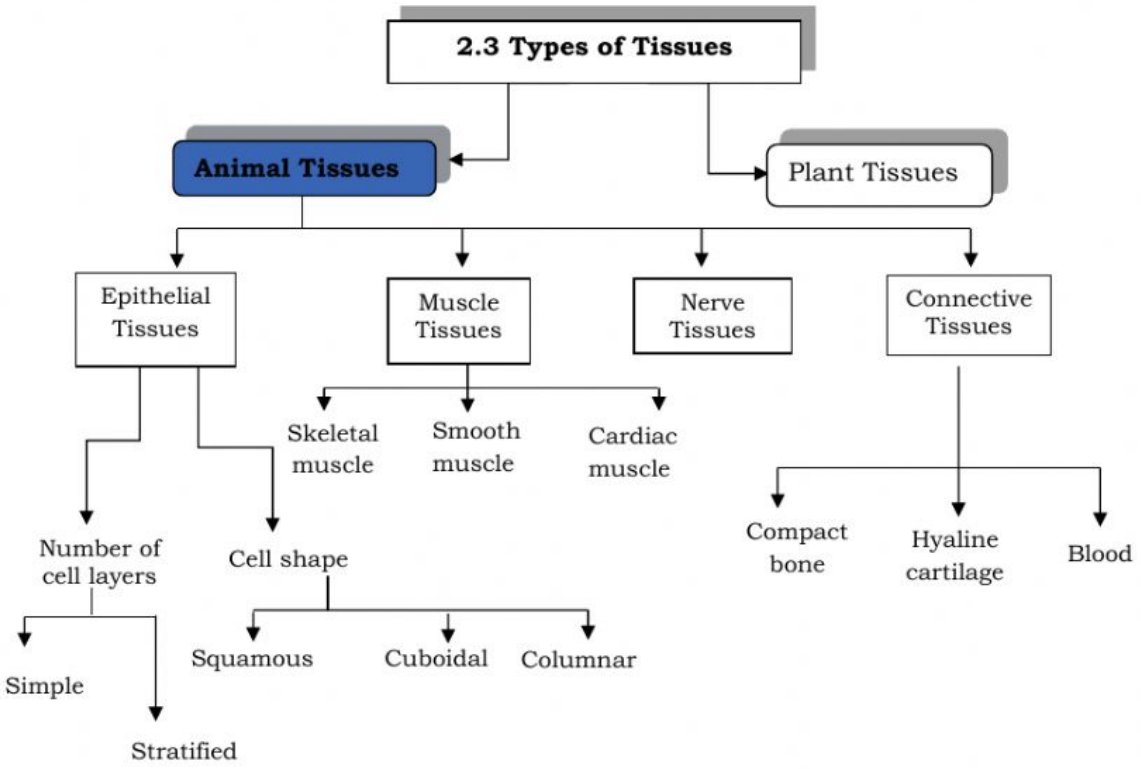
2.3 CELLS ARE GROUPED INTO TISSUES

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)**



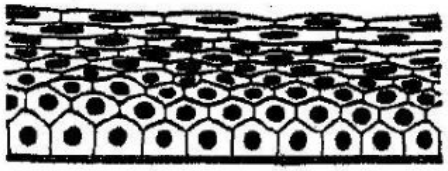
2.3.1 Animal cells and tissues

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



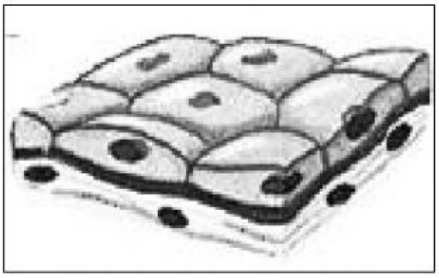
B) Stratified epithelium tissues

- 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

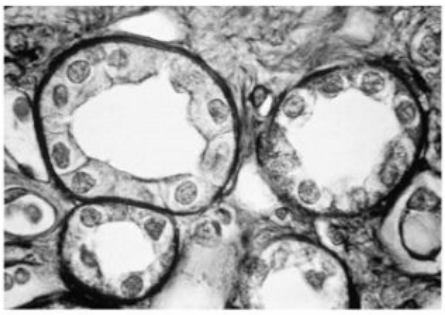


Shape:
- ✓ Single layer of _____ cells
- ✓ With _____-shaped central nuclei

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:

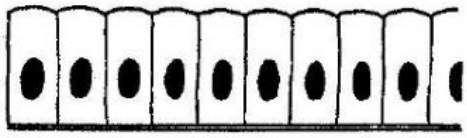
✓ Facilitate _____ & _____

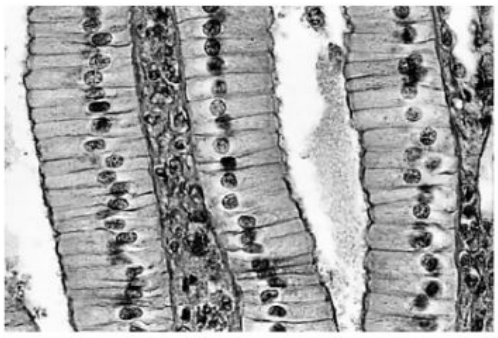
Location:

✓ 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

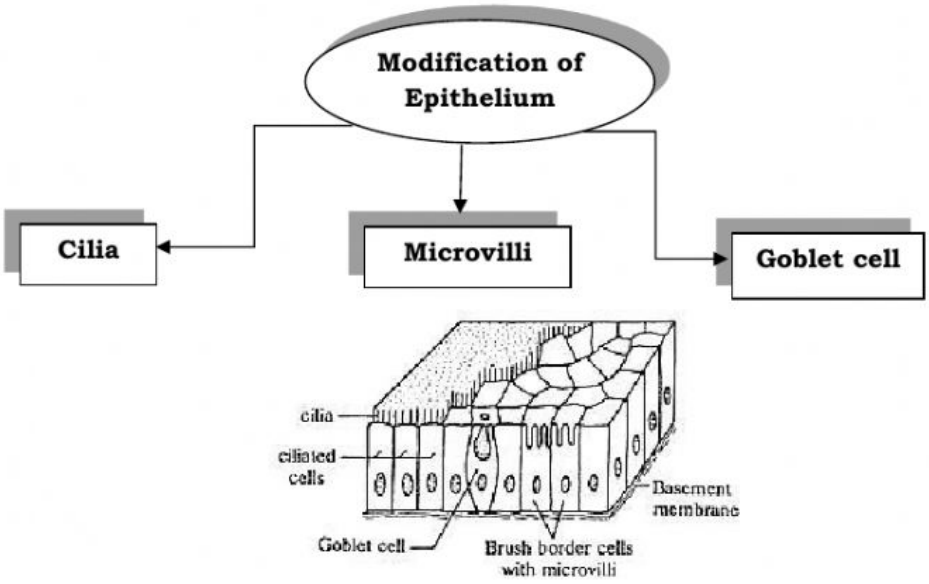
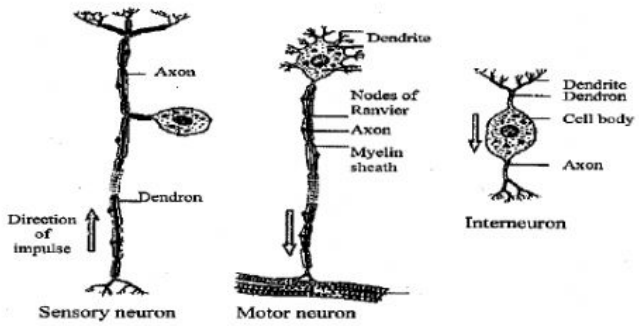


Fig. 4-3 – Simple columnar epithelium

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

Nerve cells (neurons)

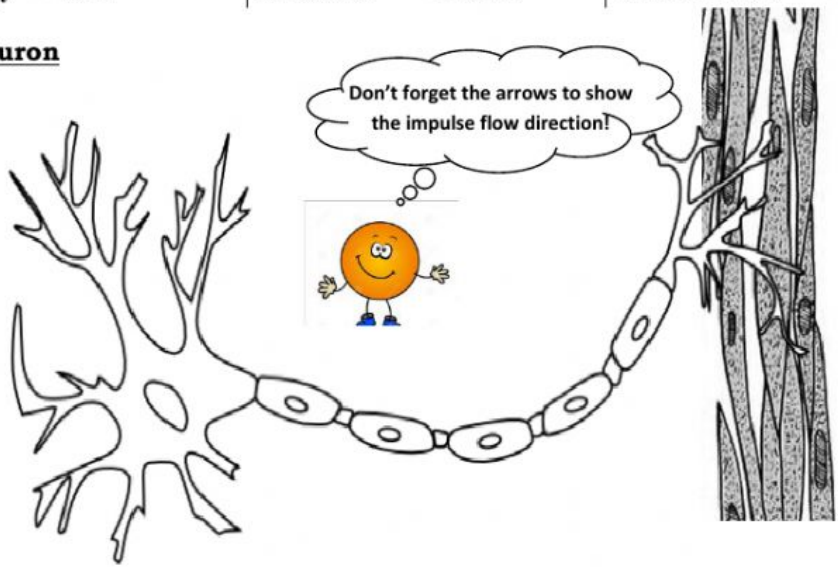


Types of neurons based on function

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

Axon - purple	**Axon terminals - orange**	**Myelin sheath - yellow**
cell body - blue	**Dendrites - brown**	**Muscle fibers - red**

Motor neuron



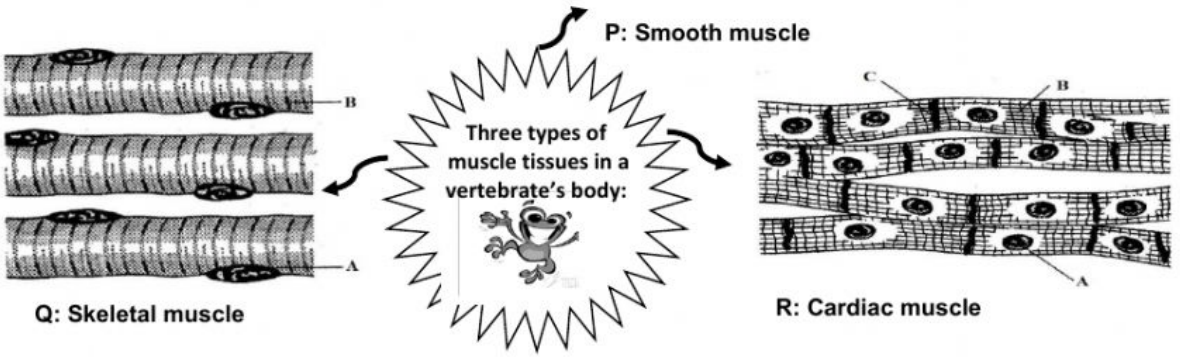
Exercise 2.3 (c): Match the descriptions in the table below using the terms in the list.

Neuron	Axon	Myelin sheath
Motor neuron	Node of Ranvier	Interneuron
Cell body	Dendrite	Sensory neuron

	Connect one neuron with another neuron
	The long fiber that carries the nerve impulses away 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



Smooth muscle tissue

Structure:

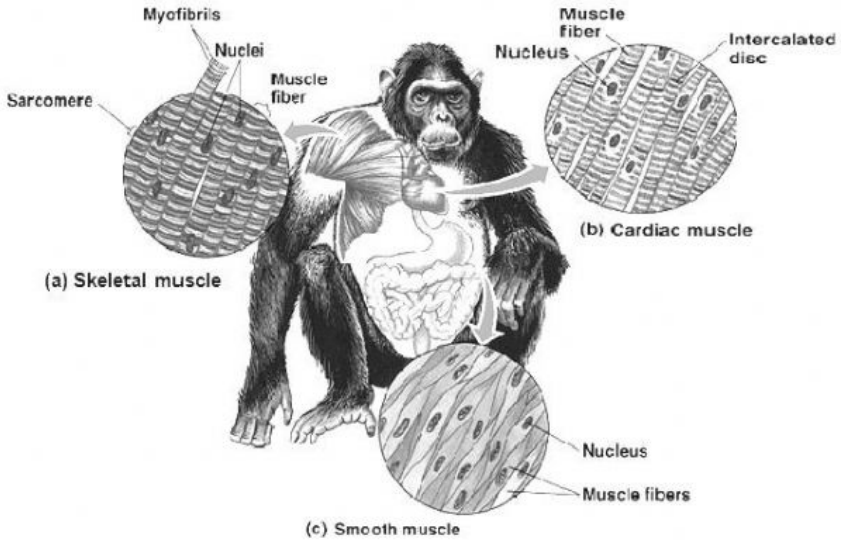
- _____**shaped** with both _____ ends
- uninucleated, centrally located
- no_____
- **Unbranched** fibre

Functions:

- _____ movement
- move substances along the internal passageways.

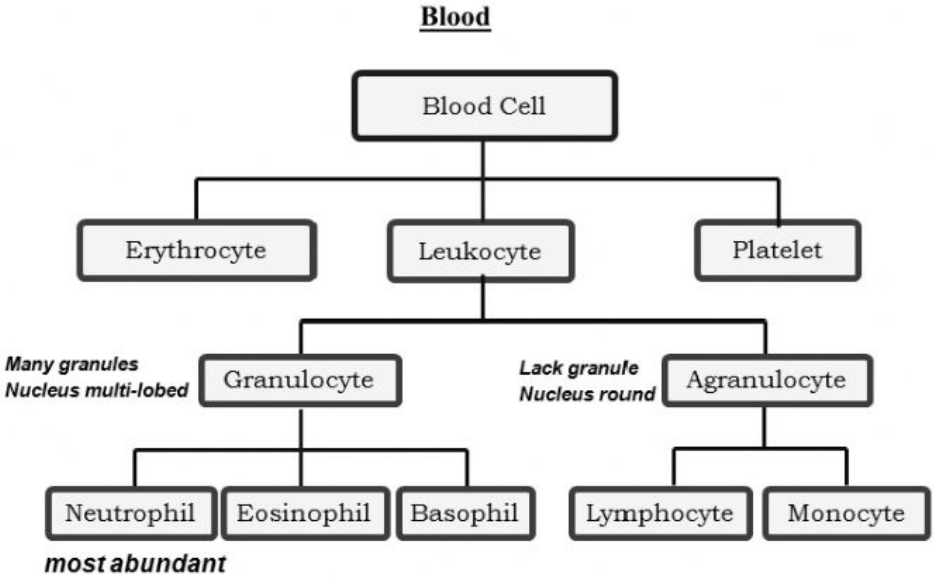
Distribution:

- **Walls of digestive tract/ urinary bladder/urinogenital tract/respiratory tract / blood vessel**



Connective tissues:

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

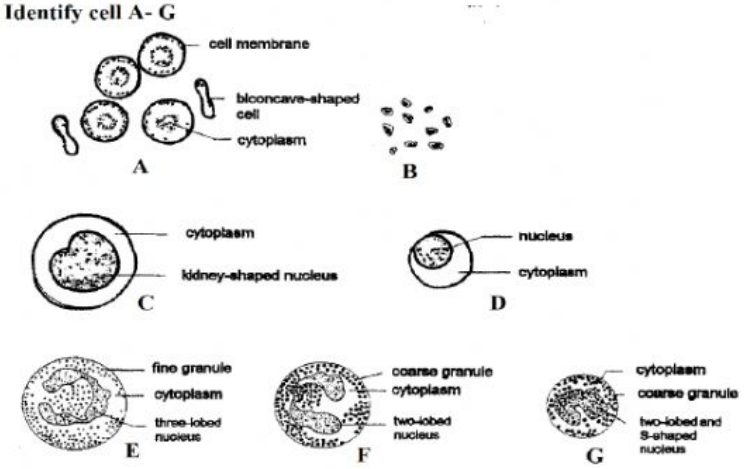


Exercise 2.3 (d): Use the concept map above to fill in the blanks below.

- 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: _____

  _____

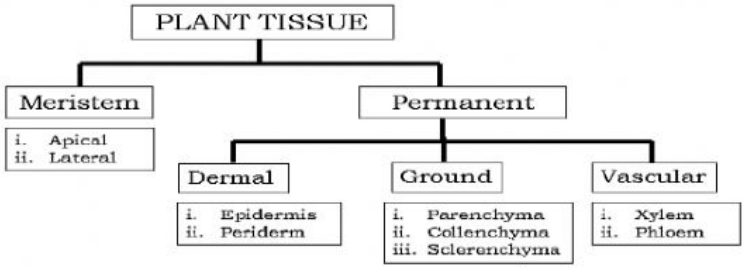
- Leukocyte: _____

  _____

- Platelets: _____

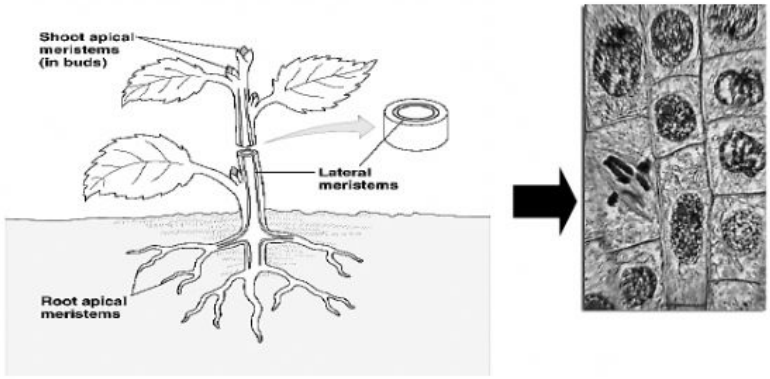
  _____

2.3.2 Plant Cells and Tissues



A. Meristem tissue

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



Structure

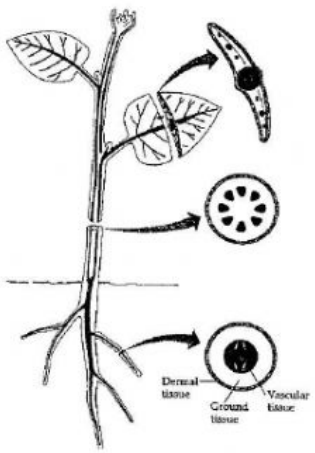
- Small young cells
- Isodiametric shape
- Thin primary cell wall
- Large, central nucleus
- Dense cytoplasm
- No or small central vacuoles
- Closely packed with no intercellular air spaces

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



i. Dermal tissue

Distribution: Outermost layer of cells @ surface of plant body.

Structure : Tightly packed → forming a protective layer on the surface

Function:
Defense against – mechanical damaged, pathogenic disease & water loss

ii. Ground tissue

Consist of:

- _____ cells
- _____ cells
- _____ cells