

Class - 7th

Subject - Biology

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Chapter - 1

Plant and Animal Tissues

Subject Teacher Ms. Nidhi Rana

Before starting the chapter, let us discuss about -
What is a cell? A cell is the structural and functional unit of all living organisms. It can exist independently and can perform all the life processes.

Unicellular organisms are formed of single cell while multicellular organisms may have millions of cells in their body.

- ★ The cell has the same central position in biology as an atom is the fundamental unit in physical science.
- ★ A cell is capable of independent existence and performs all the basic functions of life. Every organism starts its life as a single cell. Each cell has its own lifespan. Old and worn out cells are continuously replaced by new cells in the body of multicellular organisms.
- ★ The living substance of the cell bounded by plasma membrane is called protoplasm. Various cell organelles like mitochondria, ribosomes, lysosomes, endoplasmic reticulum remain suspended in it. Each kind of organelles are specialised to perform a specific function. Thus, division of labour is found in cell organelles.
- ★ A group of similar cells dedicated to perform a specific function is called tissue.

Several tissues together form an organ.

Different organs are specialised to carry out different functions. Several organs join together to form an organ system. Lastly, many organ systems join together to form a complete organism.

Cell → Tissues → Organs → Organ systems → Organism

In this chapter we are going to study about different plant and animal tissues.

In multicellular organisms, there is division of labour where different groups of cells take up different functions. The cells specialised to carry one particular function occur together and form a cluster of cells. Such a cluster of similar cells in the body forms a tissue.

The tissue may be defined as a group of cells that have a common origin, shape and structure. They work together to achieve a common function.

Importance of tissues - Formation of tissues has resulted in division of labour in multicellular organisms.

2. Tissues become organised to form organs and organs further get organised into organ systems.
3. Origin of tissues has reduced the work load of individual cells.
4. Due to improved organisation and higher efficiency of tissues, multicellular organisms have higher survival.

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* There are noticeable differences between the plant and animals tissues.

1. Most plant tissues are supportive and provide mechanical strength. They need less energy and maintenance, while animal tissues carry out different functions and need more energy.

2. In plants, some tissues are dead, whereas in animals tissues are living.

3. Tissue organisation is simple in plants but in animals, tissue organisation is complex.

4. Some tissues in plants divide throughout the life and are localised in certain region.

Plant Tissues

Meristematic Tissues
(actively dividing cells)

Permanent Tissues
(non-dividing cells, cells perform a particular function).

Simple permanent tissues

Complex permanent tissues

Supportive tissue

Protective tissue

Xylem

Phloem

Parenchyma

Collenchyma

Sclerenchyma

Epidermis, Cork

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1. Meristematic Tissues - are made up of young, compactly arranged undifferentiated living cells that keep dividing and add new cells throughout the life of a plant. They are responsible for the growth and development in plants.

Location : They are found at the growing tips of stems, roots and growing young leaves. It is responsible for the growth and elongation of roots and stem. Hence, it increases the length of plant. (Primary meristem).

Another type of meristem called lateral meristem is found beneath the bark. (cork cambium). It helps in increasing the diameter and thickness of stem. This type of growth is called secondary growth.

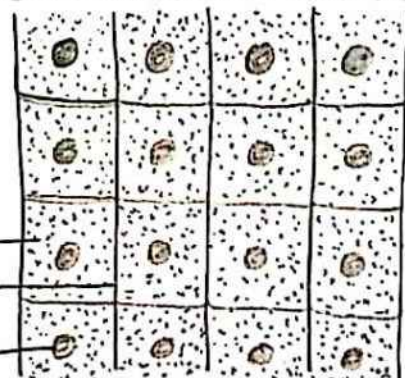
Characteristics of Meristematic Tissues

1. The meristematic cells are small, undifferentiated and thin-walled.
2. These are compactly arranged, without inter-cellular spaces.
3. The cells may be spherical, oval or rectangular with thin cell-wall made of cellulose.
4. Nucleus is large and centrally located.
5. Cytoplasm is dense, vacuoles are small or absent.
6. The cells divide repeatedly throughout the life of a plant adding to its size.

cytoplasm

cell wall

nucleus



II Permanent Tissues - Permanent tissues are formed of cells that have lost their capacity to divide. They have definite permanent shapes and are specialised to carry out different functions. They form bulk of plant body. According to the function, the simple permanent tissues are of two types

(a) Protective tissue - It includes epidermis and cork. Epidermis is the simple permanent tissue, protective in function. It forms one-cell thick covering over all the parts of plant.

Characteristics of Epidermis

1. Epidermis is formed of living cells arranged in a single layer.
2. In aerial parts, epidermis is covered with a waterproof and noncellular waxy covering called cuticle.
3. Cells form a continuous layer, but in leaves epidermis has small openings called stomata.
4. Each stoma is guarded by a pair of bean-shaped guard cells which govern opening and closing of stomatal aperture.

Cork - In old dicot stems and roots, the cells of protective tissue at the periphery change into cork cells.

Characteristics of cork

1. Cork cells are dead and closely packed without any intercellular spaces.
2. Their thick cell walls are deposited with waterproof substance which make cork cells impervious to water and air.

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(b) Supportive tissue - Supporting tissues provide support and strength to the plants. These are Parenchyma, Collenchyma and Sclerenchyma.

(i) Parenchyma - Parenchyma is the living plant tissue formed to thin-walled rounded, oval or polygonal cells.

Location : Found in the soft parts of almost all the organs of plants. They store food material and also provide temporary support to the plant.

Functions : Parenchyma forms the packing tissue in plants.

⇒ It stores food eg: Potatoes are mainly composed of parenchyma cells storing starch.

⇒ In aquatic plants, large air cavities are present between the parenchyma cells. It helps aquatic plants in floating by providing buoyancy.

⇒ Parenchyma cells with chloroplasts form chlorenchyma. They manufacture food for the plants by photosynthesis.

⇒ Intercellular spaces between parenchyma cells allow exchange of respiratory gases.

(ii) Collenchyma - Collenchyma is made up of cells which are elongated and are thick at the corners.

Location - Collenchyma is found in stem, leaf stalk (petiole) and leaf midribs. It forms a layer below the epidermis. Collenchyma is absent in monocot stems.

Functions - Collenchyma provide a flexible mechanical support to the delicate developing organs of herbaceous dicot stems.

⇒ Collenchyma cells with chloroplasts carry out photosynthesis.

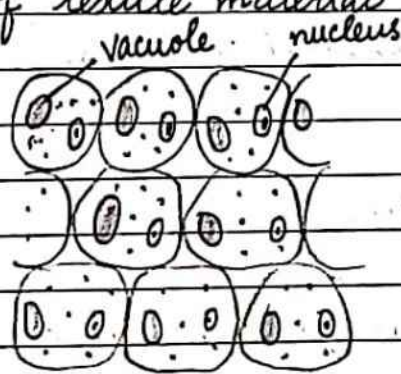
(iii) Sclerenchyma - Sclerenchyma is composed of long, narrow and thick-walled cells. Its cells are dead, without nucleus and cytoplasm. Their cell wall is formed of cellulose. It is thickened due to deposition of lignin. Lignin acts as a cement and hardens the cell wall.

* Lignin is a protein which makes the cell wall impermeable and does not allow substances to pass through it.

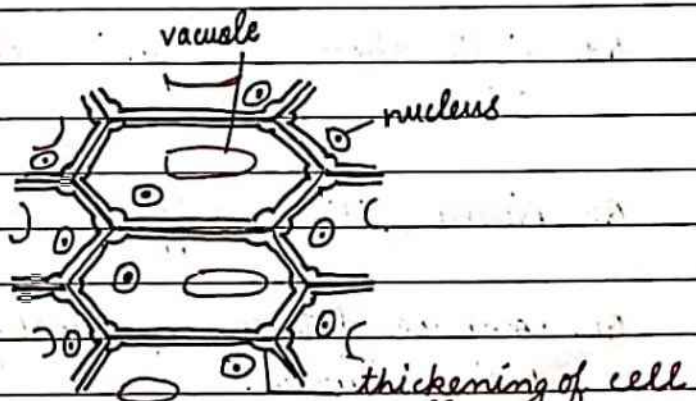
Location - Sclerenchyma occurs in roots, stem, leaves and petiole. It is also found in mature parts of plant like in wood and bark, in hard seed coats, hard shells of nuts.

Functions - The sclerenchyma provide strength and mechanical support to the plant.

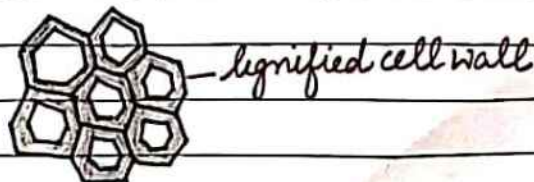
* Ropes, mats and gunny bags that are used in our everyday life are obtained from sclerenchyma fibres. Linen, flax, jute and hemp are used in preparation of textile material.



Parenchyma cells
in transverse section



Collenchyma cells in
transverse section.



Sclerenchyma cells in transverse
section.

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★ Note : Parents are requested to kindly read out the matter to the children and explain the given material alongside so that proper learning outcome takes place.

Following questions are to be written after thoroughly understanding the content of the chapter.

Q1. Define the following terms :

(i) Cell

(ii) Tissue

(iii) Organ.

Q2. What is a meristematic tissue? How is it different from permanent tissues?

Q3. What is the function of meristematic tissue?

Q4. Write about the main characteristics of meristematic tissues.

Q5. Name three supportive tissues.

Q6. Compare between parenchyma, collenchyma and sclerenchyma.