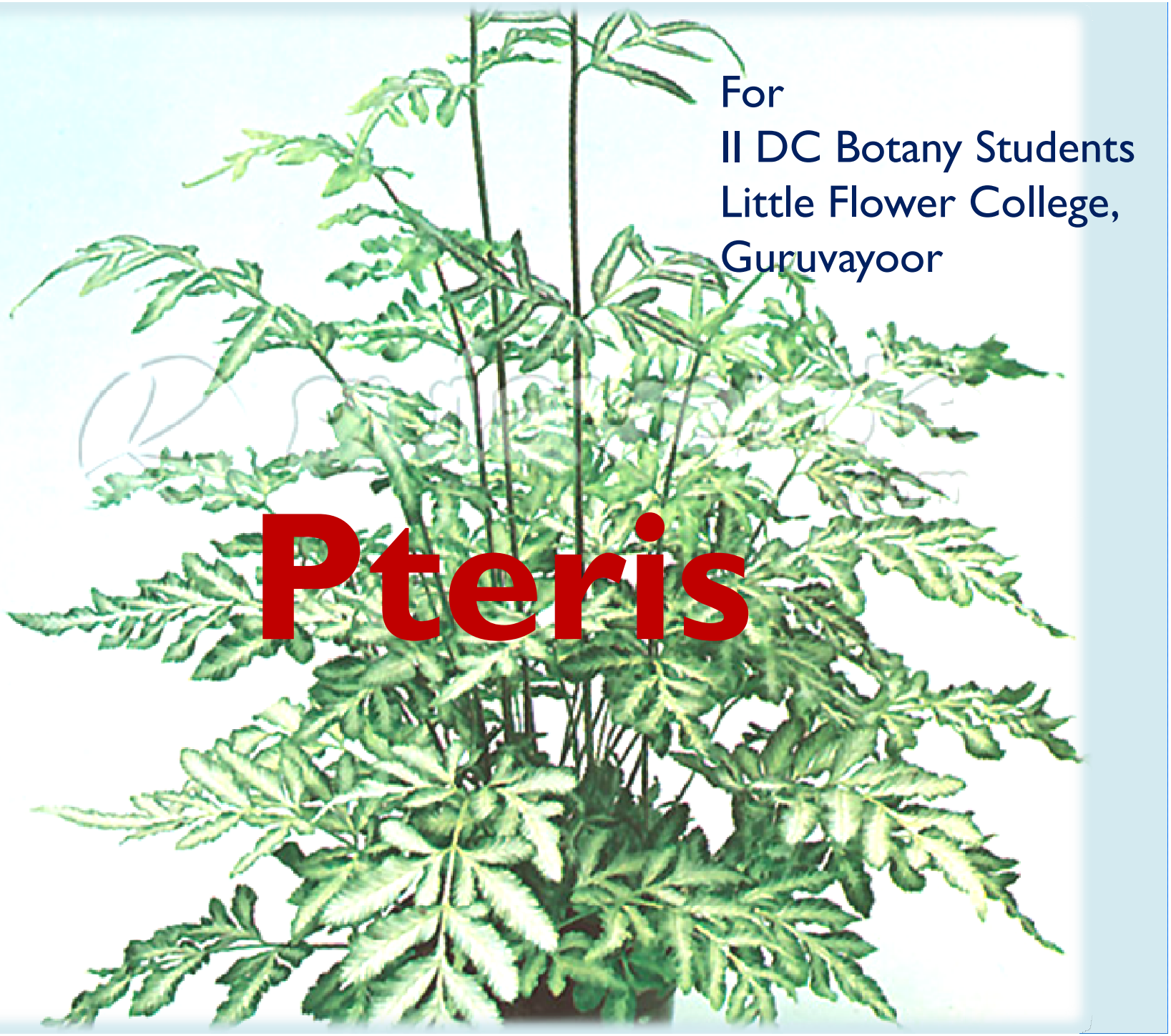


For
II DC Botany Students
Little Flower College,
Guruvayoor

Pteris

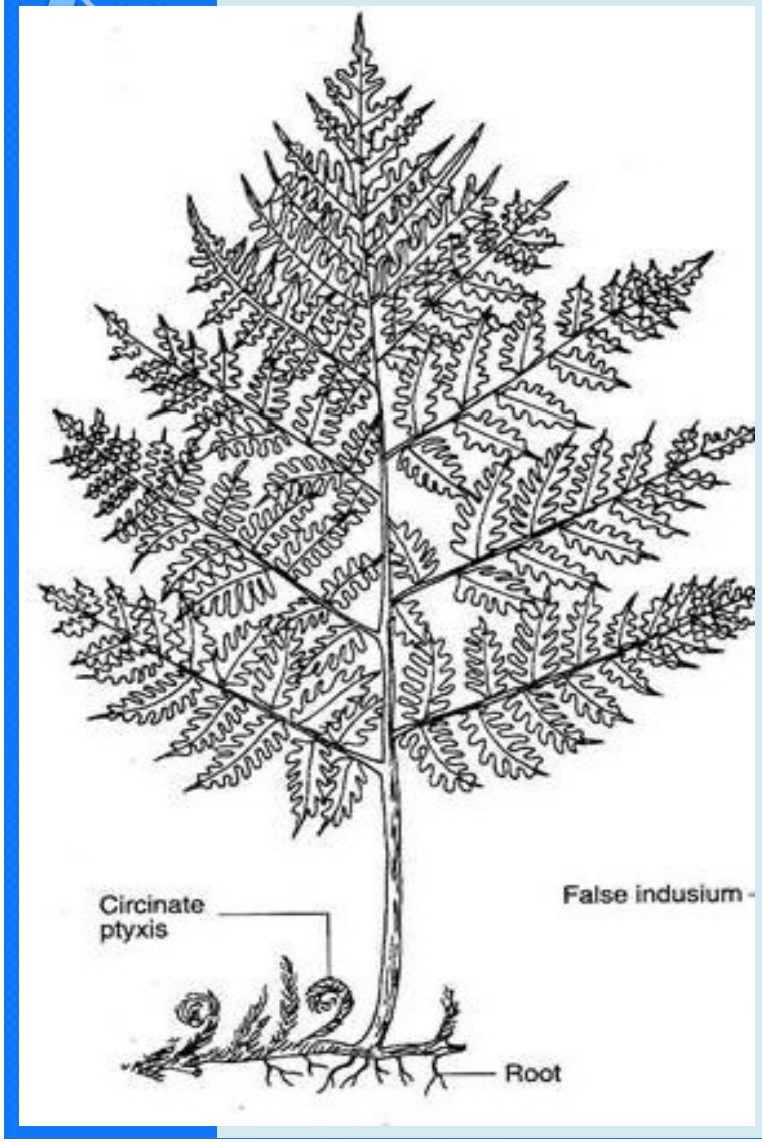
Pteris

Pteris is a common pteridophyte distributed in the tropical and subtropical regions of the world

Pteris vittata

- Division : Filicophyta
- Class : leptosporangiopsida
- Order : Filicales
- Family : Polypodiaceae
- Subfamily : Pteridioideae

General Characters and External Morphology



The main sporophytic plant body is differen-tiated into

- root
- rhizomatous stem
- leaves

The short rhizome is Creeping, erect to suberect and branched, covered with narrow, thin scales that are pale green when young and pale brown when old.

The growing point of rhizome is covered with ramenta.

Roots

Roots arises from the lower surface of the rhizome

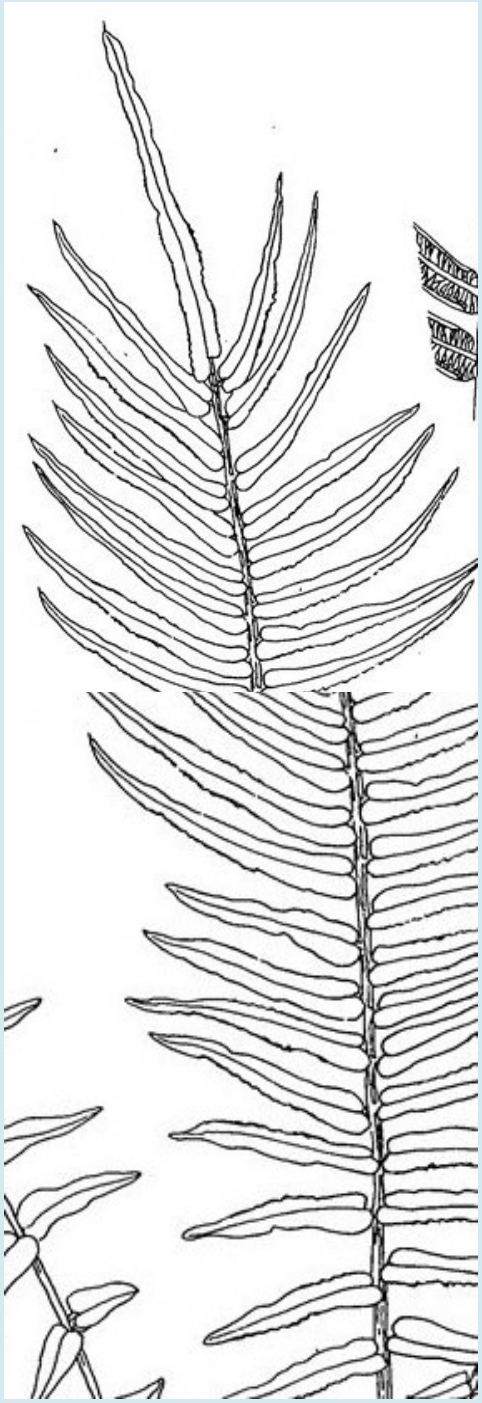
The leaves are borne on the upper surface of the rhizome. When young the leaves are spirally coiled and show circinate vernation that is typical of true ferns .

The leaves are unipinnately or multipinnately compound or decom-pound with a long rachis

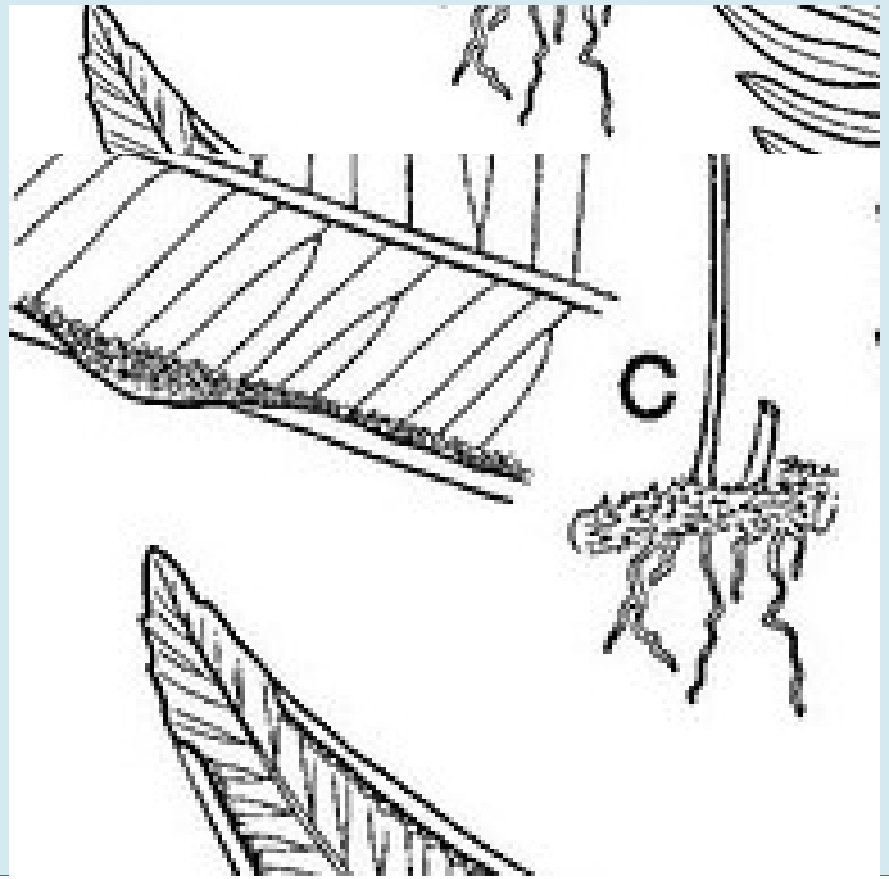
The pinnae are small near the base as well as towards the apex, while they are large towards the middle.

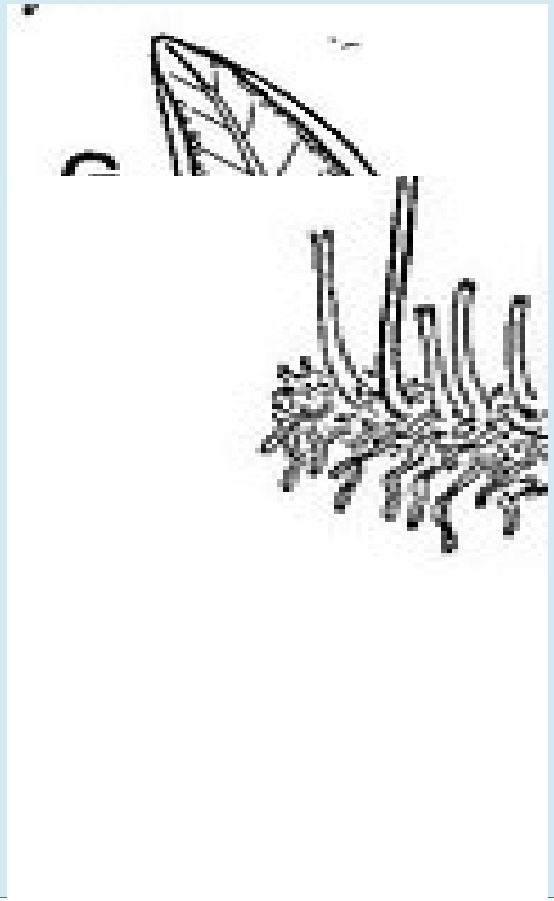
- Petiole is covered with scales or hairs

- The pinnae are sessile. They are smaller towards the base, large towards the middle and again smaller towards tip. Leaf apex is occupied by an odd leaflet



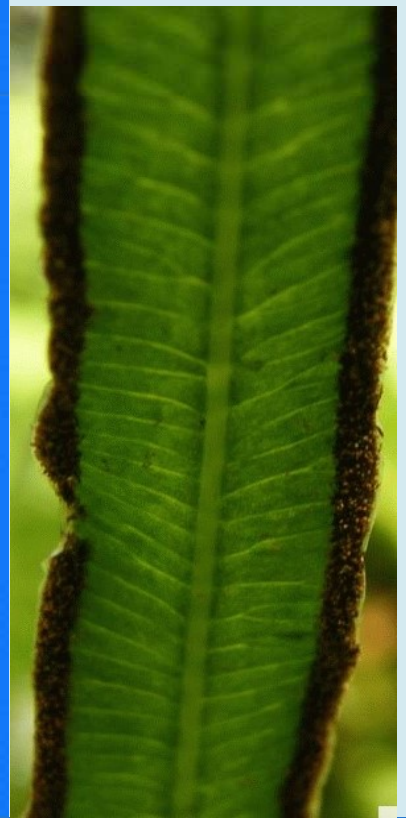
Leaf venation is open and furcate. Each pinna is transversed by a central midrib which gives off lateral veins that bifurcate near the tip





Leaf bears sori on the margins so they are called as sporophylls. The sori are linear and submarginal, with a thin indusium when young formed from the thin reflexed margin of the lamina.

Nearly all fertile pinnae in mature plants are fertile except the reduced basal ones.

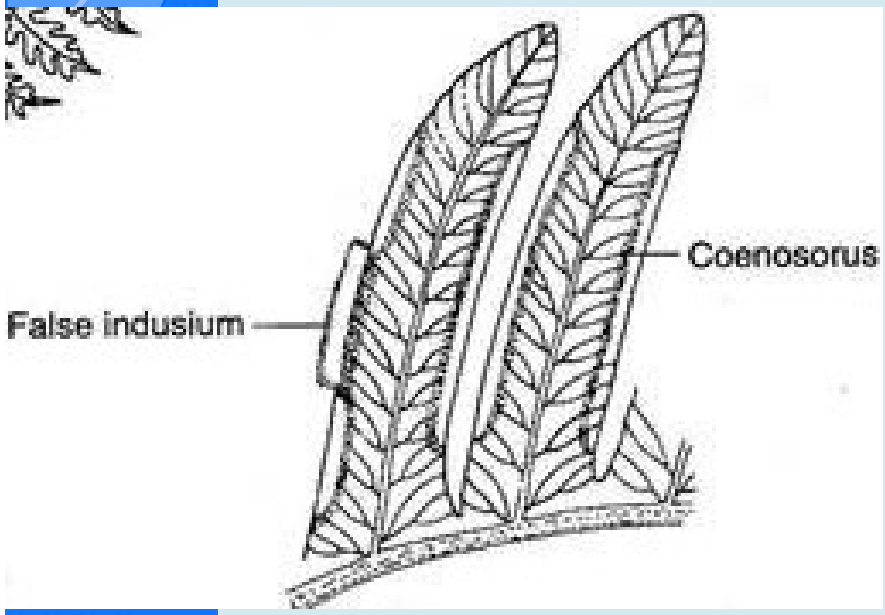


PTERIS

REPRODUCTION AND LIFE CYCLE

Spore-Producing Organ:

- Pteris is a homosporous fern. The sorus of Pteris is called coenosorus. Coenosori are marginal, borne continuously on sporophyll margins.



The coenosori are protected by the reflexed margin (false indusium) of the pinnae.

Sori are intermingled with many sterile hairs in between the sporangia

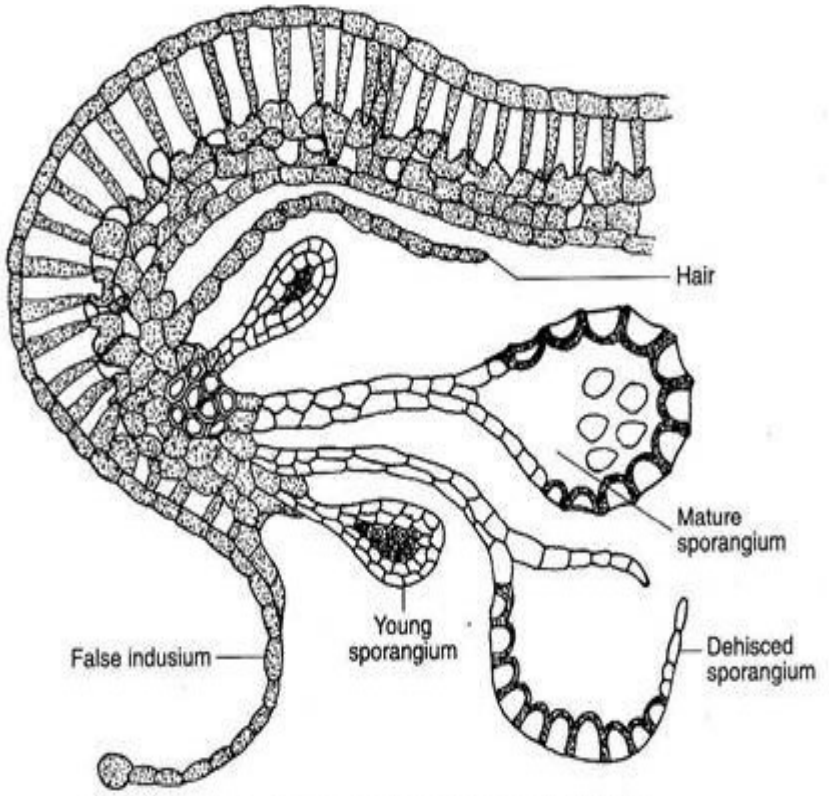


Fig. 7.104 : *Pteris* : T.S. of pinnule showing sorus (a portion)

Structure of a Mature Sporangium:

A mature sporangium has a long stalk that terminates in a capsule **The jacket or wall of the capsule is single-layered, but with three different types of cells:**

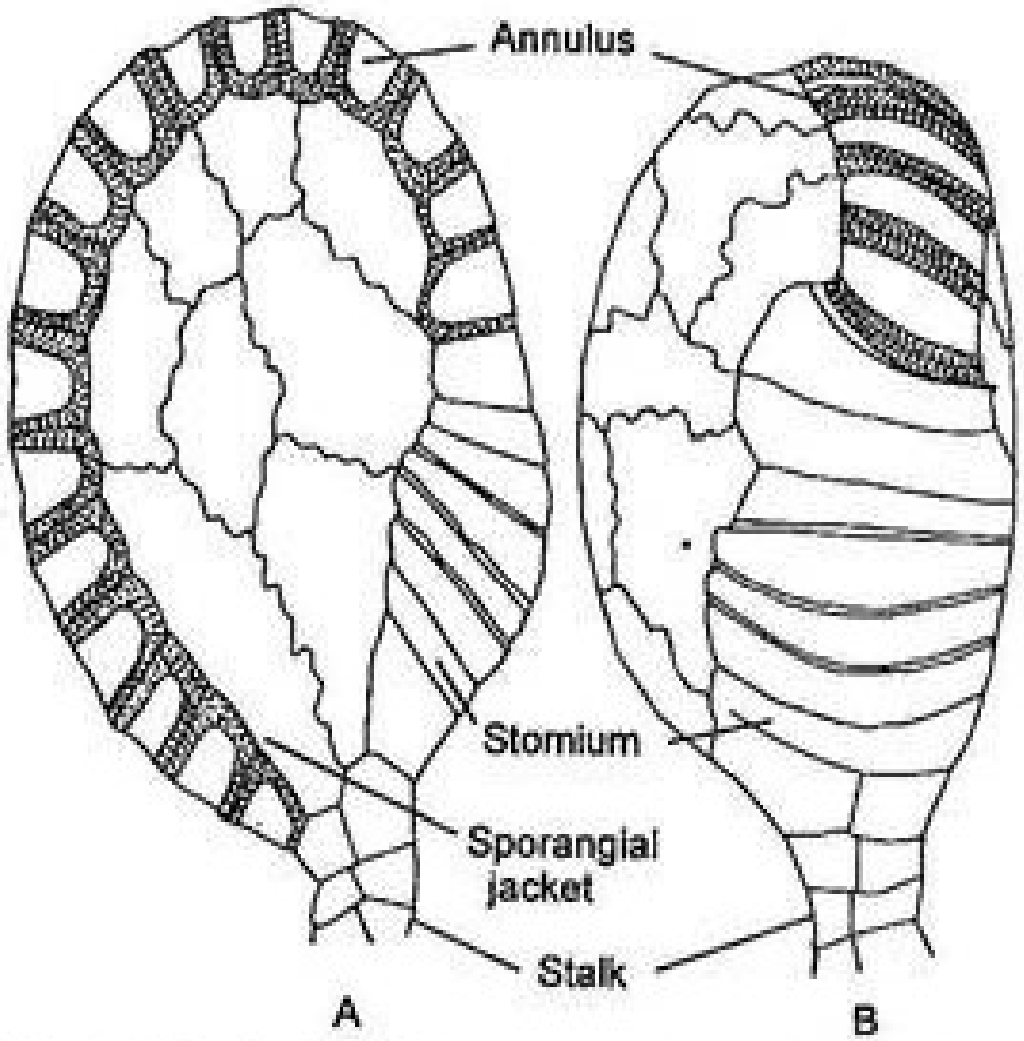
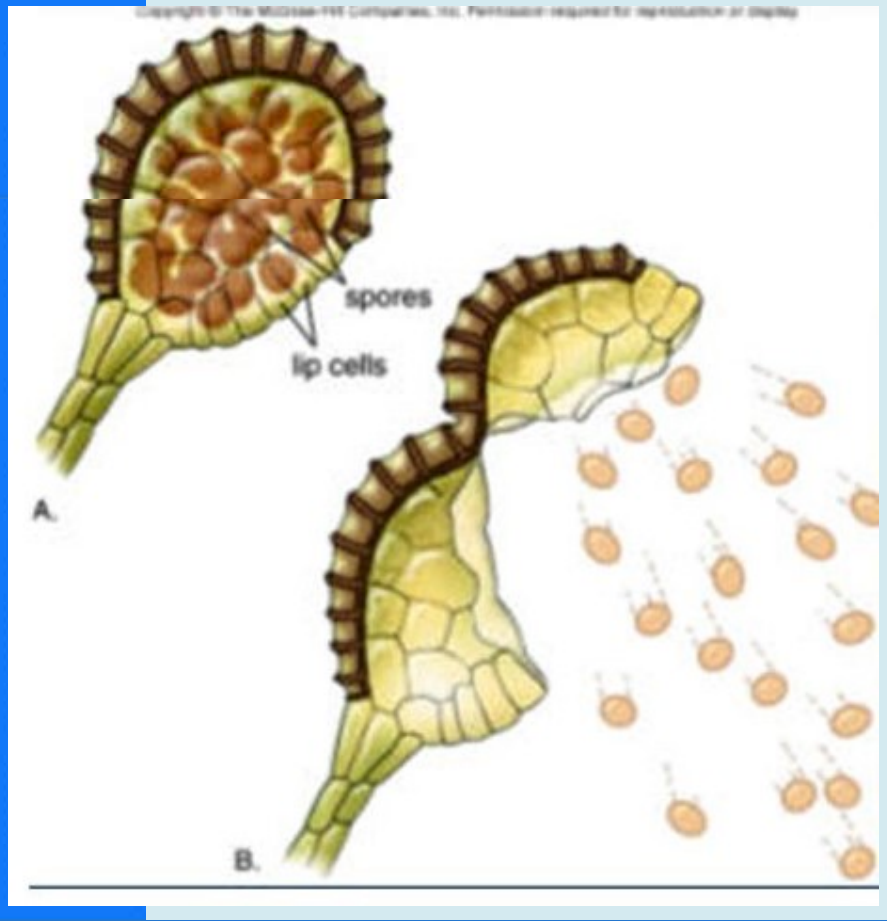


Fig. 7.106 : *Pteris* : Mature sporangium. A. Front view, B. Side view

- (1) A thick walled vertical annulus incompletely overarches the sporangium,
- (2) A thin walled radially arranged stomium, and
- (3) Large parenchymatous cells with undulated walls.

- The sporangium dehisces transversely along the stomium due to the shrinkage of annular cells. The spores are dispersed through air to a moderate distance.



Please check this link

https://www.youtube.com/watch?v=xhqiy5WNR-M

The capsule contains many spores. All spores are structurally and functionally alike; hence Pteris is a homosporous pteridophyte.

Spores are triangular in shape with trilete aper-ture, bounded by two walls. The outer wall, exine, is variously ornamented.

The spores germinate after falling on a sui-table substratum. Initially the spore wall (exine) ruptures and the inner contents come out in the form of a germ tube and subsequently by a trans-verse division in the germ tube forms the first rhizoid and the first prothallial cell. From that the complete gametophyte is originated

• Gametophyte

The pro-thallus is made up of parenchymatous cells which are single-celled thick towards the margin and many-celled thick towards the centre. The growing point are located in the apical notch. Rhizoids are formed over the ventral surface.

The prothallus is monoecious, protandrous. Antheridia appear first and are confined to the basal central or lateral regions among the rhizoids. Archegonia develop near the apical notch.

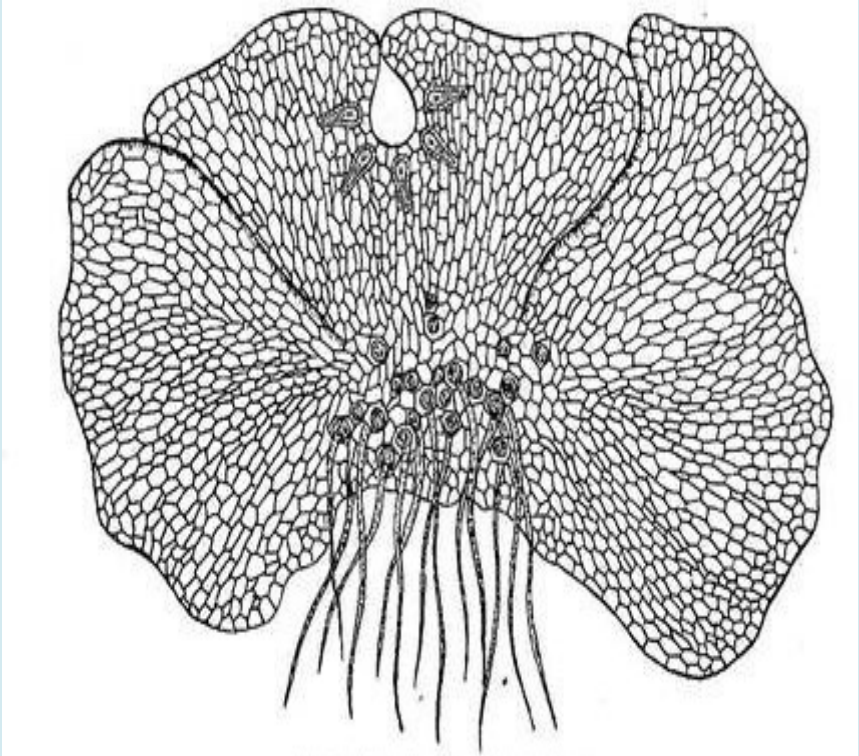


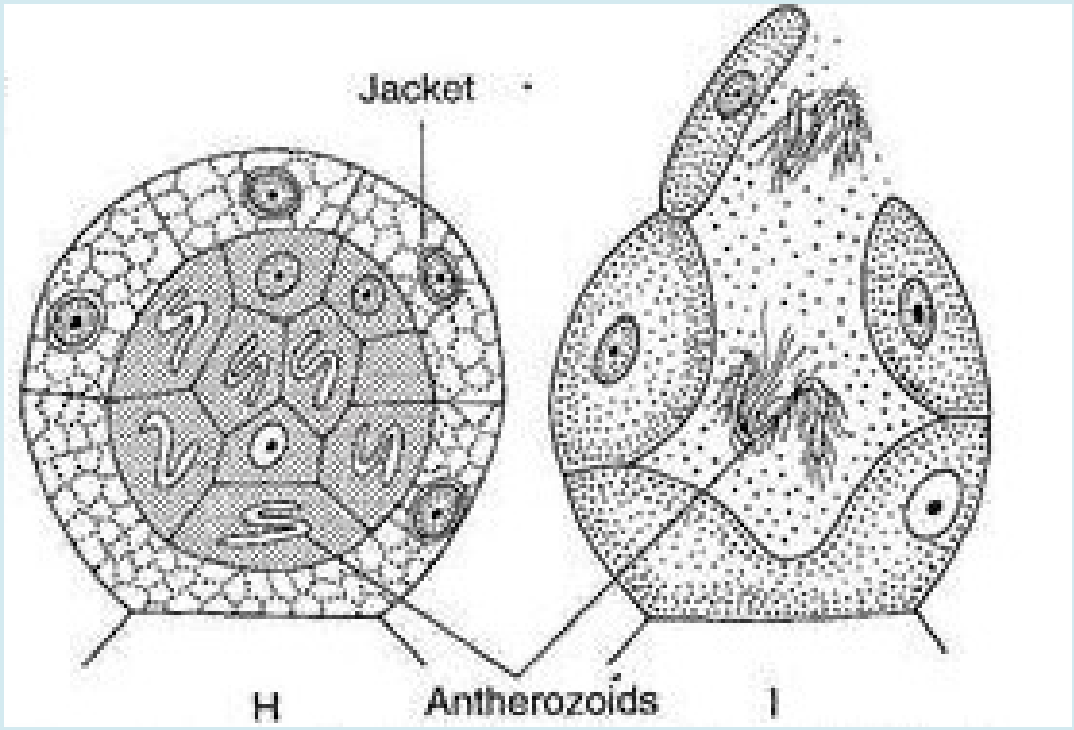
Fig. 7.107 : *Pteris* : Gametophyte

Antheridium:

two ring cells, the cover cell multiflagellated coiled antherozoid.

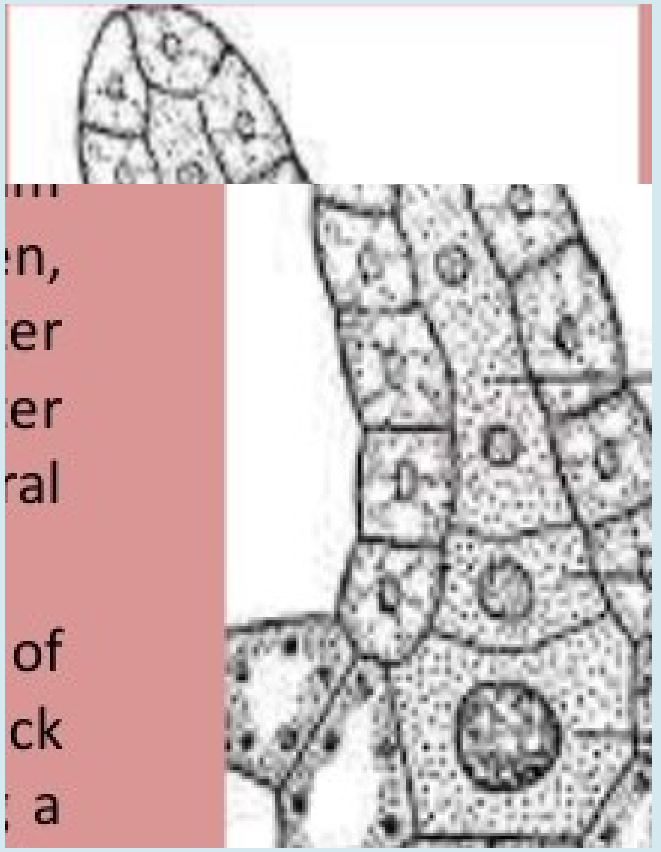
The antheridium at maturity absorbs water and swells.

Due to the increase in pressure with-in the antheridium the cover cells split apart releasing the antherozoids in a thin film of water present on the surface of the prothallus.



Archegonium:

A mature archegonium of Pteris consists of a 5-6 celled projecting curved neck, a neck canal cell, a ventral canal cell and an egg



Fertilisation:

At the time the ventral canal cell, the neck canal cell and the neck cells at the top disintegrate forming an open passage for the antherozoids to come towards the egg and, eventually, one of the antherozoids fuses with the egg to form the zygote.

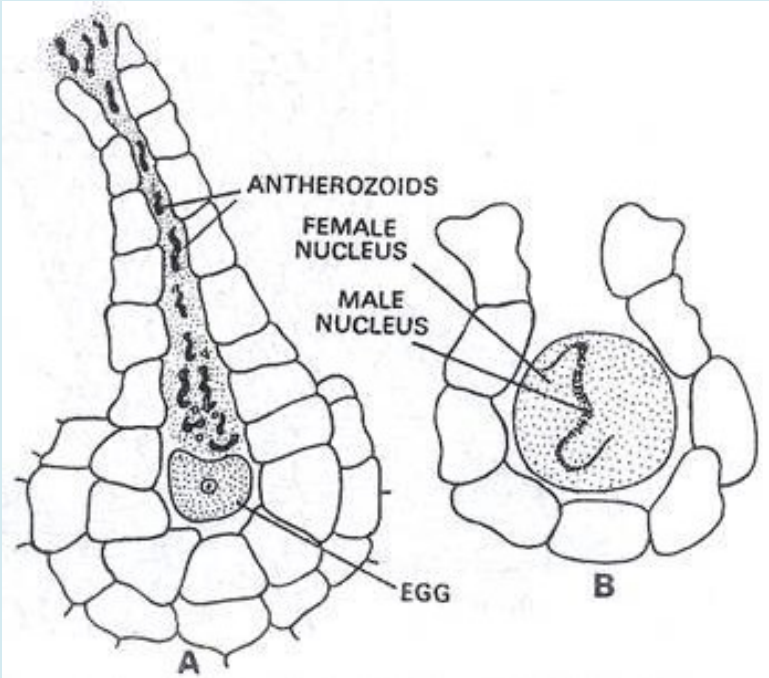


Fig. 31.18. *Dryopteris filix-mas.* A and B, fertilization.

New Sporophyte (Embryo):

In Pteris the first division of the zygote is vertical followed by a second transverse division resulting in the formation of a quadrant. Further a 32-celled embryo is formed due to further divisions of the quadrant.

The differentiation of embryo begins at this 32-celled stage. No suspensor is formed; the hypobasal cells form stem apex and foot, while epibasal cells form cotyledon and root.

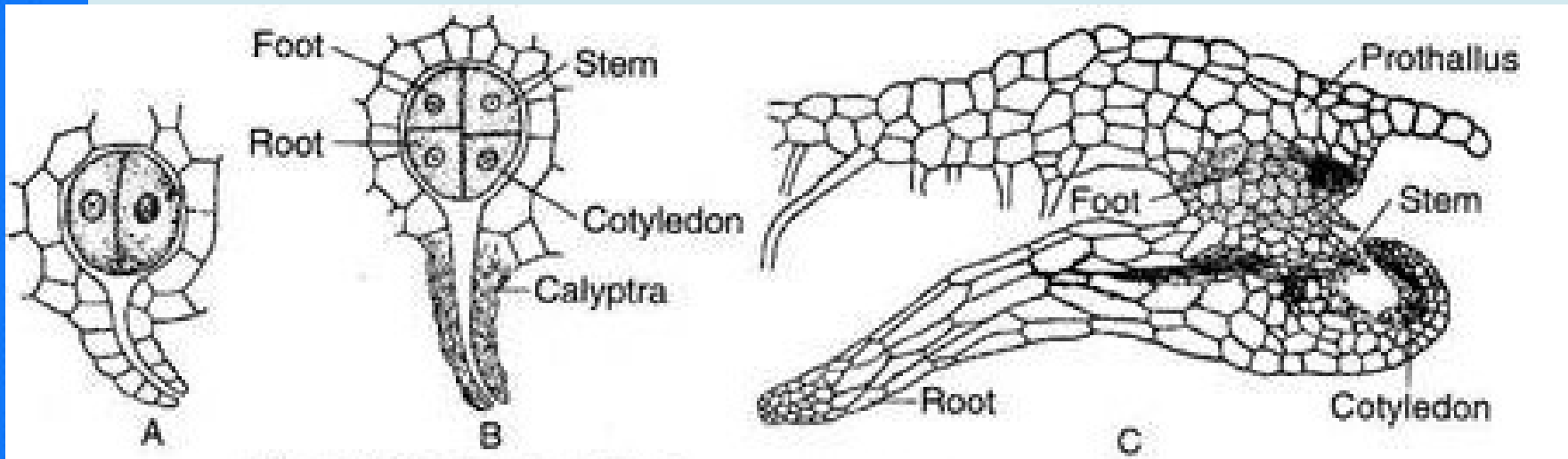


Fig. 7.109 : *Pteris* : A–C. Stages in the development of embryo

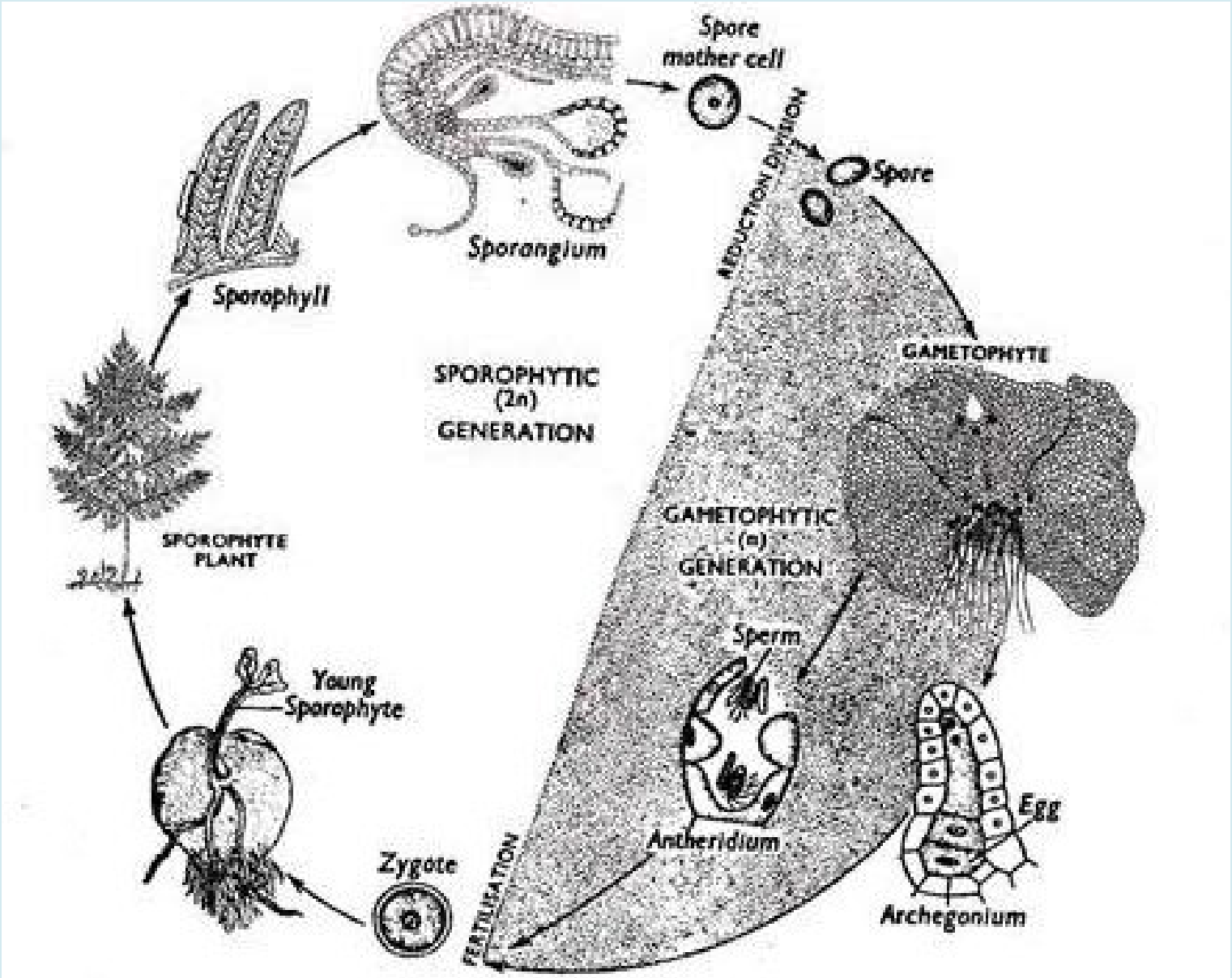
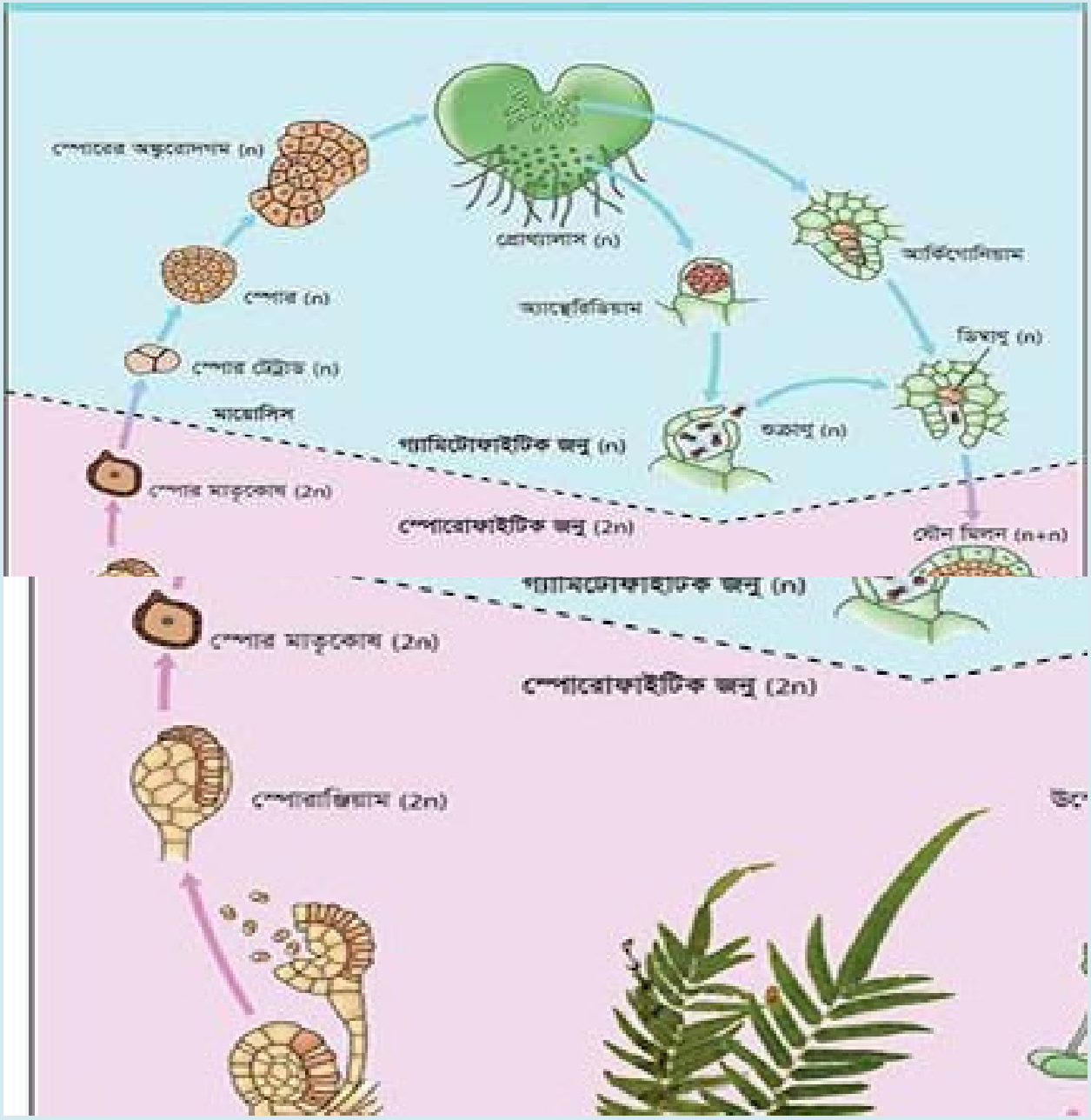


Fig. 7.110 : Life cycle of *Pteris*


স্পোরের অঙ্কুরোদ্গম (n)
স্পোর (n)
স্পোর ট্রেড্রাড (n)
মায়োসিস
স্পোর মাতৃকোষ (2n)
স্পোরোফাইটিক জনু (2n)
স্পোরাঞ্জিয়াম (2n)
প্রোথ্যালাস (n)
অ্যান্থেরিডিয়াম
আর্কিগোনিয়াম
জিঙ্কাণু (n)
গ্যামিটোফাইটিক জনু (n)
শুক্রাণু (n)
ডিম্বাণু (n)
যৌন মিলন (n+n)
গ্যামিটোফাইটিক জনু (n)
স্পোর মাতৃকোষ (2n)
স্পোরোফাইটিক জনু (2n)

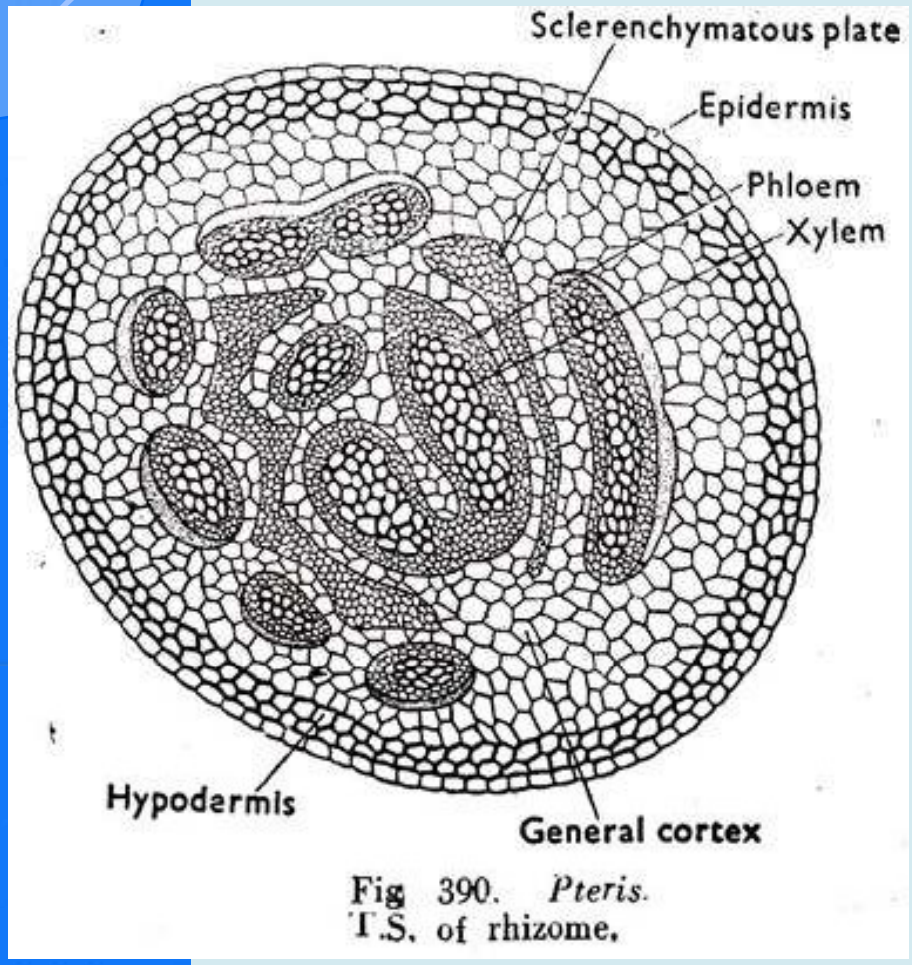


Fig 390. *Pteris.* T.S. of rhizome.

Pteris Rhizome

- Epidermis
- Cortex
- pericycle
- Stelar region
  - Solenostele
  - dictyostele

Meristele

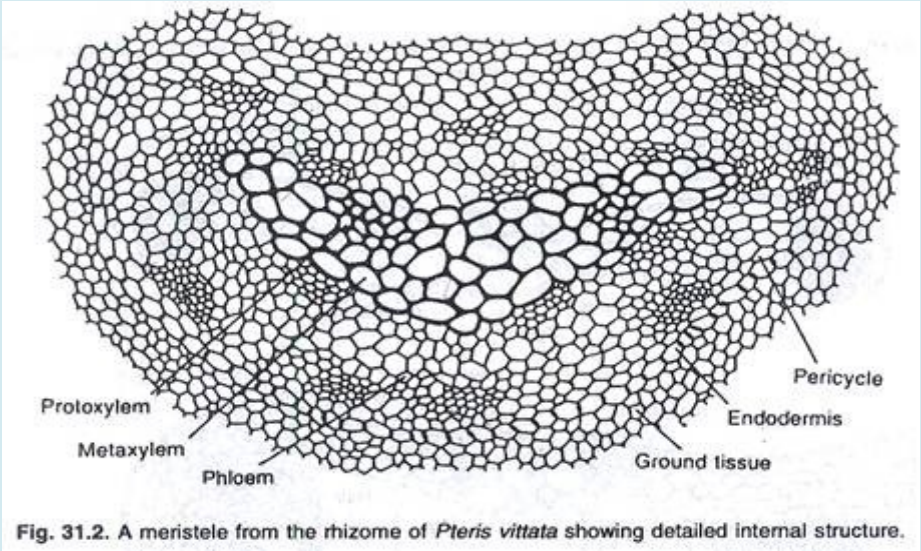
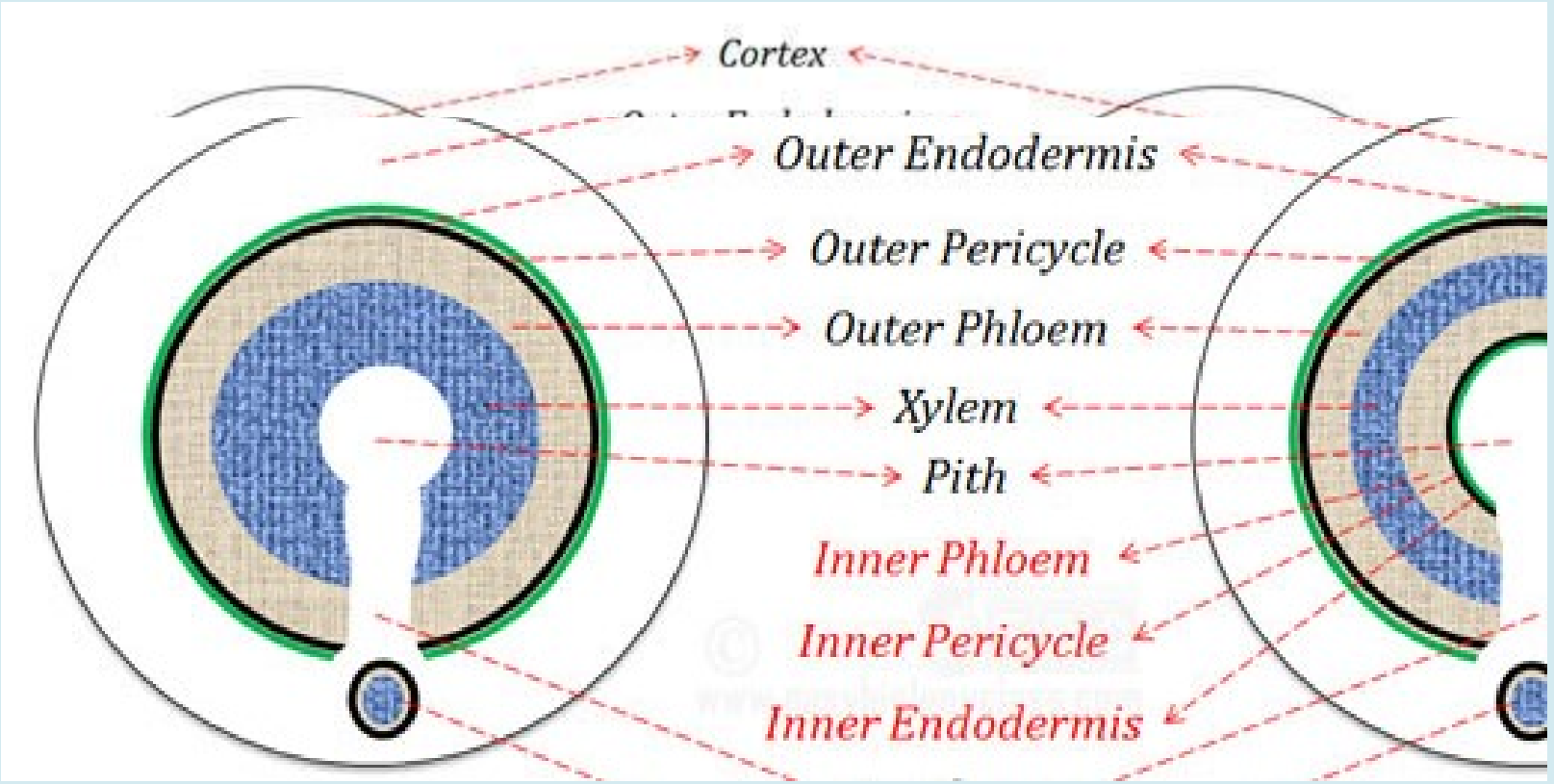


Fig. 31.2. A meristele from the rhizome of *Pteris vittata* showing detailed internal structure.

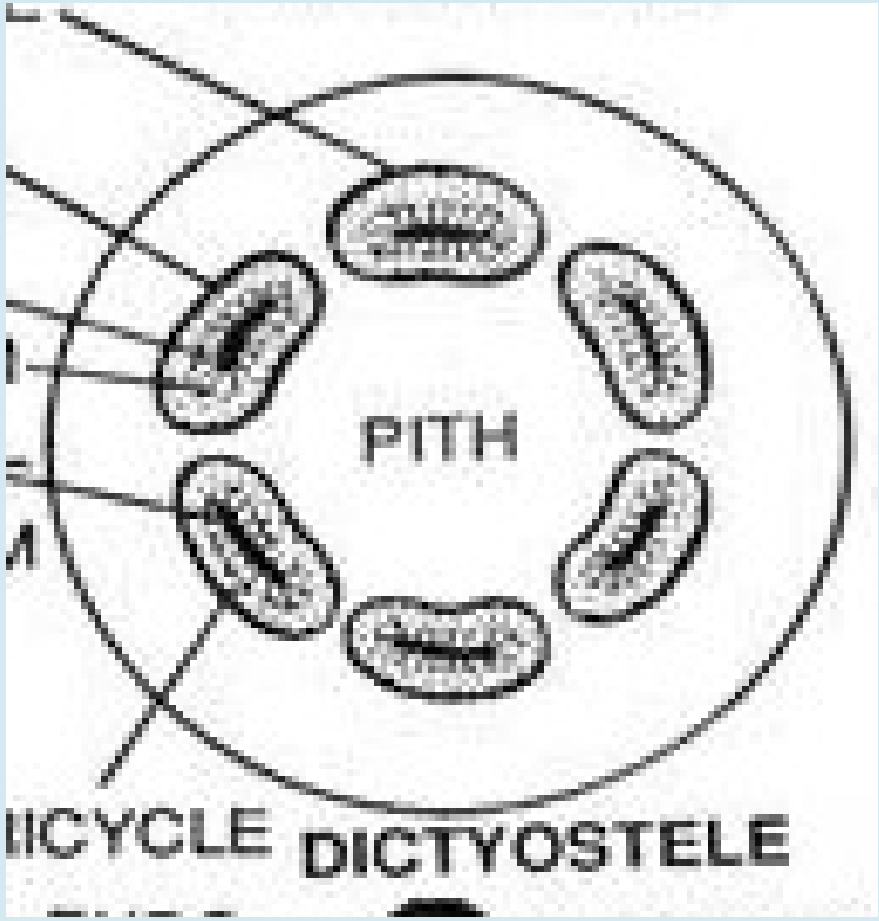
A stele in which the protostele is medullated or with pith at the centre is known as siphonostele

In solenostele, pith is found with one leaf gap

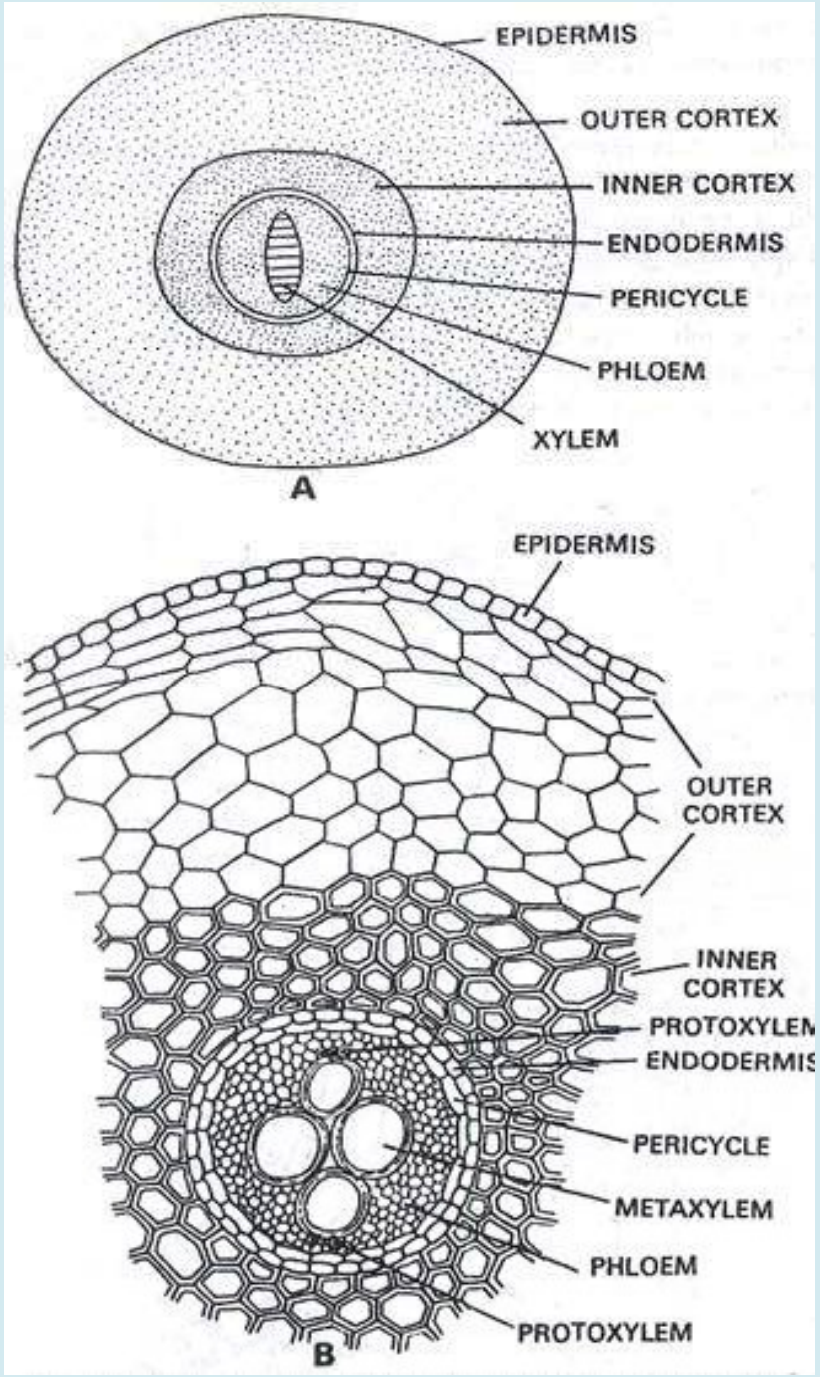


Siphonostele or Solenostele that is broken into a network of separate vascular strands are called dictyostele. This breaking up of stelar core is due to the presence of large number of leaf gaps.

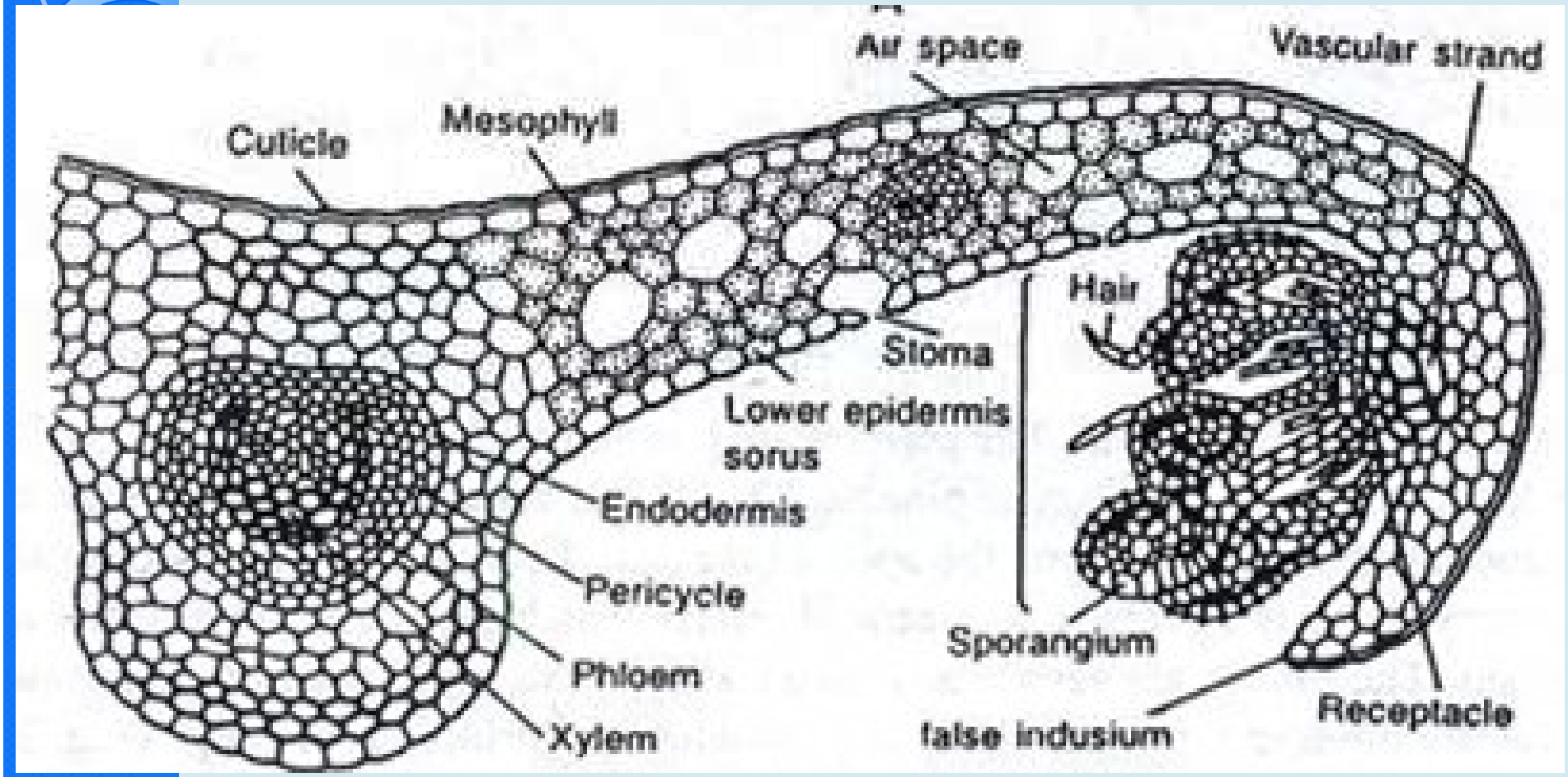
Each such separate vascular strands is called meristele.



- Root
- Epidermis
- Cortex
- Endodermis
- Stele
  - Protostele
  - Exarch
  - diarch



Leaf-upper and lower epidermis, mesophyll



- Pteris petiole

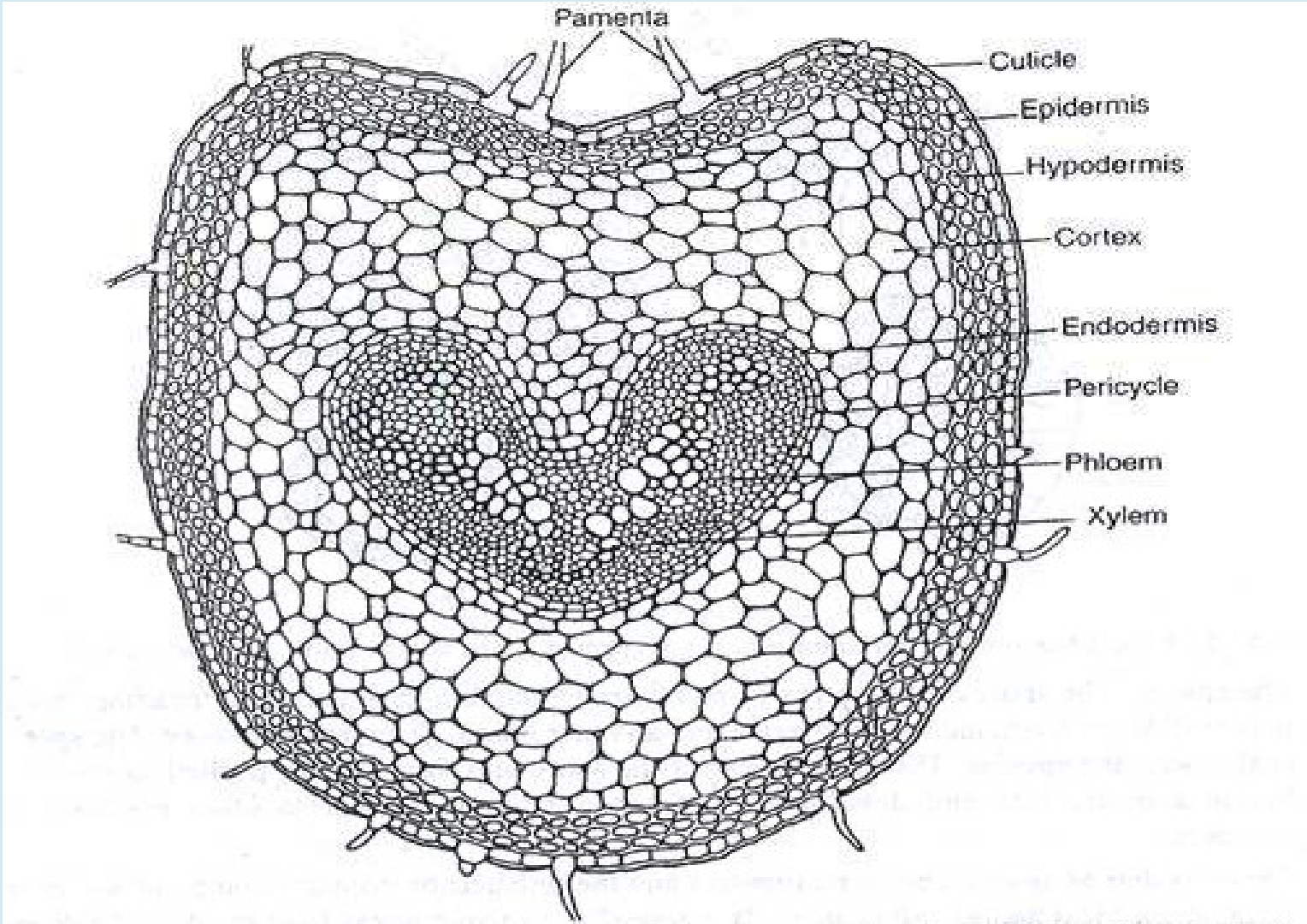


Fig. 31.5. *Pteris Vittata*. T.S. Petiole. Note the C-*shaped vascular* bundle and the protoxylem hooks.

Thank you and Study well