

Plant Tissues

Multicellular organisms are made up of millions of cells. Cells are structural and functional units of life. They show divisions of labour and each cell performs a particular function efficiently. Such cells are grouped together and are referred to as tissues. In other words, a tissue is a group of cells which are similar in structure and origin and perform a similar function. Plant tissue - plant tissue is a collection of similar cells performing an organized function for the plant. Each plant tissue is specialized for a unique purpose, and can be combined with other tissues to create organs such as flowers, leaves, stems and roots

In plants, most of the tissue are dead and provide mechanical strength to plants. Plant tissues are of two types:

1. Meristematic tissue
2. Permanent tissue

Meristematic Tissue

The cells of this tissue have the ability to divide and redivide to form new cells (mitosis). The newly formed cells are similar to the parent cell but as they grow their characteristics change and they differentiate. These cells, found in growing areas of plants, help in increase of length and width of plants. These cells are living, have dense cytoplasm, thin cellulose walls, prominent nuclei and lack vacuole.

Types Of Meristematic Tissue: -

1. Apical Meristem

Location- This type of meristem is found in growing tips of stem and roots.

Function-This tissue helps in increase in length of the plant.

2.Lateral Meristem

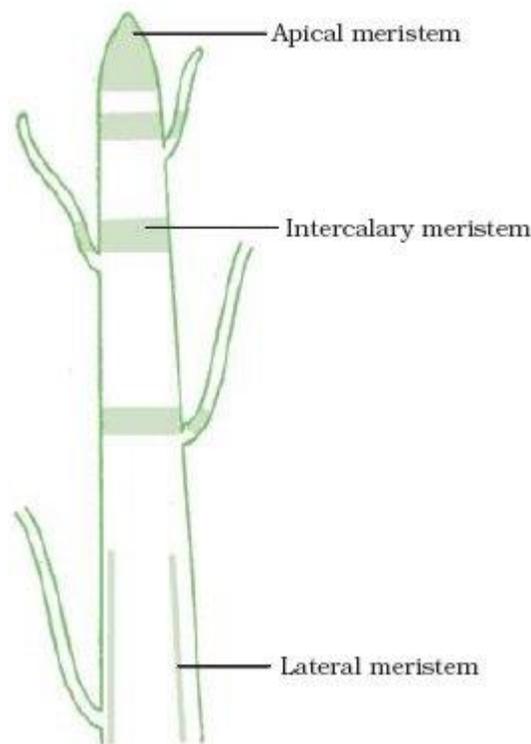
Location- This type of meristem is found on sides of stem and roots.

Function- This tissue help in the plant's increase of the diameter and girth.

3. Axillary Meristem (or intercalary meristem)

Location- This type of tissue is found at the base of leaves or internodes.

Function-This tissue helps in increase of the length of organs like leaves and internodes.

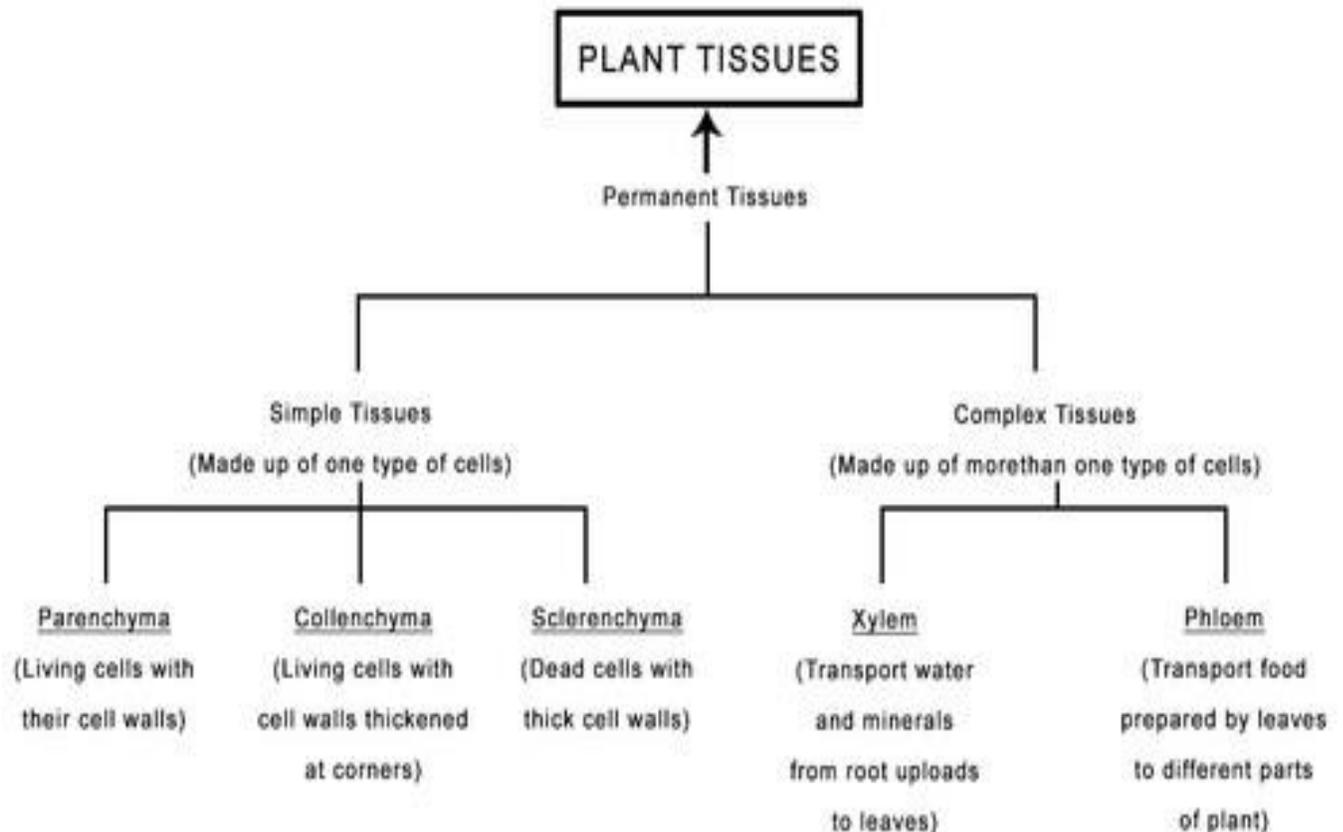


PERMANENT TISSUE

These are mature meristematic tissue. The meristematic cells form permanent tissue once they lose the ability to divide. These cells have a definite shape, size and function and may be dead or living. The process by which cells arise from meristematic tissue

and take up a permanent shape, size and function is called differentiation.

Permanent tissues:



Permanent tissues are of two types,

1. Simple permanent tissue.

2. Complex permanent tissue.

1. SIMPLE PERMANENT TISSUE

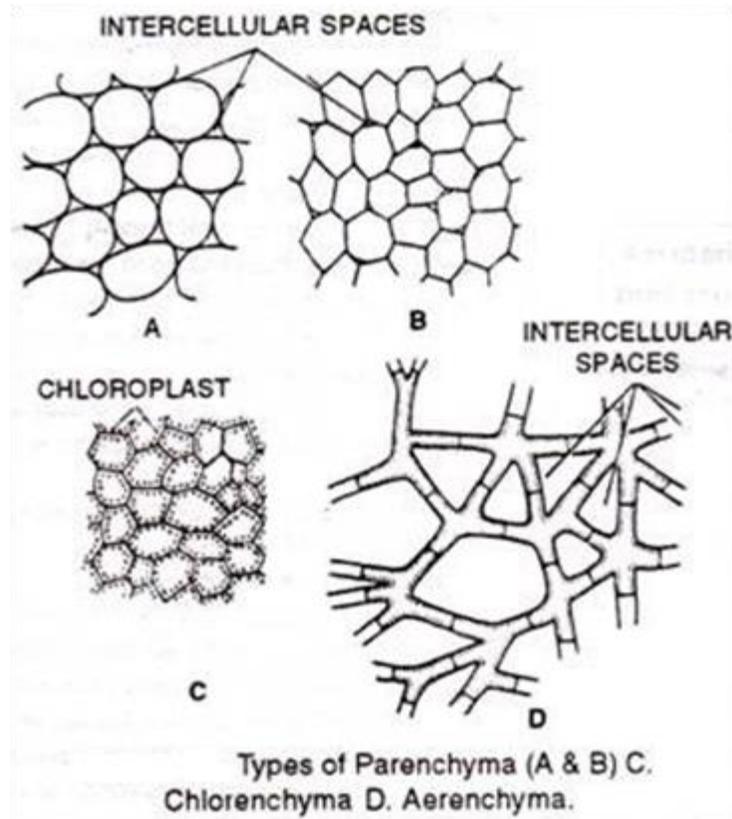
This type of tissue are made of one type of cells, which are similar in origin, structure and function. Simple permanent tissues are of three types:

1. Parenchyma
2. Collenchyma
3. Sclerenchyma

Parenchyma

Characteristics- it is the basic packaging tissue that fills the spaces between other tissues and is found most abundantly in plants. They have unspecialised/ undifferentiated cells with thin cell walls made of cellulose. they have large intercellular spaces as the cells are loosely arranged. Cells have dense cytoplasm and nucleus and large vacuole.

Function- This tissue performs various functions. Parenchyma of stem and roots stores nutrients and water and is called as STORAGE PARENCHYMA. When it contains chloroplast having chlorophyll and performs photosynthesis, it is called CHLORENCHYMA. In aquatic plants, parenchyma has large air spaces to provide buoyancy to plants to help them float and exchange gases, it is called AERENCHYMA.

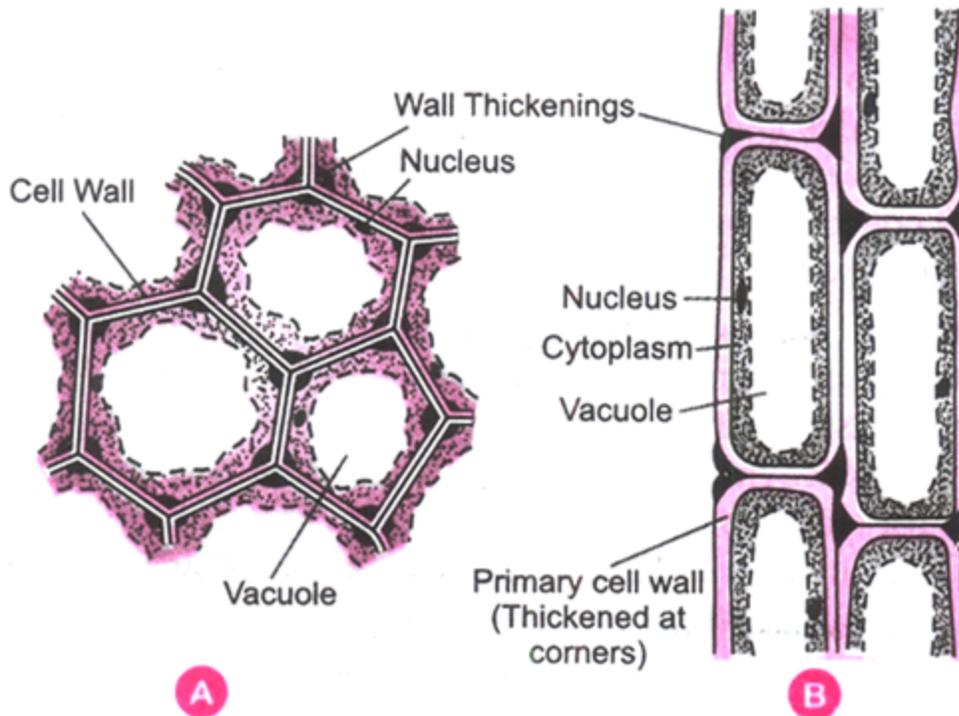


Isolated parenchyma cell or group of cells are capable of producing the whole plants.

LOCATION- This type of tissue found in non woody or soft parts of roots, stem, flowers, leaves and fruits.

Collenchyma

Characteristics - The cells are living, elongated and irregularly thick at the corners made of cellulose or pectin. They have very less or no intercellular spaces. The cells have a nucleus, dense cytoplasm and large vacuole. The wall has large amount of hemicellulose and pectin in addition to cellulose. The lignin is not present.



**Figure : COLLENCHYMA; A-TRANSVERSE SECTION;
B-LONGITUDINAL SECTION**

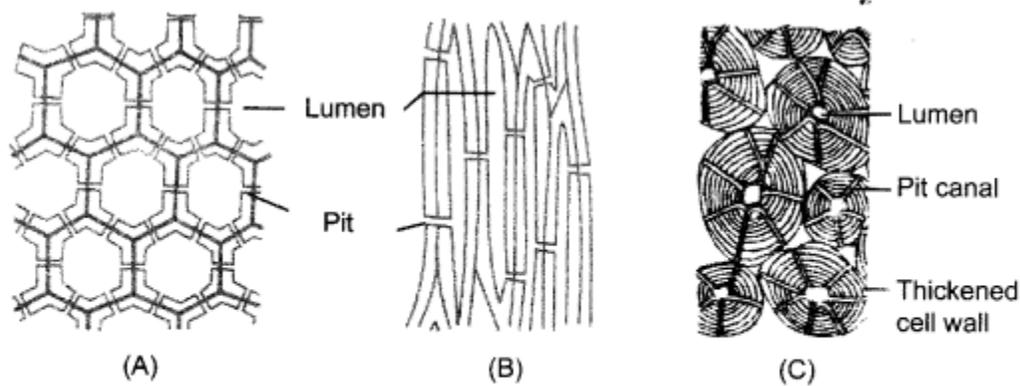
Function - These cells provide flexibility (elasticity) and mechanical support to the aerial parts of the plants.

Location - This type of tissue is found in leaf stalks, below epidermis of leaves and stem.

Sclerenchyma:

Characteristics - The cells are long, narrow thick walled due to deposition of lignin. Such cell walls are called as lignified walls and have pits. These cells lack intercellular spaces due to deposition of lignin. The cells do not have a nucleus and cytoplasm and are dead.

Functions -These cells provide rigidity and strength to plants and makes it hard and can bear stress and strains. Function as mechanical tissues.



Sclerenchyma: (A) Transverse section, (B) Longitudinal section and (C) Sclereids (Stone cells)

Fig. 6.3.

Location - This type of cells are found in stems, around vascular bundles, in the veins of leaves.

COMPLEX PERMANENT TISSUE

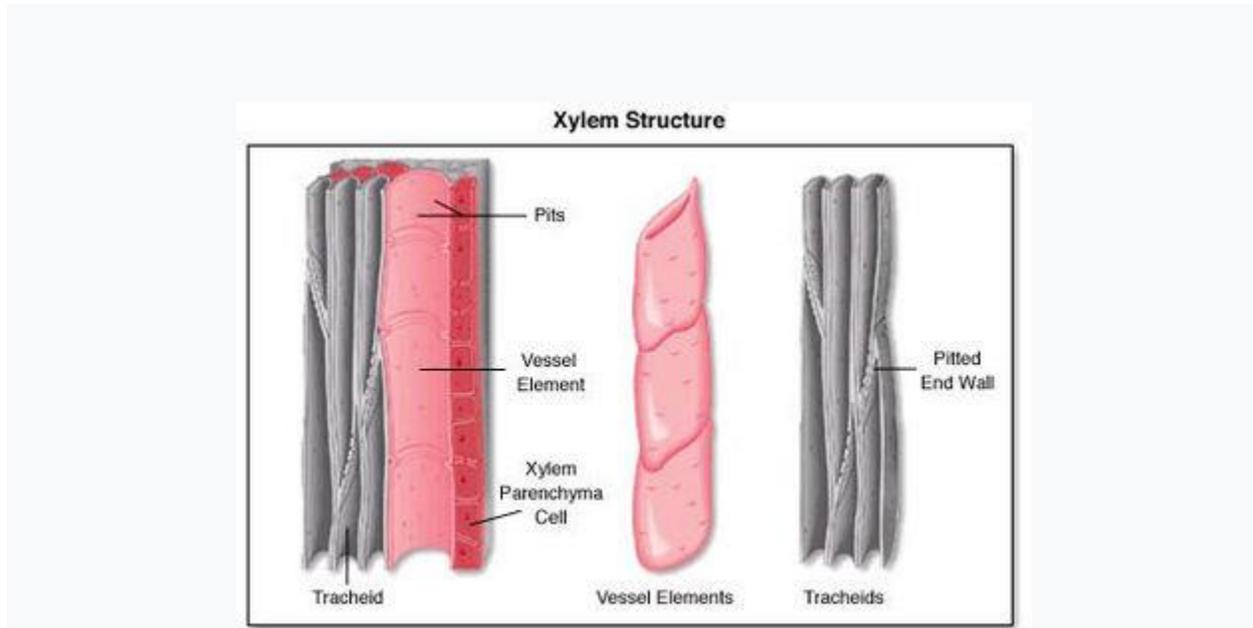
This type of tissue is made up of more than one type of cells that have a common origin and work together to do a common function. Its function is to transport water, minerals and food to all parts of the plant. Complex permanent tissue is of two types,

1. Xylem
2. Phloem

1. Xylem

The cells have thick walls. Elements are tracheids, vessels, xylem parenchyma, and xylem fibres. Vessels are the most important elements and are shorter and wider than tracheids. Vessels and tracheids have tube like structures that help in transporting water and minerals vertically efficiently. Conduction takes place in one direction. Xylem parenchyma stores food and helps in lateral conduction of water. In addition to transporting water and mineral salts from roots to leaves, xylem also provides support to plants

and trees because of its tough lignified vessels. In xylem, only the Xylem parenchyma is living and all other elements are dead.



2. Phloem

Elements of phloem are sieve tubes, companion cells, phloem parenchyma and phloem fibres. Sieve tubes are tube like structures, the end walls are called sieve plates and are perforated due to presence of pores. Companion cells help in efficient functioning of sieve tubes. Phloem transports the prepared food from leaves to storage organ and from storage organ to growing regions. Hence the conduction is bi directional. In phloem all the elements are living except the phloem fibres.

