TOPIC:PLANT TISSUE SYSTEM-III

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Monocotyledonous Root

The anatomy of the monocot root is similar to the dicot root in many respects.

It has epidermis, cortex, endodermis, pericycle, vascular bundles and pith.

As compared to the dicot root, monocots have more xylem bundles (usually more than six – polyarch).

Pith is large and well developed.

Monocotyledonous roots do not undergo any secondary growth.

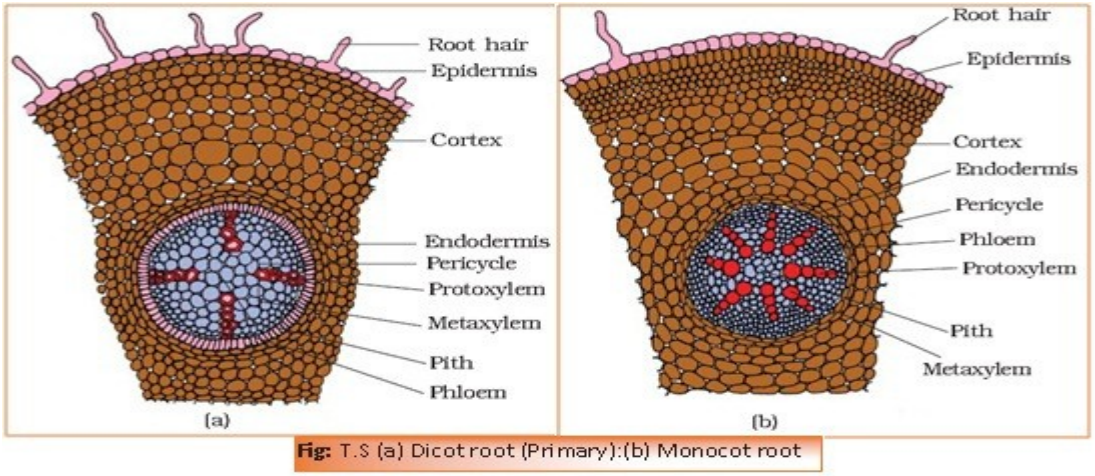

Fig: T.S (a) Dicot root (Primary):(b) Monocot root

Dicotyledonous Stem

Epidermis – outermost protective layer of the stem Covered with a thin layer of cuticle, it may bear trichomes and a few stomata.

Hypodermis –consists of a few layers of collenchymatous cells just below the epidermis, which provide mechanical strength to the young stem.

Cortex –consist of rounded thin walled parenchymatous cells with conspicuous intercellular spaces.

Endodermis – The innermost layer of the cortex is called the endodermis. The cells of the endodermis are rich in starch grains and the layer is also referred to as the starch sheath.

Pericycle –present on the inner side of the endodermis and above the phloem in the form of semi-lunar patches of sclerenchyma.

VascuIr bundles – Conjoint, collateral, open type; endarch xylem; arranged in a ring.

Pith – A large number of rounded, parenchymatous cells with large intercellular spaces which occupy the central portion of the stem constitute the pith.

Monocotyledonous Stem

- Sclerenchymatous hypodermis,
- large, undifferentiated, conspicuous parenchymatous ground tissue large number of scattered vascular bundles, each surrounded by a sclerenchymatous bundle sheath,
- Vascular bundles are conjoint and closed. Peripheral vascular bundles are generally smaller than the centrally located ones.
- The phloem parenchyma is absent, and water-containing cavities are present within the vascular bundles.

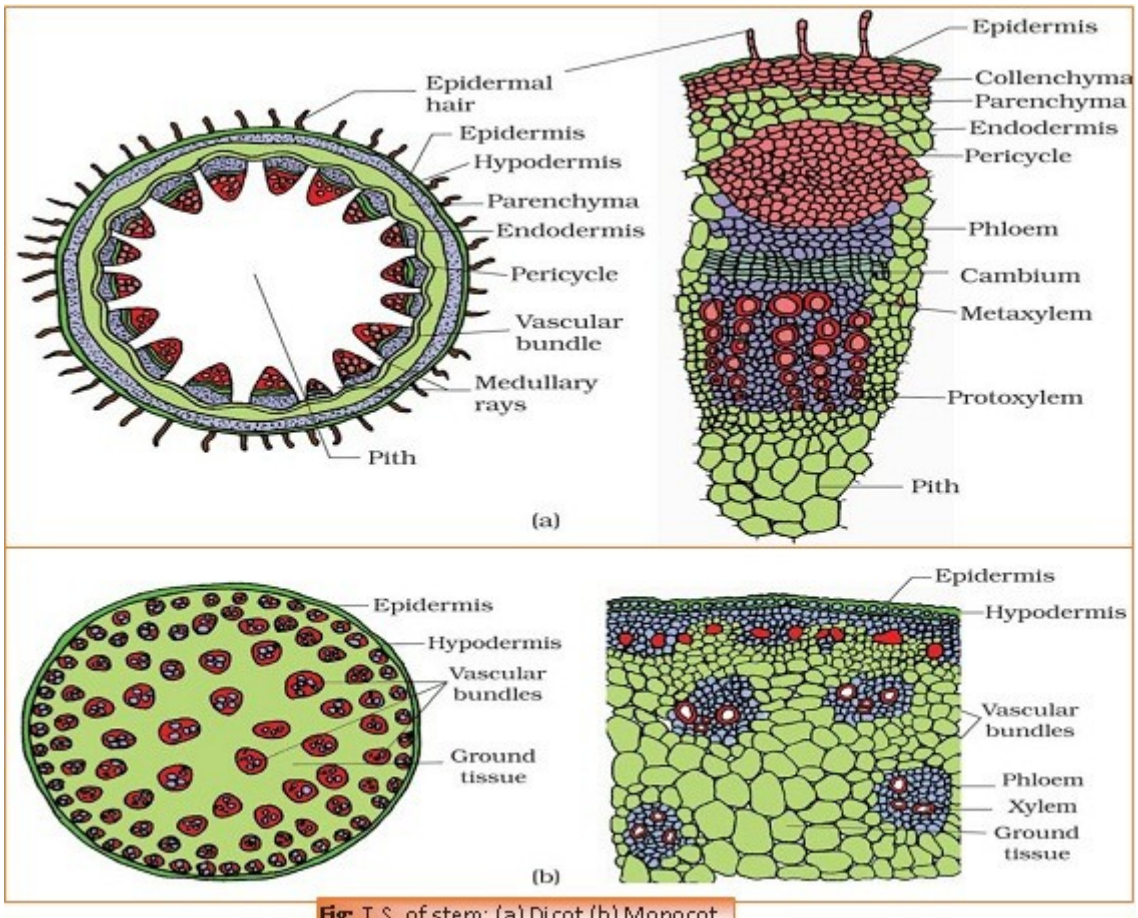

Fig: T.S. of stem: (a) Dicot (b) Monocot

Dorsiventral (Dicotyledonous) Leaf

Epidermis – It covers both the upper surface (adaxial epidermis) and lower surface (abaxial epidermis) of the leaf and has a conspicuous cuticle. The lower (abaxial) epidermis generally bears more stomata than the upper (adaxial) epidermis. The latter may even lack stomata.

Mesophyll –parenchymatous cells present between the upperand the lowerepidermis. it possesses chloroplasts and carry out photosynthesis.It has two types of cells – the **palisade parenchyma** andthe **spongyparenchyma**.

Palisade parenchyma is placed adaxially and made up of elongatedcells, which are arranged vertically and parallel to each other.

Spongy parenchyma made up of oval or round and loosely arranged spongy parenchymatous cells. There are numerous large spaces and air cavities between these cells.

Vascular system –vascular bundles are seen in the veins and the midrib. The size of the vascular bundles are dependent onthe size of the veins.The veins vary in thickness in the reticulate venation of the dicot leaves.

The vascular bundles are surrounded by a layer of thick walled **bundle sheath cells**

Isobilateral (Monocotyledonous) Leaf

The anatomy of isobilateral leaf is similar to that of the dorsiventral leaf in many ways.

It shows the following characteristic differences –

- In an isobilateral leaf, the stomata are present on both the surfaces of the epidermis.
- mesophyll is not differentiated into palisade and spongy parenchyma.
- In grasses, certain adaxial epidermal cells along the veins modify themselves into large, empty, colourless cells. These are called **bulliform cells.** When the bulliform cells in the leaves have absorbed water and are turgid, the leaf surface is exposed. When they are flaccid due to water stress, they make the leaves curl inwards to minimise water loss.
- The parallel venation in monocot leaves is reflected in the near similar sizes of vascular bundles (except in main veins).

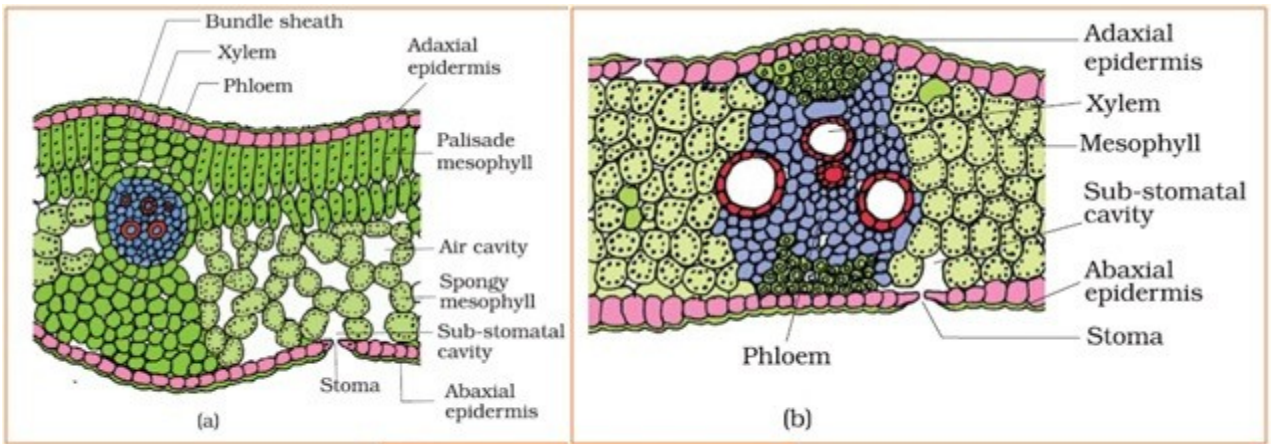

Fig: T.S. of leaf: (a) Dicot (b) Monocot