

Pteridophytes

The First Vascular Land Plants

An exploration of evolutionary biology based on Class 11
NCERT Curriculum.



Introduction & Evolutionary Origin

Successors of Bryophytes

Evolutionarily, pteridophytes occupy the space between bryophytes and gymnosperms. They are the first terrestrial plants to possess vascular tissues.

Defining Feature

They are characterized by the presence of **Xylem** and **Phloem**, which allows for efficient transport of water and nutrients.

Scientific Significance

They flourished during the Carboniferous period, forming vast coal-forming forests that shaped our planet's fossil fuel reserves.

Members

This group includes horsetails and ferns. They are widely grown as ornamentals and used for various medicinal purposes.

Ecological Habitat

Pteridophytes are found in diverse ecological niches, but they predominantly thrive in:



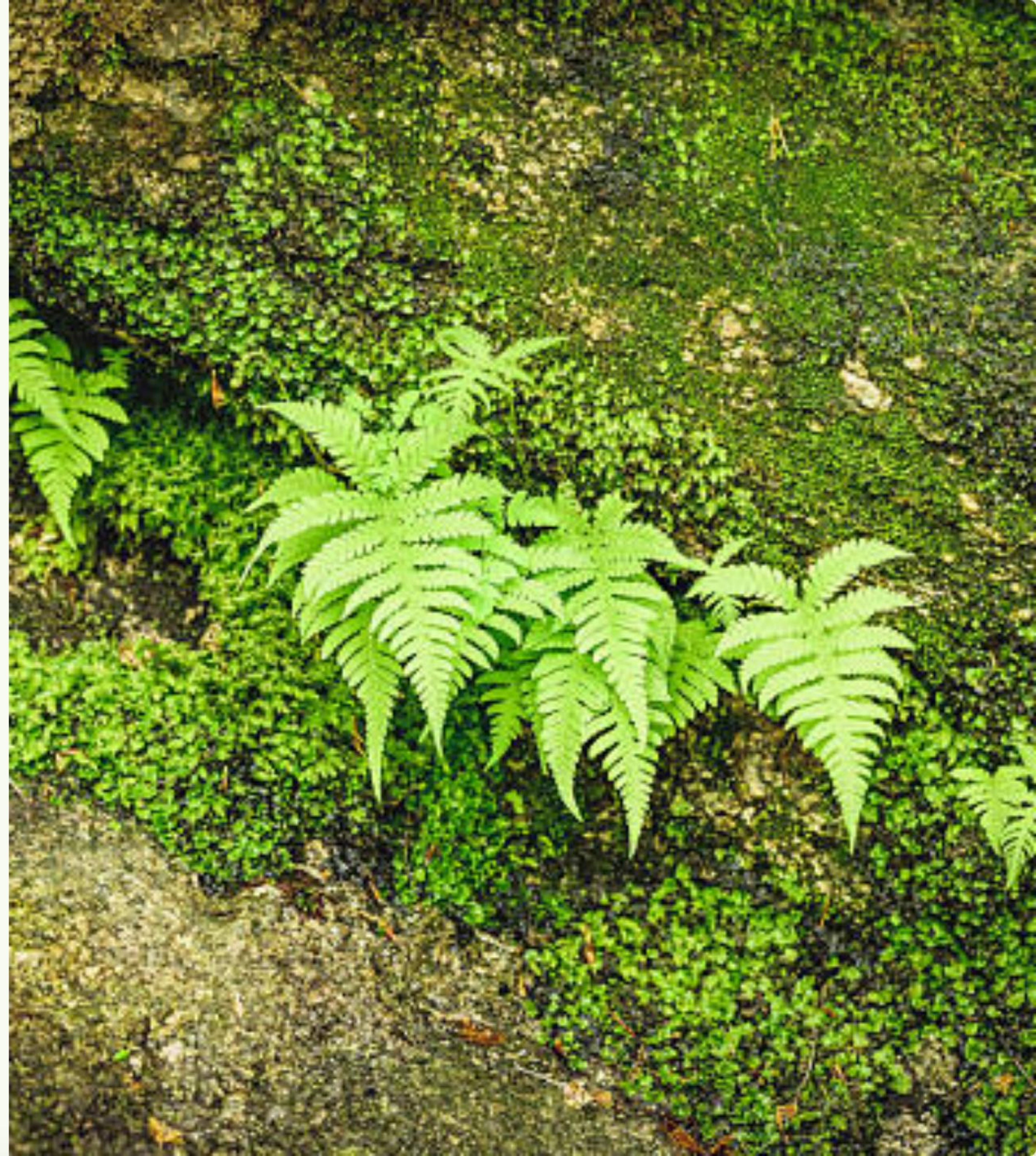
Cool, damp and shady places.



Some species may flourish well in sandy-soil conditions.



They require water for the transfer of antherozoids to the archegonium.



The Main Plant Body: Sporophyte

Unlike bryophytes where the dominant phase is the gametophyte, in pteridophytes:

The **Sporophyte (2n)** is the main dominant plant body.

It is differentiated into **true roots, stem, and leaves**.

These organs possess well-differentiated vascular tissues for transport.

 Dryopteris morphology



Leaf Diversity & Structure



Microphylls: Small leaves as found in *Selaginella*.

 Fern Macrophylls

Macrophylls: Large leaves typical of most Ferns.



Sporophylls: Leaf-like appendages bearing sporangia.

Vascular Superiority

Complex Conducting Tissues

Pteridophytes represent a major leap in plant evolution with the development of:

Xylem: Responsible for the upward conduction of water and minerals.

Phloem: Facilitates the translocation of organic food materials.

Note: Xylem lacks vessels and Phloem lacks companion cells in most pteridophytes.

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Reproductive Structures

Sporangia & Strobili

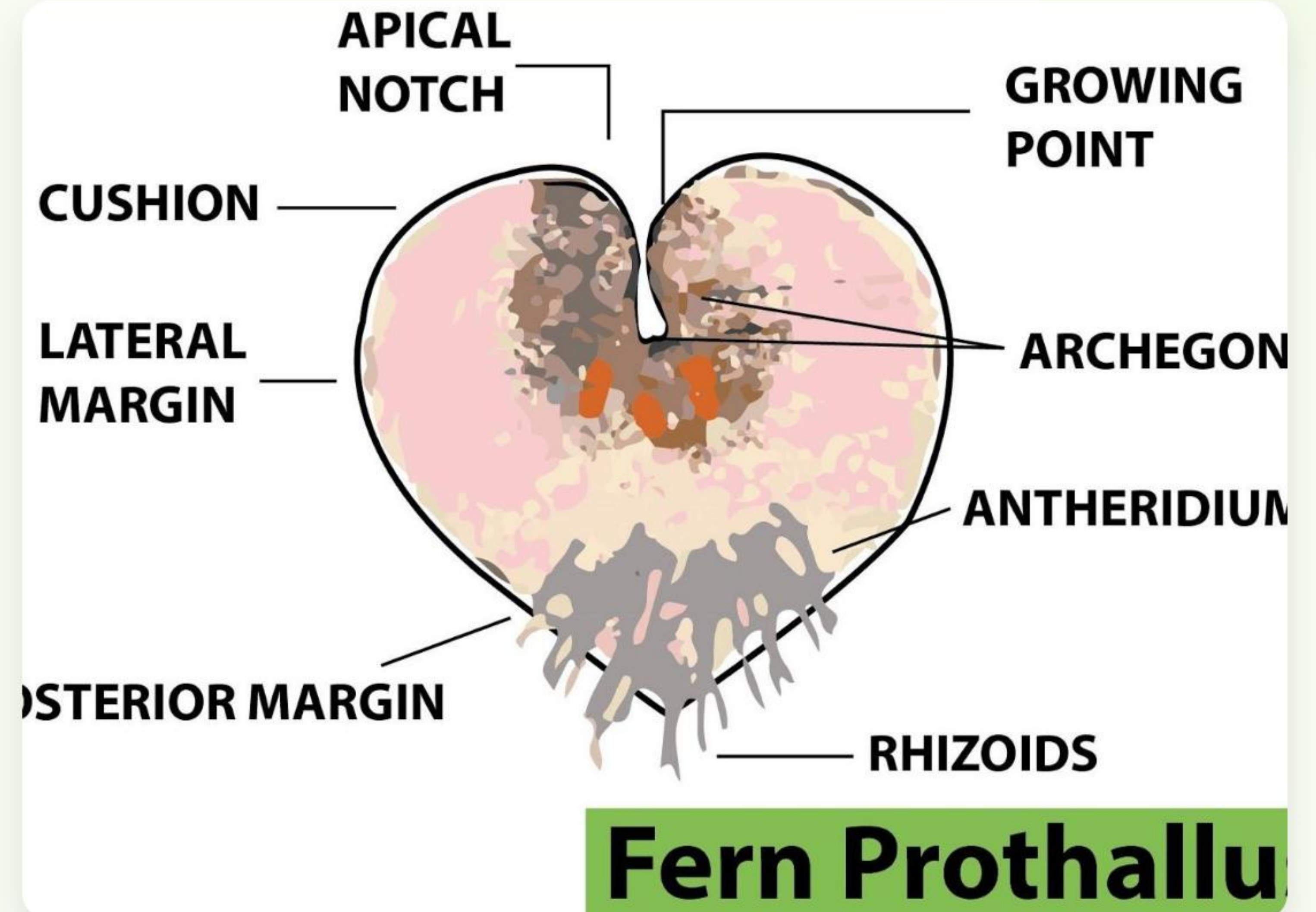
The sporophyte produces spores by meiosis in sporangia. In some cases, sporophylls may form distinct compact structures called **Strobili** or **Cones**.

Examples: Selaginella, Equisetum.

Spores germinate to give rise to inconspicuous, small but multicellular, free-living, mostly photosynthetic thalloid gametophytes called **Prothallus**.

The Gametophyte: Prothallus

-  **Inconspicuous:** Small and often heart-shaped.
-  **Photosynthetic:** Free-living thalloid structure.
-  **Sex Organs:** Bears Antheridia (male) and Archegonia (female).
-  **Requirement:** Needs water for fertilization, limiting its geographic spread.



The Life Cycle Dynamics



Spore Types & Seed Habit

Evolution of spores led to the "Seed Habit," a significant milestone in plant evolution.

Homosporous

Most Pteridophytes (e.g. Dryopteris)

Heterosporous

Selaginella, Salvinia

The Seed Habit

In heterosporous plants, megaspores and microspores develop into female and male gametophytes. The retention of the female gametophyte on the parent sporophyte for variable periods is a precursor to the **Seed Habit**.

Classification of Pteridophytes

Class	Key Characteristics	Examples
Psilopsida	Ancient, primitive, mostly extinct.	Psilotum
Lycopsida	Presence of microphylls.	Selaginella, Lycopodium
Sphenopsida	Jointed stems, silica deposits.	Equisetum (Horsetail)
Pteropsida	Commonly called ferns; macrophylls.	Dryopteris, Pteris, Adiantum



Questions?

Thank you for your attention!

Key Summary:

- ✓ 1st Vascular plants.
- ✓ Dominant Sporophyte (2n).
- ✓ Heterospory leads to Seed Habit.

Image Sources



<http://planetdesert.com/cdn/shop/files/Boston-fern-plant-jpj.jpg?v=1730909853>

Source: planetdesert.com



<https://media.istockphoto.com/id/2250691367/photo/lush-green-ferns-grow-on-a-mossy-rock-wall-in-a-damp-forest-setting.jpg?s=612x612&w=0&k=20&c=BsJtS1vclq uSRMYM1h6BBPodtLIY7vUIN-Ykf58efu8=>

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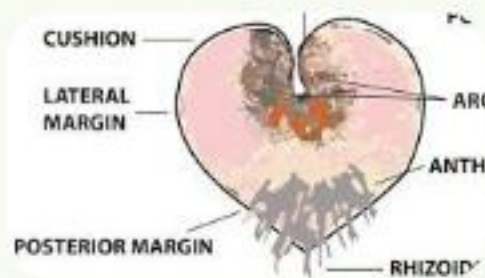
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Image Sources



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