

Chapter – 6

Tissues

Introduction to Tissue

- ⇒ A multicellular organism contains millions of cells.
- ⇒ Each of these cells is specialized to carry out a function and each specialized function is taken by a different group of cells.
- ⇒ The groups of similar cells that perform a common function and have a similar origin are called tissue.
- ⇒ The term tissue was given by Bichat in 1972.
- ⇒ Blood, phloem, and muscles are examples of tissue.
- ⇒ Plants and animals are made of different types of tissues.

Meristematic Tissues

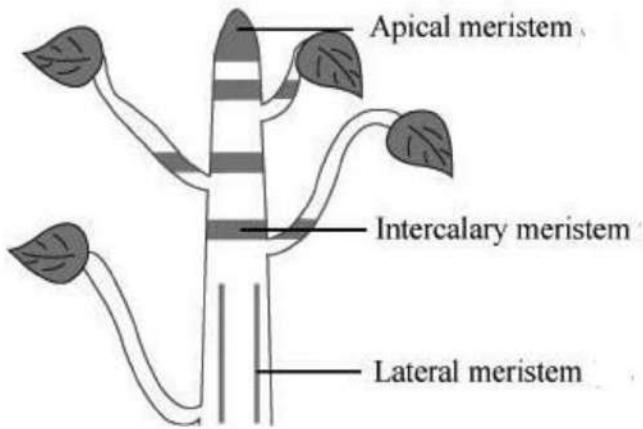
⇒ Some tissues in plants divide throughout their life and they are localized in certain regions of the plant body (roots, stems, and branches).

⇒ Based on the dividing capacity plants tissues are classified into: Meristematic Tissues and Permanent Tissues.

◆ *Meristematic Tissue:*

⇒ Meristematic tissues are the tissue that continues to grow throughout life.

⇒ According to their position in plants, meristematic tissues are grouped into three types:



(a) Apical Meristems:

It results in an increase in height of plants. This is called primary growth.

(b) Lateral Meristems:

It causes an increase in the width (diameter) of roots and stems called secondary growth.

(c) Intercalary Meristems:

They are located at the base of the leaves or internode. They produce an increase in the length of leaves and internode.

*Tip: Apical meristem is responsible for elongation of roots and stems. If the apical meristem is cut or damaged the growth of the plant will stop.

Permanent Tissues

⇒ Permanent tissues do not have the capacity to divide.

⇒ The cells formed by meristematic tissue take up the specific roles and they lose the ability to divide. This gives rise to permanent tissue. This process is called differentiation.

⇒ These are grouped into two categories:

1. Simple permanent tissues:

They are made up of one type of cell. There are three types of simple permanent tissues:

(a) *Parenchyma*:

The parenchyma tissue which contains chlorophyll is called chlorenchyma. It performs photosynthesis. The parenchyma tissue which contains large air cavities is called aerenchyma. All aquatic plants (hydrophytes) have air cavities. It gives buoyancy to the plants. Ex: Hydrilla.

(b) *Collenchyma*:

It provides mechanical support and flexibility to the plants.

(c) *Sclerenchyma*:

The cells of sclerenchyma tissue are dead and lack protoplasm. The cell walls of sclerenchyma are very strong and thickened due to the presence of lignin. Such cell walls are called lignified. The husk of the coconut is made of sclerenchymatous tissue. It is present in the mesocarp of fruit and yield coir. This is a well-known fiber used for making mats, ropes, brushes, etc.

2. *Complex permanent tissues*:

They are made up of more than one type of cell which coordinates to perform a common function. There are two types of complex permanent tissue:

(a) *Xylem*:

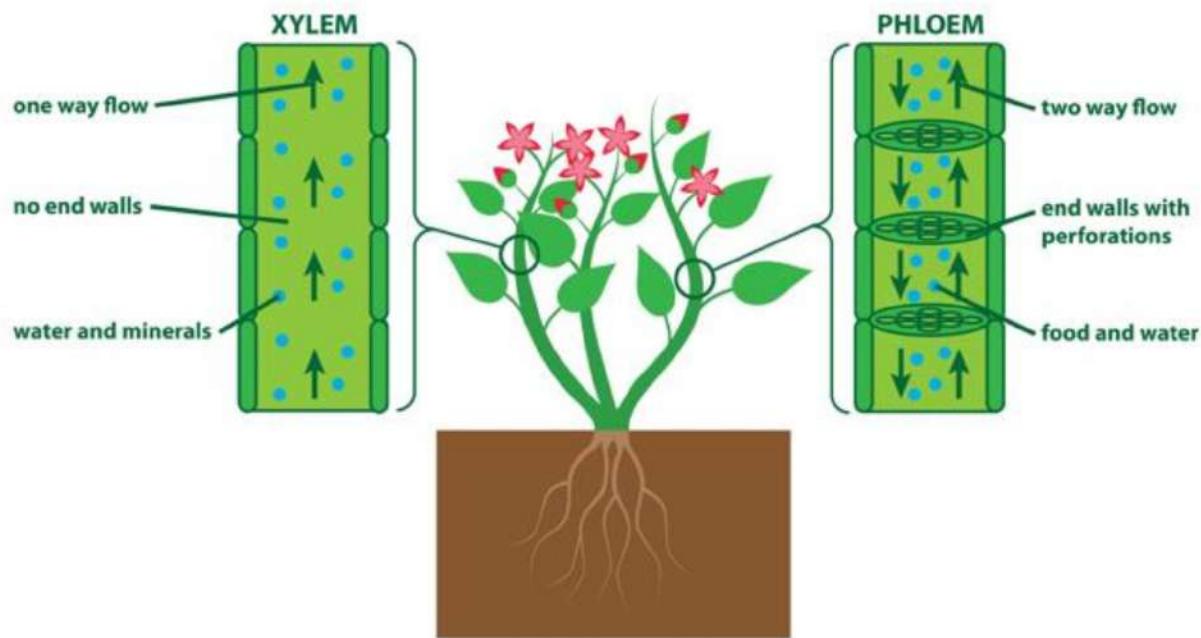
Xylem consists of four types of cells: tracheid, vessels, xylem parenchyma, and xylem sclerenchyma. Tracheids, vessels, and xylem sclerenchyma are dead and are bounded by a thick lignified wall and provide mechanical strength to the plant body.

Xylem is responsible for the transportation of water and minerals from roots to different parts of the plants.

(b) *Phloem*:

Phloem consists of sieve tubes, companion cells, phloem parenchyma, and phloem fibers. Except for phloem fibers all the components are living.

Phloem transport food prepared by leaves to another part of plants.



Epithelial Tissue

◆ Animal Tissues:

Blood and muscles are examples of tissues found in our bodies. Tissues are classified into four categories on the basis of their function:

1. Epithelial Tissue
2. Muscular Tissue
3. Connective Tissue
4. Nervous Tissue

◆ Epithelial Tissue:

- ⇒ Epithelial tissues are found in the outer layer of the skin.
- ⇒ It is the simplest tissue and the protective tissue of the animal body.
- ⇒ The Types of epithelial tissue are:

(a) Squamous epithelium:

They form the lining of cavities i.e. mouth oesophagus, nose, pericardium, alveoli etc. and blood vessels. It also forms the covering of the tongue and skin.

(b) Columnar epithelium:

The lining of the small intestine and stomach is made up of columnar epithelium. It forms a mucous membrane and also forms the lining of the gall bladder and oviducts.

(c) Cuboidal epithelium:

It forms the lining of kidney tubules and salivary glands.

(d) Ciliated epithelium:

They are found in the respiratory tract. Cilia is a hair-like projection on the outer surface of epithelial cells. These are called the ciliated epithelium.

Muscular Tissue

Muscular tissue has been classified into striated, smooth, and cardiac muscles on the basis of their location, structure, and function.

Striated	Smooth	Cardiac
They are striated (shows light and dark stripes).	They are not striated.	They are striated.
They are long, cylindrical and multinucleated.	They are spindle-shaped and uninucleate.	They are branched and uninucleate.
They are found in the limbs, body wall and neck.	They are found in the wall of tubular organs such as the stomach, intestine, blood vessels	They occur only in the wall of the heart.
They are voluntary.	They are involuntary.	They are involuntary.

Connective Tissue

- ⇒ They are specialized to connect various body organs.
- ⇒ The tissues can connect bone to each other, muscles to bone, bind tissue and give support to various parts of the body by creating a packing around organs.
- ⇒ This packing prevents the organ from getting displaced by body movement.
- ⇒ The main function of connective tissue is binding, supporting, and packing together different organs of the body.
- ⇒ Types of connective tissue:

(a) *Areolar connective tissue:*

This is found between skin and muscles, blood vessels, and bone marrow. It fills the space inside the organs and helps in the repair of tissues after injury.

(b) *Adipose connective tissue:*

Adipose tissue is the fat-storing tissue in our body. They are found below the skin and between the internal organs. It acts as an insulator.

(c) *Tendon:*

Tendons are connective tissue. It connects muscles to bones. Tendons are white fibrous tissue and have great strength but limited flexibility.

(d) *Ligaments:*

Ligaments are connective tissue. It connects bones to bones. It has great strength and elasticity.

(e) *Bones:*

Bone is a very strong and non-flexible skeletal connective tissue. Bones form our skeleton system and protect the main organs of our body.

(f) *Cartilage:*

The cartilage is a skeletal connective tissue. They are found in the nose tip, ear pinna, end of long bones, and rings of the trachea. It provides flexibility.

(g) Blood:

Blood is fluid connective tissue. It has a fluid matrix called plasma which contains WBCs, RBCs, and platelets.

Nervous Tissue

- ⇒ Nervous tissue is highly specialized to transmit messages within our body.
- ⇒ The brain, spinal cord, and nerves are composed of nervous tissue.
- ⇒ The cells of the nervous tissue are called nerve cells or neurons.
- ⇒ Neurons are the unit of the nervous system.
- ⇒ Neurons have the ability to receive and send stimuli to different parts of the body.
- ⇒ The impulse travels from one neuron to another neuron.
- ⇒ Each neuron has three parts.

(a) Cyton or cell body – It contains a nucleus and cytoplasm.
(b) Axon – Axon is the single long part.
(c) Dendrite – Dendrite is the short branch arising from the cyton.

