

Quadrant II – Transcript and Related Materials

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Unit: 01- Pteridophytes

Module Name: General Characteristics of Pteridophytes

Module No: 01

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Notes

Introduction

- **Pteridophytes are considered as the first plants to be evolved on land:**
It is speculated that life began in the oceans, and through millions of years of evolution, life slowly adapted on to dry land. And among the first of the plants to truly live on land were the Pteridophytes.
- **The Pteridophytes occupy the intermediate position in between the bryophytes on one hand and the phanerogams on the other.**
- **They possess certain combinations of major characters which are not found in bryophytes or in phanerogams.**
- **The most characteristic feature of the petridophyte is the presence of independent gametophyte and sporophyte at maturity.**
- **Pteridophytes, Pteron = feathers and phyton = plant**

- Known as Vascular cryptogams; Greek ,Kruptos = hidden and gamous = wedded
- The Pteridophytes comprises over 300 genera and about 12,000 species.
- They are spore bearing vascular plants and distinguished from other cryptogams by the possession of vascular tissues: xylem and phloem.
- All pteridophytes have a sporophytic plant body rather than gametophytic.
- The sporophytic plant body is composed of roots, stems and leaves.

General Characteristics of Pteridophytes

1. Habit: The plants vary from small sized annuals (*Azolla, Salvinia*) to large tree like perennials (*Angiopteris*).
2. Habitat: They occur in variety of habitats. Mostly they are terrestrial plants, grow well in abundant moisture and shaded places. Some grow in xeric conditions, in aquatic environments, while some are epiphytic.
3. Plant body: Plant body is sporophytic in all the pteridophytes. The sporophyte develops from the zygote. Most of the pteridophytes have herbaceous stem, except some woody ferns.
 - The sporophytic plant body is composed of roots stem and leaves.
 - The primitive members lack true roots and well developed leaves.
 - Primary roots are short lived and are soon replaced by adventitious roots.
 - Branching of the stem is dichotomous type while it is monopodial in other.

4. Leaves : the sporophytic plant bears 2 types of leaves :

- **Microphyllous :** are simple, small, have a single central vein and do not form leaf gaps in the stele of stem.
- **Macrophyllous:** are compound, large sized, supplied with vascular bundles and form the distinct leaf gaps in the stele of stem.

5. Vascular system:

- All the vegetative organs have well developed vascular system.
- The vascular system of pteridophytes is composed of xylem and phloem.
- Xylem is composed of tracheids and xylem parenchyma.
- Phloem is composed of sieve tubes and phloem parenchyma. The phloem lacks companion cells.
- Secondary growth does not take place in living pteridophytes because of the absence of cambium except in *Isoetes* and *Botrychium*.

6. Reproduction : the sporophytic plant reproduces asexually by spores. Spores are produced in sporangia. The leaf bearing sporangia is called sporophyll. The sporophyll bearing microspore is called microsporophyll and sporophyll bearing megaspore is called megasporophyll.

- The development of the sporangia is of two fundamental types
 - i. **Eusporangiate type:** the sporangium develops from group of sporangial initial cells.
 - ii. **Leptosporangiate type:** the sporangium develops from single sporangial initial cell.
- The spores produced may be homosporous or heterosporous

- i. **Homosporous** : plant produces only one kind of spore.
 - ii. **Heterosporous**: the plant produces two kinds of spores. The smaller spore are termed as microspore and are produced in microsporangia while the larger spores are termed as megaspores and are produced in megasporangia.
7. **The gametophyte**: the spores germinate to produce the haploid gametophytes or prothalli. The gametophytes are usually small and insignificant structure. The sporophyte is the dominant part of the life cycle while the gametophyte is much reduced.
8. **Sex organs**: the gametophyte or prothallus bears sex organs, the antheridia and archegonia. The gametophyte develops from the homosporous are monoecious and the gametophyte develops from heterospore are dioecious.
- **The Antheridia** :
 - i. Are embedded either wholly or partially in the tissues of gametophyte or they are projected from prothallus.
 - ii. Each antheridium is a globular structure and is composed of an outer sterile wall and inner a large number of androcytes.
 - iii. Each androcyte gives rise to a single biflagellated or multiflagellated motile antherozoid.
 - **The Archegonia**:
 - i. Each archegonium is flask shaped structure and is composed of a basal swollen venter and a short narrow terminal neck.
 - ii. The venter lies embedded in the tissue of the prothallus.
 - iii. The venter encloses an egg.
 - iv. Fertilization takes place in the venter of archegonium, water is necessary during the process of fertilization.

v. The male gamete fuses with the egg to form the zygote.

9. The embryo (the new sporophyte):

- **The zygote divides repeatedly to form a new sporophyte.**
- **The basal half forms foot and root and the apical half forms the shoot.**
- **The sporophyte is dependent on the gametophyte only during its early stages. It develops into stem, roots and leaves.**