VIVEKANANDA COLLEGE

THAKURPUKUR

KOLKATA-700063

NAAC ACCREDITED 'A' GRADE

Topic:	PTERIDOPHYTES
Course Title:	PLANT DIVERSITY II
Paper:	BOT-G-CC-2-2-TH
Unit:	1
Semester:	II
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Name of the Department:	Botany (Morning)

LIFE CYCLE OF *Pteris*

Occurrence and Distribution:

This is a cosmopolitan fern being distributed in almost all geographical regions. *Pteris* however, prefers tropical and subtropical climates. Plants usually grow in well drained places or in the crevices of rocks. They are very common along the slopes of hills and can be seen even at 1200 metres above sea level.

There are about 250-280 species reported for the genus. Some of the common Indian species are *P. quadriaurita, P.critica, P.vittata, P.pellucida, P.wallichiana, P.stenophylla, P.biaurita,* etc.

Morphology of the Plant (external features):

The main **sporophytic plant body** is differentiated into ---**root, rhizomatous stem, and leaf.**

1. Root:

The primary root is ephemeral, and is replaced by a large number of adventitious roots developed all over the surface of the rhizome. The roots are small and branched (Fig. 7.102A).

2. Rhizome:

The rhizome or stem may be creeping *(P. grandiflora)* or erect (*P. cretica, P. vittata*) which may or may not show branching. The rhizome is differentiated into nodes and internodes and its entire surface is covered with scales. The growing point of the rhizome is covered with **ramenta**.

3. Leaf:

- The leaves are borne on the upper surface of the rhizome.
- When young the leaves are spirally coiled and show **circinate vernation** that is typical of true ferns (Fig. 7.102A).
- The leaves are unipinnately or multipinnately compound or decompound with a long rachis (Fig. 7-.102B).
- The pinnae are small near the base as well as towards the apex, while they are large towards the middle.
- The pinnae are very often coriaceous.
- All leaves are fertile, bearing **sori** along the ventral margin of pinnae, except the apices of the segments.
- Venetaion dichotomous type.

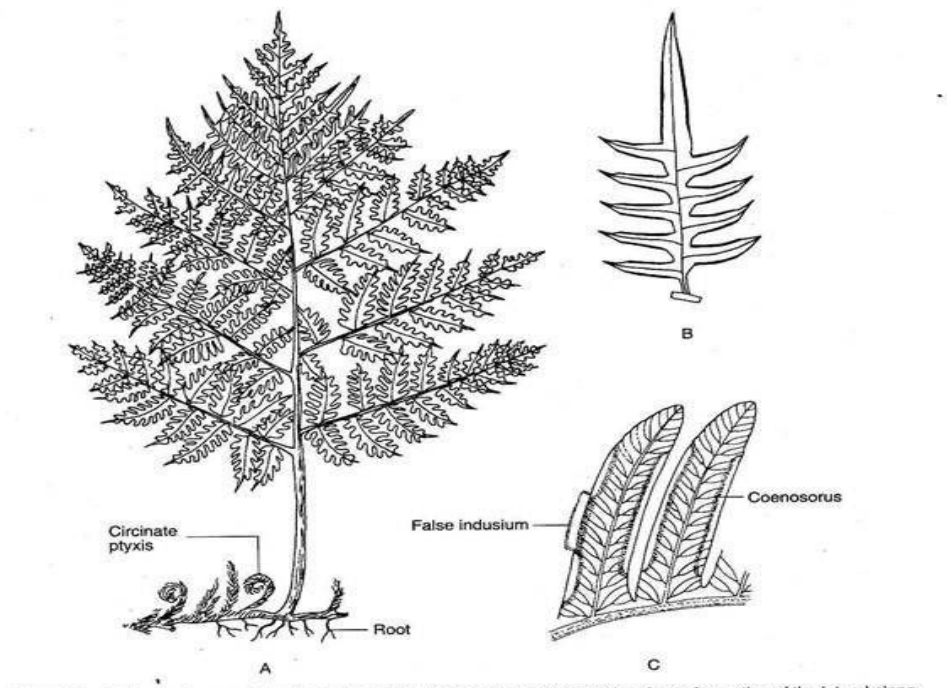

Fig. 7.102 : *Pteris* : A. A sporophyte showing habit, B. A lateral pinna, C. Abaxial surface of a portion of the lateral pinna showing two pinnules

Internal Structure:

Rhizome: Anatomically, the rhizome shows

- an outer single-layered epidermis,
- a few-layered thick sclerenchymatous hypodermis and
- a broad parenchymatous cortex
- with a diversified stelar organisation (Fig. 7.103). It may be solenostelic (*P. grandiflora, P. vittata*) or dictyostelic.
- Even the diversity is noted in different regions of the rhizome in the same species. For example, in *P. biaurita,* the lower part of the rhizome shows mixed protostele which becomes

siphonostelic a little up and exhibits polycyclic dictyostele near the apex.

- In general, the stele is made up of a number of meristeles forming two rings (Fig. 7.103). The inner ring consists of 2 to 3 large meristeles and the outer ring consists of a number of small meristeles.
- Each meristele has a band or platelike mesarch xylem surrounded by phloem.
- Each stele is bounded by its own endodermis.
- Here the breaking of the vascular strand is due to the leaf gaps.

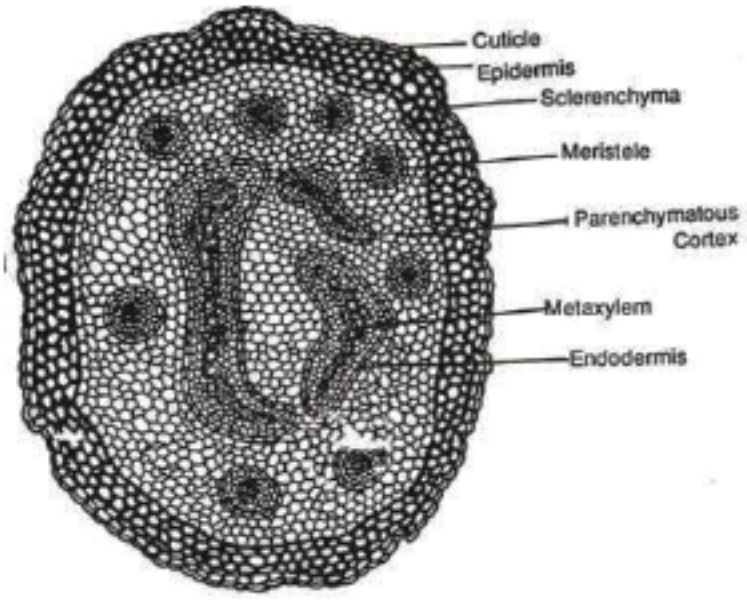

Fig. 157. *Pteris* : Anatomy of Rhizome

. **Leaf:** from the point of view of its anatomy, the leaf may be divided into three parts :. the petiole, the lamina and the rachis

Anatomy of rachis:

- The rachis is traversed by a single leaf trace which is variable in shape. 'C' shaped leaf traces are found in *P. vittata*. In *P. biaurita* the leaf trace is 'U' shaped while entering the leaf base, but further up it becomes 'V' shaped.
- The xylem strand appears hooked.
- As usual xylem is surrounded by phloem, pericycle and endodermis. The cortical region has an inner parenchymatous zone and an outer sclerotic zone.
- Epidermis is a single layer with a deposition of the cuticle over it. Ramenta arises from some of the epidermal cells.

Anatomy of fertile leaflet or pinna:

- The pinnule has upper and lower epidermal layers.
- In *P. cretica* the upper epidermis has larger cells with less sinuous walls.
- The stomata are restricted to the lower epidermis which has smaller cells and the more sinuous walls.

- The mesophyll may not be differentiated into palisade and spongy parenchyma.
- The mid-rib region has a single concentric type of vascular strand, e.g., in *P. vittata*, with distinct endodermis.
- The bundle sheath extensions are prominent and occur as groups of thick-walled cells below the upper and above the lower epidermis. Palisade and spongy tissue is absent around the mid-rib.

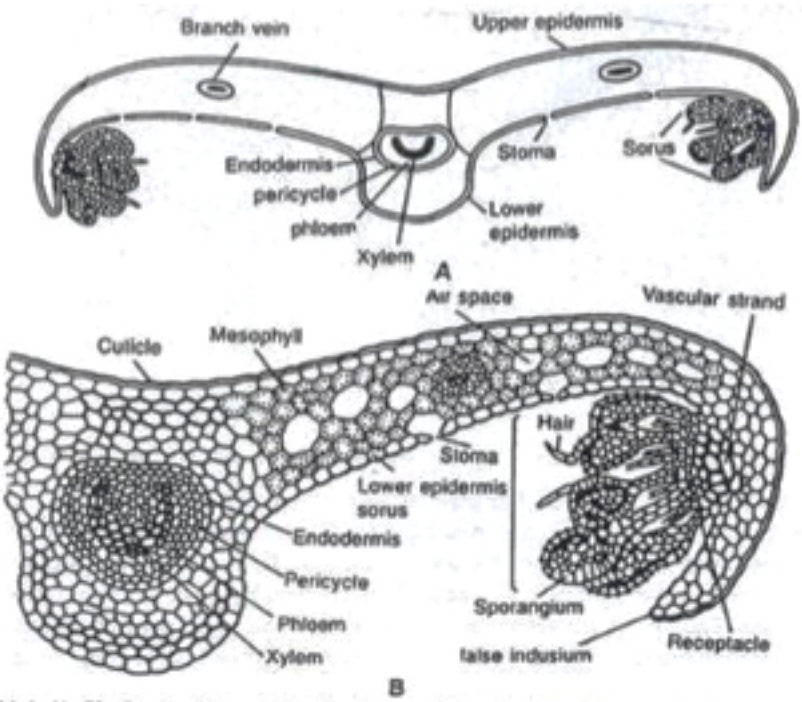

Fig. 31.4. (A–B). *Pteris vittata*. A. Outline figure of T.S. fertile leaflet showing internal structure; B, portion of 'A' in detail.

Anatomy of petiole:

- The petiole is traversed by a single C-shaped (*P. vittata*) or U-shaped or V-shaped leaf trace (Fig. 31.6).
- In *P. biaurita* the U-shaped leaf trace enters the petiole and becomes V-shaped higher up.
- The xylem has two adaxial hooks. In the rachis the petiole trace gives off strands into its pinnae if the leaf is unipinnate or it divides to give rise to secondary and tertiary pinna traces in bipinnate leaves (*P. biaurita*). The rachis traces are marginal in origin and are usually flat U-shaped or shallow arc-like.

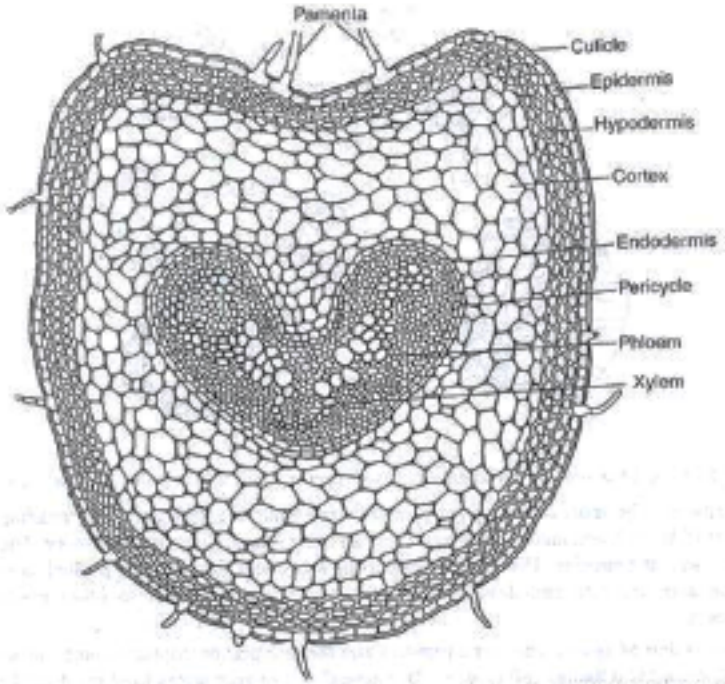

Fig. 31.5. *Pteris Vittata*. T.S. Petiole. Note the C-shaped vascular bundle and the protoxylem hooks.

Root: Anatomically the root shows an outer piliferous layer and a cortex divided into an outer parenchymatous zone and an inner sclerotic zone. The stele is protostelic and has an exarch, diarch xylem.