

1. Class: Psilotopsida:

The members of the class Psilotopsida show close resemblance in fundamental characteristics to the Silurian and Devonian members of Rhyniopsida (e.g., Rhynia, Cooksonia), Zosterophylloids (e.g., Zosterophyllum) and Trimerophytes (e.g., Trimerophyton, Psilophyton). Psilotopsida includes only two living genera viz., Psilotum and Tmesipteris.

Characteristic Features of Class Psilotopsida:

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. The large rhizoids borne on the rhizome absorb water and nutrients from the soil.
4. On the aerial shoots, spirally arranged scale-like (e.g., Psilotum) or leaf-like appendages (e.g., Tmesipteris) are borne.
5. Stele is protostelic or siphonostelic with sclerenchymatous pith.
6. Secondary growth is absent.
7. Bi- or trilocular sporangia are borne in the axils of leaf-like appendages.
8. Mode of sporangial development is of eusporangiate type.
9. Spores are of equal sizes and shapes i.e., homosporous.
10. The gametophytes are non-green, cylindrical, branched and subterranean. They grow as saprophytes with an associated endophytic fungus.
11. Antherozoids are spirally coiled and multi-flagellated.

2. Class. Lycopsidea:

This class has a long evolutionary history and is represented both by extant and extinct genera. This group first originated during the Lower Devonian period of Palaeozoic Era (ca 390 my).

This class is represented by five living genera

— Lycopodium, Selaginella, Phylloglossum, Styhtes, and Isoetes, and fourteen extinct genera

— Asteroxylon, Baragwanathia, Protolepidodendron, Lepidodendron, Sigillaria etc.

Salient Features of the Class Lycopsidea:

- (a) The sporophyte plant body is differentiated into definite root, stem and leaves.
- (b) The sporophytes are dichotomously branched.
- (c) The leaves are usually small and micro-phyllous.
- (d) The xylem in stem exarch.
- (e) Sporangia are borne singly on the adaxial (upper) surface of the sporophylls.
- (f) The spores may be of either one type i.e., homosporous (e.g., Lycopodium) or two types i.e., heterosporous (e.g., Selaginella).

(g) The spores develop into independent gametophyte.

3. Class: Sphenopsida:

This class is represented by only one living genus (*Equisetum*) and about 18 extinct forms (e.g., *Calamites*, *Annularia* etc.). This group originated during the Devonian period of Palaeozoic Era, attained their maximum development in the Carboniferous period. Subsequently, the group became less prevalent and at present is represented by only a single genus (*Equisetum*).

Salient Features of the Class Sphenopsida:

1. The stems and branches are jointed with nodes and internodes. The internodes are with longitudinal-oriented ridges and furrows.
2. The leaves are extremely reduced and borne in whorls at the nodes of aerial branches and stems.
3. Branches arise in whorls.
4. The sporangia develop on a petaloid appendage called sporangiophore. Sporangial walls are thick.
5. Most of the members are homosporous including *Equisetum*. However, some extinct forms were heterosporous (e.g., *Calamites casheana*).
6. The gametophytes are exosporic and green.
7. Antherozoids are multiflagellated.
8. The embryo is without suspensor and is exoscopic in nature.

4. Class: Pteropsida:

This group of pteridophytes is commonly known as 'ferns'. The Pteropsida differs from other classes in possessing raised leaves (megaphylls). This is the largest and highly evolved group of pteridophytes and is represented by about 9,000 species which show a wide range of distribution. The Pteropsida are known from as far back as the Devonian period of Paleozoic Era.

Salient Features of the Class Pteropsida:

1. The sporophytes are usually perennial in nature and differentiated into roots, stem and spirally arranged leaves.
2. Most of the members grow in moist and shaded habitats, either epiphytic or terrestrial. A few are aquatics.
3. Mostly, the rhizomes are short and stout.
4. The leaves are large (megaphylls), pinnately compound and described as frond, except *Ophioglossum* (simple leaf).
5. The rachis is covered with brown hairs (ramenta). Leaf trace is usually C-shaped with adaxial curvature.

6. Young fronds show circinate vernation (coiling of leaves), except *Ophioglossum*.
7. The stele in Pteropsida shows a wide variety of types, e.g., protostele, siphonostele, solenostele, dictyostele and polycyclic stele.
8. Most ferns are homosporous, but a few aquatic members are heterosporous.
9. Sporangia are borne at the tips or at the margin of the pinnule or to the abaxial surface of the fronds.