STUDY MATERIALS FOR PTERIDOPHYTES
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CLASSIFICATION OF PTERIDOPHYTES

The classification of pteridophytes has been changing in the recent past, mainly because of discoveries of several new fossil plants in different parts of the world. Several scientists proposed different classification systems.

In 1935, Sinnott introduced the term "tracheophyta" to include all vascular plants. Tracheophyta are further divided into four main groups: **Psilopsida, Lycopsida, Sphenopsida** and **Pteropsida.**

In 1953, Haupt considers them as classes in the division tracheophyta. Tippo assigns them the ranks of sub-phylla of the phylum Tracheophyta. The terms phylum and subphylum being not in accord with the International Code of Nomenclature, Wardlaw (1955) suggested the rank of sub-divisions for the four groups. The outline of this revised system of classification is given below:

Division Tracheophyta

Sub-division **Psilopsida**

Sub-division **Lycopsida**

Sub-division **Sphenopsida**

Sub-division **Pteropsida**

The characteristic features of the divisions are as follows: -

I. Psilophyta (Psilopsida)

1. The plant body is a rootless sporophyte that differentiates into a subterranean rhizome and an aerial erect shoot.

2. Branching is dichotomous in both subterranean rhizome and aerial shoot.

3. Rhizoids borne on the rhizome absorb water and nutrients from the soil.

4. Leaves often absent or if present, they are spirally arranged scale like (e.g. ***Psilotum***) or leaf-like appendages (e.g. ***Tmesipteris***) are bone

5. The vascular tissue is of primitive type i.e., simple, cylindrical protostele with annular or spiral tracheids.

6. Secondary growth is absent.

7. Sporangia are borne at the apex of the aerial shoots. They are either solitary (e.g., ***Rhynia***) or in groups and terminal in position. There was nothing like that of sporophyll.

8. Sporangia always bearing the same type of spores i.e., they are homosporous .

9. The gametophyte is known only in *Psilotum* and ***Tmesipteris*** (living genera) while unknown in Psilophytales.

II. Lycophyta (Lycopsida)

1.The plant body is sporophytic and can be differentiated into root, stem and leaves.

2. The leaves are small (microphyllous), simple with a single mid vein. They are usually spirally arranged, sometimes in opposite fashion and or even in whorls.

3. In some cases the leaves are ligulate (e.g., ***Selaginella***, ***Isoetes***). The ligule is present at the base of each leaf.

4. The vascular tissue may be either in the form of plectostele, siphonostele or sometimes even polystele. Leaf gaps are **absent**.

5. Sporophylls are loosely arranged or aggregated to form strobilus or cones.

6. Some members are homosporous (e.g. ***Lycopodium***) while others are heterosporous (e.g. ***Selaginella***).

7. Heterosporous forms have endoscopic gametophytes while in homosporous forms the gametophyte is exosporic.

8. Antherozoids are biflagellate or multi-flagellate.

9. Secondary growth does not take place except in *Isoetes.*

III. Sphenophyta (Sphenopsida)

1. The plant body is sporophytic and can be differentiated into root, stem and leaves.

2. The stem in majority of the forms is long, jointed or articulated and is ribbed i.e., having ridges and grooves. Stem is divisible into nodes and internodes and is developed as upright aerial branches from the underground creeping rhizome.

3. Leaves are thin, small, scaly brown and are arranged in transverse whorls at the nodes of the aerial branches.

4. Branches also develop in whorls from the axil of the scaly leaves.

5. As the foliage leaves are reduced to scales, the process of photosynthesis is taken up by the stem and hence it becomes green.

6. The stem has a solid protostele (e.g. ***Sphenophyllum***) or medullated protostele (e.g., ***Equisetum***).

7. The sporangia are borne on specialized appendages called sporangiophores.

8. Sporangia are developed at the apex of the fertile branches in whorls forming compact cone.

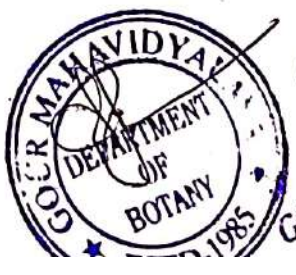
9. Most of the members are homosporous but some fossil forms are heterosporous (e.g., ***Catamites***).

10. Gametophytes (prothalli) may be monoecious or dioecious. Gametophytes are exosporic and green.

11. Antherozoids are large and multi-flagellate.

IV. Pterophyta (Pteropsida)

1. They occur in all types of habitats. Majority of the ferns are terrestrial and prefer to grow in moist and shady places.



2. Majority of the members (except some tree ferns (e.g., ***Angiopteris***) have short and stout rhizome. The rhizome may be creeping, upright or growing above the soil.

3. Leaves are large, may be simple (e.g., ***Ophioglossum***) or pinnately compound (majority of the ferns for example, ***Pteridium***, ***Marsilea*** etc.) and described as fronds. Young fronds are circinately coiled.

4. The vascular cylinder varies from a protostele to a complicated type of siphonostele. Solenostele, dictyostele and polystele are also found.

5. Vegetative reproduction takes place by fragmentation, adventitious buds or by apogamy.

6. Sori develop on the margins or abaxial surface of the leaves (sporophylls) or leaflets.

7. Sori are protected by true (e.g.***Marsilea***) or false indusium (e.g. ***Pteris***).

8. The sporangial development may be leptosporangiate (e.g., ***Osmunda***) or eusporangiate type (e.g., ***Ophioglossum***).

9. Members may be homosporous (e.g., ***Pteris***, ***Adiantum*** etc.) or heterosporous (e.g., ***Marsilea, Azolla, Salvinia*** etc.)

10. Antheridia and archegonia are partially or completely embedded in the gametophyte. Antherozoids are multi-flagellated.

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