

Stelar Evolution =

- » The central vascular cylinder of the primary axis of Pteridophytes is usually referred to as stele.
- » Besides xylem and phloem it includes pith and is delimited from the cortex by pericycle.
- » The concept that stele is the fundamental unit of vascular system was put forward by Van Tieghem and Douliot (1886).
- » They proposed the stelar theory, according to which the root and stem have the same basic structure consisting of two fundamental units: the cortex and the central cylinder.
- » Van Tieghem considered endodermis (the innermost layer of the cortex) to be the anatomical boundary between these two fundamental units. Although a distinct endodermis is present between the cortex and stele in vascular cryptogams and pericycle.
- » Esau (1953) and Foster and Gifford (1963), therefore, opined that in relation to higher plants, the term vascular cylinder is better suited than stele.

⇒ In lower vascular cryptogams like Lycopodium and Selaginella, the stele of the axis and the leaf traces develop independently, the stele being merely cauline and the leaf traces are attached only to its surface. Contrary to this the stele of higher vascular cryptogams (Pteris) is a composite structure consisting of the vascular cylinder of the stem and leaf traces.

⇒ There are several type of stele found in pteridophytes on basis of structure. Schmidt (1982) recognized the two principal type of steles, i.e. -

(i) Protostele

(ii) Siphonostele.

⇒ Protostele is a non-medullated stele consisting of a central core of xylem, surrounded by a band of phloem.

⇒ There is a single or multiple layer of pericycle outside the phloem which is delimited externally by a continuous sheath of endodermis.

⇒ Siphonostele has originated by the development of pith in the centre of the protostele.

⇒ The process of the medullation of protostele has been debated. Two views have put forward regarding the origin of pith in protostele.

(i) Intra-stelar origin of pith,

(ii) Extra-stelar origin of pith.