

Name: Dr. Rachana Shalini
Subject: Botany
Course: Deg.-I (Hons. & Subs.)
Paper: II
Topic: Anatomy of *Psilotum*
Lecture no.- 41
Date: 20/05/2020

Internal Structure of *Psilotum*:

(1). Aerial shoot:

A transverse section of the stem shows three regions, viz., epidermis, cortex and stele. Epidermis is single layered and has closely packed cells. The layer is discontinuous due to the presence of stomata. The stomata are restricted to grooves between the longitudinal ridges and are sunken in nature. Above the epidermis there is a thick cuticle.

The cortex is divided into three zones. The outer zone is chlorenchymatous and is made up of 2-5 layers of cells. The cells are loosely arranged with intercellular spaces. As the leaves are reduced, this constitutes the chief photosynthetic tissue of the plant.

The presence of thick cuticle, sunken stomata, photosynthetic stem and reduced leaves indicate the xerophytic nature of *Psilotum*. The middle region of cortex consists of 4-5 layers of sclerenchyma offering mechanical support to the stem. The inner cortex is made up of a few layers of closely packed parenchyma cells.

The stele occupies the central region of the stem. The outermost layer of the stele is endodermis. Next to the endodermis is an ill defined pericycle. The nature of the stele varies in the ultimate branches and in the basal portion. In the ultimate

branches the stele is an actinostelic protostele with a solid core of stellate xylem mass in the centre. In the basal portion however, the central region of the stele consists of a sclerotic pith.

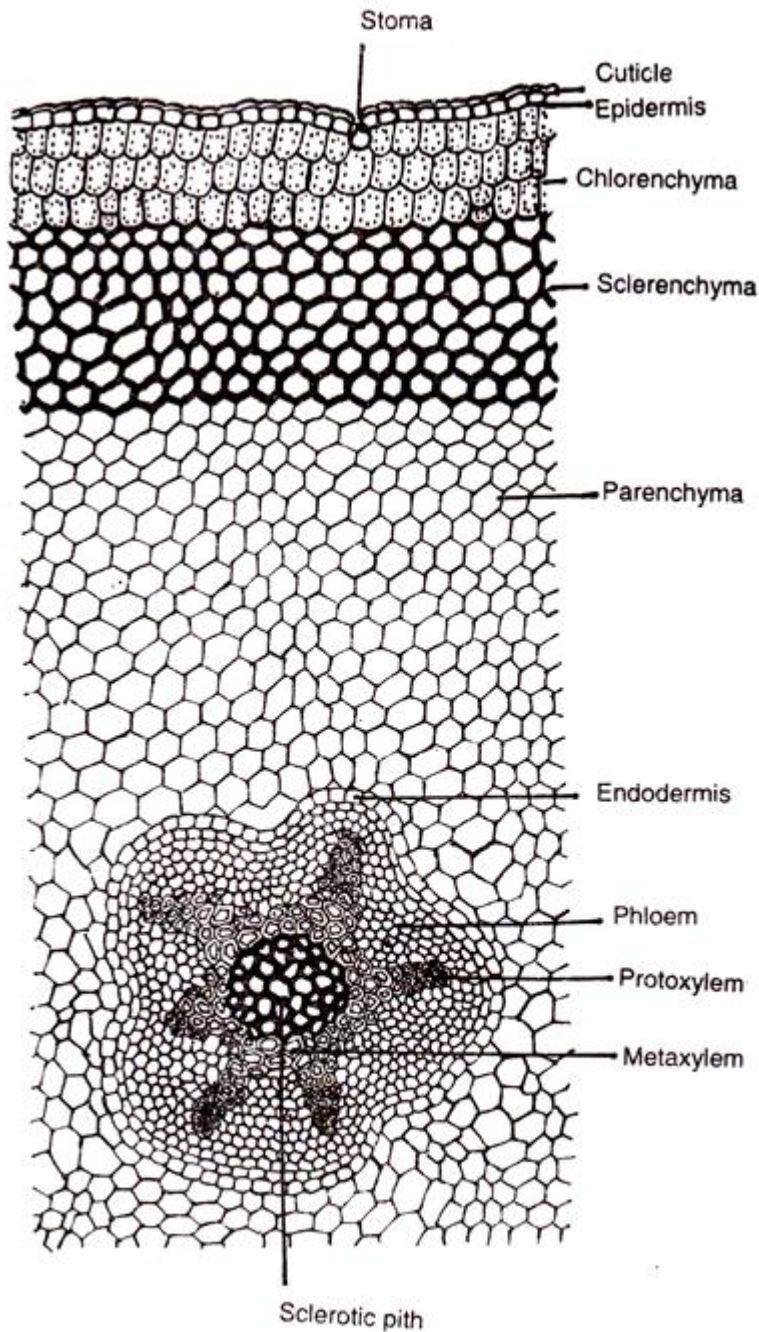


Fig. 21. *Psilotum* : T.S. of Aerial Shoot (a sector enlarged)

The xylem is exarch with the protoxylem points located at the lips of the rays. The xylem consists of scalariform pitted or annular tracheids. Sometimes spiral

tracheids are also found. Surrounding the xylem is the phloem. According to Parihar (1965) the nature of phloem is difficult to determine because the distribution of sieve areas in these cells is imperfectly known.

In the ultimate branches the xylem may be smooth instead of the usual stellate nature. At the extreme base of the aerial stem between the xylem and phloem some, scattered xylem elements are found. Boodle (1904), Ford (1904) and others regard it as secondary xylem. According to Schoute (1938) however, these are primary xylem elements differentiating a little later in ontogeny. His opinion is, based on the absence of a definite cambium.

(2). Rhizome:

This also shows an epidermis, a cortex and stele. The epidermis is ill defined. The cortex is divided into three zones. The outer cortex is parenchymatous and the cells have mycorrhizal fungus. The middle cortex has parenchyma cells rich in starch grains.

The innermost region of the cortex also consists of parenchyma that are usually dark brown in colour due to the deposition of a substance called phlobaphene. This is believed to be an oxidation product of tannins.

The stele is protostelic and is surrounded by a typical endodermis which is followed by a layer of pericycle. The shape of the xylem varies with the diameter of the axis. Usually it is circular in outline. The xylem is exarch and is surrounded by phloem.

(3). Leaf:

Anatomically the leaves show epidermis and the mesophyll. The epidermal cells are cutinised. The mesophyll has chlorophyllous cells which may be loosely or closely packed. The stomata are absent in the epidermis as such the chlorophyllous cells have no means of gaseous exchange. There is no vascular

supply to the leaf. But in *P. flaccidum* a leaf trace which starts from the stem terminates at the leaf base.

The absence of stomata and the lack of vascular supply make the chlorophyllous cells of the leaf ineffective in photosynthesis.

Apical growth: A single wedge shaped apical cell contributes to the growth of the stem.

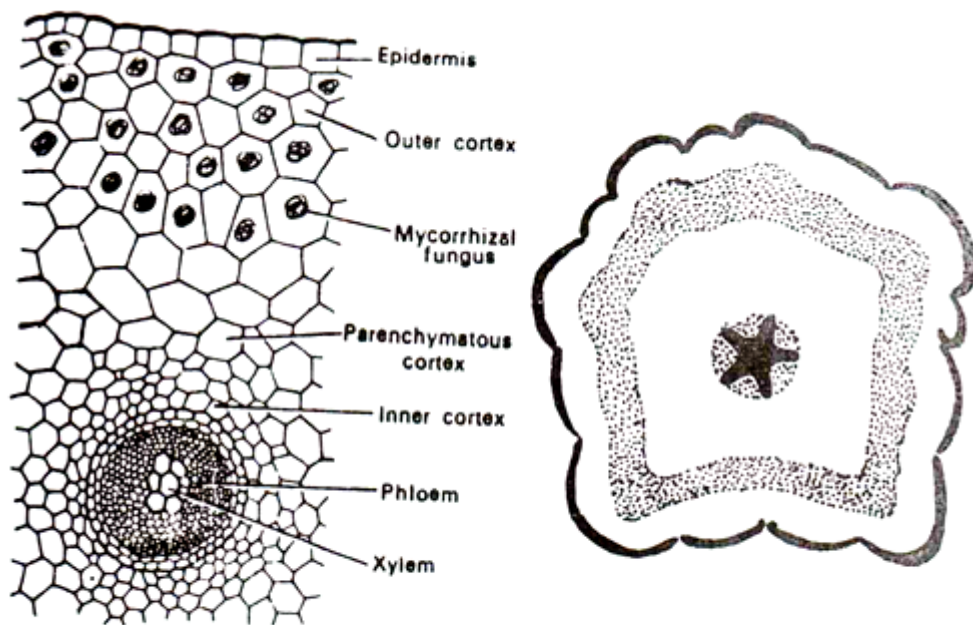


Fig. 20. *Psilotum* : T.S. of Rhizome.
A. Sector Enlarged, B. Ground Plan.
