

Summary of online class taken on 15.4.2020

Study of Anatomical Details of Dicotyledonous Leaf

Plant Specimen: Leaf of *Mangifera indica* (Family: Anacardiaceae)

Observation: A thin section of the leaf reveals the following internal tissue organisation.

Epidermis:

1. It occurs on the **adaxial** and **abaxial** surface of the leaf and accordingly termed as **upper epidermis** and **lower epidermis**.
2. Both the epidermis layers are uniseriate and composed of tubular cells.
3. The cells are compactly set and are covered with cuticle on their outer wall.
4. The upper epidermis is continuous and the cuticle is thick in contrast to lower epidermis.
5. The continuity of lower epidermis is interrupted by presence of stomata.

Mesophyll:

1. It occurs between the upper and lower epidermis.
2. Mesophyll tissue is distinguished into palisade and spongy parenchyma.

(a) Palisade Parenchyma:

1. It is just internal to the upper epidermis and is composed of elongated columnar parenchyma, which is arranged perpendicular to upper epidermis.
2. They are compactly set and contain abundant chloroplasts on their radial walls.
3. Palisade parenchyma consists of two layers of cells and occurs as a continuous band.
4. The cells of bundle sheath extension above large vascular bundle may interrupt the continuity of palisade cells.
5. Although palisade cells are compactly arranged, small intercellular spaces are present and each cell is in contact with the spaces.

(b) Spongy Parenchyma:

1. It is present towards the lower epidermis.
2. They are many layered and occur as a continuous layer except at the bundle sheath extension region.
3. The cells are more or less isodiametric, loosely arranged with conspicuous intercellular spaces and enclose small air spaces.
4. These intercellular spaces are continuous with the intercellular spaces formed by palisade parenchyma.

Vascular Bundles:

1. The vascular bundles are collateral, closed with **mesarch xylem**.
2. The phloem occurs towards the lower epidermis and xylem occurs towards the upper epidermis.
3. The bundles are of various sizes.
4. A layer of bundle sheath made up of parenchyma surrounds the smaller bundles.
5. In the large bundles, in addition to bundle sheath, there occurs thin or thick walled parenchyma above and below and it connect the bundle with upper and lower epidermis.

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- Comment:**
1. There are two epidermis, i.e., upper and lower.
 2. Ground tissue is differentiated as **mesophyll tissue**.
 3. Vascular bundles are **closed collateral**.
 4. Xylem is **mesarch** (protoxylem lies in centre surrounded by lately developed metaxylem).
 5. In each vascular bundle, xylem occurs towards upper epidermis and phloem occurs towards lower epidermis (**Inverted Vascular Bundles**).
.....Hence the supplied specimen is a T.S. of a **leaf**.
 6. Stomata is present on the lower epidermis.
 7. Leaves are dorsiventrally differentiated.
 8. Mesophyll tissue is differentiated into palisade and spongy parenchyma.
 9. Vascular bundles are of various sizes.
..... Hence the supplied specimen is a T.S. of a **dicotyledonous leaf**.

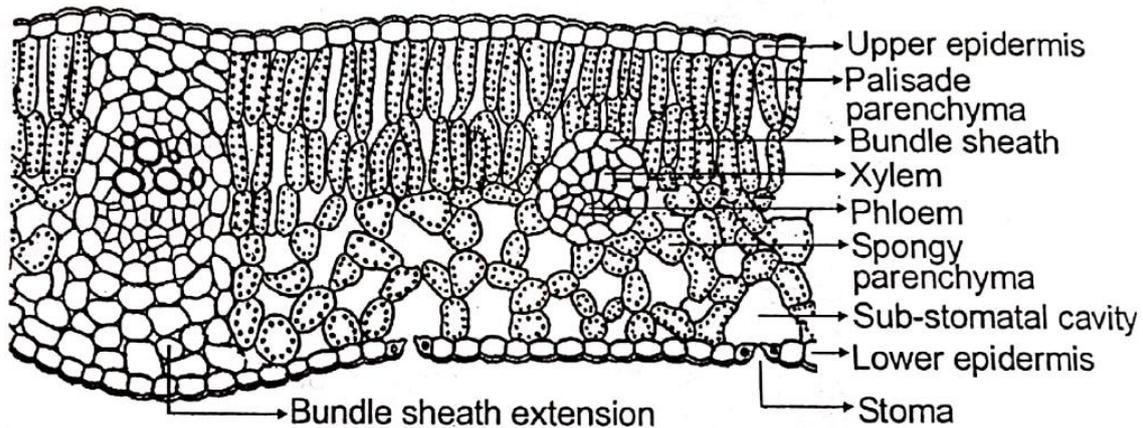


Fig. 25.45 : A part of *Mangifera* leaf in transverse section.

Hydrophyte: Dicot

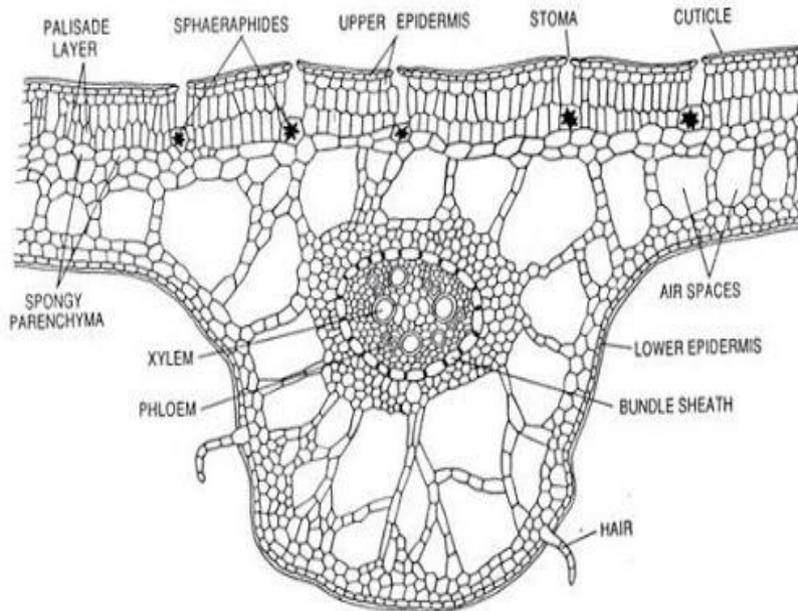
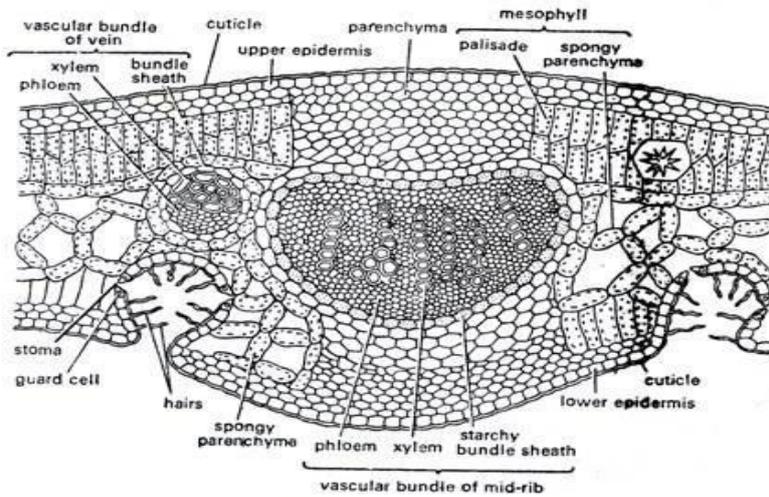


Fig. 41.25. Hydrophytes. T.S. floating leaf of *Trapa bispinosa*, showing big air spaces; the stomata confined to upper epidermis only.

Xerophyte : Dicot



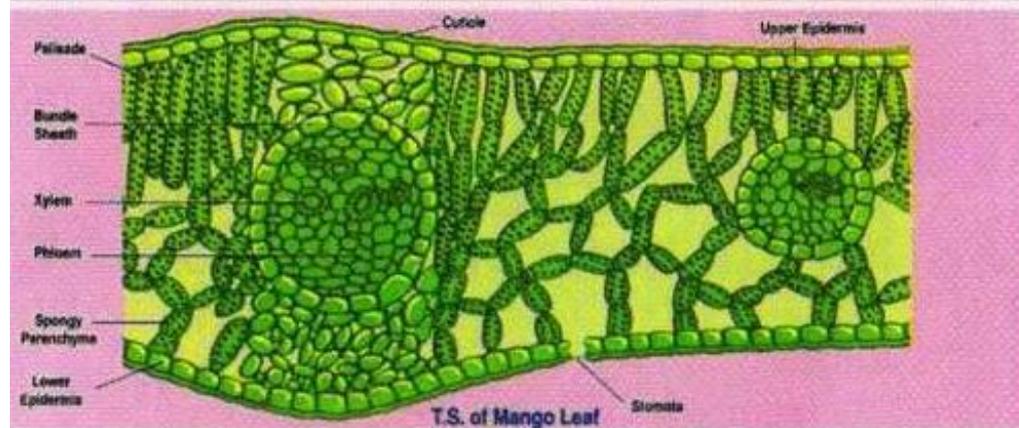
T.S. leaf of *Nerium* (non-succulent perennial)

Anatomical features of some true xerophytes.

T. S. Leaf – Dicot

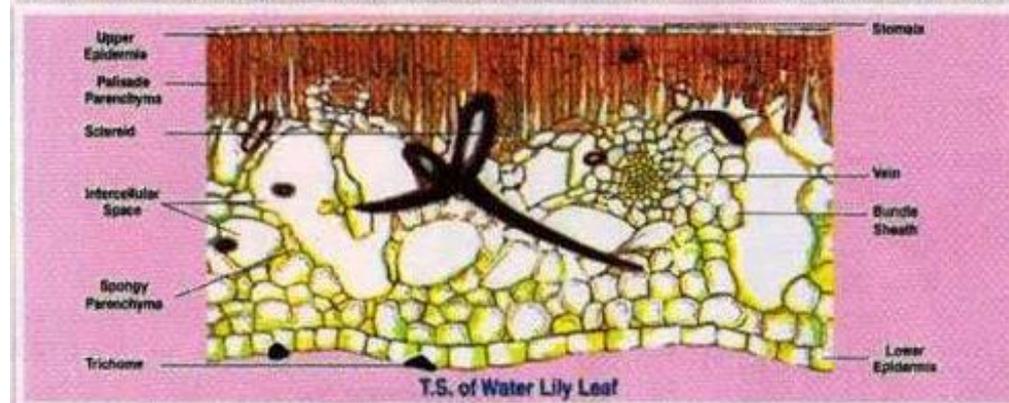
T.S. of Dicot Leaf (Mango)

Dicot leaf is dorsiventral. A dorsiventral leaf is more strongly illuminated on the upper surface in the lower surface. In the internal structure, there is a good deal of difference between the two sides



T.S. of Hydrophytic Dicot Plant Leaf

Water lily, a magnollid, floats on the surface of water and has stomata in the upper epidermis only. Cuticular tissue is much reduced, especially the xylem. The palisade parenchyma consists of several layers of cells above the spongy parenchyma. The large intercellular spaces add buoyancy to this floating leaf.



T.S. of Xerophytic Dicot Plant Leaf

Nerium oleander, a xerophyte, have very thick cuticle, covering the multiple epidermis on the upper and lower surfaces of the leaf. The stomata and trichomes are restricted to invaginated portions of the lower epidermis, called stomatal crypts.

