

Short Notes (Anatomy)

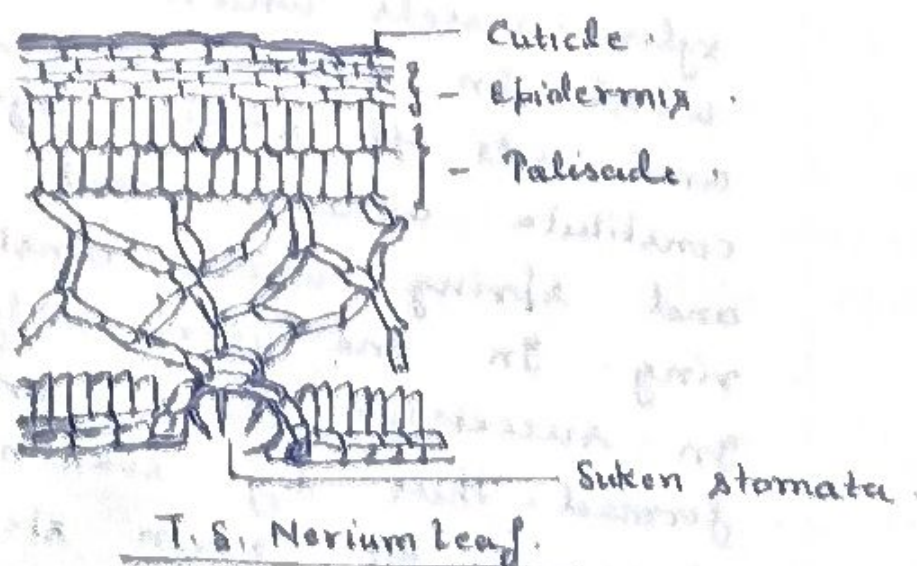
Xerophyte, Periderm, Annual ring, Phellum, Abscission of leaf, Medullary bundles, Tyloses, Sclerenchyma, Intraxillary phloem

Xerophyte → Xerophyte (xeric: Dry) are those plants which occur in physical or physiological dry environment. They can withstand a prolonged period of drought uninjured. The anatomical adaptations are for the purpose of -

- Control of transpiration rate
- To increase special means for absorption of more water
- Storage mechanism to retain water for longer period.

The characteristic anatomical features of the xerophytes are as follows -

Presence of thick cuticle on epidermis, sunken stomata, Sclerenchymatous, hypodermis, reduced intercellular space, well developed mechanical and vascular tissue. Latex tubes, water storage tissue, mucilaginous canals are also present. eg. Nerium, Euphorbia, Salanum, xanthocarpum, Argemone, mexicana, etc.

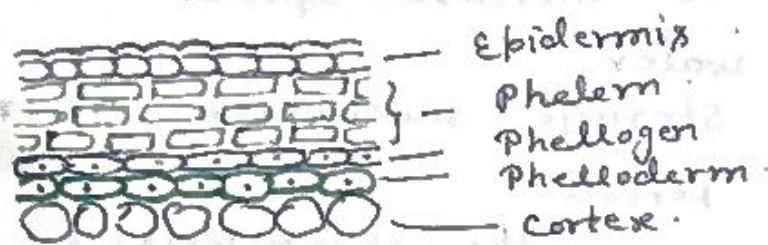


Periderm →

Periderm is the protective tissue of extrastelar origin. It originates by the meristematic activity of the cork cambium. The formation of periderm is a common phenomenon in stems & roots of dicotyledons.

and gymnosperms that increase in thickness by secondary growth. It is meant to adjust the underlying tissues like epidermis, cortex, endodermis, and pericycle against the spontaneous internal pressure due to secondary growth.

Structurally, the periderm consists of three parts - ① a meristem known as phellogen or cork cambium, ② the layer of cells cut off by phellogen on the outer side, the phellern or cork, ③ the cells cut off by phellogen towards inner side - the phelloderm.

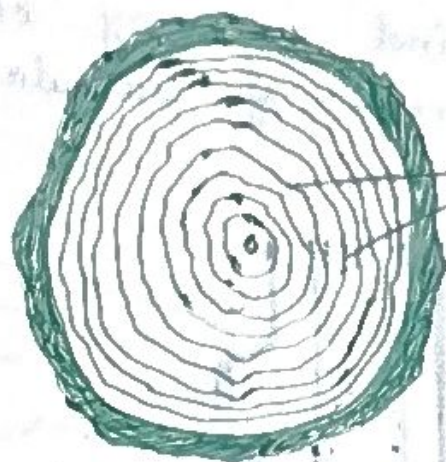


Periderm formation.

Annual ring →

Annual ring is the ring developed in the region of secondary xylem due to seasonal variations by the cambium. Cambium is not uniformly active throughout the year. In spring or summer cambium is more active and forms large sized xylem vessels which constitute spring or early wood. In autumn or winter cambium is less active and cuts off small size xylem vessels that constitute autumn wood or late wood. Both autumn and spring wood constitute a growth or annual ring. In one year, only one growth ring is formed. In successive year numerous growth rings are formed. Thus by counting the number of annual rings in the main stem at the base we can determine the age of a tree. The branch of science is known as dendrochronology.

Dtg -



Annual ring.

Abscission of leaves → During abscission of leaves, leaves are separated from the stem without causing any injury to the living tissues in stem and the newly exposed tissue is also protected from desiccation and infection.

Periodic defoliation is a notable feature of the woody dicots. The deciduous plants shed their leaves at the approach of winter or spring season. Defoliation takes place due to cytologic and chemical changes in cells along which the leaf will separate. This zone is called abscission zone.

In the abscission zone two layers are formed an abscission or separation layer, in which structural changes facilitate the separation of the leaf and a protective layer which develops beneath the separation layer and protects the exposed surface formed by the falling of leaf.

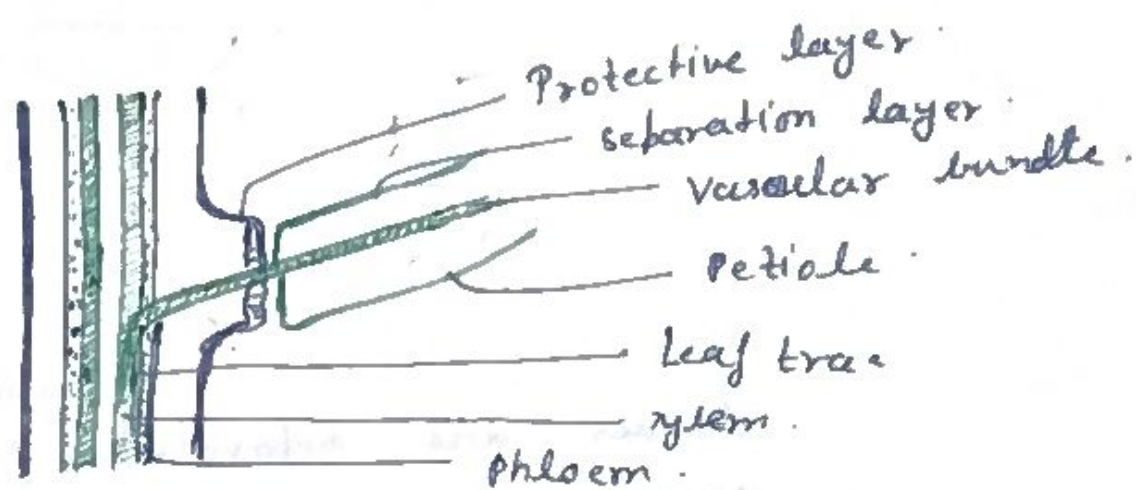
In most of the leaves and other parts the abscission zone formation starts during ontogeny but it may take place directly when conditions provoking exist.

The separation of the leaf along the abscission layer can be caused by three methods -

- I) The dissolution of middle lamella.
- II) The dissolution of primary walls.
- III) The dissolution of entire walls.

The formation of tyloses in the vessels and the callose in sieve tissue stops the supply of water & food. A little disturbance to the

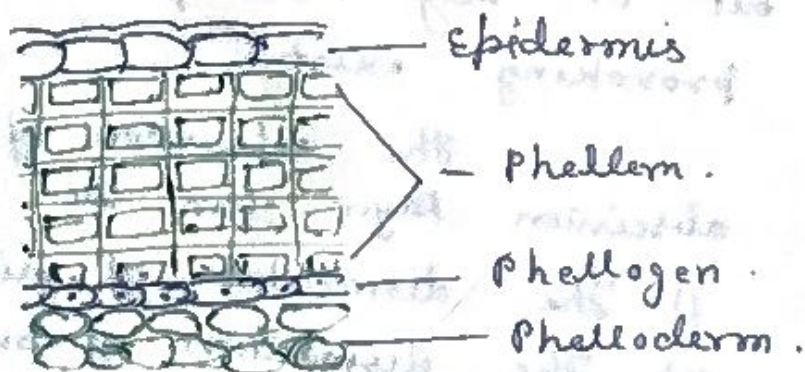
leaf by wind or any other mechanical pressure causes the break of vascular tissue and the leaf falls.



Topographical sketch of abscission of leaf.

Phellum → Phellum is the part of periderm. The new cells formed on the outside of the cork cambium lose their contents, become filled with air and are arranged in rows at right angles to the surface forming a dead impervious layer. Phellum are the thick walled uniform cells without any inter cellular space. The cell wall becomes suberized and the intercellular spaces are lost. This dead tissue acts as a phellum.

- (i) Protection is the main function of cork.
- (ii) The lack of air spaces and suberization in the cork help in checking evaporation of water.
- (iii) It checks the invasion of living tissues by fungi & bacteria.



Medullary bundle → In many dicot, in addition to the normal V.B., there are other vascular bundle which are scattered in ring in well defined path

is called medullary bundle. These bundles are conjoint, collateral and open with endarch xylem. Such type of medullary bundles have been found in 38 dicot families such as Amaranthus, Achyranthes, Chenopodium, Boerhaavia, Mirabilis etc.

In Mirabilis medullary bundles are numerous and scattered. Peripheral bundles are smaller in size and more crowded while the central bundles are larger & more spaced out. In Boerhaavia, medullary bundles are arranged in rings. The central ring consists of two leaf trace bundles oppositely oriented which are surrounded by numerous bundles. In Piper betle, there are numerous medullary bundles which are found to be scattered in the pith. In Achyranthes aspera two separate medullary bundles occur throughout the length of an individual plant.

Intraxylary phloem →

Intraxylary phloem is also called internal phloem. The phloem present on the inner of xylem is called intraxylary phloem. It occurs in the form of strands or as a continuous band around the pith. The origin of intraxylary phloem in most plants is primary. The cells of intraxylary phloem are like those of external phloem except that they