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PROJECT REPORT ON
ANATOMY OF MONOCOT AND DICOT ROOT,STEM AND LEAF



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Examiners

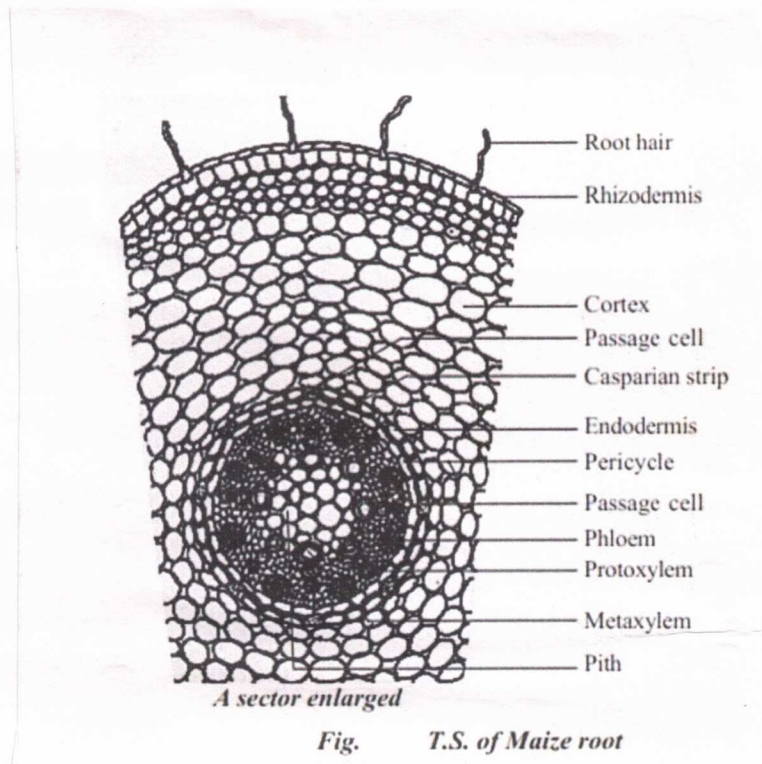

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T.S. OF MONOCOT ROOT



⇒ The transverse section of the monocot root shows the following plan of arrangement of tissues from the periphery to the centre.

* Epiblema: The outer most layer is made up of single layer of parenchymatous cells without intercellular spaces.

* Cortex: The function of cortical cells is storage.

* Endodermis: It is made up of single layer.

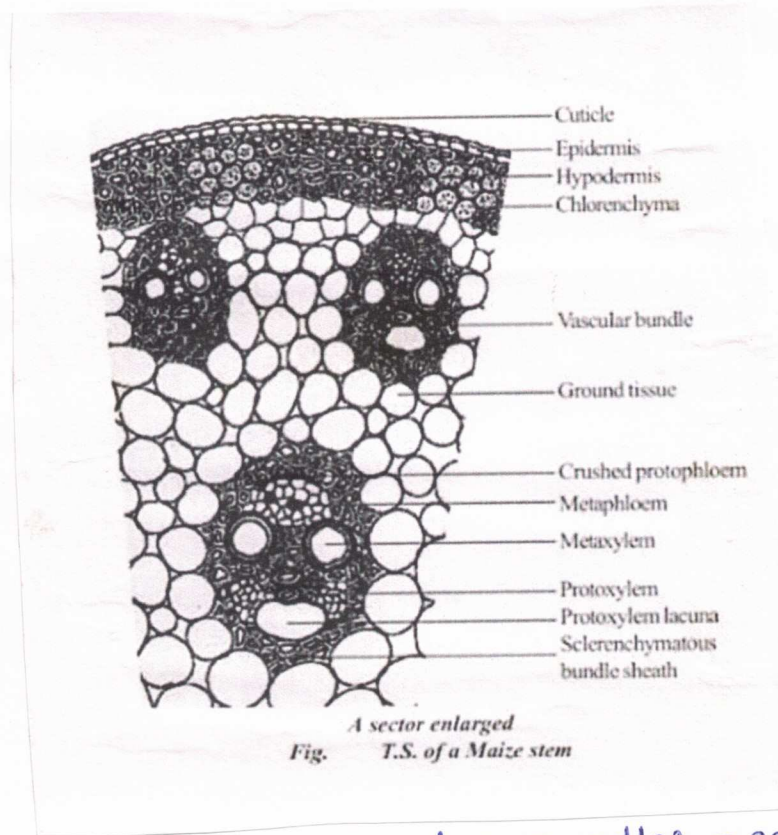
* Stele: All the tissues present inside endodermis comprise the stele.

A. Pericycle: A single layer of parenchymatous cells found inner to the endodermis. Lateral roots originate from the pericycle.

B. Vascular system: vascular tissues are in radial arrangement. Xylem and phloem are separated by sclerenchymatous conjunctive tissue.

* Pith: The central position is occupied by a large pith consist of thin walled parenchyma cells with intercellular spaces. These cells are filled with abundant starch grain.

T.S. OF MONOCOT STEM



⇒ The Monocot stem has vascular bundles near the outside edge of stem. Bundles are scattered in parenchymatous ground tissue.

* Epidermis: It is the outermost layer made up of single layer of tightly packed parenchymatous cells with thick cuticle.

* Hypodermis: A few layers of sclerenchymatous cells lying below the epidermis constitute the hypodermis, gives mechanical strength to the plant.

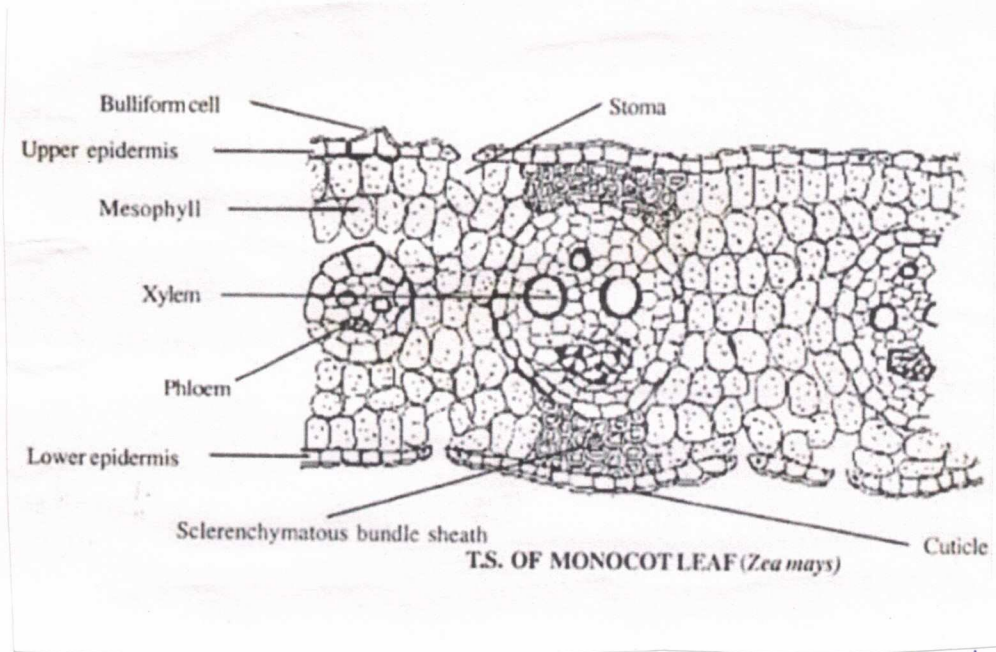
* Ground tissue: It is differentiated into cortex, endodermis, pericycle and pith.

* Vascular Bundles: Vascular bundles are scattered in the parenchymatous ground tissue. The vascular bundles are conjoint, collateral, endarch and closed.

* Phloem: The phloem in the monocot stem consists of sieve tubes and companion cells.

* Xylem: The two metaxylem vessels are located at the upper two arms and one or two protoxylem vessels at the base [Y shaped].

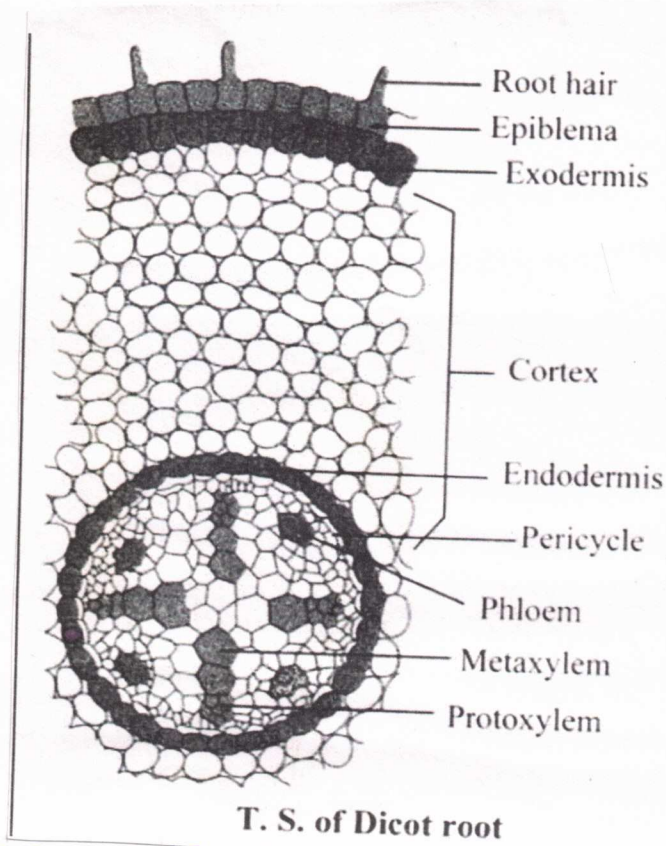
T.S. OF MONOCOT LEAF



The anatomy of a monocot leaf includes: Both adaxial epidermis and abaxial epidermis bear stomata. There is no differentiated palisade and spongy parenchyma of the mesophyll. Bulliform cells are present, which is developed from adaxial epidermal cells and the veins.

Cuticle and trichomes are present in both the layers. Stomata are found in both the epidermal layers. Inter-cellular spaces are prominent. Veins are found parallelly arranged in the mesophyll [Parallel venation]. Each vascular bundle is surrounded by a bundle sheath composed of a single layer of compactly arranged barrel-shaped cells. The bundle sheath encloses both phloem and xylem, phloem is found towards lower epidermis and xylem towards upper epidermis. In the xylem, only two protoxylem and two metaxylem vessels are present. The vascular bundle is described as conjoint and collateral with endarch xylem.

T.S. OF DICOT ROOT



⇒ The transverse section of dicot root.

* Epiblema: The outermost layer is made up of single layer of parenchymatous cells without intercellular spaces.

* Cortex: Cortex contains of oval or rounded cells.

* Endodermis: The radial and the inner tangential walls of endodermal cells are thickened with suberin. These thickenings are known as Casparyan strips.

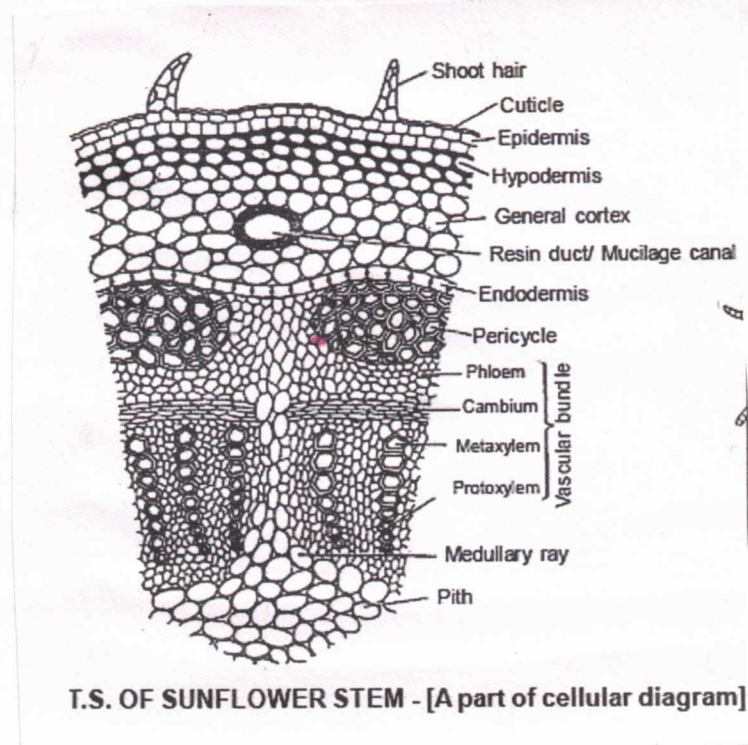
* Stele:

A. pericycle: Pericycle is generally a single layer of parenchymatous cells found inner to the endodermis. Lateral roots originated from the pericycle.

B. Vascular system: Vascular tissues are in radial arrangement. The tissue by which Xylem and phloem are separated is called conjunctive tissue. Xylem shows exarch and tetrarch condition. Metaxylem shows vessels are generally polygonal in shape.

* Pith: Usually absent.

T.S. OF DICOT STEM



The dicot stem contains vascular bundles arranged in a ring around the pith. Vascular bundle is conjoint, collateral, open and endarch.

* Epidermis: It is a protective outermost single layer of parenchymatous cells without intercellular spaces.

* Cortex: Below the epidermis, cortex is differentiated into few layers of collenchyma cells that make hypodermis which gives mechanical strength to the stem.

* Endodermis [starch sheath]: The cells of this layer are barrel shaped arranged compact without intercellular spaces.

* Stele: It contains of pericycle, vascular bundles and pith.

A. Pericycle [Bundle cap]: Pericycle occurs b/w the endodermis and vascular bundles.

B. Vascular bundles: Arranged in a ring around the pith. Each vascular bundle is conjoint, collateral spaces; open and endarch.

C. Pith: The large central portion called pith composed of parenchyma cells with intercellular spaces.

T.S. OF DICOT LEAF

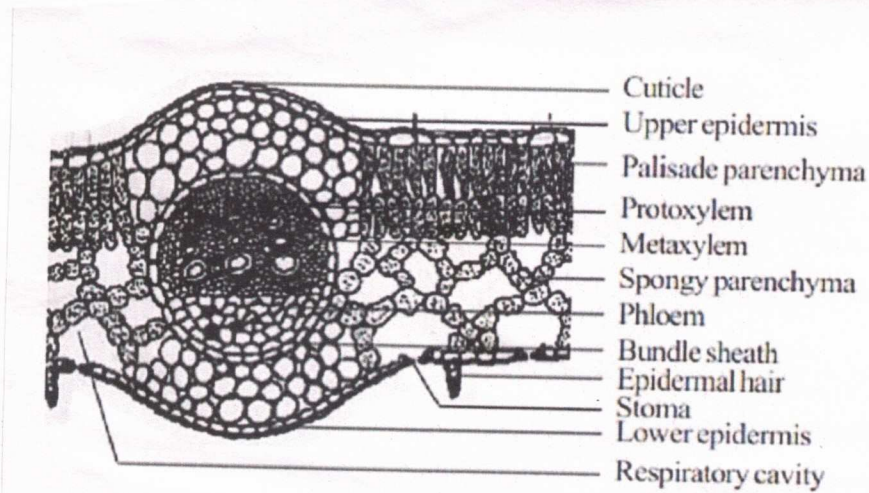


Fig. T.S. of sunflower leaf

Broadly, a dorsiventral dicot leaf shows three structures, namely - epidermis, mesophyll and vascular system. The epidermis is present on both the upper and lower surfaces of a leaf with thin cuticles which protect the plants against mechanical and physical injury.

*Epidermis: Upper and lower epidermis has completely arranged parenchymatous cells. Stomata are present more in lower epidermis as compared to upper epidermis.

*Mesophyll: It is made up of palisade parenchyma and spongy parenchyma. Mesophyll also possess different kinds of Sclerenchyma.

*Vascular Bundles: The vascular bundles in midrib are conjoint and collateral. Phloem lies towards the lower side, Xylem lies toward the upper side. Nerium, cannabis, Prunus etc. have a single vascular bundle. Sunflower, ~~vitis~~ vitis etc have many vascular bundles. Bulliform cells are absent in dicot leaves.