STUDY MATERIAL

VIVEKANANDA COLLEGE
THAKURPUKUR

NAAC Accredited Grade—A

BOTANY

(HONOURS & GENERAL)

PTERIDOPHYTA

(General Features)

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Pteridophytes are the first vascular plants on the earth. To know the characters of Pteridophytes, we first have to know the characters of vascular plants in general.

CHARACTERISTIC FEATURES OF VASCULAR PLANTS

1. Development of an anchorage and water (along with dissolved minerals) absorbing systems, such as underground stem (rhizomes) with rhizoids (extensions of epidermal cells), performing the functions of roots. True roots developed later.

2. Development of water and mineral conducting system (xylem) and a system for the conduction of product of photosynthesis (phloem).

3. Prevention of desiccations by the formation of a waxy layer (cuticle) or aerial branch systems (this develops because vascular plants are mainly terrestrial, not aquatic).

4. Development of structure for aerial gas exchange (stomata).

5. Development of specialized photosynthetic tissue in aerial stems (leaves).

6. Production of spores with highly evolved cell wall to resist desiccation and microbial degradation.

So vascular plants include Pteridophytes, Gymnosperms and Angiosperm. All the above characters are common in these three groups.

GENERAL CHARACTERS OF PTERIDOPHYTES

1. Main plant body sporophytic. Gametophytes and sporophytes are independent (but sporophytes are dependant on gametophytes for a short period. For this reason, it is assumed that Pteridophytes have evolved from bryophytes where the sporophyte is totally dependent on gametophytes).

2. Sporophyte is provided with roots, stem and leaves (or enations). Stem and roots show apical growth.

3. Pteridophytes are the only vascular plants without flower. So they are also called as vascular cryptogams.

4. Sporophytes bear sporangia either in strobilar form or in sorus form, generally.

5. Both homosporous and heterosporous forms are found in Pteridophytes.

6. Spores germinate to form gametophytes. Gametophytes are either bisexual (hermaphrodite) or unisexual. Gametophytes produce antheridia and archegonia as male ans female sex organs, respectively.

7. Embryo is formed. Thus, pteridophytes are embryophytes.

SPOROPHYTE

1. Almost all are rooted. Very early plants were devoid of roots. Among the extant genera, *Psilotum*, *Tmesipteris* are rootless.

2. Stem is either rhizomatous or vertical. Vascular system present in the form of stele. Stele may be protostele or eustele.

3. Leaves present. In *Psilotum* and other primitive members, enations are found. A leaf is a structure with vascular supply from the main stem. But enation is a leaflike small appendage without any vascular supply.

LEAVES ARE OF TWO TYPES: A) MICROPHYLL AND B) MEGAPHYLL.

Microphylls are single vascular traced leaves without leaf gaps in the main vasculature.

Megaphylls are with branch veins in the leaves and with a leaf gap in the stele.

In leaves, we find stomata. It is of different types like polocytic, anomocytic, desmocytic etc. In *Zosterophyllum*, only one guard cell exists.

REPRODUCTIVE STRUCTURE

Sporangium is the reproductive structure and spore is the unit of reproduction. Position of sporangium varies-

1) Terminal: In Rhyniophytes eg. *Rhynia*, *Cooksonia* etc.

2) Lateral: In Zosterophyllopsida.

3) Associated with leafy structures (sporophyll): sporangium just above the axil of leaves (sporophyll). eg. *Lycopodium selago.*

4) Sporophylls and sporangia compactly form strobilus: In *Lycopodium clavatum*, *L. cernuum* etc.

5) Sporangia form sorus on megaphylls: Found in ferns.

Sorus may be simple, graded or mixed.

Sorus is sometimes covered with a protective covering called indusium.

SOME OTHER TYPES:

Psilotum shows fusion of three sporangia to form a structure commonly called as synangium.

In *Ophioglossum*, *Botrychium*, we find fertile spike.

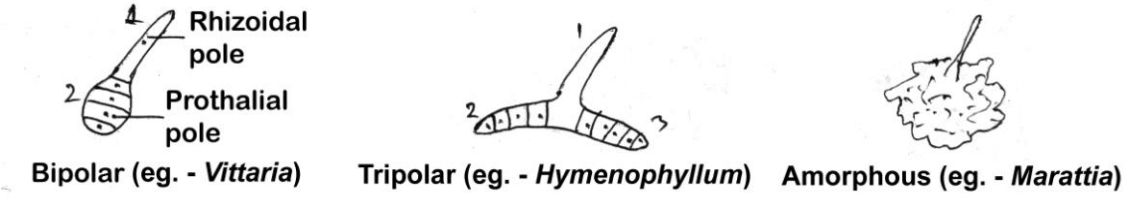
SPORE:

Spore germination:

It may be bipolar, tripolar or amorphous.

Spore germinates to form a gametophyte called prothallus.

Gametophytes produce antheridia and archegonia.



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