

Stem anatomy of Lycopodium

A T.S. of the stem of Lycopodium shows a superficial epidermis, a broad cortex, and a central massive vascular strand or stele.

Epidermis - The epidermis is one cell in thickness, usually with thick cutinised outer walls. Stomata are present in the epidermis.

Cortex - The cortex is quite broad and its relative thickness and structure varies from sps to sps. It may be either of the following:

(a) Homogenous parenchymatous through out the life of plant e.g. L. inundatum.

(b) Wholly sclerenchymatous in mature portion of stems e.g. L. annotinum.

(c) Divided into three zones -
outer and inner cortex - sclerenchymatous
Middle cortex - Parenchymatous e.g. L. clavatum.
Or outer & inner cortex - Parenchymatous
Middle cortex - Sclerenchymatous e.g. L. cernuum

In the cortex many leaf traces are found.

Endodermis - The endodermis marks off the stele from the cortical region. Endodermis is clearly recognisable in the earlier stages of development because of the presence of casparian strips. As the development proceeds in mature stems, the endodermal cells become thickened. There is a controversy about the origin of

endodermal layer.

Pericycle - internal to the endodermis is a pericycle of one or more layers of parenchymatous cells.

Vascular region or the stele - there is a good deal of variations in the arrangement of the vascular elements, not only in different sps but in different portion of the same individual.

Basically the arrangement of primary xylem and phloem is a protostele.

In this case the xylem forms the central core of the stem surrounded by phloem and the pith is absent. There is variation with respect to its shape and arrangement of vascular tissues. It may be of the following type -

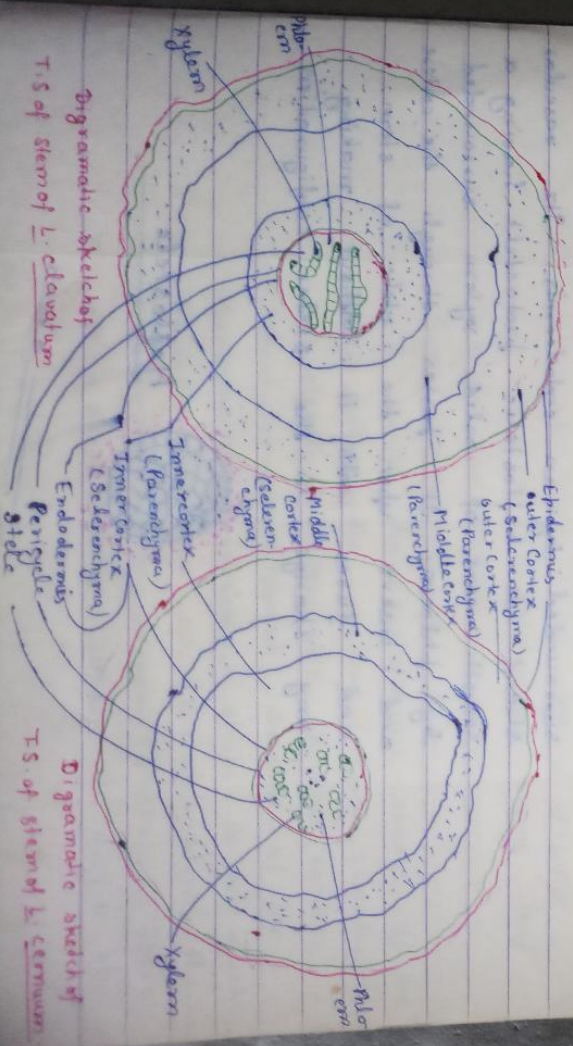
1) Actinostele - The xylem core has got radiating ribs forming a star like mass, the phloem lies in the space between the xylem rays. In L. phlegmaria, the adult stem has still the exarch actinostelic organization with rays of varying number. In L. serotinum the xylem rays are expanded outwards into a wide spread, almost fan like outline.

2) Plectostele - Here, the xylem appears to be in the form of separate plates of variable size with phloem in between them eg. L. volubile, L. clavatum.

3) Mixed protostele - In which the xylem and phloem are uniformly distributed and in F.S, it appears as if strands of

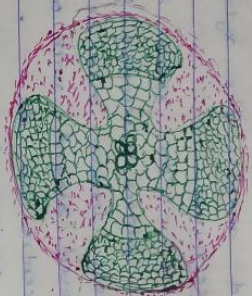
Xylem are embedded in the phloem which forms the ground mass. The xylem is arch eg. L. cernuum.
 (v) Partially stellate stete - the xylem strands at several places becomes grooved and eventually gets broken into several strands. Each grooved strand with a concavity facing the centre in all. Such strand exhibits further breakage at the point of its concavity, this results in the formation of mosaic xylem masses. The rest of the spaces are occupied with phloem masses eg. L. immitium.

The stem is wholly primary in structure, cambium is lacking, hence there is no secondary growth. The xylem being simple is scalariform - pitted walls. The phloem is also simple, consisting of sieve tubes and parenchyma cells.



T.S of stem of L. clavatum

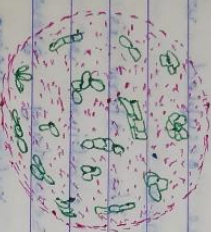
T.S of stem of L. cernuum



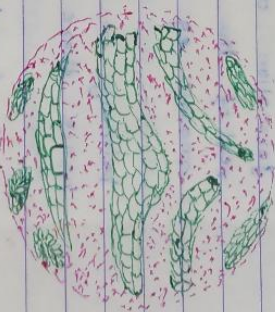
Actinostelele



Partially stellate type



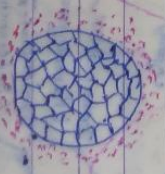
Mixed protostele



Pleustele

Leaf trace

It is a small spherical structure surrounded by an endodermis. Its vascular strand is haplostele having a small core of solid xylem surrounded by phloem. It passes through the cortex and insert upon the stele of stem and fuses with it without making any change in the stellar configuration.



Haplostele

Handwritten notes on the left margin, including 'Handwritten notes' and 'Handwritten notes'.