

Fern Life Cycle (Pteris/ Pteridium/ Dryopteris)

by

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Classification

Division: Polypodiophyta

Class: Filocopsida

Order: Filicales/Polypodiales

Familiiy: Pteridaceae (*Pteris*),

Dennstaedtiaceae (*Pteridium*)

Dryopteridaceae (*Dryopteris*)

Genus: *Pteris*/ *Pteridium*/ *Dryopteris*

Common name:

Pteris: Brake fern

Pteridium: Braken fern (*Pteridium aquilinum*)

Dryopteris : Wood fern,

Male fern (*Dryopteris filix mas*),

Buckler fern

Distribution : These genera are generally cosmopolitan fern being distributed in almost all geographical regions preferring tropical, sub-tropical and temperate climates. Plants usually grow in well drained places or in the crevices of rocks. They are generally found in moist and shady places.

Sporophytic Plant Body: External Morphology



Differentiated into : Root, rhizome and leaves
Rhizomatous stem producing roots and leaves; rhizome creeping/compact/ erect, branched or unbranched, covered with scales. Roots arising at the base of the leaf or all over the rhizome. The growing point of the rhizome is covered with ramenta. Leaves arising from the upper surface of the rhizome have a long rachis. They are unipinnately compound, decomposed or multi-pinnately compound. The dissections of the pinnae in *Pteris* are not as deep as in *Pteridium*. Venation open dichotomous type. The pinnae small near the base, large towards the middle and once again small towards the apex as in *Pteris vittata*. The leaves show circinate vernation in young stage (a typical fern feature). In *Pteris* pinnae elongated. Sori on abaxial surface of sporophylls.

Sporophylls

In *Pteris* coenosorus is continuous, submarginal from base to apex avoiding the apices and sinuses between pinnae. Protected by false indusium (recurved margin).

In *Pteridium* the sorus is almost the same as in *Pteris* but protected by double indusia : false as well as true as shown in figure.

In *Dryopteris*: Isolated sori are superficial on lateral veins midway between midvein and margin of pinnule, protected by reniform true indusia.

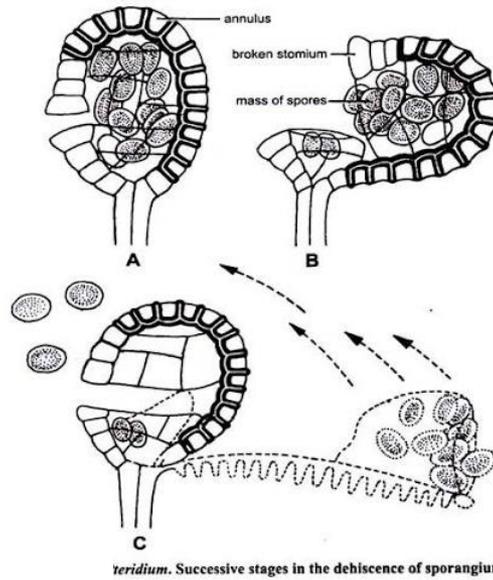
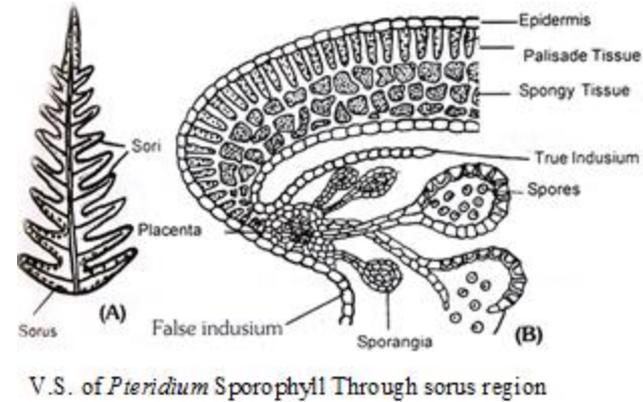
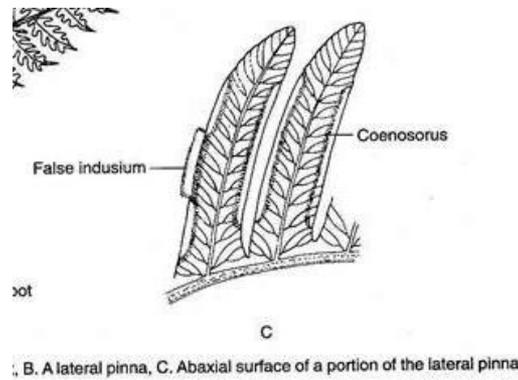


Pteris

Sporangium: Leptosporangiate stalked, biconvex. Capsule like body with vertical annulus bearing stomium at one side. The sporangial wall made up of sinuous walled cells.

Dehiscence: In dry weather the annular cells lose water, outer thin walls of cells develop concavity resulting pressure. Sporangial wall ruptures along stomium, wall goes backwards and then snaps back throwing spores.

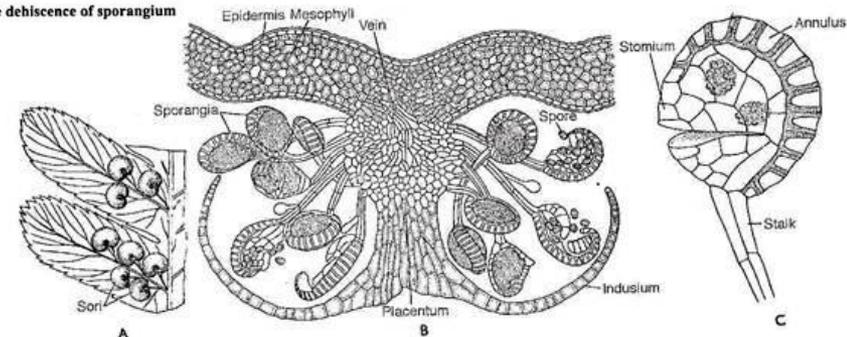
Spores: Homosporous, trianguloid spheroidal with trilete marks on proximal face, produced in limited number. Produced by reduction division in spore mother cells in ratio of 1:4.



Dryopteris



Trilete spore

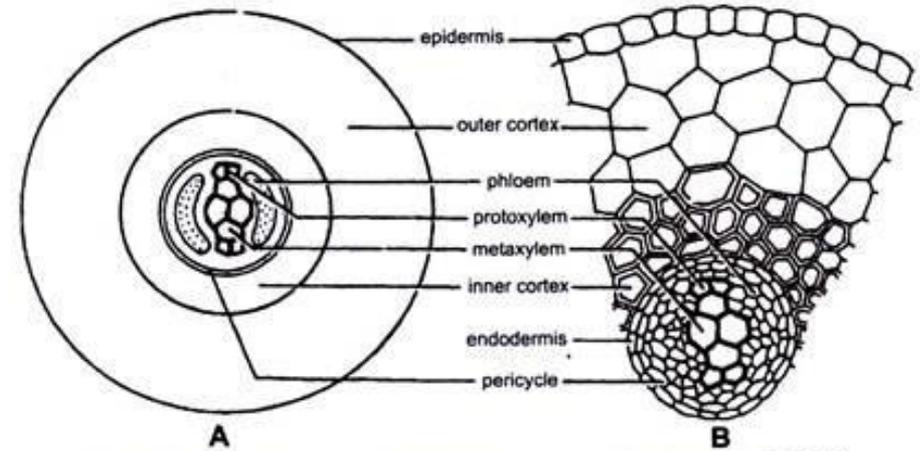


Dryopteris filix-mas: A. Fertile pinnules with sori covered by indusia, B. V.T.S. of pinnule through a sorus, C. A mature sporangium

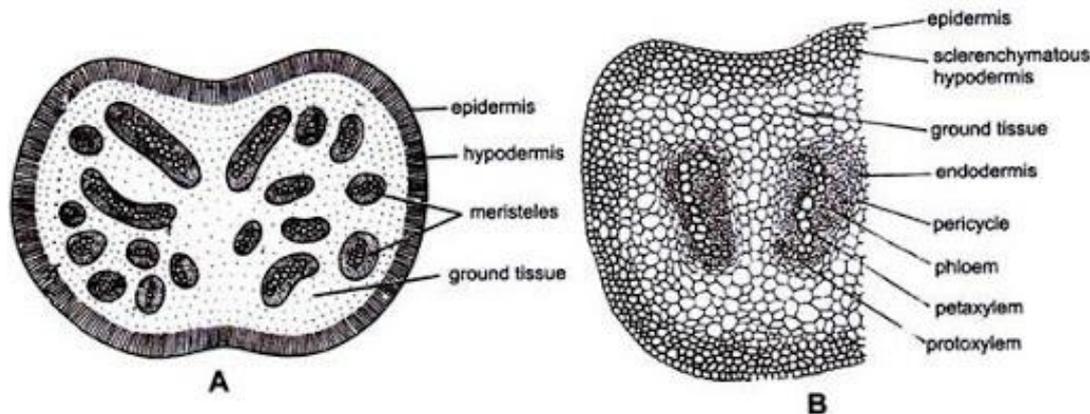
Anatomy

Root anatomy: outline circular in T.S.

- Epidermis single layered
- Cortex differentiated into outer (parenchymatous) and inner cortex (sclerenchymatous).
- Endodermis and Pericycle single layered.
- Stele: A protosteles present in the centre. Xylem diarch and exarch, xylem plate in the centre with two protoxylem groups, one at each end. Xylem surrounded by phloem.



Transverse section of root A. Diagrammatic; A. portion, B. Cellular.

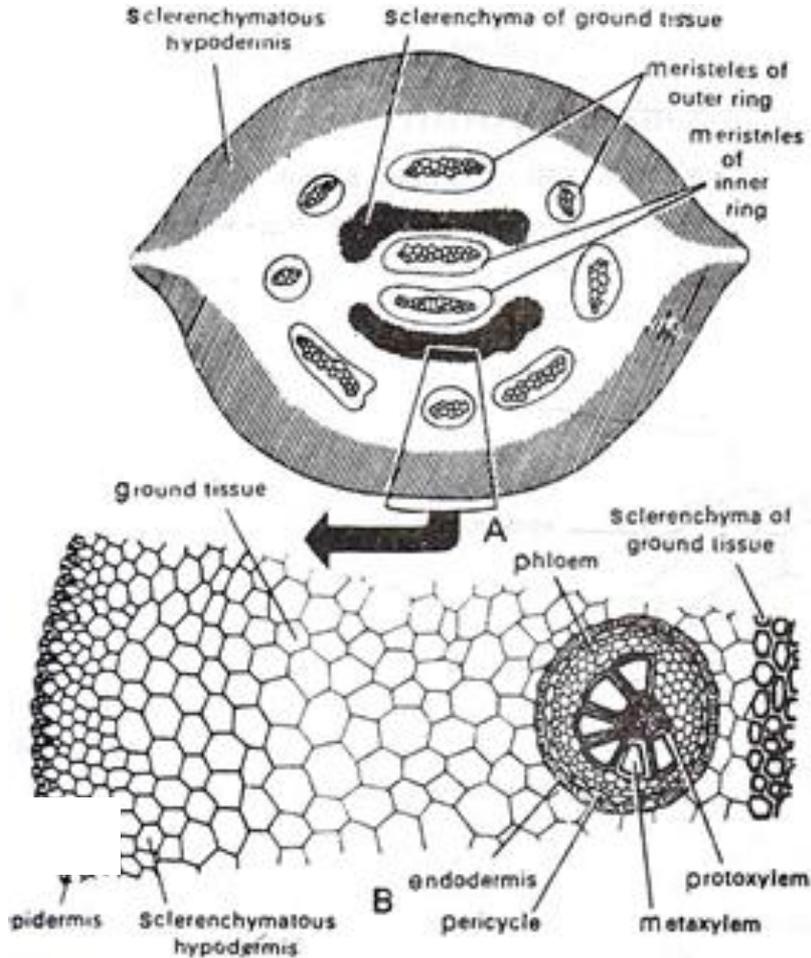


A. T.S. petiole (diagrammatic); B. A portion magnified.

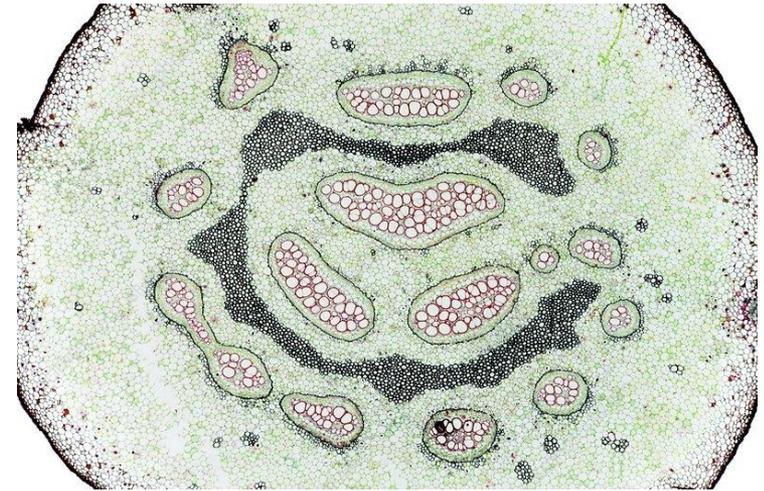
Anatomy of Petiole/rachis:

Differentiated into epidermis (single layered), ground tissue (parenchymatous) and stele (in form of vascular strands arranged in v or u shaped outline; vascular strands mesarch or exarch-xylem surrounded by phloem, pericycle and endodermis. The number of vascular strands increases from petiole to rachis.

Anatomy of Rhizome



Pteridium. T.S. rhizome (diagrammatic and a part cellular).



Protostele = solid core of xylem surrounded by phloem, pericycle and endodermis
Siphonostele = medullated protostele
Dictyostele = fragmented protostele

T.S. Rhizome: Differentiated into epidermis (single layered), hypodermis (sclerenchymatous) and stele (Polycyclic dictyostele). There are two or more rings of meristemes separated by bands of sclerenchyma. Each meristeme (part of stele) has mesarch xylem in the centre surrounded by phloem, pericycle and endodermis.

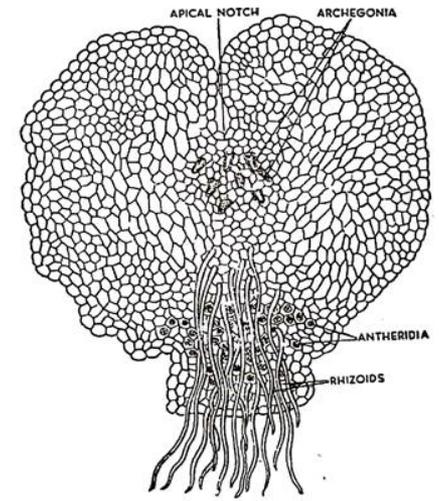
Gametophyte

Spores germinate by series of mitotic divisions to produce heart shaped vertically almost elliptical, autotrophic prothallus with a prominent apical notch and rhizoids in the basal region.

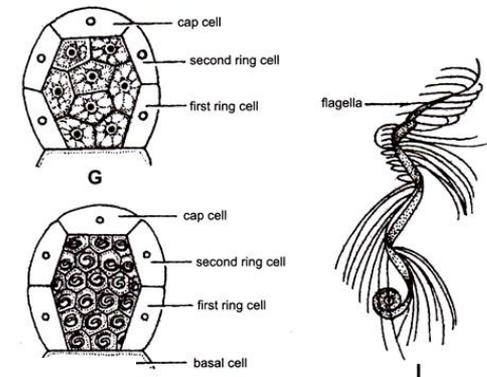
Male sex organs, antheridia spherical, sessile, surrounded by single layered jacket, producing a number of spirally coiled multiflagellate antherozoids.

Female sex organs, archegonia appear near apical notch, sessile inverted with protruding neck, 4 vertical rows of neck cells, single binucleate neck canal cell and single egg.

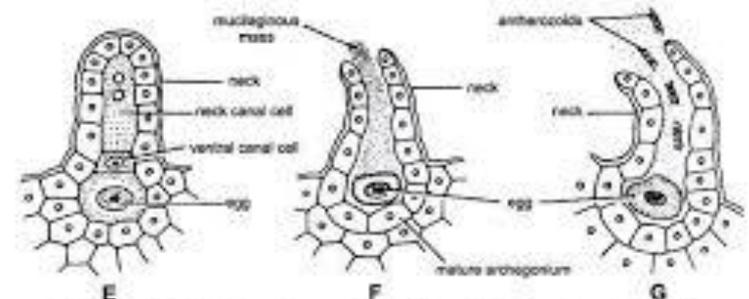
Fertilization: by zoidogamy and chemotaxis in presence of external water



Mature prothallus (gametophyte) of fern viewed from below.



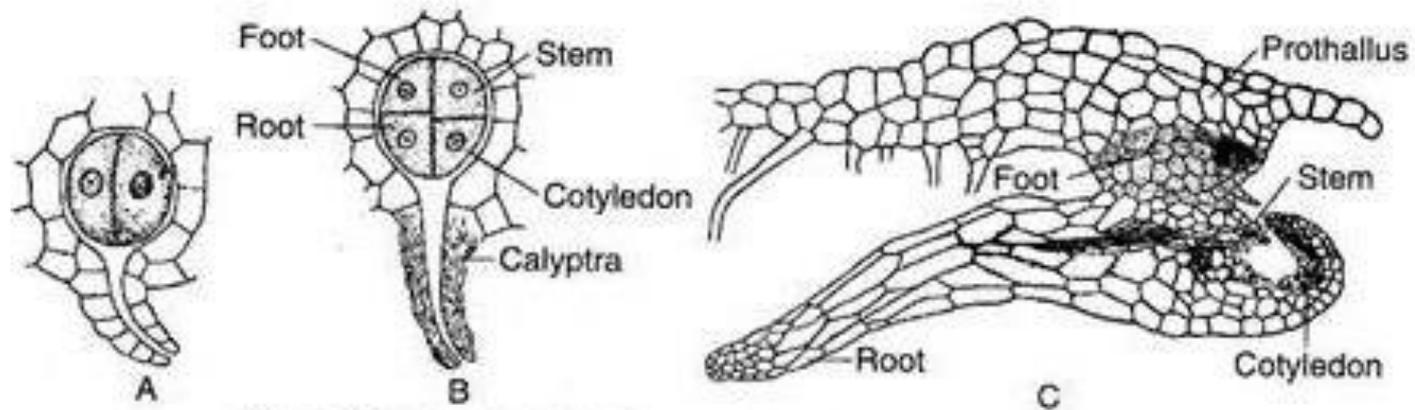
Peridium. Successive stages in the development of antheridium.



Successive stages in the development of archegonium and fertilization.

Embryogeny:

Zygote divides by a series of mitotic divisions to produce prone type embryo. First division of zygote parallel to the longitudinal axis of archegonium and stem apex develops from lateral cell.



A-C. Stages in the development of embryo