primary growth)
Lateral	Cylinders around the stem & root (cambium)	Increase the <u>diameter</u> of stems & roots (secondary growth)



### Structure

- Small young cells
- Isodiametric shape
- Thin primary cell wall
- Large, central nucleus
- Dense cytoplasm
- No or small central vacuoles
- Closely packed with no intercellular air spaces

### Functions of meristem cells

- Cells divide by \_\_\_\_\_ to produce new cells.
- Cells grow, elongate and differentiate to form specialized cells to carry out specific function.

## B. Permanent plant tissue (matured and specialized cells)

### i. Dermal and Ground Tissues

<p>The diagram shows a plant with three circular cross-sections. The top section shows a leaf with a central vein. The middle section shows a stem. The bottom section shows a root. Arrows point from these sections to three circular diagrams. The first diagram is labeled 'Dermal tissue' and shows a single layer of cells. The second diagram is labeled 'Ground tissue' and shows a large area of cells. The third diagram is labeled 'Vascular tissue' and shows a central column of cells.</p>	<p><b>i. Dermal tissue</b></p> <p>Distribution: Outermost layer of cells @ surface of plant body.</p> <p>Structure : Tightly packed → forming a protective layer on the surface</p> <p>Function: Defense against – mechanical damaged, pathogenic disease &amp; water loss</p> <p><b>ii. Ground tissue</b></p> <p>Consist of:</p> <ul style="list-style-type: none"> <li>• _____ cells</li> <li>• _____ cells</li> <li>• _____ cells</li> </ul>
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