Tissues

Tissues:
Tissues can be defined as a group of cells that are similar in structure and/or perform the same function.
Microscopic study of Tissues and their function is known Histology.
Plants and Animals have different types of tissues since they differ structurally and perform different functions.

Types of Tissues and differences:

Characterstics:	Plant tissue:	Animal tissue:
Movement	They are stationary. Most of the plant tissues are dead.	They move around in search of food, shelter and to find mates. They contain living tissues which help them move and utilize energy.

Types of Tissues and differences: (cont)

Pattern of growth	Growth is limited to certain regions.	They have more uniform growth which stops at some point of life.
Structural organization of organs and organ system	The structural organization of organs and organ system is less specialized that animal.	The structural organization of organs and organ system is more specialized than plants.

Functions of Collenchyma:

1] It provides tensile strength and rigidity to the plants due to thickening of the walls.
2] Collenchyma also provides elasticity to the plant organs.
3] It provides bending of leaves and stems without breaking them.
4] Collenchyma stores food as it is alive.

Collenchyma:

Cells of collenchyma are living , elongated with cellulose thickening at the corners. They are found as longitudinal strips. Collenchyma cells appear circular or oval. Each cell posses a large central vacuole, peripheral cytoplasm and a nucleus. There is very little intercellular space between cells due to cellular thickening.
It is usually found below the epidermis is stem and stalks of leaves and midrib of leaves of dicot plants. Collenchyma is absent in monocot stems.

Complex permanent tissue

Complex tissues are made up of more than one type of cells which work in close coordination.to perform a common function. The main complex tissues in vascular plants are Xylem and Phloem. Both Xylem and Phloem are assemblage of living and dead cells. They conduct tissue and together constitute a Vascular Bundle.

Plant tissues:

There are two types of Plant tissues:
1] Maristmatic Tissues
2] Permanent Tissues

Maristmatic Tissues

A meristematic tissue is a group of young cells that have the capacity of active cell division.
Characteristics:
1] Composed of living cells and are very active.
2] Thin-walled, small sized and undifferentiated.
3] Dense granular cytoplasm. The nucleus is large, prominent and centrally.
4] Compactly arranged cells without intercellular spaces.
5] Capable of dividing indefinitely, active cell division.
6] They don't store reserve food material.
7] They lack Vacuoles.
Types of Meristematic Tissues:
1] Apical meristem
2] Lateral meristem
3] Intercalary meristem

Apical meristem:

It is found at the growing tips of stem, root and their growing branches. It is also called primary meristem. It consists of a group of cells which give rise to primary tissues that together constitute the primary body of the plant.
Due to growth of Apical meristem, there is increase in the length of stems and roots.

Sclerenchyma:

Cells of this tissue are dead. Their cell wall are thickened due to lignin which is a chemical substance that acts as cement and hardens them. These tissues occur in the veins of leaves and in hard covering of seeds and nuts. They form an important part of the bark trees. Sclerenchyma consists of two types- fibers and sclereids

Functions of Sclerenchyma:

1] It provides mechanical strength to the plant and its parts.
2] They protect the plant from environment forces like strong winds.
3] They make the plant hard and stiff. The husk of a coconut is made up of Sclerenchyma only.

Xylem

Xylem is mainly concerned with the conduction of water and minerals. It also provides mechanical support to the plant. Xylem forms a continuous channel through the roots, stem, leaves and other aerial parts. Xylem consists of four types of cells: Xylem vessels, Tracheid, Xylem fibers and Xylem parenchyma.

Functions of Xylem

1] There are four types of cells- Xylem vessels, Tracheids, Xylem fibres and Xylem Parenchyma.

Functions of Xylem (cont)

2] Xylem vessels and tracheids are tabular structures and helps in transport of water and minerals from roots to aerial parts of the plant.
3] Xylem fibres are supportive in nature and provides mechanical strength too the plant body.
4] Xylem Parenchyma are the only living components of Xylem and is concerned with the storage of food and sideways conduction of water.

Lateral meristem

It occurs on the sides of roots and stem and its responsible for increase in the girth (diameter) of the roots and stem. These tissues are also responsible for growth in thickness by the addition of secondary tissue and this is called Secondary growth.

Intercalary meristem

It helps in elongated of the Organs. It represent mostly at the base nodes, internodes and the base of leaves.

Permanent tissues:

It is a group of cells in which growth has either stopped completely or for the time being. Maybe dead or alive, thin or thick walled. They are formed by the growth of meristematic tissues. Process of taking up up a permanent shape, size and function is called called different-iation.
It can be categorized as:
1] Simple permanent tissues
2] Complex permanent tissues

Simple Permanent Tissue:

The tissue made up of one type of cells, which resemble each other and perform similar functions are called simple permanent tissues. They are specialized to perform supportive function.
There are three types of simple permanent tissues:
1] Parenchyma
2] Collenchyma
3] Sclerenchyma

Epidermis:

(*epi*- upon, *derma*- skin)
Epidermis is the outermost protective layer of plant organs. It covers the entire surface of the plant. It so not have intercellular spaces. Outer and side walls of most epidermal cells are thicker than the inner walls.
Aerial plants secrete a waxy, water resistant layer on their outer most surface which protects them against loss of water, mechanical injury and any attack by pathogenic fungi.
In desert plants, outer walls of the epidermis are usually thick and covered with organic substances like Cutin. Cutin is a chemical substance that is waterproof.
The epidermal cells of the root contain long hair like structures called Root Hair. The root hairs increases surface area for absorption of water and nutrients from soil.

Epidermis: (cont)

Epidermis of leaf contains small pores called Stomata. Each stomata is enclosed by two kidney shaped celled called Guard cells. These guard cells enclose a central cavity.
Stomata helps in exchange of gases with the atmosphere.
They also helps in transpiration (loss of excess water in the form of water vapour).

Phloem

It is the chief food-conducting tissues of plants. Phloem is responsible for the transport of food prepared by the leaves to the other parts of the plant.
There four types of phloem cells- Sieve tubes, Companion cells, Phloem Parenchyma and phloem fibres.

Parenchyma

It is made up of unspecialized thin-walled cells. The cells of Parenchyma tissue are live and oval, rounded or polygonal in outline. Their wall is made up of cellulose. There are intercellular spaces in between them.

Parenchyma (cont)

Parenchyma is found in all plants. It forms the major tissue of softer parts like epidermis, cortex, pith and leaf mesophyll.
It is also found in Xylem and Phloem.

Functions of Parenchyma:

1] It stores materials in the form of proteins, starch, oil and fats.
2] Parenchyma of stem and roots also store nutrients and water.
3] Parenchyma cells provide support and rigidity to the plants by keeping the cells rigid.
4] Parenchyma cells form the basic packing tissues and protect the internal tissues.
Parenchyma tissue contains chlorophyll and is called chlore-nchyma. Chlorenchyma helps in photosynthesis.
In many aquatic plants, parenchyma cells have well developed air spaces and are known as as Aerenchyma. These air filled intercellular spaces give buoyancy to plants and help them float in water.

Functions of Epidermis

1] It protects internal tissues against mechanical injury, parasitic fungi, bacteria and cold or heat.
2] Thick cuticle, wax, epidermal hair and multiple epidermis reduce loss of water from internal tissue.
3] Epidermis cells of roots have hair that greatly increase the surface area for the absorption of water and nutrients.

Cork (phellum)

A strip of secondary meristem replaces the epidermal layer of the stem forming a multiple layered thick bark of the tree is called Cork. It made up of dead, thick-walled cells. The cork cells are compactly arranged without any intercellular spaces. The walls of cork also contain Suberin (a chemical substance) which is impervious to gases and water.

Functions of cork cells

1] Cork cells being highly suberized and thick-walled protect the inner tissues.
2] It provides insultation from freezing temperatures.
3] It protects the inner tissues from the attacks of microorganisms and prevents water loss also.

Functions of Phloem

1] There are four types of Phloem- Sieve tubes, Companion cells, Phloem Parenchyma and Phloem fibres.
2] Except phloem fibres which are dead, rest all other members of Phloem tissues are living.
3] The Sieve tubes are elongated tubular conducting channels, which are placed end to end. They have perforated walls.
4] They conduct food material prepared in the leaves and greener young stems to all parts of the plants.

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